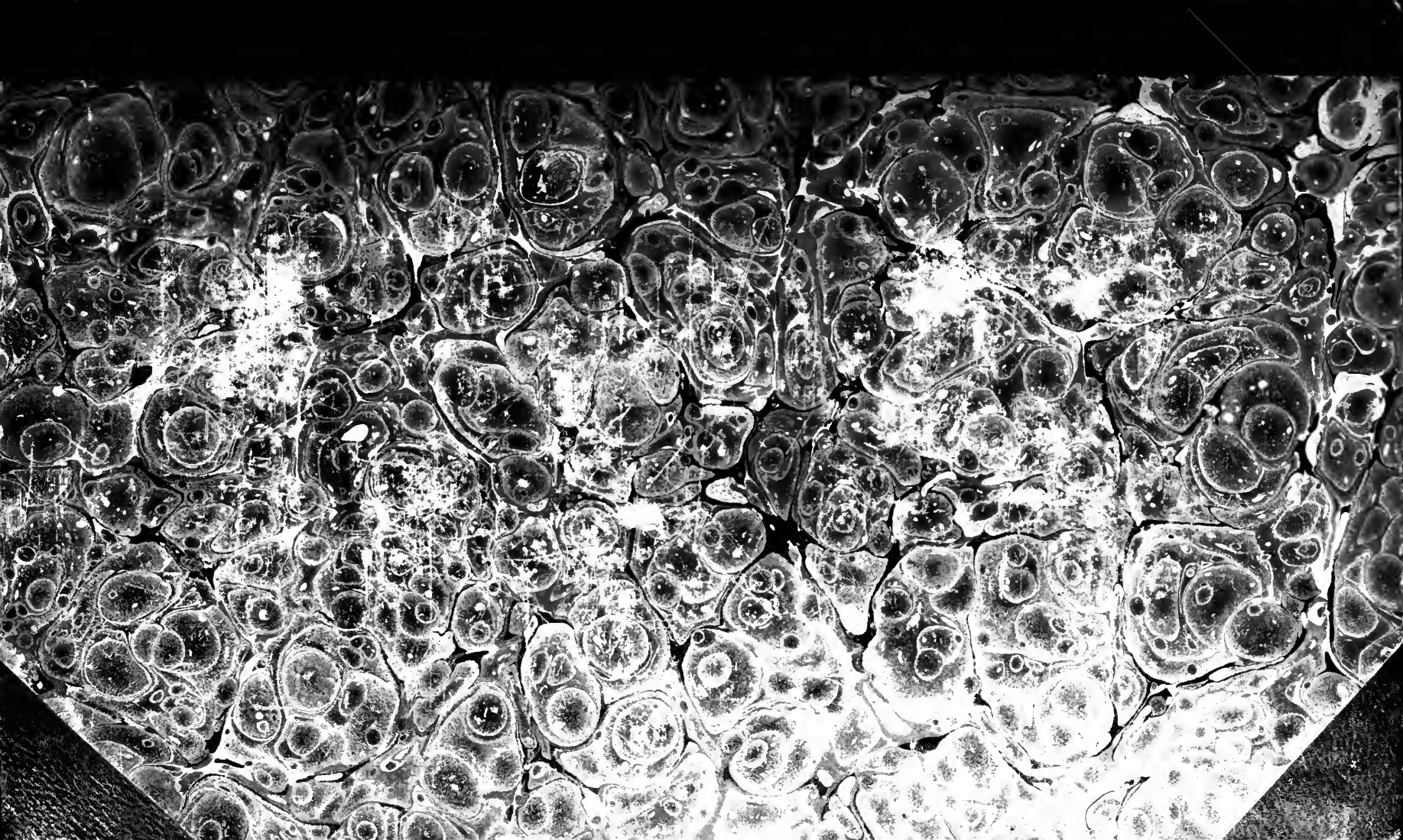

THE

LONDON ENCYCLOPÆDIA.

VOL. XXI.

SPHEROID TO TEWKESBURY.

J. Haddon, Printer, Castle Street, London.

THE

LONDON ENCYCLOPÆDIA,

OR

UNIVERSAL DICTIONARY

OF

SCIENCE, ART, LITERATURE, AND PRACTICAL MECHANICS,

COMPRISING A

POPULAR VIEW OF THE PRESENT STATE OF KNOWLEDGE.

ILLUSTRATED BY

NUMEROUS ENGRAVINGS, A GENERAL ATLAS,

AND APPROPRIATE DIAGRAMS.

Sic oportet ad librum, presertim miscellanei generis, legendum accedere lectorem, ut solet ad convivium conviva civilis. Convivator annititur omnibus satisfacere; et tamen si quid appositur, quod hujus aut illius palato non respondeat, et hic et ille urbane dissimulant, et alia fercula probant, ne quid contristent convivatorem.

Erasmus.

A reader should sit down to a book, especially of tha miscellaneous kind, as a well-behaved visitor does to a banquet. The master of the feast exerts himself to satisfy his guests; but if, after all his care and pains, something should appear on the table that does not suit this or that person's taste, they politely pass it over without notice, and commend other dishes, that they may not distress a kind host.

Translation.

BY THE ORIGINAL EDITOR OF THE ENCYCLOPÆDIA METROPOLITANA,

ASSISTED BY EMINENT PROFESSIONAL AND OTHER GENTLEMEN.

IN TWENTY-TWO VOLUMES.

VOL XXI.

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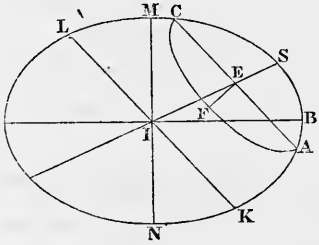
1837.

The SPHEROID, in geometry, is generated by the entire revolution of a semi-ellipsis about its axis. When the revolution is made round the largest axis, the spheroid is called prolate; and when round the shortest, oblate. This last is the figure of the earth, and probably of all the planets.

To obtain the solid dimensions of a spheroid, multiply continually together the fixed axis, the square of the revolving axis, and the number 52359877, or $\frac{1}{6}$ of 3·14159, and the last product will be the solidity; i. e. $\frac{1}{6} p t t c =$ the oblate, and $\frac{1}{6} p t c c =$ the oblong spheroid, where $p =$ 3·14159, $t =$ the transverse, and $c =$ the conjugate axis of the generating ellipsis. Or, multiply the area of the generating ellipse by $\frac{2}{3}$ of the revolving axis, and the product will be the content of the spheroid; i.e. $\frac{2}{3} t$ A $=$ the oblate, and $\frac{2}{3}$ c A $=$ the oblong spheroid; where A is the area of the ellipse. *E. g.* Required the content of an oblate, and of an oblong spheroid, the axes being 50 and 30. Thus, 50 × 30 × ·78539816 = 1178·09724 = the area of the ellipse. And 1178·09724 × $\frac{2}{3}$ × 30 = 23561·9448 = the oblong spheroid; and 1178·09724 × $\frac{2}{3}$ × 50 = 39269·908 = the oblate one.

Dr. Hutton has demonstrated the rule above given in the following manner. Put $f =$ B I the fixed semi-axis, $r =$ I M the revolving



semi-axis of the spheroid, $a =$ S I any semi-diameter of the section N B M, $b =$ I K its semi-conjugate, $y =$ A E an ordinate to the diameter S I, or a semi-axis of the elliptic section A F C parallel to K L, and $z =$ E F its other semi-axis, also $x =$ E I, $s =$ the sine of the angle A E S, or of the angle K I S, to the radius 1, and $p =$ 3·14159.

Then, by the property of the ellipse K S L, $aa : bb :: aa - xx : bb \times \frac{aa - xx}{aa} = yy$; and $b : r :: y : \frac{ry}{b} = z$. But the fluxion of the solid K A C L is $psyz\dot{x} = \frac{psryy\dot{x}}{b}$, by writing for z its value $\frac{ry}{b}$, $= pbsr\dot{x} \times \frac{aa - xx}{aa}$, by substituting for yy its value $bb \times \frac{aa - xx}{aa}$, $= pfrr\dot{x} \times \frac{aa - xx}{aaa}$, by putting for abs its value rf; and hence the fluent $pfrrx \times \frac{aa - \frac{1}{3}xx}{aaa}$, or $\frac{1}{3} pfrr \times \frac{3aa - xx}{aaa}$, will be the value of the frustum K A C L; which, when E I or x becomes S I or a, gives $\frac{2}{3} pfrr$ for the value of the semi-spheroid K S L; or the whole spheroid $= \frac{1}{6} p$ F R R, putting F and R for the whole fixed and revolving axes. Q. E. D.

Cor. 1.—From the foregoing demonstration it appears that the value of the general frustum K A E C L is expressed by $\frac{1}{3} pfrrx \times \frac{3aa - xx}{aaa}$.

And if for fr be substituted its value abs, the same frustum will also be expressed by $\frac{1}{3} pbrsx \times \frac{3aa - xx}{aa}$.

Also, if for aa be put its value $\frac{bbxx}{bb - yy}$, the last expression will become $\frac{1}{3} prsx \times \frac{2bb + yy}{b}$, or $\frac{1}{3} psx \times \left(2br + \frac{ryy}{b}\right)$; which, by writing z instead of its value $\frac{ry}{b}$, gives $\frac{1}{3} psx \times (2br + yz)$ for the value of the frustum, viz. the sum of the area of the less end, and twice that of the greater, drawn into one-third of the altitude or distance of the ends.

And out of this last expression may be expunged any one of the four quantities b, r, y, z, by means of the proportion $b : r :: y : z$.

When the ends of the frustum are perpendicular to the fixed axis, then a is $= f$, and the value of the frustum becomes $\frac{1}{3} prrx \times \frac{3ff - xx}{ff}$ for the value of the frustum whose ends are perpendicular to the fixed axis, its altitude being x.

And, when the ends of the frustum are parallel to the fixed axis, a is $= r$, and the expression for such a frustum becomes $\frac{1}{3} pfx \times \frac{3rr - xx}{r}$.

Cor. 2.—If to or from $\frac{2}{3} pfrr$, the value of the semi-spheroid be added or subtracted, $\frac{1}{3} pfrrx \times \frac{3aa - xx}{aaa}$, the value of the general frustum K A C L, there will result $\frac{1}{3} pfrrhh$

$\times \frac{3a - h}{aaa}$ for the value of a general segment, either greater or less than the semi-spheroid, whose height, taken upon the diameter passing through its vertex and centre of its base, is $h = a + x$.

When a coincides with f, the above expression becomes $\frac{1}{3} p r r h h \times \frac{3f - h}{ff}$ for the value of a segment whose base is perpendicular to the fixed axis. And here if we put R for the radius of the segment's base, and for rr its value $\frac{RRff}{2fh - hh}$, the said segment will become $\frac{1}{3} p RR h \times \frac{3f - h}{2f - h}$.

And when a coincides with r, the general expression will become $\frac{1}{3} pfhh \times \frac{3r - h}{r}$ for the value of the segment whose base is parallel to the fixed axis. And if we put F, R, for the two semi-axes of the elliptic base of this segment, respectively corresponding or parallel to f, r, the semi-axes of the generating ellipse, when parallel to the base of the segment, and for $\frac{f}{r}$ and r substitute their values $\frac{F}{R}$ and $\frac{RR+hh}{2h}$, the said frustum will be expressed by $\frac{1}{3} p F h \times \frac{3RR + hh}{2R}$, in which the dimensions of itself only are concerned.

Cor. 3.—A semi-spheroid is equal to $\frac{2}{3}$ of a cylinder, or to double a cone of the same base and height; or they are in proportion as the numbers 3, 2, 1. For the cylinder is $= 4nfrr = \frac{12}{3} nfrr$, the semi-spheroid $= \frac{8}{3} nfrr$, and the cone $= \frac{4}{3} nfrr$.

Cor. 4.—When $f = r$, the spheroid becomes a sphere, and the expression $\frac{8}{3} fnrr$ for the semi-spheroid becomes $\frac{8}{3} nr^3$ for the semi-sphere. And, in like manner, f and r being supposed equal to each other in the values of the frustums and segments of a spheroid, in the preceding corollaries, will give the values of the like parts of a sphere.

Cor. 5.—All spheres and spheroids are to each other as the fixed axes drawn into the squares of the revolving axes.

Cor. 6.—Any spheroids and spheres, of the same revolving axis, as also their like or corresponding parts cut off by planes perpendicular to the said common axis, are to one another as their other or fixed axes. This follows from the foregoing corollaries.

Cor. 7.—But if their fixed axes be equal, and their revolving axes unequal, the spheroids and spheres, with their like parts terminated by planes perpendicular to the common fixed axis, will be to each other as the squares of their revolving axes.

Cor. 8.—An oblate spheroid is, to an oblong spheroid generated from the same ellipse, as the longer axis of the ellipse is to the shorter. For if T be the transverse axis, and C the conjugate; the oblate spheroid will be $= \frac{2}{3} n T^2 C$, and the oblong $= \frac{2}{3} n C^2 T$; and these quantities are in the ratio of T to C.

Cor. 9.—And if about the two axes of an ellipse be generated two spheres and two spheroids, the four solids will be continual proportionals, and the common ratio will be that of the two axes of the ellipse; that is, as the greater sphere, or the sphere upon the greater axis, is to the oblate spheroid, so is the oblate spheroid to the oblong spheroid, so is the oblong spheroid to the less sphere, and so is the transverse axis to the conjugate. For these four bodies will be as T^3, $T^2 C$, $T C^2$, C^3, where each term is to the consequent one as T to C.

To find the content of a universal spheroid, or a solid conceived to be generated by the revolution of a semi-ellipse about its diameter, whether that diameter be one of the axes of the ellipse or not. 1. Divide the square of the product of the axes of the ellipse by the axis of the solid, or the diameter about which the semi-ellipse is conceived to revolve; multiply the quotient by ·5236, and the product will be the content required. That is, $\frac{T^2 C^2}{d} \times \cdot 5236 =$ the content; T and C being the transverse and conjugate axes of the ellipse, and d the axis of the solid.

Or, 2. The continual product of ·5236, the diameter about which the revolution is made, the square of its conjugate diameter, and the square of the sine of the angle made by those diameters, the radius being 1, will be the content. That is, $dccss \times \cdot 5236 =$ the content; c being the conjugate diameter to d, and s the sine of the angle made by the diameters. For the demonstration of this rule see Hutton, ubi infra. Hence, if $d = T$, the rule becomes $\frac{1}{6} p T C^2$ for the oblong spheroid: and, if $d = C$, it will be $\frac{1}{6} p C T^2$ for the oblate spheroid: and if T, C, and d, be all equal, the rule will be $\frac{1}{6} p d^3$ for the sphere. See Hutton's Mensuration.

Dr. Halley has shown, that in a sphere, Mercator's nautical meridian line is a scale of logarithmic tangents of the half complements of the latitudes. But, as the earth has been found to be a spheroid, this figure will make some alteration in the numbers resulting from Dr. Halley's theorem. Mr. Maclaurin has therefore given us a rule, by which the meridional parts to any spheroid may be found with the same exactness as in a sphere.

SPHERUS, a Greek philosopher, a disciple of Zeno of Cyprus, who flourished about A.A.C. 243. He came to Sparta in the reign of Agis III. and Cleomenes III., and opened a school for philosophy.—Plut. Diod.

SPHEX, ichneumon wasp, or savage, a genus of insects belonging to the order of hymenoptera. See Entomology. The mouth is armed with entire jaws, but contains no tongue; the mandibles are horny, crooked, dentated; the lip horny, the apex membranaceous. The palpi or feelers are four. The antennæ have from ten to sixteen joints. The wings of both sexes are extended without folds, and laid horizontally on the back. The sting is sharp, and concealed within the abdomen. There are ninety-seven species. The manner of living is different in the various species, and so is the general form of the body and their haunts; but though the

method of life be utterly different, yet the same manners appear innate and inherent in all. They agree in being the fiercest of all flies: they will attack insects much larger than themselves, and this whether they be defenceless or armed, as they are provided with a sting. The strength in all this savage kind is great; their jaws are hard and sharp, and in their sting lies a poison suddenly fatal to the creatures with whom they engage. The savage seizes hardily on the animal he attacks, and gives a stroke of amazing force; after which he falls down as if himself were killed, but it is to rest from his fatigue, and enjoy his victory. He keeps a steady eye on the creature he has struck till it dies, which happens in a few minutes, and then drags it to the nest to feed the young. The number of other insects they destroy is scarcely to be conceived; the mouth of their cave is like that of a giant in the days of yore, strewed with the remains of prey. The eyes, the filament that serves as a brain, and a small part of the contents of the body, are all the savage eats, and he will kill fifty for a meal. Of this numerous genus only two are natives of Britain and Ireland, viz. 1. S. cribraria is black, with yellow ringlets on the abdomen; the antennæ are short, and turned backwards; the fore legs are broad, with an appendix like a shield. 2. S. viatica is black; the antennæ are short and thick; the first three segments of the abdomen red brown; the pedicle is short; the length half an inch.

SPHINCTER, in anatomy, a term applied to a kind of circular muscles, or muscles in form of rings, which serve to close and draw up several orifices of the body, and prevent the excretion of the contents. See Anatomy.

SPHINX, *n. s.* Gr. σφιγξ. Defined below.

The *sphinx* was a famous monster in Egypt, that remained by conjoined Nilus, having the face of a virgin, and the body of a lion.

Peacham on Drawing.

Sphinx, or Sphynx, in the mythology, a monster which had the head and breasts of a woman, the body of a dog, the tail of a serpent, the wings of a bird, the paws of a lion, and a human voice. It sprang from the union of Orthos with the Chimæra, or of Typhon with Echidna. The sphinx had been sent into the neighbourhood of Thebes by Juno, who wished to punish the family of Cadmus, which she persecuted with immortal hatred; and it laid this part of Bœotia under continual alarms, by proposing enigmas, and devouring the inhabitants if unable to explain them. In the midst of their consternation, the Thebans were told by the oracle that the sphinx would destroy herself as soon as one of the enigmas she proposed was explained. In this enigma she wished to know what animal walked on four legs in the morning, two at noon, and three in the evening. Upon this Creon king of Thebes promised his crown and his sister Jocasta, the widow of king Laius, in marriage to him who could deliver his country from the monster by a successful explanation of the enigma. It was at last explained by Œdipus, who observed that man walked on his hands and feet in the morning of life, at the noon of life he walked erect, and in the evening of his days he supported his infirmities upon a stick. See Jocasta and Oedipus. The sphinx, upon this explanation, dashed her head against a rock, and expired. Among the Egyptians the sphinx was the symbol of religion, by reason of the obscurity of its mysteries; and on the same account the Romans placed a sphinx in the pronaos or porch of their temples. Sphinxes were used by the Egyptians to show the beginning of the water's rising in the Nile; with this view, as it had the head of a woman and body of a lion, it signified that the Nile began to swell in July and August, when the sun passes through the signs of Leo and Virgo. There are several of these still to be seen; one in particular, near the pyramids, much spoken of by the ancients, being of a prodigious size, and cut out of the rock; the head and neck appear only at present, the rest of the body being hid in the sand. This, according to Thevenot, is twenty-six feet high, and fifteen feet from the ear to the chin; but Pliny assures us, the head was no less that 102 feet in circumference, and sixty-two feet high from the belly, and that the body was 143 feet long, and was thought to be the sepulchre of king Amasis. See Pyramids. The learned Mr. Bryant (in his Ancient Mythol. vol. iii. p. 532), observes that the sphinx seems to have been originally a vast rock of different strata; which, from a shapeless mass, the Egyptians fashioned into an object of beauty and veneration. The Egyptians used this figure in their buildings; from them the Greeks derived it, and afterwards improved it into an elegant ornament. It is also frequently used in modern architecture. The sphinx of the Egyptians is said in the Asiatic Researches, vol. ii. p. 334, to have been found in India. Colonel Pearce was told by Murari Pandit, a man of learning among the Hindoos, that the sphinx, there called singh, is to appear at the end of the world, and as soon as he is born will prey on an elephant: he is therefore figured seizing an elephant in his claws; and the elephant is made small, to show that the singh, even a moment after his birth, will be very large in proportion to it. But in opposition to this account, given by Murari Pandit, the late Sir William Jones, the learned and illustrious president of the Asiatic Society, was assured by several Brahmins that the figure taken for a sphinx was a representation of a lion seizing a young elephant.

Sphinx, in entomology, hawk-moth; a genus of insects belonging to the order of lepidopteræ. The antennæ are shaped somewhat like a prism, and are more slender at each end than at the middle. The tongue is generally thrust out: the two palpi are bent back, and the wings deflexed. The name sphinx is given to this genus on account of the singular attitudes of their caterpillars, who apply the hinder part of their body to a branch of a tree, holding the rest of it erect, like the fabulous sphinx. Most of them spin their cod under ground, making them up with small parcels of earth and grains of corn interwoven with threads. The sphinxes fly either early in the morning or after sunset in the evening. They fly heavily and sluggishly, often emitting a kind of sound. There are about 165 species already discovered, of which ten are found in Great Britain and Ireland: viz.—

1. S. atropos, jessamine hawk-moth. The wings are entire; the trunk long, spiral. Above, first wings brown, clouded with gray and yellow, and a yellowish spot in the centre; second, yellow, with two waved transverse stripes. The abdomen is yellow, with seven black brown belts. The thorax marked like a Death's head, whence the name, from Atropos, the third and last of the Fatal Sisters, who cuts the thread of life. The length is two inches. Caterpillar very large, yellow, with six green and orange oblique belts, and a posterior horn.

2. S. convolvuli, unicorn, or bindweed hawk-moth. The antennæ are long and thick; the trunk very long and spiral. Above, body marked with black and red belts; wings entire, brown-gray, with black zig zag transverse lines. The breadth three inches. Caterpillar smooth, green, with a posterior horn.

3. S. elpenor, elephant moth. The wings are angular, entire. Above, first wings striped transversely with red and green: second, black at the base, and red outwards. The body red and green. Caterpillar smooth, brown and yellow, with a posterior horn, and a snout like a hog. It lives on vines, convolvulus, &c.

4. S. filipendulæ, burnet moth. The antennæ, legs, and body, are black. Second wings red, with a greenish border. First wings bluish-green, with six red spots, in pairs. Length eight lines. Caterpillar yellow, with black spots. It lives on grass.

5. S. ligustri, privet hawk-moth. The antennæ are long, thick, and brown. Trunk long, spiral. First wings two inches long, narrow, entire, brown; second, short, red, with black bars. The abdomen is red, with black rings. Caterpillar smooth, yellow-green, with a posterior horn.

6. S. ocellata, eyed willow hawk-moth. There is no trunk; the wings are indented. Above, first wings dark and light brown, marbled; second, red, with a large yellow black eye. Beneath, a large red triangle from the base of the first wings. The breadth one inch and a half. Caterpillar smooth, green, with oblique white lines on the sides, and a posterior horn. The eggs are green; it lives on willows.

7. S. populi, poplar hawk-moth. The wings are scalloped, bluish-gray, and waved with dark lines. On the first wings a long white spot, and the base of the second red brown. Wings reversed. Length one inch. A long spiral trunk caterpillar, green, smooth, with oblique white spots, and a posterior horn. It lives on poplars and willows.

8. S. stellatarum, large bee-moth. The antennæ are thick, towards the ends brown. The trunk is spiral; the wings are short and entire; the body is thick, brown, and hairy. First wings are brown, waved; second, red brown. It resembles a large bee. Caterpillar smooth, with a posterior blue horn, tipt with red. It lives on gallium.

9. S. tiliæ, lime hawk-moth. No trunk; the wings are scalloped; the antennæ are white on the upper side, yellow on the under. Above, first wings gray-brown, with two irregular large green spots; second wings orange. Beneath, greenish-gray. Caterpillar green, shagreened, with a posterior horn.

10. S. tipuliformis, small bee-moth. The thorax is yellow beneath; the wings are short, with black veins. The abdomen black, bearded, yellow at the extremity. Caterpillar on the lonicera.

SPHINX, in zoology. See SIMIA.

SPHŒRULITE, in mineralogy. Colors brown and gray. In imbedded roundish balls and grains. Glimmering. Fracture even, splintery. Opaque. Scratches quartz with difficulty. Brittle. Specific gravity 2·4 to 2·5. Nearly infusible. It occurs in pearlstone and pitchstone porphyries, in the vicinity of Glasshütte near Schemnitz; and in the pitchstone of Meissen.

SPHONDYLIUM, in anatomy, one of the vertebræ of the back.

SPHRAGIDIUM, a famous cave of Bœotia, in Mount Citheron.—Paus. ix. c. 3.

SPI'AL, *n. s.* Fr. *espial.* A spy; scout; a watcher. Obsolete.

His ears be as *spials*, alarum to crie.
Tusser's Husbandry.

He privy *spials* placed in all his way,
To weet what course he takes, and how he fares.
Spenser.

Their trust towards them hath rather been as to good *spials* and good whisperers, than good magistrates and officers. *Bacon.*

For he by faithful *spial* was assured
That Egypt's king was forward on his way.
Fairfax.

SPICA, in botany. See BOTANY.

SPICE, *n. s.* & *v. a.* } Fr. *espices;* Italian
SPI'CER, *n. s.* } *specei,* of Lat. *speci.*
SPI'CERY. } A vegetable production, fragrant to the smell, and of pungent taste; an aromatic substance used in sauces: to season with spice: a spicer is a dealer in spice: spicery is the commodity or depository of spices.

Dangerous rocks,
Which, touching but by gentle vessel's side,
Would scatter all the *spices* on the stream.
Shakspeare.

Is not manhood, learning, gentleness, and virtue, the *spice* and salt that seasons a man?
Id. Troilus and Cressida.

His mother was a vot'ress of my order,
And in the *spiced* Indian air by night
Full often she hath gossip'd by my side.
Shakspeare.

Their camels were loaden with *spicery,* and balm, and myrrh. *Raleigh's History of the World.*

Names have been derived from occupations, as Salter and *Spicer.* *Camden.*

She in whose body
The western treasure, eastern *spicery,*
Europe and Africk, and the unknown rest,
Were easily found. *Donne.*

These hymns may work on future wits, and so
May great-grandchildren of thy praises grow;
And so, though not revive, embalm and *spice*
The world, which else would putrify with vice. *Id.*

With a festivall
She'll first receive thee; but will *spice* thy bread
With flowrie poysons. *Chapman.*

So in the wicked there 's no vice,
Of which the saints have not a *spice.* *Hudibras.*

What though some have a fraught
Of cloves and nutmegs, and in cinnamon sail,

If thou hast wherewithal to *spice* a draught,
When griefs prevail? *Herbert.*

Off at sea north-east winds blow
Sabæan odour, from the *spicy* shore
Of Araby the blest; with such delay
Well pleased they slack their course; and many a league,
Cheered with the grateful smell, old ocean smiles. *Milton.*

High sauces and rich *spices* are fetched from the Indies. *Baker.*

It containeth singular relations, not without some *spice* or sprinkling of all learning. *Browne's Vulgar Errours.*

Garlick, the northern *spice*, is in mighty request among the Indians. *Temple.*

For them the Idumæan balm did sweat,
And in hot Ceilon *spicy* forests grew. *Dryden.*

The *spicery*, the cellar and its furniture, are too well known to be here insisted upon. *Addison on Italy.*

The regimen in this disease ought to be of *spicy* and cephalick vegetables, to dispel the viscosity. *Arbuthnot on Diet.*

Under southern skies exalt their sails,
Led by new stars, and borne by *spicy* gales! *Pope.*

SPICK AND SPAN. Span-new is used by Chaucer, and is supposed to come from Saxon ꝑpannan to stretch; Lat. *expandere:* whence span. There is also a Swedish *sping span*, meaning every bit. Span-new is therefore originally used of cloth new extended or dressed at the clothiers, and spick and span is newly extended on the spikes or tenters; it is, however, a low word. Quite new; now first used.

While the honour thou hast got
Is *spick and span* new, piping hot,
Strike her up bravely. *Butler.*

They would have these reduced to nothing, and then others created *spick and span* new out of nothing. *Burnet.*

I keep no antiquated stuff;
But *spick and span* I have enough. *Swift.*

SPICKNEL, or SPIGNEL. See ATHAMANTA.

SPICULA. See BOTANY.

SPI'DER, *n. s.* Skinner thinks this word softened from spinder, or spinner, from spin. Junius, with his usual felicity, dreams that it comes from Gr. σπίζειν, to extend; for the spider extends his web. Perhaps it comes from Dutch *spieden*, Dan. *speyden*, to spy, to lie upon the catch. Sax. ᵹoꝺ, ᵹoꝺa, is a beetle, or properly an humble bee, or stingless bee. May not spider be spy dor, the insect that watches the dor? Johnson. Sax. ꝑpin aᵹᵹeꝑ.—Thomson. From spin, and atter, venom. The animal that spins a web for flies.

More direful hap betide that hated wretch,
Than I can wish to adders, *spiders*, toads. *Shakspeare.*

The *spider's* web to watch we'll stand,
And, when it takes the bee,
We'll help out of the tyrant's hand
The innocent to free. *Drayton.*

Insidious, restless, watchful *spider*,
Fear no officious damsel's broom;
Extend thy artful fabrick wider,
And spread thy banners round my room:
While I thy curious fabrick stare at,
And think on hapless poet's fate,
Like thee confined to noisome garret,
And rudely banished rooms of state. *Lit'leton.*

The *spider's* touch how exquisitely fine!
Feels at each thread, and lives along the line. *Pope.*

SPIDER, in entomology. See ARANEA and ENTOMOLOGY.

SPIDER, SHEPHERD. See PHALANGIUM.

SPIDERWORT, GREAT SAVOY, a species of HEMEROCALLIS.

SPIERINGS (H.), an eminent landscape painter, born at Antwerp, about 1633. His manner of designing was agreeable, his touch delicate, and his coloring natural.

SPIERS (Albert Van), an historical painter, born at Amsterdam in 1666. After studying in Italy he returned to his native city, where he acquired great fame. He died in 1718.

SPIGELIA, worm grass, in botany, a genus of plants belonging to the class of pentandria, and order of monogynia; natural order forty-seventh, stellatæ: COR. funnel-shaped: CAPS. didymous, bilocular, and polyspermous. There are two species; 1. S. anthelmia, has a herbaceous stem, and its highest leaves are fourfold. 'The effects of this medicine,' says Dr. Browne, 'are these:—It first procures sleep, almost as certainly, and in an equal degree, with opium: the eyes seem to be distended, and sparkle as it were before the eruption of the small-pox or measles, which may be easily observed after the sleep is over; the pulse grows regular and rises, the fever cools, the symptoms appear more favorable, and the worms are generally discharged by the use of the subsequent purgative (if not before) in great quantities, often above 100 at a time; but when a few only come away, which is seldom, and these alive, the same doses are again repeated, which seldom or never fail. I never saw this medicine fail when there was the least probability of success; nay, often prove successful when there was not the least reason to expect it. I have been, however, cautious in ordering it for children; for though I never knew it at all hurtful, its effect upon the eyes has often deterred me from ordering it to children, whose fibres are weak and relaxed, and in whom the fevers from this source are seldom so vehement as to hinder the administration of other medicines, likely as effectual in other cases of this nature. This plant is generally had in low dry lands, after they have been turned up some months, and after great rains; its taste is herbaceous, and somewhat clammy; its growth is soft and sudden; its stalk hollow, smooth, and roundish. Its herbaceous taste and sudden growth would alone make me think it capable of little or no action, had not hundreds of careful observations satisfied me to the contrary.'

2. S. Marilandica, perennial worm-grass, or Indian pink. The best description of this plant which we have seen is given by Dr. Woodville in his Medical Botany; a work which exhibits a complete systematic view of the medicinal effects of vegetables. Its stem is four cornered; all the leaves opposite Dr. Garden, in a letter to the late Dr. Hope, professor of botany in the university of Edinburgh, dated 1763, gives the following account of the virtues of this plant:—'About forty years ago the anthelmintic virtues of the root of this plant were discovered by the Indians;

since which time it has been much used here by physicians, practitioners, and planters; yet its true dose is not generally ascertained. I have given it in hundreds of cases, and have been very attentive to its effects. I never found it do much service, except when it proved gently purgative. Its purgative quality naturally led me to give it in febrile diseases which seemed to arise from viscidity in the primæ viæ; and, in these cases, it succeeded to admiration, even when the sick did not void worms. I have of late, previous to the use of the Indian pink, given a vomit, when the circumstances of the case permitted it; and I have found this method to answer so well that I think a vomit should never be omitted. I have known half a drachm of this root purge as briskly as the same quantity of rhubarb; at other times I have known it, though given in large quantities, produce no effect upon the belly: in such cases it becomes necessary to add a grain or two of sweet mercury, or some grains of rhubarb; but the same happy effects did not follow its use in this way, as when it was purgative without addition. The addition, however, of the purgative renders its use safe, and removes all danger of convulsions of the eyes, although neither ol. rutæ sabinæ, nor any other nervous substance, is given along with it. It is, in general, safer to give it in large doses than in small; for from the latter more frequently the giddiness, dimness of the sight, and convulsions, &c., follow: whereas from large doses I have not known any other effect than its proving emetic or violently cathartic. To a child of two years of age, who had been taking ten grains of the root twice a-day, without having any other effect than making her dull and giddy, I prescribed twenty-two grains morning and evening, which purged her briskly and brought away five large worms. After some months an increased dose had the same good effect. I prefer the root to the other parts of the plant; of which, when properly dried, I gave from twelve to sixty or seventy grains in substance. In fusion it may be given to the quantity of two, three, or four drachms, twice a day. I have found that, by keeping, the plant loses its virtue in part; for forty grains of the root which has not been gathered about two months will operate as strongly as sixty which has been kept for fifteen months.' In Dr. Garden's subsequent letters, addressed to Dr. Hope, in 1764 and 1766, the efficacy of this root in worm cases is further confirmed; and he observes that the root keeps better than he at first thought (having lately used it several years old with great success). In what he calls continued or remitting low worm fevers, he found its efficacy promoted by the addition of rad. sepentar. virg.

SPIGELIUS (Adrian), an eminent anatomist, surgeon, and botanist, born at Brussels in 1578. He became professor of anatomy and surgery at Padua. The senate of Venice honored him with the order of St. Mark. He died 1625. His works on these branches of science were printed at Amsterdam, in 3 vols. folio, 1645.

SPIGNA, or Spigno, a town and castle, and ci-devant marquisate of Italy, in the late duchy of Montferrat; now annexed to France, and included in the department of Marengo; seated on the Belbo, between the Aqua and the Savona; forty miles south-east of Turin. Long. 8° 26′ E., lat. 44° 45′ N.

Spignel, Wild, a species of seseli.

SPI'GOT, *n. s.* Dut. *spijcker*. A pin or peg put into the faucet to keep in the liquor.

Base Hungarian wight, wilt thou the *spigot* wield?
Shakspeare.

Take out the *spigot*, and clap the point in your mouth. *Swift.*

SPIKE, *n. s.* & *v. a.* Lat. *spica*. An ear of corn: hence a long nail; a species of lavender: to fasten with nails.

For the body of the ships, no nation equals England for the oaken timber; and we need not borrow of any other iron for *spikes* or nails to fasten them.
Bacon.

Drawn up in ranks and files, the bearded *spikes*
Guard it from birds, as with a stand of pikes.
Denham.

Suffering not the yellow beards to rear,
He tramples down the *spikes*, and intercepts the year.
Dryden.

Lay long planks upon them, *spiking* or pinning them down fast. *Mortimer's Husbandry.*

Lay long planks upon them, pinned or *spiked* down to the pieces of oak on which they lie.
Moxon's Mechanical Exercises.

He wears on his head the corona radiata, another type of his divinity: the *spikes* that shoot out represent the rays of the sun. *Addison.*

A youth, leaping over the *spiked* pales, was suddenly frighted down, and in his falling he was catched by those *spikes*. *Wiseman.*

The gleaners,
Spike after *spike*, their sparing harvest pick.
Thomson

The oil of *spike* is much used by our artificers in their varnishes, but it is generally adulterated
Hill's Materia Medica.

Spike, Oil of, an essential oil distilled from lavender, and much used by the varnish makers and the painters in enamel.

SPIKE'NARD, *n. s.* Lat. *spica nardi*. A plant, and the oil or balsam produced from the plant.

A woman, having an alabaster box of ointment of *spikenard*, brake and poured it on his head.
Mark xiv. 3.

He cast into the pile bundles of myrrh, and sheaves of *spikenard*, enriching it with every spicy shrub. *Spectator.*

It grows plentifully in Java. It has been known to the medical writers of all ages.
Hill's Materia Medica.

Spikenard. See Nardus.

Spikenard, Celtic, a species of valeriana.

Spikenard, False, a species of lavandula.

Spikenard, Indian, or True. See Nardus. The Indian or True Spikenard was discovered in 1786, and announced in the Philosophical Transactions for 1790: yet Mr. Lee, in his Introduction to Botany, p. 330, published in 1794, says it is still 'unknown.'

Spikenard, Ploughman's. See Baccharis. It is also the name of a species of Conyza.

Spikenard, Wild, a species of Asarum.

SPIKE-ROLLER, in agriculture, a useful implement of the roller kind, introduced by Mr. Randall of York. It has been found of much advantage in bringing stiff cloddy lands into a

state of suitable pulverization and fineness of mould for being sown. It is likewise employed in a beneficial manner on sward-land that is worn out and mossy, by preparing it for the application of earthy composts and grass-seeds. But it is remarked by the inventor that in this business the roller must go up and down till the swarth and ground are perfectly well broken up: this being done, the seeds of clover, trefoil, and rye-grass, or any other mixed with them, must be sown in the usual way and quantity; then the compost must be spread over the seeds so as to cover them; and a common barley-roller, with a thorn-bush fastened to it, must follow, and the ground be shut up, lest the cattle should do harm by treading. In respect to this sort of roller the dimensions in length were seven feet, the diameters at the ends eighteen inches, and the whole cylinder made of the heart of oak; and when the irons were burnt in, and the man seated on the box designed for that purpose, the weight of the whole was about a ton. But the blunt ends of the irons were opposed to the clods, and run more taper, till they came to the surface of the cylinder, into which the irons were burnt, and inserted about three inches, which was their length above the surface of the roller, and which he always found very sufficient to crush the hardest clod that ever came in their way. Had he, indeed, attempted to go on the ground when the soil was not perfectly dry, this position of the irons would have carried the clods round with the roller; for it is not its province to squeeze, but crush. Nor indeed can a man do more harm to his ground than going upon it, when it is not quite dry, with a roller constructed in this way. He had the irons fixed in four inches asunder, in the first row, from end to end. The second row began just between the first and second irons of the first row. The third row was like the first; and the fourth like the second. Then alternately for the whole surface of the cylinder, as nearly as possible, the irons were four inches asunder in each individual row; and four inches from row to row, as nearly as the superficies of the cylinder would permit. He does not know how to convey a juster idea of the shape of the irons than to call them ox-harrow teeth, or those of a very large harrow; for when he sent for the workman he desired him to make so many of this denomination six inches in length, and burn the small end three inches into the wood. This is a roller that requires a strong team in performing its work.

In addition to these uses it has been suggested that it may likewise be very useful in preparing clay for the making of canals, or pieces of water: for where, as sometimes happens, the clay grows dry, and will not admit of being duly tempered for use, without great pains in breaking it, a very large quantity may very soon be reduced to the requisite fineness, by spreading it on hard ground in a due thickness, and passing this roller a few times over it. In extensive works much trouble and labor may sometimes be saved by this means, and the clay prepared in a manner that will answer the purpose much more effectually. It may also be noticed that this is a sort of tool which no farm, where the land is a stiff clay, or in the least liable to clot, should want: for besides the constant advantage of saving labor, and bringing land to a better condition for any kind of sowing than the plough and harrow, with any assistance of the work of hands, can make it; in favorable seasons, and under certain circumstances, the loss of the whole crop, by an otherwise unavoidable delay beyond the seed-time, may be with certainty prevented.

This implement may likewise be employed to assist in reducing the half-burnt turf of burn-baked land, which requires much labor as commonly done by hand; but by going over the land several times with the spike-roller, and harrowing it with heavy harrows alternately, to pull up the turfs, or ploughing them up, they may be reduced fine in a much shorter time, and at a much less expense, than by beating or breaking them by hand. The mode of constructing the tool, in the common manner, has been already shown.

As an improvement in this implement it has been suggested, in order to prevent its tearing up the ground, and the great stress that is upon the frame in turning, to have it divided into two parts. Let the ends of each part be bound with narrow, but strong, bands of iron, and let the spikes at the ends be placed close to them; let each part have a separate frame; but let the cheeks, in which the inward gudgeons turn, be made of iron plates, about two inches wide above and four where the gudgeons enter; the thickness, a common flat bar of iron; and these fixed in any firm manner to two cheeks of wood, reaching down just to the bands, and of such a thickness at bottom as not to interrupt the spikes. Let the inward gudgeons be made with quite flat heads to prevent their slipping out in working, and bring the two ends of the roller nearer together, which is of consequence, as the fewer clots will be missed in working. Let the frames be joined together by four eyes, like those of a small gate, two at one end, about five or six inches apart; the two at the end of the other to take place just within them, an iron pin being put through all four and keyed. Let the thills be placed just on the middle of each frame, and a bar of wood just behind the horse to strengthen them; the bar sawed through in the middle, and joined by a strong flat hinge; one side made to hasp upon a staple kept down with a wooden clet. This gives the whole proper play in working.

The spikes are about four inches without and three within the wood: the thickness of the roller and number of spikes may be determined, in some measure, by the nature of the soil it is to work upon. Thus formed it will be found, it is said, next to the plough, the most useful instrument in tillage, not only in reducing a stiff soil, but, with a bush at its tail, to cover the seed, when sown, much more effectually, and in a better manner, than a harrow, as it turns up the earth light and fine behind it; and, though seemingly unwieldy, will turn with ease, and may be worked with one, two, or three horses at most, upon any land that is of a proper dryness to work upon.

SPILANTHUS, in botany, a genus of plants,

belonging to the class of syngenesia, and to the order of polygamia æqualis. The common calyx is erect; the leaflets numerous, sub-equal, and oblong, the two exterior being longer than the rest. The compound corolla is uniform and tubular; the florets are hermaphrodite and equal; the proper corolla is funnel-shaped. The filaments are five in number, and short. The antheræ cylindrical and tubular. The seeds are vertical, oblong, flat, and covered with chaff. The receptacle is paleaceous and conical. There are seven species, viz. 1. S. acmella; 2. atriplicifolia; 3. insipida; 4. oloracea; 5. pseudo-acmella; 6. salivaria; and, 7. urens.

SPILBERG (John), an historical and portrait painter, born at Dusseldorp in 1619. He was painter to the prince Palatine, and died in 1691.

Spilberg, (Adriana), daughter of John, was born at Amsterdam, in 1646, and learned painting under her father. She excelled in drawing portraits with crayons. The celebrated painter, Eglon Vander Neer, married her.

SPILL, *v. a.* & *v. n.* } Sax. ꝑpillan; Goth. and
Spilth, *n. s.* } Teut. *spilla*; Belg. *spijlen*.

To shed; throw away; lose; destroy; waste; be lavish; be shed: spilth, that which is spilt.

Thus is our thought with pain of thistle tilled,
Thus be our noblest parts dried up with sorrow;
Thus is our mind with too much minding *spilled*.
Sidney.

Thy father bids thee spare, and chides for *spilling*.
Id.

Why are you so fierce and cruel?
Is it because your eyes have power to kill?
Then know that mercy is the Mighty's jewel,
And greater glory think to save than *spill*. *Id.*

Friend or brother,
He forfeits his own blood that *spills* another.
Shakspeare. Timon.

Our vaults have wept with drunken *spilth* of wine.
Shakspeare.

All bodies are with other bodies filled;
But she receives both heaven and earth together:
Nor are their forms by rash encounters *spilled*;
For there they stand, and neither toucheth either.
Davies.

Be not angry with these fires;
For then their threats will kill me:
Nor look too kind on my desires;
For then my hopes will *spill* me. *Ben Jonson.*

Themselves exact their cruelty,
And I constrained am this blood to *spill*.
Daniel's Civil War.

They having *spilled* much blood, and done much waste,
Subduing nations; and achieved thereby
Fame in the world, high titles, and rich prey;
Shall change their course to pleasure, ease, and sloth. *Milton.*

Medea must not draw her murth'ring knife,
And *spill* her children's blood upon the stage.
Roscommon.

Orbellan did disgrace
With treach'rous deeds our mighty mother's race;
And to revenge his blood, so justly *spilt*,
What is it less than to partake his guilt? *Dryden.*

Nor the Centaur's tale
Be here repeated; how, with lust and wine
Inflamed, they fought and *spilt* their drunken souls
At feasting hour. *Philips.*

This sight shall damp the raging ruffian's breast,
The poison *spill*, and half-drawn sword arrest.
Tickell.

He was so topful of himself, that he let it *spill* on all the company: he spoke well indeed, but he spoke too long. *Watts.*

Spill, *n. s.* Teut. *spille*; Belg. *spil*. A shiver or small bar of wood or iron; small quantity of money.

The oysters, besides gathering by hand, have a peculiar dredge, which is a thick strong net, fastened to three *spills* of iron, and drawn at the boat's stern.
Carew.

Have near the bunghole a little venthole, stopped with a *spill*. *Mortimer.*

The bishops, who consecrated this ground, were wont to have a *spill* or sportule from the credulous laity. *Ayliffe.*

SPILLER (John), a young sculptor of great promise, was born December, 1763, in London, and after a liberal education became a pupil of Bacon. His talents becoming known, he was chosen to execute a statue of Charles II. for the centre of the Royal Exchange; and while engaged in this work the pulmonary disease, to which he had a tendency, became so much aggravated that soon after his much-admired production was placed on its pedestal he expired, in May 1794. The author of the Curiosities of Literature makes the following observations illustrative of the enthusiasm of genius:—'The young and classical sculptor who raised the statue of Charles II., placed in the centre of the Royal Exchange, was, in the midst of his work, advised by his medical friends to desist from working in marble; for the energy of his labor, with the strong excitement of his feelings, already had made fatal inroads on his constitution. But he was willing, he said, to die at the foot of his statue. The statue was raised, and the young sculptor, with the shining eyes and hectic blush of consumption, beheld it there, returned home and shortly was no more.' He married in 1792, and his accomplished wife died a few months after him of a similar disease. They left behind them, at the tender age of a few months, an only daughter.

SPILSBY, a market-town in the county of Lincoln, situated on an eminence overlooking the extensive level of the marshes and the German Ocean. It is the chief town in the southern part of Lindsey division, and consists mainly of four streets, uniting at the market-place. A spacious square, with the market cross at the east end, and the town-hall at the west. The cross consists of a plain octagonal shaft, with a quadrangular base, elevated on five steps. The town-hall is a plain brick building, built in 1764, standing on arches on the site of an old hall. The general quarter sessions of the peace have been holden here for upwards of 100 years. The parish church, situated in the west end of the town, is an irregular building, consisting of north and south aisles, the latter being much larger than the rest of the building; and here is a chapel, in which are some ancient monuments belonging to the families of Beke, Willoughby, and Bertie. At the west end of the church is an embattled tower of more modern date. Spilsby contains a free-school and Sunday school. Market on Mon-

day, and three annual fairs. Thirty-one miles east of Lincoln, and 134 north of London.

SPIN, *v. a.* & *v. n.* SPIN'DLE, *n. s.* & *v. n.* SPIN'DLESHANKED, *adj.* SPIN'NY, SPIN'STER, *n. s.* } *Preter.* spun or span; *part.* spun. Sax. ꝑpinnan; Belg. *spinnen.* To draw out into, or form, threads: hence to protract; draw out; form by degrees; to exercise the art of spinning; stream out in threads or filaments: a spindle is a pin on which the spinning of thread is performed: spindleshanked, having thin or spindle-like legs: spinster, a woman who spins; the legal term for an unmarried woman not of noble birth: spinny is their loom.

The women *spun* goats' hair. *Exodus* xxxv. 26.

Weaving spiders come not here:
Hence, you long-legged *spinners*, hence!
Shakspeare.

The *spinsters* and the knitters in the sun,
And the free maids that weave their thread with bones,
Do use to chaunt it. *Id. Twefth Night.*

You would be another Penelope; yet all the yarn she *spun*, in Ulysses's absence, did but fill Ithaca full of moths. *Shakspeare.*

Bodies fibrous by moisture incorporate with other thread, especially if there be a little wreathing; as appeareth by the twisting of thread, and twirling about of *spindles.* *Bacon.*

Another ill accident in drought is the *spindling* of the corn, which with us is rare, but in hotter countries common; insomuch as the word calamity was first derived from calamus, when the corn could not get out of the stalk. *Id.*

Together furiously they ran,
That to the ground came horse and man;
The blood out of their helmets *span*,
So sharp were their encounters.
Drayton's Nymphiad.

If a gentlewoman be termed *spinster*, she may abate the writ. *Lord Coke.*

I passed lightly over many particulars, on which learned and witty men might *spin* out large volumes. *Digby.*

Whether the sun, predominant in heaven,
Rise on the earth, or earth rise on the sun;
He from the east his flaming road begin,
Or she from west her silent course advance
With inoffensive pace, that *spinning* sleeps
On her soft axle, while she paces even
And bears thee soft with the smooth air along,
Solicit not thy thoughts. *Milton's Paradise Lost.*

Sing to those that hold the vital sheers,
And turn the adamantine *spindle* round
On which the fate of gods and men is wound.
Milton.

A practised *spinner* shall *spin* a pound of wool worth two shillings for sixpence. *Graunt.*

We can fling our legs and arms upwards and downwards, backwards, forwards, and round, as they that *spin.* *More.*

The fates but only *spin* the coarser clue;
The finest of the wool is left for you. *Dryden.*

Repose yourself, if those *spindle* legs of yours will carry you to the next chair. *Id. Spanish Fryar.*

By one delay after another, they *spin* out their whole lives, till there 's no more future left before 'em. *L'Estrange.*

Men of large thoughts and quick apprehensions are not to expect any thing here, but what, being *spun* out of my own coarse thoughts, is fitted to men of my own size. *Locke.*

So Pallas from the dusty field withdrew,
And, when imperial Jove appeared in view,
Resumed her female arts, the *spindle* and the clew,
Forgot the sceptre she so well had swayed,
And, with that mildness she had ruled, obeyed.
Stepney.

The *spindles* must be tied up, and, as they grow in height, rods set by them, lest by their bending they should break. *Mortimer.*

When the flowers begin to *spindle*, all but one or two of the biggest at each root, should be nipped off. *Id.*

They plow it early in the year, and then there will come some *spinny* grass that will keep it from scalding. *Id.*

The marriage of one of our heiresses with an eminent courtier gave us *spindle* shanks and cramps. *Tatler.*

Upon a true repentance, God is not so fatally tied to the *spindle* of absolute reprobation, as not to keep his promise, and seal merciful pardons. *Jasper Maine.*

Why should Rome fall a moment ere her time?
No, let us draw her term of freedom out
In its full length, and *spin* it to the last.
Addison's Cato.

Her lawyer is a little rivelled, *spindleshanked* gentleman. *Addison.*

Ten thousand stalks their various blossoms spread;
Peaceful and lowly in their native soil,
They neither know to *spin*, nor care to toil. *Prior.*

If his cure lies among the lawyers, let nothing be said against intangling property, *spinning* out causes, and squeezing clients. *Collier.*

My *spinning* wheel and rake
Let Susan keep for her dear sister's sake. *Gay.*

The lines are weak, another 's pleased to say;
Lord, Fanny *spins* a thousand such a day. *Pope.*

I desire that a yearly annuity of twenty pounds shall be paid to Rebecca Dingley, of the city of Dublin, *spinster*, during her life. *Swift.*

Do thou take me for a Roman matron,
Bred tamely to the *spindle* and the loom?
A. Philips.

That hour arrived, his work begins;
He *spins* and weaves, and weaves and *spins*;
Till circle upon circle wound
Careless around him and around,
Conceals him with a veil, though slight,
Impervious to the keenest sight. *Cowper.*

SPINA BIFIDA. See SURGERY.

SPINA CERVINA, the same as the rhamnus catharticus. See RHAMNUS.

SPINA VENTOSA, in surgery, that species of corruption of the bones which takes its rise in the internal parts, and by degrees enlarges the bone, and raises it into a tumor. See SURGERY.

SPIN'ACH, *n. s.* SPIN'AGE. } Latin *spinachia.* A plant.

It hath an apetalous flower, consisting of many stamina included in the flower-cup, which are produced in spikes upon the male plants, which are barren; but the embryos are produced from the wings of the leaves on the female plants, which afterwards become roundish or angular seeds, which in some sorts have thorns adhering to them. *Miller.*

Spinage is an excellent herb crude or boiled. *Mortimer.*

SPINACIA, spinage, in botany, a genus of plants belonging to the class of diœcia, and to the order of pentandria; and in the natural system arranged under the twelfth order, holoraceæ.

The male calyx is quinquepartite; there is no corolla: the female calyx is quadrifid: no corolla; there are four styles, and one seed within the indurated calyx. There are only two species: 1. S. fera, wild spinage, produces its fruit on footstalks. 2. S. oleracea, common spinage, has sessile fruits and sagitated leaves. It has been cultivated in Britain since 1568, but it is not known from what country it was originally brought. When intended for winter use, it should be sown on an open spot of ground in the end of July; and if possible when the weather is rainy. When the young plants are come up, the weeds must be destroyed, and the plants left at about five inches asunder. The ground being kept clear of weeds, the spinage will be fit for use in October. The way of gathering it to advantage is only to take off the longest leaves, leaving those in the centre to grow bigger; and at this rate a bed of spinage will furnish the table for a whole winter, till the spinage sown in spring is become fit for use, which is commonly in April.

SPINÆ, in botany, thorns, rigid prickles: a species of arma, growing on various parts of certain plants for their defence; spinæ ramorum arcent pecora. On the branches we find examples in the pyrus, prunus, citrus, hippophaes, gmelina, rhamnus, lycium, &c.; on the leaves in the aloe, agave, yucca, ilex, hippomane, theophrasta, carlina, &c.; on the calyx, in the carduus, cnicus, centauria, molucella, galeopsis, &c.; on the fruit, in the trapa, tribulus, murex, spinacia, agremonia, datura, &c.

Spinage. See Spinach and Spinacia.

SPI'NAL, *adj.* } Lat. *spina*. Belonging to
Spine, *n. s.* } the backbone: the backbone.

All *spinal*, or such as have no ribs, but only a backbone, are somewhat analogous thereto.
Browne's Vulgar Errours.

There are who think the marrow of a man,
Which in the *spine*, while he was living ran;
When dead, the pith corrupted will become
A snake, and hiss within the hollow tomb. *Dryden.*

Descending careless from his couch, the fall
Luxed his joint neck, and *spinal* marrow bruised.
Philips.

Those solids are entirely nervous, and proceed from the brain and *spinal* marrow, which, by their bulk, appear sufficient to furnish all the stamina or threads of the solid parts. *Arbuthnot.*

The rapier entered his right side, reaching within a finger's breadth of the *spine*. *Wiseman's Surgery.*

Spinal Marrow, Spinal Nerves. See Anatomy, Index.

SPINALIS, in anatomy, several muscles, &c. of the spine. See Anatomy.

SPINCKES (Nathanael), an eminent nonjurant divine, born in 1654, at Castor n Northamptonshire, where his father Edmund, a native of New England, and a man of letters, was rector. He was educated at Trinity College, Cambridge, in 1669–70. In 1671 he fell heir, by his father's death, to a large fortune and a fine library. After taking his degrees of B. and M. A., &c., he was admitted priest, December 22d, 1678. He then became chaplain to Sir R. Edgcomb; and in 1681 the same to the duke of Lauderdale. In 1685 he was made rector of Peakirk in Northamptonshire, where he married Miss Rutland of London. In 1687 he was made a prebendary of Salisbury, rector of St. Mary, and preacher at Stratford at £80 a year. But in 1690 he lost all his preferments, by refusing to take the oaths to William and Mary. On the 3d of June 1713 he was made a bishop. He died 28th of July, 1727. His publications were numerous. The most celebrated is his Sick Man Visited.

Spindle, in geometry, a solid body generated by the revolution of some curve line about its base or double ordinate; in opposition to a conoid, which is generated by the rotation of the curve about its axis or absciss, perpendicular to its ordinate. The spindle is denominated circular, elliptic, hyperbolic, or parabolic, &c., according to the figure of its generating curve.

Spindle, in mechanics, sometimes denotes the axis of a wheel, or roller, &c., and its ends are the pivots.

Spine. See Anatomy, Index.

Spine, in botany. See Spinæ.

SPINEL, in mineralogy, a sub-species of octohedral corundum. Color red. Occurs in grains, more frequently crystallised; in a perfect octohedron, which is the fundamental figure; in a tetrahedron, perfect or modified; a thick equiangular six-sided table; a very oblique four-sided table; a rhomboidal dodecahedron; a rectangular four-sided prism. Splendent and vitreous. Cleavage fourfold. Fracture flat conchoidal. Translucent to transparent. Refracts single. Scratches topaz, but is scratched by sapphire. Brittle. Specific gravity 3·5 to 3·8. Fusible with borax. Its constituents are, alumina 82·47, magnesia 8·78, chromic acid 6·18, loss 2·57.—Vauquelin. It is found in the gneiss district of Acker in Sudermannland, in a primitive limestone; in the kingdom of Pegu; and in Ceylon. It is used as a precious stone. When it weighs four carats (about sixteen grains) it is considered of equal value with a diamond of half the weight.—Jameson.

Spinel, in the linen manufactory, four hanks.

SPINELLANE. Color plum-blue. It occurs crystallised in rhomboids of 117° 23′, and 62° 37′; and in six-sided prisms acuminated with three planes. It scratches glass. It is found on the shores of the lake of Laach, in a rock composed of glassy felspar, quartz, hornblende, &c. It is said to be a variety of Haüyne.

SPINELLO (Aretino), a Tuscan painter, of great repute in his time. He was born in 1328, and studied under James di Casentino, whom at twenty he excelled. He painted history and portraits admirably, and finished the pieces exquisitely at last. But he painted a picture of the fallen angels, in which he drew so horrid a picture of Lucifer that it frightened him so much as to affect his senses ever after. He died in 1420.

Spinello (Paris), the son and disciple of Aretino, was also an eminent painter. His style greatly resembled that of his father, whom he did not long survive, dying in 1422.

SPINESCENT, sharp and pricking.

SPIN'ET, *n. s.* Fr. *espinette*. A small harpsichord; an instrument with keys.

When miss delights in her *spinnet*,
A fiddler may his fortune get. *Swift.*

SPINET, or SPINNET, a musical instrument ranked in the second or third place among harmonious instruments. It consists of a chest or belly made of the most porous and resinous wood to be found, and a table of fir glued on slips of wood called summers, which bear on the sides. On the table is raised two little prominences or bridges, wherein are placed so many pins as there are chords or strings to the instrument. It is played on by two ranges of continued keys, the former range being the order of the diatonic scale, and that behind the order of the artificial notes or semitones. The keys are so many flat pieces of wood, which, touched and pressed down at the end, make the other raise a jack which strike and sound the strings by means of the end of a crow's quill, wherewith it is armed. The first thirty strings are of brass, the other more delicate ones of steel or iron wire; they are all stretched over the two bridges already mentioned. The figure of the spinet is a long square or parallelogram: some call it a harp couched, and the harp an inverted spinet. See HARP. This instrument is generally tuned by the ear; which method of the practical musicians is founded on a supposition that the ear is a perfect judge of an octave and a fifth. The general rule is to begin at a certain note, as C, taken towards the middle of the instrument, and turning all the octaves up and down, and also the fifths, reckoning seven semitones to each fifth, by which means the whole is tuned. Sometimes to the common or fundamental play of the spinet is added another similar one in unison, and a third in octave to the first, to make the harmony the fuller; they are either played separately or together by means of a stop; these are called double or triple spinets; sometimes a play of violins is added, by means of a bow, or a few wheels parallel to the keys, which press the strings and make the sound last as long as the musician pleases, and heighten and soften them more or less, as they are more or less pressed. The harpsichord is a kind of spinet, only with another disposition of the keys. See HARPSICHORD. The instrument takes its name from the small quill ends which touch the strings, resembling spinæ or thorns.

SPINIFEX, in botany, a genus of plants belonging to the class of polygamia and order of monœcia. The hermaphrodite flowers have a calyx with bivalved biflorus glumes, the valvelets being parallel to the rachis; the corolla is bivalved and awnless; there are three stamina and two styles. In the male flowers the calyx is common with the hermaphrodite; the corolla and stamina are similar. There is only one species; viz. S. squarrosus.

SPINK, *n. s.* Scot. *spink*. A finch; a bird.

Want sharpens poesy, and grief adorns;
The *spink* chaunts sweetest in a hedge of thorns.
Harte.

SPINNING (from spin), in commerce, the act or art of reducing silk, flax, hemp, wool, hair, or other matters, into thread. Spinning is either performed on the wheel, or with a distaff and spindle, or with other machines proper for the several kinds of working. Hemp, flax, nettle-thread, and other like vegetable matters, are to be wetted in spinning; silks, wools, &c., are spun dry, and do not need water; yet there is a way of spinning or reeling silk as it comes off the cases or balls where hot and even boiling water is to be used. See SILK. The vast variety and the importance of those branches of our manufactures which are produced from cotton, wool, and flax, spun into yarn, together with the cheapness of provisions and the low price of labor in foreign countries, which are our rivals in trade, have occasioned many attempts at home to render spinning more easy, cheap, and expeditious. For which see COTTON. These contrivances have in some parts of Scotland been applied to the spinning of flax.

The ancient Greeks entertained so high an opinion of the utility and benefits of spinning and making cloth, that they ascribed the invention to Minerva, the goddess of wisdom. But we, who profess to be Christians, ought to trace the origin of the arts to persons who really existed, and not to the imaginary gods and goddesses of the Greeks. Moses, while he informs us that music and metallurgy were invented by the descendants of Cain before the flood, mentions also that Jabel was the father or instructor of such as dwell in tents. Hence it is evident that spinning, weaving, and cloth-making, must have been invented about or before the same period, and probably by the same person. But to descend to our own times we do not know, except perhaps the steam-engine, any mechanical invention that has made such amazing addition to the activity, industry, and opulence of this island, as the invention of Sir Richard Arkwright for spinning by water, where dead matter is made to perform all that the nicest fingers can do when directed by the never ceasing attention of the intelligent eye. We know not to what benefactor we owe the fly-wheel. Sir Richard has the honor of combining this with the spindle and distaff. To give an intelligible and accurate de-description of a cotton mill would require a volume. But in our article COTTON will be found a complete account of the modern furniture of this most important manufactory.

Worsted is spun in a frame resembling the water-frame of Arkwright, from which it only differs in the relative distances of the rollers, by which the drawing out or extending of the fibres is effected.

In 1806 Messrs. Clarke and Bugby obtained a patent for improvements in a machine for spinning hemp and flax, which is intended to be worked by hand labor, and to be at such a small expense as to bring it within the reach of small manufacturers. The inventors state it to be constructed upon such safe and easy principles, that no length of experience is necessary to enable children to work it; and that it occupies so little space that the machines may be placed in small rooms, out-buildings, or other cheap places. To effect the above purposes it was necessary to get rid of the flyer fixed upon the spindle used in the old machinery for spinning hemp or flax, which additions require a power in proportion of five to one; and also to surmount the difficulty which arises from the want of elasticity in these

substances, and which prevents them from being spun by stretching out at the same time that the thread is twisted, in the manner of the mule or jenny. These patentees recommend a machine which is in fact a mule with certain modifications; and, to give the effect of elasticity in the fibres, they have two methods. The most simple, and that which they particularly recommend, is to provide a holder of large wire for every spindle, which holders are several inches in length, fixed in an arbor or shaft that extends from one end of the carriage to the other.

This arbor or shaft, with the holders, may be considered as an enlarged and improved substitute for what is called the faller in the mules or jennies for spinning cotton, and the wire-holders fixed therein have elliptical eyes at their extremities, through each of which a thread is conducted in its passage from the rollers which draw out the thread to its spindle. The wire of which the holder is made, after forming the elliptical eye, is left or extended beyond the uppermost part something in the manner of a cork-screw, so that the yarn may be conveniently slipped in when occasion may require it. These holders for each thread are for the purpose of keeping the yarn in a state nearly vertical over the tops of the spindle, when the carriage which contains them is coming out; and, as they will readily yield or spring from the vertical position, they have the same effect as elasticity in the fibres of the substance which is to be stretched out; but the wires being removed from the vertical situation at the beginning of the return of the carriage and thrown into nearly an horizontal position, by inclining the shaft into which they are all fixed, they bring the yarn below the tops of the bobbins or quills which are fixed upon the spindles, which will then wind up the threads upon them when the spindles are turned round, and then the wire-eyes being regularly curved, and raised up again by the motion of an elliptic wheel which is turned round by the machine, they distribute the yarn regularly upon the bobbins or quills, and prevent it from hinkling and improperly doubling or twisting together. Another method of compensating for the want of elasticity in hemp and flax is to fix a round bar of wood, about an inch and a half in diameter, the whole length of the carriage, about three or four inches above the tops of the spindles, so that the outer surface, or that next the person who works the machine, may be perpendicular, or nearly so, over the tops of the spindles, the inner side having pieces of wood or metal fixed or nailed thereto, leaving only small spaces or notches between each for the yarn to pass through. The use of these pieces is to prevent the threads from getting together and entangling. Every thing relating to the wire holders before mentioned, and the arbor to which they are affixed, must be applied in concert with these pieces of metal, which form a separation between the threads. See Cotton and Weaving.

M. Reaumur has shown, by a series of curious experiments, that the common mussel, and some other shell-fish of the sea, possess the art of spinning in a great degree of perfection. But he observes that, though the workmanship is the same, the manner of producing it is very different. Spiders, caterpillars, and the like, make threads of any length that they please by making the viscous liquor, of which they are formed, pass through a fine perforation in the organ appointed for this spinning: but the way in which the mussels form their threads is very different, as the former resembles the work of the wire-drawer, so does this that of the founder, who casts metals in a mould. The canal of the organ destined for the mussel's spinning, which, from its shape, is commonly called its tongue, is the mould in which its thread is cast, and gives it its determinate length.—Mem. Acad. Par. 1711.

The Spinning-Wheel, in rope-making, for twelve spinners, is about five feet in diameter, and is hung between two posts fixed in the ground: on its top is fixed a semi-circular frame called the head, which contains twelve whirls that turn on iron spindles, with hooks to their front ends to hang the hemp on, and are worked by means of a leather band encircling the wheel and whirls. The whirls are made to run with a truer motion when the head on the rising side of the band has a larger segment of a circle than the falling side; or, in other words, let the base part of the head be longer from the middle than the opposite or falling side, by which means the band will be kept equally tight over the whirls, and consequently the motion be alike to all. N. B. Heads made in this manner have always the wheel turned the same way.

SPINOSITY, *n. s.* Lat. *spinosus.* Crabbedness; thorny or briary perplexity.

The first attempts are always imperfect; much more in so difficult and *spiny* an affair as so nice a subject. *Digby.*

Philosophy consisted of nought but dry *spinosities,* lean notions and endless altercations about things of nothing. *Glanville.*

SPINOSUM Folium, a spinous leaf, indicates the margin running out into rigid points or prickles, quod margine exit in acumina duriora, rigida, pungentia.

SPINOSUS Caulis. See Botany, Glossary.

Spinous, in botany. See Spinosus.

Spinous Fishes, such as have some of the rays of the back fins running out into thorns or prickles, as the perch, &c.

SPINOZA (Benedict), was born at Amsterdam the 24th of November 1632. His father was a Jew of Portugal, by profession a merchant. After being taught Latin, by a physician, he studied theology, and afterwards devoted himself to philosophy. He began very early to be dissatisfied with the Jewish religion; and, as his temper was open, he did not conceal his doubts from the synagogue. The Jews, it is said, offered to tolerate his infidelity, and even promised him a pension of 1000 dollars a year, if he would remain in their society, and continue outwardly to practise their ceremonies. But, if this offer was really made, he rejected it, from his aversion to hypocrisy, or because he could not endure the restraint which it would have imposed. He also refused the legacy of a very considerable fortune, to the prejudice of the natural heirs; and he learned the art of polishing glass for spectacles, that he might subsist independently of every one. An

accident hastened his leaving the synagogue. As he was returning home one evening from the theatre, he was stabbed by a Jew; the wound was slight; but the attempt led Spinoza to conclude that the Jews had formed the design of assassinating him. He then became a Christian, and frequented the churches of the Lutherans and Calvinists. He now devoted himself more than ever to his philosophical speculations; and, being often interrupted by his friends, he left Amsterdam, and settled at the Hague, where he sometimes continued for months together without ever stirring from his lodging. His Tractatus Theologico Politicus was published about this time, a book containing all those doctrines in embryo, which were afterwards unfolded in his Opera Posthuma, and which are generally considered as a system of atheism. His fame, which had now spread far and wide, obliged him sometimes to interrupt his philosophical reveries. Learned men visited him from all quarters. While the prince of Condé commanded the French army, in Utrecht, he entreated Spinoza to visit him; and, though he was absent when the philosopher arrived, he returned immediately, and spent a considerable time with him. The elector Palatine offered to make Spinoza professor of philosophy at Heidelberg; but this he declined. He died of a consumption at the Hague on the 21st of February 1677, aged forty-five. His life was a perpetual contradiction to his opinions. He was temperate, liberal, and remarkably disinterested; he was sociable, affable, and friendly. His conversation was agreeable and instructive, and never deviated from the strictest propriety. In the Tractatus Theologico Politicus, he treats of prophecy and prophets; and of the call of the Hebrews, whom he affirms to have been distinguished from other nations only by the admirable form of their government. He is likewise of opinion, or pretends to be so, that God may, in a supernatural way, have given political institutes to other nations as well as to the Hebrews. For, according to him, every nation was blessed with the light of prophecy. That light indeed, if his notions of it be just, was of very little value. He labors to prove that the prophets were distinguished from other men only by their piety and virtue; and that their writings are valuable to us only for the excellent rules they contain respecting piety and virtue. He then endeavours to prove that no miracle, in the proper sense of the word, can have been at any time performed; because every thing happens by a necessity of nature, the result of the divine decrees, which are from all eternity necessary themselves. He acknowledges that in the Scriptures, which he professes to admit as true history, miracles are often mentioned; but he says that they were only singular events which the sacred historians imagined to be miraculous. He affirms, in contradiction to the clearest internal evidence, that the Pentateuch and all the other historical books must have been written by one man; and that man, he thinks, was Ezra. The grounds of this opinion are unworthy of the talents of Spinoza. His principal objection to the authenticity of the Pentateuch is, that Moses is made to speak of himself in the third person; the very same childish objection since repeated by Thomas Paine, whose ignorance may somewhat excuse him, but Spinoza surely could read the Commentaries of Cæsar, in the original, who speaks of himself modestly in the third person throughout all his writings. He also objects to the expression of the Canaanites being then in the land. These senseless cavils, worthy only of one of those modern freethinkers whose learning, in the opinion of bishop Warburton, is not sufficient to carry them even to the confines of rational doubt, we have sufficiently obviated in another place. See SCRIPTURE. In the midst of this dogmatical scepticism, he bears such a testimony to the last chapters of the book of Daniel as we should not have looked for in the writings either of a Jew or a Deist. After detailing the various hypotheses respecting the author and the intention of the book of Job, in which, he says, Momus is called Satan, he proceeds in these words:—'Transeo ad Danielis librum; hic sine dubio ex cap. 8. ipsius Danielis scripta continet. Undenam autem priora septem capita descripta fuerint, nescio,' thus admitting the famous prophecy of the seventy weeks. That so paradoxical a writer, who had been originally a Jew, and was now almost a Deist, should have treated the New Testament with as little ceremony as the Old, will not surprize the intelligent reader. He begins his remarks, however, with affirming that no man can peruse the Christian Scriptures and not acknowledge the apostles to have been prophets; but he thinks that their mode of prophecying was altogether different from that which prevailed under the Mosaic dispensation; and that the gift, whatever it was, forsook them the instant that they left off preaching, as their writings have to him every appearance of human compositions. This distinction between Christian and Jewish prophecy is the more wonderful, that he founds it principally on the dissimilarity of style visible in the writings of the Old and New Testaments. Taking our leave of his Tractatus Theologico Politicus, we shall now give our readers a short account of his Opera Posthuma. These consist of, 1. Ethica, more geometrico demonstrata; 2. Politica; 3. De Emendatione Intellectus; 4. Epistolæ, et ad eas Responsiones; 5. Compendium Grammatices Linguæ Hebrææ. The Ethica are divided into five parts, which treat in order, de Deo; de natura et origine mentis; de origine et natura effectuum; de servitute humana, seu de affectuum viribus; de potentia intellectus, seu de libertate humana. As the author professes to tread in the footsteps of the geometers, and to deduce all his conclusions by rigid demonstration from a few self-evident truths, he introduces his work, after the manner of Euclid, with a collection of definitions and axioms. These are couched in terms generally ambiguous. His definition of substance, for instance, is so expressed as to admit of two senses; in one of which it is just, whilst in the other it is the parent of the most impious absurdity. 'Per substantiam intelligo id, quod in se est, et per se concipitur: hoc est id, cujus conceptus non indiget conceptu alterius rei, a quo formari debeat.' If by this he meant that a substance

is that which we can conceive by itself without attending to any thing else, or thinking of its formation, the definition, we believe, will be admitted by every reflecting mind, as sufficiently distinguishing the thing defined from an attribute, which, he says, is that which we perceive of a substance, and which we certainly cannot conceive as existing by itself. Thus the writer of this article can shut his eyes and contemplate in idea the small quarto volume now before him, without attending to any thing else, or thinking of its paradoxical author, or even of the Great Being who created the matter both of him and of it; but he cannot for an instant contemplate the yellow color of its vellum boards without thinking of triple extension, or, in other words, of body. The book therefore is a substance, because conceivable by itself; the color is an attribute or quality, because it cannot be conceived by itself, but necessarily leads to the conception of something else. But if Spinoza's meaning be, that nothing is a substance but what is conceived as existing from eternity, independent of every thing as a cause, his definition cannot be admitted: for every man conceives that which in himself thinks, and wills, and is conscious, as a substance; at the same time that he has the best evidence possible that he existed not as a conscious thinking, and active being, from eternity. His fourth axiom is thus expressed:—'Effectus cognitio a cognitione causæ dependet, et eandem involvit;' and his fifth, 'Quæ nihil commune cum se invicem habent, etiam per se invicem intelligi non possunt, sive conceptus, unius alterius conceptum non involvit.' The former of these propositions, so far from being self-evident, is not even true; and the latter is capable of two senses very different from each other. That every effect proceeds from a cause is indeed an axiom; but surely we may know the effect accurately, though we be ignorant of the particular cause from which it proceeds (see Philosophy and Physics); nor does the knowledge of the one by any means involve the knowledge of the other. If different things have nothing in common, it is indeed true that the knowledge of one of them will not give us an adequate conception of the other; but it will in many cases compel us to believe that the other exists or has existed. A parcel of gunpowder lying at rest has nothing in common with the velocity of a cannon-ball; yet, when we know that a ball has been driven with velocity from a cannon, we infer with certainty that there has been a parcel of powder at rest in the chamber of that cannon, before it was fired. It is upon such ambiguous definitions and axioms as these that Spinoza has raised his pretended demonstrations, that one substance cannot produce another; that every substance must necessarily be infinite; that no substance exists or can be conceived besides God; and that extended substance or body is one of the infinite attributes of God. We shall not waste time with a formal confutation of these absurdities. They are sufficiently confuted in other articles of this work; and whoever wishes for a more particular examination of the author's principles, may find it in Dr. Clarke's Demonstration of the Being and Attributes of God. According to Spinoza bodies are either attributes or affections of God; and, as he says there is but one extended substance, he affirms that substance to be indivisible. He attempts to prove that God is an extended as well as a thinking substance; that as a thinking substance he is the cause of the idea of a circle, and as an extended substance of the circle itself; that the minds of men are not substances, but certain modifications of the divine attributes. And that thinking and extended substances are in reality but one and the same substance, which is sometimes comprehended under one attribute of the Deity, and sometimes under another. If this impious jargon be not Atheism, or as it has been sometimes called Pantheism, we know not what it is. According to Spinoza, there is but one substance, which is extended, infinite, and indivisible. That substance indeed he calls God; but he labors to prove that it is corporeal; that there is no difference between mind and matter; that both are attributes of the Deity variously considered; that the human soul is a part of the intellect of God; that the same soul is nothing but the idea of the human body; that this idea of the body, and the body itself, are one and the same thing; that God could not exist, or be conceived, were the visible universe annihilated; and therefore that the visible universe is either the one substance, or at least an essential attribute or modification of that substance. According to him, nothing but the prejudices of education could have led men to fancy that there is any real distinction between good and evil, merit and demerit, praise and reproach, order and confusion; that eyes were given that the owners might see; that the sun was formed to give light, &c. If this be true, it is impossible to discover wisdom in the operations of his one substance; since it is the very characteristic of folly to act without any end in view. His Compendium Grammatices Linguæ Hebrææ, though left imperfect, appears to have so much merit, that it is to be wished he had fulfilled his intention of writing a philosophical grammar of that language, instead of wasting his time on abstruse speculations, which, though they seem not to have been injurious to his own virtue, are certainly not calculated to promote the virtue of others, or to increase the sum of human happiness.

SPINOZISM, the opinions and doctrines of Spinoza. See the last article.

SPINTHERE. Color greenish-gray. In small oblique double four-sided pyramids. It does not scratch glass. It occurs in the department of Isere in France, incrusting calcareous spar crystals. It is believed to be a variety of sphene.

SPINTURNIX, in fabulous history, a bird, or rather a quadruped with wings, which was said sometimes to attend the sacrifices, and carry away a live coal from the altar; which was reckoned an omen of ill luck.—Pliny. It would have been more natural for such a monster to have carried off the sacrifice.

SPIRA (Francis), an eminent Italian lawyer, who flourished with great reputation in the beginning of the sixteenth century, at Citadella in the Venetian States. He had imbibed the prin-

ciples of the Reformation, and was accused of heresy, before John De La Casa, archbishop of Benevento, the pope's nuncio at Venice. He made some concessions, and asked pardon for his errors; but the nuncio insisted on a public recantation. Spira was exceedingly averse to this measure, but, at the pressing entreaties of his wife and his friends, he at last complied. But he would have suffered much less torture at the stake, had he had the courage to have avowed his faith and died a martyr, than he did afterwards by the remorse he felt, and the dreadful state of melancholy he fell into. By the advice of physicians and divines, he was removed to Padua; but no change of place, medicine, regimen, or consolatory advice, could afford any relief to his wounded conscience. He thought himself certain of eternal damnation, and refused all the consolation that could be suggested. He sometimes even imagined that he already felt the torments of the damned. His melancholy case, in which he long lingered, and to which at last he fell a victim in 1548, made a great noise throughout Europe. The celebrated Henry Scrimzeor is said to have written an account of it with his life. We have seen a small work giving an account of his case in English, probably an extract or translation from Scrimzeor; but, of all the books that ever were printed, it would be the most dangerous to be put into the hands of a person inclined to melancholy.

SPIR'ACLE, *n. s.* } Lat. *spiraculum.* A
SPIRAC'ULA. } breathing hole; vent; small aperture.

Most of these *spiracles* perpetually send forth fire, more or less. *Woodward.*

As these volcanos are supposed to be *spiracula* or breathing holes to the great subterraneous fires, it is probable that the escape of elastic vapours from them is the cause, that the earthquakes of modern days are of such small extent compared to those of ancient times, of which vestiges remain in every part of the world, and on this account may be said not only to be innocuous, but useful. *Darwin.*

SPIRÆA, the spiræa frutex, in botany, a genus of plants belonging to the class of icosandria, and to the order of pentagynia; natural order twenty-sixth, pomaceæ: CAL. quinquefid; there are five petals; CAPS. polyspermous. There are eighteen species; of which two only are British, the filipendula and ulmaria. 1. S. filipendula, dropwort, has pinnated leaves: the leaflets are serrated; the stalk is herbaceous, about a foot and a half high, terminated with a loose umbel of white flowers, often tinged with red. The petals are generally six, and the segments of the calyx are reflexed; the stamina are thirty or more; the germina twelve or upwards. It grows in mountainous pastures. 2. S. ulmaria, meadow-sweet. The leaves have only two or three pair of pinnæ, with a few smaller ones intermixed; the extreme one being larger than the rest, and divided into three lobes. The calyx is reddish; the petals white, and the number of capsules from six to ten twisted in a spiral. The tuberous pea, like roots of the filipendula dried and reduced to a powder, have been used instead of bread in times of scarcity. Hogs are very fond of these roots. Cows, goats, sheep, and swine, eat the plant; but horses refuse it. The flowers of the ulmaria have a fragrant scent, which rises in distillation. The whole plant in deed is extremely fragrant, so that the common people of Sweden strew their floors with it on holidays. It has also an astringent quality, and has been found useful in dysenteries, ruptures, and in tanning of leather.

SPIRAGO, a town of the new Italian kingdom, in the department of the Olona, district and late principality of Pavia, seated on the Olona, in a fertile country.

SPI'RAL, *adj.* } Fr. *spirale*; Lat. *spira.*
SPI'RALLY, *adv.* } Curve; winding; in-
SPIRE, *n. s.* & *v. n.* } volved, like a screw: the adverb corresponding: a spire is a curvature; any thing wreathed or hoisted to a point; any thing taper: to shoot up in the way.

'Twere no less than a traducement to silence, that
Which to the *spire* and top of praises vouched,
Would seem but modest. *Shakspeare.*

His head
Crested aloft, and carbuncle his eyes;
With burnished neck of verdant gold, erect
Amidst his circling *spires*, that on the grass
Floated redundant. *Milton.*

With glistering *spires* and pinnacles adorned. *Id.*

He cannot make one *spire* of grass more or less than he hath made. *Hale's Origin of Mankind.*

A dragon's fiery form belied the god,
Sublime on radiant *spires* he rode. *Dryden.*

The process of the fibres in the ventricles, running in *spiral* lines from the tip to the base of the heart, shews that the systole of the heart is a muscular constriction, as a purse is shut by drawing the strings contrary ways. *Ray.*

The sides are composed of two orders of fibres, running circularly or *spirally* from base to tip. *Id. on the Creation.*

It is not so apt to *spire* up as the other sorts, being more inclined to branch into arms. *Mortimer.*

These pointed *spires* that wound the ambient sky,
In glorious change! shall in destruction lie. *Prior.*

Why earth or sun diurnal stages keep,
In *spiral* tracts why through the zodiack creep. *Blackmore.*

The intestinal tube affects a straight, instead of a *spiral*, cylinder. *Arbuthnot on Aliments.*

Air seems to consist of *spires* contorted into small spheres, through the interstices of which the particles of light may freely pass; it is light, the solid substance of the *spires* being very small in proportion to the spaces they take up. *Cheyne.*

As woodbine weds the plant within her reach,
Rough elm, or smooth-grained ash, or glossy beech,
In *spiral* rings ascends the trunk, and lays
Her golden tassels on the leafy sprays,
But does a mischief while she lends a grace,
Straitening its growth by such a strict embrace. *Cowper.*

Well spake the prophet, Let the desert sing.
Where sprang the thorn, the *spiry* fir shall spring,
And where unsightly and rank thistles grew,
Shall grow the myrtle and luxuriant yew. *Id.*

SPIRAL LINE, in geometry, a curve line of the circular kind, which in its progress recedes from its centre.

SPIRE, in architecture, was used by the ancients for the base of a column, and sometimes for the astragal or tore; but among the moderns it denotes a steeple that continually diminishes as it ascends, whether conically or pyramidically.

Spire, or Speyer, an ancient town in the west of Germany, situated at the confluence of the Spirebach and the Rhine, fourteen miles south of Manheim, and sixteen north-east of Landau. It long gave name to a bishopric; and the only interesting building is the old cathedral, now falling into decay. Spire was frequently the seat of the German diet; and it was in one of these assemblies, in 1529, that a protest, entered by the reformers against certain proceedings of the emperor, procured them the name of Protestants. From 1795 to 1814 it belonged to the French; at present it is the capital of the Bavarian province of the Rhine, and has a lyceum established by government. Population about 4000. The bishopric of Spire was not of great extent. It contained 55,000 inhabitants, and yielded a revenue of £30,000 sterling. It was secularised in 1802, and at present belongs partly to Bavaria, partly to Baden. The episcopal residence was Bruchsal.

SPIR'IT, *n. s.* & *v. a.* Spir'italy, *adv.* Spir'ited, *adj.* Spir'itedness, *n. s.* Spir'itfulness, Spir'itless, *adj.* Spir'itous, Spir'itousness, *n. s.* Spir'ituai, *adj.* Spiritual'ity, *n. s.* Spir'ituaiize, *v. a.* Spir'itually, *adv.* Spir'ituaity, *n. s.* Spir'ituous, *adj.* Spirituos'ity, *n. s.* Spirituous'ness. Fr. *esprit.* Lat. *spiritus*; Breath; air; wind; an immaterial substance or being; intellectual being; the soul; temper or disposition; genius; ardor; courage; an apparition or spectre: to spirit is to animate or actuate as a spirit; encourage; entice: spiritally is by means of the breath: spirited, lively; vivacious: the noun substantive corresponding: spiritfulness is sprightliness; liveliness: spiritless, vapid; dejected; low; depressed: spiritous, defecated; refined; advanced near to spirit: spiritousness corresponds: spiritual, immaterial, mental, or intellectual; not gross; not temporal: the adverb (spiritually) and noun substantive corresponding: the spirituaity is used for the clerical body: to spiritualize is to refine; purify from the pollutions of the world: spirituous is having the quality of spirit; lively; gay: both the noun substantives following corresponding.

The *spirit* shall return unto God that gave it. *Bible.*

They were terrified, and supposed that they had seen a *spirit.* *Luke* xxiv. 37.

More ample *spirit* than hitherto was wont
Here needs me, whiles the famous ancestors
Of my most dreaded sovereign I recount,
By which all earthly princes she doth far surmount. *Faerie Queene.*

Place man in some publick society, civil or *spiritual.* *Hooker.*

Look, who comes here? a grave unto a soul,
Holding the' eternal *spirit* against her will
In the vile prison of afflicted death. *Shakspeare. King John.*

Farewel the big war,
The *spirit* stirring drum, the ear piercing fife. *Shakspeare.*

You were used
To say extremity was the trier of *spirits*,
That common chances common men could bear. *Id.*

You are too great to be by me gainsaid
Your *spirit* is too true, your fears too certain. *Id.*

The watry kingdom is no bar
To stop the foreign *spirits*, but they come. *Id.*

When I sit and tell
The warlike feats I've done, his *spirits* fly out
Into my story. *Id. Cymbeline.*

A man so faint, so *spiritless*,
So dull, so dead in look, so woe-begone.
Drew Priam's curtain. *Shakspeare. Henry IV*

Nor doth the eye itself,
That most pure *spirit* of sense, behold itself. *Id.*

Thou art reverend
Touching thy *spiritual* function, not thy life. *Id.*

We of the *spirituality*
Will raise your highness such a mighty sum,
As never did the clergy at one time. *Id.*

If this light be not *spiritual*, yet it approacheth nearest unto *spirituality*; and if it have any corporality, then of all other the most subtile and pure. *Raleigh.*

All purges have in them a raw *spirit* or wind, which is the principal cause of tension in the stomach. *Bacon.*

All bodies have *spirits* and pneumatical parts within them; but the main difference between animate and inanimate are, that the *spirits* of things animate are all continued within themselves, and branched in veins as blood is; and the *spirits* have also certain seats where the principal do reside and whereunto the rest do resort: but the *spirits* in things inanimate are shut in and cut off by the tangible parts, as air in snow. *Id. Natural History.*

Perhaps you might see the image, and not the glass; the former appearing like a *spirit* in the air. *Bacon.*

Both visibles and audibles in their working emit no corporeal substance into their mediums, but only carry certain *spiritual* species. *Id.*

She is a *spirit*; yet not like air or wind,
Nor like the *spirits* about the heart or brain;
Nor like those *spirits* which alchymists do find,
When they in every thing seek gold in vain:
For she all natures under heaven doth pass,
Being like those *spirits* which God's bright face do see;
Or like himself, whose image once she was,
Though now, alas! she scarce his shadow be.
For of all forms she holds the first degree,
That are to gross material bodies knit;
Yet she herself is bodyless and free,
And though confined is almost infinite. *Davies.*

Italian pieces will appear best in a room where the windows are high, because they are commonly made to a descending light, which of all other doth set off men's faces in their truest *spirit.* *Wotton.*

It may appear airy and *spirituous*, and fit for the welcome of chearful guests. *Id. Architect.*

Romish adversaries, from the rising up of some schismatical *spirits* amongst us, conclude that the main body of our church is schismatical, because some branches of members thereof were such. *White.*

As to the future glory in which the body is to partake, that load of earth which now engages to corruption, must be calcined and *spiritualized*, and thus be cloathed upon with glory. *Decay of Piety.*

To a mighty work thou goest, O king,
That equal *spirits* and equal powers shall bring. *Daniel.*

A cock's crowing is a tone that corresponds to singing, attesting his mirth and *spiritfulness.* *Harvey.*

This would take it much out of the care of the soul, to *spiritualize* and replenish it with good works. *Hammond.*

I ask but half thy mighty *spirit* for me. *Cowley.*

Oft pitying God did well-formed *spirits* raise,
Fit for the toilsome bus'ness of their days,
To free the groaning nation, and to give
Peace first, and then the rules in peace to live. *Id.*

By means of the curious inosculation of the auditory nerves, the orgasms of the *spirits* should be allayed. *Derham.*

In the same degree that virgins live more *spiritually* than other persons, in the same degree is their virginity a more excellent state.
Taylor's Rule of Holy Living.

These discourses made so deep impression upon the mind and *spirit* of the prince, whose nature was inclined to adventures, that he was transported with the thought of it. *Clarendon.*

He sits
Upon their tongues a various *spirit*, to rase
Quite out their native language. *Milton.*

In *spirit* perhaps he also saw
Rich Mexico, the seat of Montezume. *Id.*

So talked the *spirited* sly snake.
Id. Paradise Lost.

Of their wonted vigour left them drained,
Exhausted, *spiritless*, afflicted, fallen. *Id.*

More refined, more *spiritous* and pure,
As nearer to him placed, or nearer tending.
Milton.

Spiritual armour, able to resist
Satan's assaults. *Id.*

More refined, more *spirituous* and pure,
As to him nearer tending. *Id.*

A wild Tartar, when he spies
A man that's handsome, valiant, wise,
If he can kill him, thinks t' inherit
His wit, his beauty, and his *spirit*. *Butler.*

We begin our survey from the lowest dregs of sense, and so ascend to our more *spiritualized* selves. *Glanville.*

In the southern coast of America, the southern point of the needle varieth toward the land, as being disposed and *spirited* that way by the meridional and proper hemisphere. *Browne.*

What the chymists call *spirit*, they apply the name to so many different things that they seem to have no settled notion of the thing. In general, they give the name of *spirit* to any distilled volatile liquor. *Boyle.*

They, notwithstanding the great thinness and *spiritousness* of the liquor, did lift up the upper surface, and for a moment form a thin film like a small hemisphere. *Id.*

Conceive one of each pronounced *spiritally*, the other vocally. *Holder's Elements of Speech.*

That peculiar law of Christianity, which forbids revenge, no man can think grievous, who considers the restless torment of a malicious and revengeful *spirit*. *Tillotson.*

The noblest *spirit* or genius cannot deserve enough of mankind, to pretend to the esteem of heroick virtue. *Temple.*

He will be faint in any execution of such a counsel, unless *spirited* by the unanimous decrees of a general diet. *Id.*

Such *spirits* as he desired to please, such would I chuse for my judges. *Dryden.*

To sing thy praise, would heaven my breath prolong,
Infusing *spirits* worthy such a song,
Not Thracian Orpheus should transcend my lays.
Id.

Nor did all Rome, grown *spiritless*, supply
A man that for bold truth durst bravely die. *Id.*

Those servants, who have believing masters, are forbid to withdraw any thing of their worldly respect, as presuming upon their *spiritual* kindred; or to honour them less, because they are become their brethren in being believers. *Kettleworth.*

Spirit is a substance wherein thinking, knowing doubting, and a power of moving, do subsist.
Locke.

Whilst young, preserve his tender mind from all impressions of *spirits* and goblins in the dark. *Id.*

God has changed men's tempers with the times, and made a *spirit* of building succeed a *spirit* of pulling down. *South.*

There is in wine a mighty *spirit*, that will not be congealed. *Id.*

The same disaster has invaded his *spirituals*; the passions rebel; and there are so many governours that there can be no government. *Id.*

A pleasure made for the soul, suitable to its *spirituality*, and equal to all its capacities. *Id.*

Many secret indispositions and aversions to duty will steal upon the soul, and it will require both time and close application of mind to recover it to such a frame as shall dispose it for the *spirituolities* of religion. *Id.*

Art thou so base, so *spiritless* a slave?
Not so he bore the fate to which you doomed him.
Smith.

Of common right, the dean and chapter are guardians of the *spiritualities*, during the vacancy of a bishoprick. *Ayliffe.*

He showed the narrow *spiritedness*, pride, and ignorance of pedants. *Addison.*

Nor once disturb their heavenly *spirits*
With Scapin's cheats, or Cæsar's merits. *Prior.*

If man will act rationally, he cannot admit any competition between a momentary satisfaction, and an everlasting happiness, as great as God can give and our *spiritualized* capacities receive. *Rogers.*

All men by experience find the necessity and aid of the *spirits* in the business of concoction.
Blackmore.

Some, who pretend to be of a more *spiritual* and refined religion, spend their time in contemplation, and talk much of communion with God.
Calamy's Sermons.

All *spirits*, by frequent use, destroy, and at last extinguish, the natural heat of the stomach.
Temple.

In distillations, what trickles down the sides of the receiver, if it will not mix with water, is oil; if it will, it is *spirit*. *Arbuthnot on Aliments.*

The ministry had him *spirited* away, and carried abroad, as a dangerous person.
Arbuthnot and Pope.

The most *spirituous* and most fragrant part of the plant exhales by the action of the sun. *Arbuthnot.*

All creatures, as well *spiritual* as corporeal, declare their absolute dependence upon the first Author of all beings, the only self-existent God.
Bentley.

I shall depend upon your constant friendship; like the trust we have in benevolent *spirits*, who, though we never see or hear them, we think are constantly praying for us. *Pope.*

In some fair body thus the secret soul
With *spirits* feeds, with vigour fills the whole:
Each motion guides, and every nerve sustains,
Itself unseen, but in the' effects remains. *Id.*

Dryden's translation of Virgil is noble and *spirited*. *Id.*

The king's party, called the cavaliers, began to recover their *spirits*. *Swift.*

Many officers and private men *spirit* up and assist those obstinate people to continue in their rebellion. *Id.*

The clergy's business lies among the laity; nor is there a more effectual way to forward the salvation of men's souls, than for *spiritual* persons to make themselves as agreeable as they can in the conversations of the world. *Id.*

If we seclude space, there will remain in the world but matter and mind, or body and *spirit*. *Watts's Logick.*

You are all of you pure *spirits*. I don't mean that you have not bodies that want meat and drink, and sleep and clothing; but that all that deserves to be called you is nothing else but *spirit*. *Law.*

Every thing that you call yours, besides this *spirit*, is but like your cloathing: sometimes that is only to be used for a while, and then to end, and die, and wear away. *Id.*

He is the devout man, who lives no longer on his own will, or the way and *spirit* of the world, but to the sole will of God. *Id.*

He is always forced to drink a hearty glass, to drive thoughts of business out of his head, and make his *spirits* drowsy enough for sleep. *Id.*

She loves them as her *spiritual* children, and they reverence her as their *spiritual* mother, with an affection far above that of the fondest friends. *Id.*

Spirit, in metaphysics, an incorporeal being or intelligence; in which sense God is said to be a spirit, as are angels and the human soul. See Angel, Metaphysics, and Theology.

Spirit, in chemistry and pharmacy, a name applied to every volatile liquid which is not insipid like phlegm or water; and hence the distinction into acid, alkaline, and vinous spirits. See Pharmacy, Index.

Spirit, Pyro-Acetic. Some dry acetates exposed to heat in a retort yield a quantity of a light volatile spirit, to which the above name is given. When the acetate is easily decomposed by the fire it affords much acid and little spirit; and, on the contrary, it yields much spirit and little acid when a strong heat is required for its decomposition. The acetates of nickel, copper, &c., are in the first condition; those of barytes, potash, soda, strontian, lime, manganese, and zinc, are in the second. The following table of M. Chenevix exhibits the products of the distillation of various acetates:—

Table of Pyro-acetic Spirit.

		Acetate of Silver.	Acetate of Nickel.	Acetate of Copper.	Acetate of Lead.	Peracetate of iron.	Acetate of Zinc.	Acetate of Manganese.
	Loss by the fire	0·36	0·61	0·64	0·37	0·49		0·555
Residuum.	State of the base	metallic.	metallic.	metallic.	metallic.	bl. oxide.	wh. oxide.	br. oxide.
	Residue Carbon.	0·05	0·14	0·055	0·04	0·02	0·05	0·035
Liquid products	Specific gravity	1·0656	1·0398	1·0556	0·9407	1·011	0·8452	0·8264
	Ratio of acid	107·309	44·731	84·863	3·045	27·236	2·258	1·285
	Pyro-acetic spirit	0	almost 0	0·17	0·555	0·24	0·695	0·94
Gaseous products	Carbonic acid	8	35	10	20	18	16	20
	Carbonate hydro.	12	60	34	8	34	28	32
	Total gas	20	95	44	28	52	44	52

We see that, of all the acetates, that of silver gives the most concentrated and purest acetic acid, since it contains no pyro-acetic spirit. This spirit is limpid and colorless. Its taste is at first acrid and burning, then cooling, and in some measure urinous. Its odor approaches that of peppermint mingled with bitter almonds. Its specific gravity is 0·7864. It burns with a flame interiorly blue, but white on the outside. It boils at 138·2 Fahrenheit, and does not congeal at 5° Fahrenheit. With water it combines in every proportion, as well as with alcohol, and most of the essential oils. It dissolves but a little of sulphur and phosphorus, but camphor in very large quantity.

Caustic potash has very little action on the pyro-acetic spirit. Sulphuric and nitrous acids decompose it; but muriatic acid forms with this body a compound, which is not acid, and in which we can demonstrate the presence of the muriatic acid only by igneous decomposition. Hence we perceive that pyro-acetic spirit is a peculiar substance, which resembles the ethers, alcohol, and volatile oils. To obtain it cheaply we may employ the acetate of lead of commerce. After having distilled this salt in an earthen retort, and collected the liquid products in a globe, communicating by a tube with a flask surrounded with ice, we saturate these products with a solution of potash or soda, and then separate the spirit by means of a second distillation, taking care to use a regulated heat. As it usually carries over with it a little water, it is proper to rectify it from dry muriate of lime.—Ann. de Chimie, tom. 69.

Spirituous Liquors. Moralists, philosophers, and divines, in all ages, and in almost all countries (for all countries abound in some kind of spirituous liquors), have exclaimed against the abuse of spirituous liquors, and with justice; for no human invention has ever tended more to corrupt the morals, and ruin the character, constitution, and circumstances, of numberless individuals, than habitual and excessive indulgence in spirituous liquors. But, while these abuses of them are to be regretted, their proper use and importance should not be overlooked. The learned Dr. Rush of Philadelphia has written much upon this subject; and, in his zeal for the health and morals of the people, proposes a total

abolition of the manufacture. In this we differ from that learned physician. Spirituous liquors are not only useful in social life, as a means of conviviality, but in many cases highly beneficial as a medicine. In cases of sudden faintings, apoplectic fits, extreme debility, and, above all, in cases of excessive perspiration, there is no remedy or antidote so speedy and certain in affording effectual relief, except to such as have ruined their constitutions by excessive indulgence in them, as a glass of good spirits. These have another advantage, that, in cases of sudden emergency, they are always at hand; whereas few persons in health keep an assortment of medicines in their possession; and the surgeon, physician, and laboratory, are often at a great distance.

Spirituous liquors have in all nations been considered as a proper subject of heavy taxation for the support of the state. This has naturally occasioned a nice examination of their strength. It having been at last found that this was intimately connected with the specific gravity, this has been examined with the most scrupulous attention to every circumstance which could affect it, so that the duties might be exactly proportioned to the quantity of spirit in any strong liquor, independent of every other circumstance of flavor or taste, or other valued quality. The chemist at last found that the basis of all strong liquors is the same, produced by the vinous fermentation of pure saccharine matter dissolved in water. He also found that whether this vegetable salt be taken as it is spontaneously formed in the juices of plants and fruits, or as it may be formed or extricated from farinaceous fruits and roots by a certain part of the process of vegetation, it produces the same ardent spirit, which has always the same density in every mixture with water. The minute portions of aromatic oils, which are in some degree inseparable from it, and give it a different flavor, according to the substance from which it was obtained, are not found to have any sensible effect on its density or specific gravity. This seems very completely established in consequence of the unwearied attempts of the manufacturers to lessen the duties payable on their goods by mixtures of other substances, which would increase their density without making them less palatable. The vigilance of the revenue officers was no less employed to detect every such contrivance. In short, it is now an acknowledged point that the specific gravity is an accurate test of the strength. But it was soon found, by those who were appointed guardians of the revenue, that a mixture which appeared to contain thirty-five gallons of alcohol did really contain thirty-five and a half. This they found by actually making such a mixture: eighteen gallons of alcohol mixed with eighteen of water produced only thirty-five gallons of spirits. The revenue officers, finding that this condensation was most remarkable in mixtures of equal parts of water and the strongest spirits which could then be procured, determined to levy the duties by this mixture; because, whether the spirituous liquor was stronger or weaker than this, it would appear, by its specific gravity, rather stronger than it really was. This sagacious observation, and the simplicity of the composition, which could at all times be made for comparison, seem to be the reasons for our excise officers selecting this mode of estimating the strength and levying the duties. A mixture of nearly equal measures of water and alcohol is called proof spirit, and pays a certain duty per gallon; and the strength of a spirituous liquor is estimated by the gallons, not of alcohol, but of proof spirit which the cask contains. But, because it might be difficult to procure at all times this proof spirit for comparison, such a mixture was made by order of the board of excise; and it was found that, when six gallons of it was mixed with one gallon of water, a wine gallon of the mixture weighed seven pounds thirteen ounces avoirdupois. The board therefore declared that the spirituous liquor of which the gallon weighed seven pounds thirteen ounces should be reckoned one to six, or one in seven, under proof. This is but an awkward and complex formula: it was in order to suit matters to a mode of examination which had by time obtained the sanction of the board. Mr. Clarke, an ingenious artist of that time, had made a hydrometer incomparably more exact than any other, and constructed on mathematical principles, fit for computation. This had a set of weights corresponding to the additions of water or proof spirit, and the mixture one to six or one in seven was the only one which weighed an exact number of ounces per gallon without a fraction

SPIRT, *v.n.*, *v.a.* & *n.s.* } Belg. *spruyten*, to
SPIR'TLE, *v. a.* } shoot up (Skinner); Swed. *spritta*, to fly out (Lye); Goth. *sprita*. See SPRIT. To spring out in a sudden stream: stream out by intervals; throw out in a jet: sudden ejection or effort: to spirtle is a corruption of spirt.

Bottling of beer, while new and full of spirit, so that it *spirteth* when the stopple is taken forth, maketh the drink more quick and windy.
Bacon's Natural History.

The brains and mingled blood were *spirtled* on the wall. *Drayton.*

When weary Proteus
Retired for shelter to his wonted caves,
His finny flocks about their shepherd play,
And, rowling round him, *spirt* the bitter sea.
Dryden.

When rains the passage hide,
Oft the loose stones *spirt* up a muddy tide
Beneath thy careless foot. *Gay*

The terraqueous globe would, by the centrifugal force of that motion, be soon dissipated and *spirtled* into the circumambient space, was it not kept together by this noble contrivance of the Creator.
Derham's Physico-Theology.

Thus the small jett, which hasty hands unlock,
Spirts in the gardener's eyes who turns the cock.
Pope.

SPI'RY, *adj.* From SPIRE. Pyramidal; wreathed; curled.

Hid in the *spiry* volumes of the snake,
I lurked within the covert of a brake. *Dryden.*

In these lone walls, their days eternal bound,
These moss-grown domes with *spiry* turrets crowned,
Where awful arches make a noon-day night,
And the dim windows shed a solemn light,

Thy eyes diffused a reconciling ray,
And gleams of glory brightened all the day. *Pope.*

SPISS, *adj.* } Lat. *spissus.* Close; firm;
SPIS'SITUDE, *n. s.* } thick: the noun substantive corresponding. Not in use.

From his modest and humble charity, virtues which rarely cohabit with the swelling windiness of much knowledge, issued this *spiss* and dense yet polished, this copious yet concise, treatise of the variety of languages. *Brerewood.*

Drawing wine or beer from the lees, called racking, it will clarify the sooner; for, though the lees keep the drink in heart, and make it lasting, yet they cast up some *spissitude.* *Bacon.*

Spissitude is subdued by acrid things, and acrimony by inspissating. *Arbuthnot on Aliments.*

SPIT, *n. s.* & *v. a.* } Sax. ȝpitan; Belg. *spit;*
SPIT'TED, *adj.* } Ital. *spedo.* A long prong on which meat is driven, to be turned before the fire: the depth of a spade in digging: to put on a spit; thrust through: spitted is shot out into length.

A goodly city is this Antium;
'Tis I that made thy widows: then know me not,
Lest that thy wives with *spits,* and boys with stones,
In puny battle slay me. *Shakspeare. Coriolanus.*

I see my cousin's ghost
Seeking out Romeo, that did *spit* his body
Upon a rapier's point. *Shakspeare.*

Whether the head of a deer, that by age is more *spitted,* may be brought again to be more branched. *Bacon.*

They may be contrived to the moving of sails in a chimney corner, the motion of which may be applied to the turning of a *spit.* *Wilkins's Mathematical Magick.*

Where the earth is washed from the quick, face it with the first *spit* of earth dug out of the ditch. *Mortimer.*

I *spitted* frogs, I crushed a heap of emmets. *Dryden.*

With Peggy Dixon thoughtful sit,
Contriving for the pot and *spit.* *Swift.*

SPIT, *v. a., v. n.* & *n. s.* } Sax. ȝpœtan; Dan.
SPIT'TLE, *n. s.* } *spytter;* Swed. *spata;* Lat. *sputo.* To eject from the mouth: throw out spittle: the saliva of the mouth.

He *spat* on the ground, made clay of the spittle, and anointed the eyes of the blind man. *John* ix. 6.

And when he had *spat* on the ground, he anointed his eyes. *Gospel.*

A large mouth, indeed,
That *spits* forth death and mountains. *Shakspeare.*

Very good orators, when they are here, will *spit.* *Id.*

The watery kingdom, whose ambitious head
Spits in the face of heaven, is no bar
To stop the foreign spirits, but they come. *Id.*

The sea thrusts up her waves,
One after other, thicke and high, upon the groaning shores;
First in herself loud, but opposed with banks and rocks, she rores,
And all her backe, in bristles set, *spits* every way her fome. *Chapman.*

Mænas and Atys in the mouth were bred,
And never hatched within the lab'ring head;
No blood from bitten nails those poems drew,
But churned, like *spittle,* from the lips they flew. *Dryden.*

The saliva or *spittle* is an humour of eminent use. *Ray.*

A drunkard men abhor, and would even *spit* at him, were it not for fear he should something more than *spit* at them. *South.*

The *spittle* is an active liquor, immediately derived from the arterial blood: it is saponaceous. *Arbuthnot.*

A genius for all stations fit,
Whose meanest talent is his wit:
His heart too great, though fortune little,
To lick a rascal statesman's *spittle.* *Swift.*

Spit on your finger and thumb, and pinch the snuff till the candle goes out. *Id. Rules for Servants.*

SPITCH'COCK, *v. a.* To cut an eel in pieces and roast him; or rather the eel so roasted: of Teut. *speits kochen;* i. e. that which is cooked on a spit.

No man lards salt pork with orange peel,
Or garnishes his lamb with *spitchcockt* eel. *King.*

SPITE, *n. s.* & *v. a.* } Fr. *despit;* Belg. *spijt;*
SPITE'FUL, *adj.* } Ital. *spetto.* Malice;
SPITE'FULLY, *adv.* } rancor; malignity; malevolence: 'in spite of'
SPITE'FULNESS, *n. s.* } is in defiance of: to spite is to vex; treat with malice; offend: the adjective and adverb correspond.

This breeding rather *spite* than shame in her, or, if it were a shame, a shame not of the fault but of the repulse, she did thirst for a revenge. *Sidney.*

So with play did he a good while fight against the fight of Zelmane, who, more *spited* with that courtesy, that one that did nothing should be able to resist her, burned away with choler any motions which might grow out of her own sweet disposition. *Id.*

The Jews were the deadliest and *spitefullest* enemies of Christianity that were in the world, and in this respect their orders to be shunned. *Hooker.*

Beguiled, divorced, wronged, *spighted,* slain,
Most detestable death, by thee. *Shakspeare.*

All you have done
Hath been but for a wayward son,
Spiteful and wrathful. *Id. Macbeth.*

I'll guard thee free,
And save thee *in* her *spite.* *Chapman.*

Our publick form of divine service and worship is in every part thereof religious and holy, maugre the malice of *spiteful* wretches who have depraved it. *White.*

Bewray they did their inward boiling *spite,*
Each stirring others to revenge their cause. *Daniel.*

Done all to *spite*
The great Creator; but their *spite* still serves
His glory to augment. *Milton's Paradise Lost.*

Twice false Evadne, *spitefully* forsworn!
That fatal beast like this I would have torn. *Waller.*

Darius, *spited* at the magi, endeavoured to abolish not only their learning but their language. *Temple.*

In spite of me I love, and see too late
My mother's pride must find my mother's fate. *Dryden.*

The *spiteful* stars have shed their venom down,
And now the peaceful planets take their turn. *Id.*

In fireworks give him leave to vent his *spite;*
Those are the only serpents he can write. *Id.*

Blessed be such a preacher, whom God made use of to speak a word in season, and saved me *in spite of* the world, the devil, and myself. *South.*

Contempt is a thing made up of an undervaluing of a man, upon a belief of his utter uselessness, and a *spiteful* endeavour to engage the rest of the world in the same slight esteem of him. *Id.*

For thy loved sake, *spite of* my boding fears,
I'll meet the danger which ambition brings. *Rowe.*

My father's fate,
In spite of all the fortitude that shines
Before my face in Cato's great example,
Subdues my soul, and fills my eyes with tears.
Addison.

It looks more like *spitefulness* and ill-nature than a diligent search after truth. *Keil against Burnet.*

In spite of all applications, the patient grew worse every day. *Arbuthnot.*

Begone, ye criticks, and restrain your *spite;*
Codrus writes on, and will for ever write. *Pope.*

Vanessa sat,
Scarce listening to their idle chat,
Further than sometimes by a frown,
When they grew pert, to pull them down:
At last she *spitefully* was bent
To try their wisdom's full extent. *Swift.*

The cause is plain, and not to be denied,
The proud are always most provoked by pride;
Few competitions but engender *spite,*
And those the most, where neither has a right.
Cowper.

SPITHEAD, a road between Portsmouth and the Isle of Wight, where the royal navy of Great Britain frequently rendezvous.

SPIT'TLE, *n. s.* Corrupted from hospital, and therefore better written spital. Hospital. It is still retained in Scotland.

To the *spittle* go,
And from the powdering tub of infamy
Fetch forth the lazar kite of Cressid's kind.
Shakspeare. Henry V.

This is it
That makes the waned widow wed again,
She whom the *spittle* house, and ulcerous sores,
Would cast the gorge at. *Id. Timon.*
Cure the *spittle* world of maladies. *Cleaveland.*

SPITTLE, in physiology. See SALIVA.

SPITZBERGEN, or East Greenland, a name that has been given to a group of islands in the Northern Ocean, formerly supposed to make part of the continent. They are situated between 76° 30′ and 80° 30′ N. lat., and between 9° and 20° E. long. The land was first discovered by Sir Hugh Willoughby in the year 1553, who called it Groenland. In 1595 it was again visited by Barentz and Cornelius, two Dutchmen, who pretended to be the original discoverers, and called the country Spitzbergen, or Sharp Mountains, from the many sharp-pointed and rocky mountains with which it abounds. They alleged that the coast discovered by Sir Hugh Willoughby was some other country; which accordingly the Hollanders delineated on their maps and charts by the name of Willoughby Land; whereas in fact no such land ever existed; and, long before the voyage of these Dutchmen, Barrows, an English shipmaster, had coasted along a desolate country from lat. 78° to 80° 11′ N., which was undoubtedly Spitzbergen. The sea in the neighbourhood abounding in whales, this country has been long the common resort of the fishing ships from different countries. But, till the voyage of captain Phipps in 1773, the situation of the country was erroneously laid down.

This group extends further north than any other country yet discovered, and approaches within ten degrees of the pole. Spitzbergen is encompassed by the Arctic Ocean, and, though annually visited by vessels engaged in the whale-fishery, it does not ever appear to have been permanently inhabited. The main-land stretches about 300 miles, nearly in the direction of the meridian, as South Cape is in lat. 76° 30′, and the opposite extremity in 80° 7′ of latitude; and even one of the islands reaches 80° 40′.

The climate of these dreary regions is almost always intensely cold; and even in the three warmest months in the year, when the sun constantly shines, and the air is usually clear, the mean temperature is only about 34° 30′ of Fahrenheit's scale; while, during this period, the thermometer is often below the freezing point. The sun shines without setting for about four months in the year, and which has, therefore, been called their longest day. But, after he has passed the equinox, the approach of winter becomes very rapid. The sun sinks wholly below the horizon, and the temperature diminishes till the cold becomes intense. The birds of passage take their flight to milder regions, and the beasts that remain retire to their winter abodes. At this season the bear alone roams abroad. But man, as if determined to contest the sovereignty of desolation with this arctic monster, has even dared to winter on these bleak shores. Actuated by the prospect of gain to be derived from the opportunities of hunting and fishing during the winter, several adventurers annually proceed from Archangel and other ports on the White Sea, in small vessels fitted out for the purpose, and supplied with provisions and stores of all kinds that may be requisite for their support. Fuel, and huts ready constructed, are also taken out. These vessels either winter in some of the most obscure coves along the coast, or return with the members of the small colony, and the produce of their labors, that had been left the preceding year. As soon as they arrive at the place of their destination, the huts are erected, and the sailors remain on shore during the winter. Being accustomed to so severe a climate in their own country, they are seldom prevented from going abroad, unless when buried beneath the snow, which sometimes happens. In such cases they are obliged to make their way through the chimney to get out. The object of the adventurers is to kill whales, seals, sea-horses, bears, rein-deer, and arctic foxes. Instead of receiving wages from their employers, they are supplied with provisions and other stores, and are entitled to a certain portion of the produce of their labors when they return. Some of them are even hardy enough to prolong their stay for two or three years; but in that case they often fall victims to the fatal effects of the scurvy, which is the great bane of those regions. Though the sun remains below the horizon for about four months in the year, it is seldom very dark during that season; for the brightness of the moon, which sometimes shines for nearly fourteen days together, the resplendent brilliancy of the stars, and the reflection of the aurora borealis, which often resembles a blaze of fire, afford sufficient light to read by. The surface of Spitzbergen presents a scene of rugged nakedness and desolation, which is, perhaps, unparalleled. Buried beneath almost perpetual snow, its vegetable productions are

nearly all of the incumbent classes. A few mosses, lichens, and other arctic plants, make up the scanty catalogue. The only semblance of a shrub is the dwarf willow, which, in comparison, towers above all the other tribes, though seldom rising to more than two inches in height. The scenery of Spitzbergen is strikingly sublime and awfully grand; but it is a brilliancy of desolation, which rather astonishes than pleases —a chaotic confusion that chills while it delights, and rather overwhelms than elevates the mind.

Mr. Scoresby, in his late very interesting and valuable work on these regions, to which he had previously made seventeen voyages, thus describes the general appearance of Spitzbergen. 'The principal objects which strike the eye are innumerable mountainous peaks, ridges, precipices, or needles, rising immediately out of the sea, to an elevation of 3000 or 4000 feet, the color of which, at a moderate distance, appears to be blackish shades of brown, green, gray, and purple, snow or ice, in striæ or patches, occupying the various clefts and hollows in the sides of the hills, capping some of the mountain summits, and filling with extended beds the most considerable valleys; and ice of the glacier form, occurring at intervals, all along the coast, in particular situations, as already described, in prodigious accumulations. The glistening, or vitreous appearance of the iceberg precipices; the purity, whiteness, and beauty of the sloping expanse, formed by their snowy surfaces; the gloomy shade presented by the adjoining or intermixed mountains and rocks, perpetually covered with a mourning veil of black lichens, with the sudden transition into a robe of purest white where patches or beds of snow occur, presents a variety and extent of contrast altogether peculiar; which, when enlightened by the occasional ethereal brilliancy of the polar sky, and harmonised in its serenity with the calmness of the ocean, constitute a picture both novel and magnificent. There is indeed a kind of majesty, not to be conveyed in words, in these extraordinary accumulations of snow and ice in the valleys, and in the rocks above rocks, and peaks above peaks, in the mountain groups, seen rising above the ordinary elevation of the clouds, and terminating occasionally in crests of everlasting snow, especially when you approach the shore under the impenetrable density of a summer fog; in which the fog sometimes disperses like the drawing of a curtain, when the strong contrast of light and shade, heightened by a cloudless atmosphere, and powerful sun, burst on the senses in a brilliant exhibition, resembling the productions of magic.'—The highest summit that was determined by Captain Phipps was 4500 feet, and Captain Scoresby ascertained the elevation of one of these peaks, in 1815, that rose to the height of 4395 feet above the level of the sea.

The most remarkable circumstance attendant on these regions is the deception they present in reference to the distance of objects. When a person most accustomed to judge of distances in other places approaches Spitzbergen, his experience seems to vanish, and his estimate of the distance seldom exceeds a small portion of the reality. In clear weather the high land of this island is well defined, and every thing appears distinct at the distance of forty miles. When twenty miles from the shore, it is no uncommon circumstance for seamen to conceive themselves within a league of the land; and Mr. Scoresby says he has known experienced mariners who have 'imagined they could not stand an hour towards the land without running aground; and yet the ship has sailed three or four hours directly in shore and still been remote from danger. If after coming in sight of Spitzbergen in clear weather, and sailing for four or five hours directly towards the shore, the atmosphere becomes a little hazy, or even dark and cloudy, the vessel may appear to be further distant than when the land was first seen.' This Mr. Scoresby thinks satisfactorily accounts for the conduct of the Danish Captain, Hogens Heinson, who was a renowned seaman of that time, and was sent in search of the lost colony in Greenland. After surmounting many difficulties, he perceived the coast of Greenland, and with a clear sea, a favorable wind, and a fresh gale, he sailed for several hours towards it; but, not appearing to be any nearer the land, he became alarmed, tacked about, and returned to Denmark, saying that his ship had been stopped in her course by 'some load-stone rocks hidden in the sea.'

Mr. Scoresby, in the description of one of his excursions on shore, thus delineates the appearance of that part of the country, as seen from the summit of one of the mountains. 'The prospect was most extensive and grand. A fine sheltered bay was seen on the east of us, an arm of the same on the north-east, and the sea, whose glassy surface was unruffled by a breeze, formed an immense expanse on the west; the icebergs, rearing their proud crests almost to the tops of the mountains, between which they were lodged, and defying the power of the solar beams, were scattered in various directions about the sea coast and in the adjoining bays. Beds of snow and ice filling extensive hollows, and giving an enamelled coat to adjoining valleys, one of which, commencing at the foot of the mountain where we stood, extended in a continued line towards the north as far as the eye could reach; mountain rising above mountain, until by distance they dwindled into insignificancy; the whole contrasted by a cloudless canopy of deepest azure, and enlightened by the rays of a blazing sun, and the effect aided by a feeling of danger seated as we were on the pinnacle of a rock, almost surrounded by tremendous precipices; all united to constitute a picture singularly sublime. Here we seemed elevated into the very heavens, and, though in a hazardous situation, I was sensible only of pleasing emotions, heightened by the persuasion that, from experience in these kind of adventures, I was superior to the dangers with which I was surrounded. The effect of the elevation, and the brightness of the picture, were such that the sea, which was at least a league from us, appeared within reach of a musket-shot; mountains a dozen miles off seemed scarcely a league from us, and our vessel, which we knew was at the

distance of a league from the shore, appeared in danger of rocks.'

The atmosphere has a remarkable antiseptical effect. Animal and vegetable substances, exposed to the influence of the air, remain for a long period unchanged. Martens, in the account of his voyage to Spitzbergen, says, 'That a man buried ten years before, still retained his perfect shape and dress.' M. Bleau also remarks, in his Atlas Historique, that the bodies of the seven Dutchmen who perished in Spitzbergen, in 1635, were found twenty years afterwards, without having suffered the least putrefaction. Wood and other vegetable substances are preserved in a similar manner. Mr. Scoresby says that when he attempted to explore the shores of Spitzbergen, in 1818, he saw several huts, and some coffins made entirely of wood. 'One of the latter,' he says, 'appeared, by an adjoining inscription, to contain the body of a native of Britain who had died in the year 1788; and though the coffin had lain completely exposed, except when covered with snow, during a period of thirty years, the wood of which it was composed not only was undecayed, but appeared quite fresh and new. It was painted red; and the color even seemed to be but little faded. Things of a similar kind have been met with in Spitzbergen, which have resisted all injury from the weather during the lapse of a century.' One of the most interesting appearances on these coasts is the iceberg. It frequently extends several miles in length, and rises perpendicularly above the sea to the height of 400 or 500 feet, exhibiting various shades, from an emerald green to an appearance of cliffs of white marble.

Islands in the adjacent seas are Moffen Island, situated in lat. 80° 1′, and long. 12° 43′ east. It is a small island, and of comparatively low land. Low Island is nearly in the same latitude, but about 5° more to the east. Hope Island, on the south-east coast of Spitzbergen, is in lat, 76° 20′, and long. 20° east. Cherie Island is in the same longitude, but is situated about 2° further south than Hope Island.—Jan Mayen Island is in lat. 71° and long. about 8° west. It is ten leagues in length, but not more than three leagues broad; and derives its name from the Dutch captain by whom it was discovered, in the early part of the seventeenth century The highest point of this island is the peak of Beerenberg, which rears its icy summit far above the clouds. The height Scoresby determined in 1817 to be 6870 feet. Besides the islands already described, the Russians possess various others on the east of Asia, situated between the coasts of Asia and America, and some near the shores of the latter continent. These islands have many excellent bays and anchorages.

SPIXWORTH, a town of England, near Norwich.

SPLACHNUM, in botany, a genus of plants belonging to the class of cryptogamia, and order of musci. The antheræ are cylindrical, and grow on a large colored apophysis or umbraculum. The calyptra is caducous. The female star grows on a separate stem. There are six species; viz. 1. Splachnum ampullaceum; 2. Angustatum; 3. Luteum; 4. Rubrum; 5. Sphæricum; and, 6. Vasculosum. Two of these are natives of Britain; viz. 1. S. ampullaceum, the crewet splachnum, is found in bogs and marshes, and often upon cow-dung. It grows in thick tufts. and is about two inches high. The leaves are oval lanceolate, terminated with a long point or beard. The top of the filament or peduncle swells into the form of an inverted cone, which Linnæus terms an apophysis or umbraculum; upon the top of which is placed a cylindrical antheræ, like the neck of a crewet. The calyptra is conical, and resembles a small extinguisher. 2. S. vasculosum, the acorn-shaped splachnum, is found upon bogs and cow-dung, and upon the points of rocks on the top of the Highland mountains, as on Ben-Lomond, and in the Isle of Sky, and elsewhere. This differs little from the preceding, and perhaps is no more than a variety. The filaments are about an inch high. The leaves oval acute, not so lanceolate and bearded as the other. The apophysis, and the anthera at the top of it, form together nearly an oval figure, not unlike an acorn in its cup, the apophysis being transversely semi-oval, and of a blood-red color, the anthera short and conical. The calyptra is the same as that of the other. The operculum is short and obtuse, and the rim of the anthera has eight large horizontal cilia. The anthera of the other is also ciliated, but not so distinctly. It is an elegant moss, and very distinguishable on account of its orange-colored filaments and dark-red capsules.

SPLAY'FOOT, *adj.* } Splay, or display,
SPLAY'MOUTH, *n. s.* } and foot. Having the foot turned inward: an unnaturally wide mouth.

All authors to their own defects are blind:
Hadst thou but, Janus-like, a face behind,
To see the people when *splaymouths* they make,
To mark their fingers pointed at thy back,
Their tongues lolled out a foot. *Dryden.*

Though still some traces of our rustic vein,
And *splayfoot* verse remained, and will remain.
Pope.

SPLEEN, *n. s.*
SPLEEN'ED, *adj.*
SPLEEN'FUL,
SPLEEN'LESS,
SPLEEN'WORT, *n. s.*
SPLEEN'Y, *adj.*
SPLEN'ETIC,
SPLEN'IC,
SPLEN'ISH,
SPLEN'ITIVE.
} Lat *splen.* The milt; one of the viscera, of which the use is not known: supposed to be the seat of anger, melancholy, and mirth: hence anger, ill-humor; a fit of anger or melancholy: spleened is deprived of the spleen: spleenful, angry; petulant; melancholy. as also spleeny and the last four adjectives, signify. spleenless; kind; mild (obsolete): spleenwort is a plant.

If she must teem,
Create her child of *spleen,* that it may live
And be a thwart disnatured torment to her.
Shakspeare.

Charge not in your *spleen* a noble person,
And spoil your nobler soul. *Id.*

Brief as the lightning in the collied night,
That in a *spleen* unfolds both heaven and earth,
And, ere a man hath power to say, behold!
The jaws of darkness do devour it up. *Id.*

They that desire the *spleen,* and would die with laughing. *Id.*

Take thy fingers from my throat;
For though I am not *splenetive* and rash,
Yet I have in me something dangerous.
Id. Hamlet.

The commons, like an angry hive of bees
That want their leader, scatter up and down:
Myself have calm'd their *spleenful* mutiny.
Id. Henry VI.

What though I know her virtuous,
And well deserving; yet I know her for
A *spleeny* Lutheran, and not wholesome to
Our cause. *Id. Henry VIII.*

Yourselves you must engage
Somewhat to cool your *spleenish* rage,
Your grievous thirst; and to asswage
That first, you drink this liquor. *Drayton.*

Kind pity checks my *spleen*; brave scorn forbids
Those tears to issue, which swell my eye-lids.
Donne.

His solemne queen, whose *spleene* he was dispos'd
To tempt yet further, knowing well what anger it inclosed,
And how wives anger should be used. *Chapman.*

Mean time flew our ships, and straight we fetcht
The syren's isle; a *spleenless* wind so stretcht
Her wings to waft us, and so urged our keel. *Id.*

Suppose the *spleen* obstructed in its lower parts and *splenick* branch, a potent heat causeth the orgasmus to boil. *Harvey.*

All envied; but the Thestyan brethren show'd
The least respect, and thus they vent their *spleen* aloud:
Lay down those honoured spoils. *Dryden.*

The chearful soldiers, with new stores supplied,
Now long to execute their *spleenful* will. *Id.*

Horace purged himself from these *splenetick* reflections in odes and epodes, before he undertook his satires. *Id.*

The *splenick* vein hath divers cells opening into it near its extremities in human bodies; but in quadrupeds the cells open into the trunks of the *splenick* veins. *Ray on the Creation.*

This daughter silently lowers, t'other steals a kind look at you, a third is exactly well-behaved, and a fourth a *splenetick*. *Tatler.*

The *spleen* with sullen vapours clouds the brain,
And binds the spirits in its heavy chain;
Howe'er the cause fantastick may appear,
Th' effect is real, and the pain sincere. *Blackmore.*

Animals *spleened* grow salacious. *Arbuthnot.*

If the wound be on the left hypochondrium, under the short ribs, you may conclude the *spleen* wounded. *Wiseman.*

In noble minds some dregs remain,
Not yet purged off, of *spleen* and sour disdain.
Pope.

If you drink tea upon a promontory that overhangs the sea, the whistling of the wind is better musick to contented minds than the opera to the *spleenful*. *Id.*

Safe passed the gnome through this fantastick band,
A branch of healing *spleenwort* in his hand. *Id.*

Spleen, vapours, and small-pox above them all. *Id.*

You humour me when I am sick;
Why not when I am *splenetick?* *Swift.*

For not on beds of gaudy flowers
Thine ancestors reclined,
Where sloth dissolves, and *spleen* devours
All energy of mind. *Beattie.*

Mine be the friend less frequent in his prayers,
Who makes no bustle with his soul's affairs,
Whose wit can brighten up a wintry day,
And chase the *splenetic* dull hours away. *Cowper.*

SPLEEN. The use of the spleen remains a problem, towards the elucidation of which the investigations of so many anatomists and physiologists have hitherto afforded very imperfect data. Haller admonishes his reader that 'he is plunging into the region of mere conjecture,' darker than in the case of any other viscus. We might have hoped to derive some light from the diseases under which it frequently suffers, and from the experiments in which it has been removed in animals. The inferences, however, to which we arrive in this way, are only of the negative kind; they enable us to destroy or refute, but not to build up or establish. The spleen may be found considerably altered in texture where the individual has enjoyed good health before death, or has died of other complaints. It is often enormously enlarged, without materially affecting the health; and, on the other hand, where ill-effects are produced, they have no peculiar character, affording illustration of the use of the organ. The experiment of removing the spleen seems to have been performed very anciently.

Pliny says that animals will live after this part has been torn out (lib. xi. c. 30); and the same fact is noticed in the Talmud (Ginzburger, Medic. Talmud. p. 11). Haller cites various instances in which the spleen has been lost in the human subject; particularly Leon. Fioravanti, tesoro della vita humana, l. ii c. 8. Phil. Trans. No. 451. The removal of it from the dog is an experiment repeated over and over again. See Haller, t. vi. p. 421. We find that animals, and even human subjects, have lived without a spleen, and enjoyed tolerable health. Sometimes the experiment has been fatal, but not from the loss or interruption of any function that could be ascribed to the spleen. We find that dogs have been lively, fat, and even plethoric; that they have had good appetites; that bitches have produced young. Some thought they were more salacious; others that they made water more frequently. In some cases appearances were noticed that might be referred to imperfection in the digestive process, as borborygmi. The liver is said to have suffered in a few instances; in most, however, there seems to have been good bile made; and generally no particular ill effect was experienced. The inference, then, to be collected from these sources, is that the function of the spleen is of so little importance, that the alteration of its texture by disease is not marked by any unequivocal symptom, and even that its entire removal is hardly followed by any sensible effect.

It has been a generally received notion that the office of the spleen is related to that of the liver; that the blood, either by its retarded motion through the serpentine splenic vessels, its stagnation in the splenic cells, or other changes wrought in it by the actions of the spleen, acquires peculiar properties, rendering it fit for the secretion of bile in the liver. It is supposed that the splenic blood is loaded with carbon, which the action of the liver separates from it. We do not usually meet with such arrangements as these in the animal economy; indeed no instance could be adduced of the like

nature; one organ to carbonize the blood, that it may be decarbonized by another; or a part to produce changes in the blood, fitting it for the secretion which is to be performed by another. The tissue of each gland has the power of extracting its peculiar secretion from the common mass. That the spleen produces changes in the properties of the blood is not yet clearly proved; still less is it proved that such changes, if produced, are in any way concerned with the biliary secretion. Further, bile is secreted where the spleen has been removed; and it was secreted in the case recorded by Mr. Abernethy, where the vena portarum emptied its blood into the inferior vena cava. We observe no constant relation between the spleen and liver; the former is extremely small in many birds, reptiles, and fishes, where the liver is large. The close neighbourhood of this organ to the stomach, and the connexion of their blood-vessels, have led to the conjecture that they are connected in function. It has been imagined that when the stomach is empty, the spleen, like a sponge, swells with blood, and affords a reservoir for the quantity of that fluid, which the blood-vessels of the stomach do not require in the inactive state of the organ; while, on the contrary, when this bag is distended with food, and the process of digestion demands a more copious afflux of fluids into the stomachic vessels, the pressure of its great extremity empties the splenic sponge, and thus causes a greater flow in the other parts of the cœliac system. This again is all imaginary; not a single point of it founded in observation. It is quite inapplicable to the three lower classes of vertebral animals, where the position of the spleen in many instances, and its firmness in several, are quite incompatible with the explanation.

Sir Everard Home, in two papers published in the Philosophical Transactions for 1808 on the structure and use of the spleen, attempted to prove that fluids are conveyed from the cardiac end of the stomach into the spleen, and thus arrive in the general circulation, without the intervention of the general absorbing system and thoracic duct. Having tied the pylorus, he injected colored fluids into the stomach; they were partly absorbed, and manifested their presence in the circulating system by changes produced in the urine. When rhubarb was used, the cut surface of the spleen produced a decided yellow tint on paper, and the serum of the splenic blood manifested the presence of rhubarb, on the addition of potash; when no such phenomena were exhibited by the cut surface of the liver, or in the serum of blood from the vena cava. There was a corresponding difference between the effects of potash on fluids, in which the substance of the liver and that of the spleen were broken up. The author abandons this notion in a subsequent communication to the same society, on the passage of fluids from the stomach into the general circulation; having found that corresponding phenomena were exhibited, after the spleen had been removed.—Philosophical Transactions, 1812. Of numerous other fancies about this mysterious organ, such as that it forms the red globules of the blood, that it is the seat of laughter, or of the sentient soul, that it is designed to balance the liver, &c., &c., we can say no more than that those who are interested in such speculations will find ample amusement in Haller's Elem. Phisiol. lib. xxi. sec. 2; or in Soemmerring de Corp. Hum. Fabrica, t. vi. p. 158, et seq.

Spleen, in anatomy. See Anatomy.

Spleenwort, in botany, is a species of asplenium, a genus of the cryptogamia class of plants, and ranked in the order of filices. The parts of fructification are situated in the small sparse line under the disk of the leaves. There are twenty-four species: two are natives of Britain, and grow upon old walls and moist rocks: viz. 1. Asplenium ceterach, ceterach, or spleenwort; 2 Asplenium scolopendrium, or hart's tongue. Spleenwort has an herbaceous, mucilaginous, and roughish taste; it is recommended as a pectoral, and as a nephritic for promoting urine. It was anciently esteemed good against the spleen.

Spleenwort, Rough, a species of polypodium.

SPLEN'DID, *adj.* } Fr. *splendide*; Latin
Splen'didly, *adv.* } *splendidus*. Showy; magnificent; sumptuous: the
Splen'dour, *n. s.* } adverb and noun substantive corresponding.

The dignity of gold above silver is not much; the *splendour* is alike, and more pleasing to some eyes, as in cloth of silver. *Bacon's Physical Remains*

They assigned them names from some remarkable qualities, that are very observable in their red and *splendent* planets. *Browne's Vulgar Errours.*

Their condition, though it look *splendidly*, yet, when you handle it on all sides, it will prick your fingers. *Taylor.*

You will not admit you live *splendidly*, yet it cannot be denied but that you live neatly and elegantly. *More.*

Unacceptable, though in heaven, our state
Of *splendid* vassalage. *Milton.*

How he lives and eats,
How largely gives, how *splendidly* he treats.
Dryden.

He, of the royal store
Splendidly frugal, sits whole nights devoid
Of sweet repose. *Philips.*

Romulus, being to give laws to his new Romans, found no better way to procure an esteem and reverence to them, than by first procuring it to himself by *splendour* of habit and retinue. *South.*

Metallick substances may, by reason of their great density, reflect all the light incident upon them, and so be as opake and *splendent* as it is possible for any body to be. *Newton.*

The first symptoms are a chilness, a certain *splendour* or shining in the eyes, with a little moisture.
Arbuthnot.

Deep in a rich alcove the prince was laid,
And slept beneath a pompous colonnade:
Fast by his side Pisistratus lay spread,
In age his equal, on a *splendid* bed. *Pope's Odyssey.*

'Tis use alone that sanctifies expense,
And *splendour* borrows all her rays from sense.
Pope.

Upon that night, when fairies light
On Cassilis Downans dance,
Or owre the lays, in *splendid* blaze,
On sprightly coursers prance. *Burns.*

SPLENIUS. See Anatomy

SPLENT, *n. s.* Or perhaps splint. Italian *spinella;* Belg. *solint.* See SPLINTER. Defined in extract

Splents is a callous hard substance, or an insensible swelling, which breeds on or adheres to the shank-bone of a horse, and, when it grows big, spoils the shape of the leg. When there is but one, it is called a single *splent;* but when there is another opposite to it, on the outside of the shank-bone, it is called a pegged or pinned *splent.*

Farrier's Dictionary.

SPLICING, in the sea language, is the untwisting the ends of two cables or ropes, and working the several strands into one another by a fidd, so that they become as strong as if they were but one rope.

SPLINT, or SPLINT'ER, *n. s., v. a.,* & *v. n.* Belg. *splinter;* Dan. *splint.* A fragment of any thing broken with violence: to break into splints or fragments; to secure by means of them: to be broken in this way.

This broken joint intreat her to *splinter,* and this crack of your love shall grow stronger than it was before. *Shakspeare. Othello.*

He was slain upon a course at tilt, one of the *splinters* of Montgomery's staff going in at his bever. *Bacon.*

Amidst whole heaps of spices lights a ball,
And now their odours armed against them fly;
Some preciously by shattered porcelain fall,
And some by aromatic *splinters* die. *Dryden.*

A plain Indian fan used by the meaner sort, made of the small stringy parts of roots, spread out in a round flat form, and so bound together with a *splinter* hoop, and strengthened with small bars on both sides. *Grew's Musæum.*

The ancients after the seventh day used *splints* which not only kept the members steady, but straight, and of these some are made of tin, others of scabbard and wood, sewed up in linen cloths.

Wiseman's Surgery.

SPLIT, *v. a.* & *v. n.* } *Pret.* and *part. pass.*
SPLIT'TER, *n. s.* } split. Belg. *spletten, splitten.* To cleave; rive; to divide longitudinally; dash to pieces; break: to burst asunder; part; be broken against a hard substance: the noun substantive corresponds.

Do 't, and thou hast the one-half of my heart;
Do 't not, thou *splittest* thine own.

Shakspeare. Winter's Tale.

After our ship did *split,*
When you, and the poor number saved with you,
Hung on our driving boat. *Shakspeare.*

God's desertion, as a full and violent wind, drives him in an instant, not to the harbour, but on the rock where he will be irrecoverably *split.*

Decay of Piety.

Wert thou served up two in one dish, the rather
To *split* thy sire into a double father! *Cleaveland.*

A huge vessel of exceeding hard marble *split* asunder by congealed water. *Boyle.*

Cold winter *split* the rocks in twain. *Dryden.*

Those who live by shores with joy behold
Some wealthy vessel *split* or stranded nigh;
And from the rocks leap down for shipwrecked gold,
And seek the tempests which the others fly. *Id.*

A skull so hard that it is almost as easy to *split* a helmet of iron as to make a fracture in it.

Ray on the Creation.

In states notoriously irreligious, a secret and irresistible power *splits* their counsels, and smites their most refined policies with frustration and a curse.

South

These are the rocks on which the sanguine tribe of lovers daily *split,* and on which the politician, the alchymist, and projector are cast away.

Addison's Spectator.

One and the same ray is by refraction disturbed, shattered, dilated, and *split,* and spread into many diverging rays. *Newton.*

This effort is in some earthquakes so vehement that it *splits* and tears the earth, making cracks or chasms in it some miles. *Woodward.*

The road that to the lungs this store transmits,
Into unnumbered narrow channels *splits. Blackmore.*

He instances Luther's sensuality and disobedience, two crimes which he has dealt with; and, to make the more solemn shew, he *split* 'em into twenty.

Atterbury.

Each had a gravity would make you *split,*
And shook his head at M——y as a wit. *Pope.*

Oh! would it please the gods to *split*
Thy beauty, size, and years, and wit,
No age could furnish out a pair
Of nymphs so graceful, wise, and fair;
With half the lustre of your eyes,
With half your wit, your years, and size. *Swift.*

The seamen spied a rock, and the wind was so strong that we were driven directly upon it, and immediately *split.* *Id.*

How should we rejoice, if, like Judas the first,
Those *splitters* of parsons in sunder should burst.

Id.

Their logick has appeared the mere art of wrangling, and their metaphysicks the skill of *splitting* an hair, of distinguishing without a difference.

Watts on the Mind.

SPODUMENE, in mineralogy, prismatic triphane spar.—Mohs. Color between greenish-white and mountain-gray. Massive, disseminated, and in large granular concretions. Glistening, pearly. Cleavage, threefold. Fracture fine grained uneven. Translucent As hard as felspar. Most easily frangible. Specific gravity 3·0 to 3·1. Before the blowpipe it first separates into small gold yellow colored folia; and, if the heat is continued, they melt into a greenish-white colored glass. Its constituents are, silica 64·4, alumina 24·4, lime 3, potash 5, oxide of iron 2·2. Vauquelin. It was first discovered in the island of Uton in Sudermannland, where it is associated with red felspar and quartz. It has been lately found in the vicinity of Dublin by Dr. Taylor. It contains the new alkali lithia, by some recent analyses.

SPOHN (Frederic Augustus William), an eminent German physiologist, was born at Dortmund in 1792, and studied at the university of Wittemberg. His house and part of his library having been destroyed at the bombardment of that place, in 1813, he removed to Leipsic, where he was nominated in 1817 extraordinary professor of philosophy, and in 1819 professor of ancient literature. He died January 16th, 1824, in consequence of disease brought on by his excessive application to study. His literary labors were numerous and important. In 1815 he published a dissertation De Agro Trojano in Carminibus Homeri Descripto, 8vo., and Commentarius de extrema Parte Odyssiæ indè à Raphsod. Ψ. v. 297, Ævo recentiori orta quam Homerica; and in the last year of his life he printed three pieces under the title of Lectiones Theocriteæ. He left a large quantity of MSS.

SPOIL, *v. a., v. n. & n. s.* } Fr. *spolier;* Lat. *spolio.* To seize by robbery; take away by force: plunder; corrupt; mar: to practise robbery; grow corrupt or useless: as a noun substantive booty; prey; corruption; slough: a spoiler is a robber; plunderer: spoilful, rapaciously wasteful.
SPOIL'ER, *n. s.*
SPOIL'FUL, *adj.*

They which hate us *spoil* for themselves.
Psalm xliv. 14.

Beware lest any man *spoil* you, through philosophy and vain deceit. *Col.* ii. 8.

Ye took joyfully the *spoiling* of your goods, knowing in yourselves that ye have in heaven an enduring substance. *Hebrews.*

England was infested with robbers and outlaws, which, lurking in woods, used to break forth to rob and *spoil.* *Spenser.*

Yielding themselves upon the Turks' faith, for the safeguard of their liberty and goods, they were most injuriously *spoiled* of all that they had.
Knolles's History of the Turks.

Having oft in battle vanquished
Those *spoilful* Picts, and swarming Easterlings,
Long time in peace his realm established.
Faerie Queene.

The cry of Talbot serves me for a sword;
For I have loaden me with many *spoils,*
Using no other weapon but his name.
Shakspeare. Henry VI.

Company, villanous company, hath been the *spoil* of me. *Shakspeare.*

Snakes, the rather for the casting of their *spoil,* live till they be old. *Bacon.*

Too late, alas! we find
The softness of thy sword, continued through thy soil,
To be the only cause of unrecovered *spoils.* *Drayton.*

Such ruin of her manners Rome
Doth suffer now, as she's become
Both her own *spoiler* and own prey.
Ben Jonson's Catiline.

Spiritual pride *spoils* many graces. *Taylor.*

This mount,
With all his verdure *spoiled,* and trees adrift.
Milton.

Gentle gales,
Fanning their odoriferous wings, dispense
Native perfumes, and whisper whence they stole
Those balmy *spoils.* *Id.*

Go and speed!
Havock, and *spoil,* and ruin are my gain. *Id.*

He that gathered a hundred bushels of acorns or apples had thereby a property in them: he was only to look that he used them before they *spoiled,* else he robbed others. *Locke.*

Providence, where it loves a nation, concerns itself to own and assert the interest of religion, by blasting the *spoilers* of religious persons and places.
South.

Thou shalt not gain what I deny to yield,
Nor reap the harvest, though thou *spoilest* the field.
Prior.

But grant our hero's hopes long toil
And comprehensive genius crown,
Each science and each art his *spoil,*
Yet what reward, or what renown? *Bentley.*

My sons their old unhappy sire despise,
Spoiled of his kingdom, and deprived of eyes.
Pope.

Women are not only *spoiled* by this education, but we *spoil* that part of the world which would otherwise furnish most instances of an eminent and exalted piety. *Law.*

Came you then here, thus far, through waves, to conquer,
To waste, to plunder, out of mere compassion?
Is it humanity that prompts you on?
Happy for us, and happy for you *spoilers,*
Had your humanity ne'er reached our world!
A. Philips.

The SPOIL, among the ancient Greeks, was divided among the whole army; only the general's share was largest; but among the Romans, the spoils belonged to the republic.

SPOKE, *n. s.* Sax. ꝑpaca; Teut. *speiche;* Belg. *spaak.* The bar of a wheel that passes from the nave to the felly.

All you gods,
In general synod take away her power;
Break all the *spokes* and fellies of her wheel,
And bowl the round knave down the hill of heaven.
Shakspeare.

No heir e'er drove so fine a coach;
The *spokes,* we are by Ovid told,
Were silver, and the axle gold. *Swift.*

SPOLETANI, the ancient inhabitants of Spoletium.

SPOLETIUM, in ancient geography, a city of Italy, in Umbria, which bravely withstood Hannibal, when in Italy. An inscription over the gates still commemorates this defeat of the great Carthaginian. Water was conveyed into the city from an adjacent mountain, by an aqueduct 230 yards above the foundation, relics of which still exist. It is now called Spoleto. See SPOLETO.

SPOLETO, a town of the ecclesiastical state, the capital of a duchy of the same name, situated on a hill near the Mareggia. The streets are extremely steep; and, though the houses are in general well built, there is no edifice either public or private that has any claim to distinction. The cathedral, occupying a commanding situation, presents a front of five Gothic arches, supported by Grecian pillars; but the decorations of the interior display little taste. The castle, situated on a high hill which overlooks the town, is a vast stone building, surrounded with a rampart, and connected with the town by a bridge and aqueduct, thrown over a deep dell, and supported by arches of surprising height; the boldness of their construction has made them be attributed to the Romans. Spoleto is a place of great antiquity, and was in vain attacked by the Carthaginians, after their victory at the lake Thrasymene. Its antiquities are two of the town gates, the ruins of a theatre, and those of a temple. The only manufacture is of hats. Fifteen miles S. S. E. of Foligno, and fifty-five N. N. E. of Rome.

SPOLIA OPIMA, Lat., in Roman antiquity, the richest and best of the spoils, which Romulus first set the example of dedicating to Jupiter. See ROME.

SPOLIATION, in ecclesiastical law, is an injury done by one clerk or incumbent to another, in taking the fruits of his benefice under a pretended title. It is remedied by a decree to account for the profits so taken. This injury, when the jus-

patronatus, or right of advowson, doth not come in debate, is cognizable in the spiritual court; as if a patron first presents A to a benefice, who is instituted and inducted thereto; and then, upon pretence of a vacancy, the same patron presents B to the same living, and he also obtains institution and induction. Now, if A disputes the fact of the vacancy, then that clerk who is kept out of the profits of the living, whichever it be, may sue the other in the spiritual court for spoliation or taking the profits of his benefice. And it shall there be tried, whether the living were or were not vacant; upon which the validity of the second clerk's pretensions must depend. But if the right of patronage comes at all into dispute, as if one patron presented A, and another patron presented B, there the ecclesiastical court has no cognizance, provided the tithes sued for amount to a fourth part of the value of the living, but may be prohibited at the instance of the patron by the king's writ of indicavit. So also if a clerk, without any color of title, ejects another from his parsonage, this injury must be redressed in the temporal courts; for it depends upon no question determinable by the spiritual law (as plurality of benefices or no plurality, vacancy or no vacancy), but is merely a civil injury.

SPOLTORO, a town of Naples, in Abruzzo Ultra; twelve miles south-east of Teramo.

SPON (Charles), M. D., a learned French physician, son of a merchant, and born at Lyons, in 1609. He showed a peculiar genius for Latin poetry, so early as his fourteenth year. He studied at Ulm; graduated at Montpelier in 1632; and became a member of the college of physicians at Lyons, where he practised with great success. He was made honorary physician to Louis XIV. in 1645. He published the Prognostics of Hippocrates, under the title of Sibylla Medica, in hexameter verse; and some Latin iambics. He maintained a learned correspondence with professor Guy Patin, and their letters were published after his death. He died 21st of February, 1684.

Spon (James), M. D., son of the doctor, was born at Lyons, in 1647. After a liberal education, he graduated at Montpelier in 1667, and joined the Faculty at Lyons in 1669. In 1675 and 1676 he made a voyage to Dalmatia, Greece, and the Levant, of which he wrote a fine account. He published many valuable works; as, 1. Recherches des Antiquités de Lyon, 1674, 8vo 2. Ignotorum atque obscurorum Deorum Aræ, 1677, 8vo. 3. Voyage de la Grece, et du Levant, 1677, 3 vols. 12mo. 4. Histoire de la ville, et de l'état de Geneve, 1680, 2 vols. 12mo. &c. Being a Protestant, he was obliged to leave France, in 1685, on the repeal of the edict of Nantes, and set out for Zurich; but died at Vevay in 1686. He was a member of the academy of the Ricovrati, at Padua.

SPONDÆUS. See Spondee

SPONDANUS (Joannes), or John De Sponde, a learned Spaniard, born at Maulcon, in Biscay, in 1557. In his twentieth year he began a Commentary on Homer's Iliad and Odyssey, which was printed at Basil, in 1583, in folio, and dedicated to Henry king of Navarre, afterwards Henry IV. and the Great of France. He also published Aristotle's Logic, Greek and Latin with notes, at Basil, 1583. In 1593 he followed the bad example of the Great Henry, by turning Papist, and published his Reasons; but they surely could not be half so weighty as those of Henry, as the peace of a kingdom did not depend on his abjuration of Protestant principles. He died in Biscay, in 1595.

Spondanus, or Sponde (Henry), younger brother of John, was born in 1568, and educated at the College of the Reformers at Ortez, where he made a rapid progress in the languages and the canon and civil law. Henry IV. made him master of requests at Navarre. He also turned Catholic, in 1595. In 1600 he went to Rome, where he took orders, and was promoted by Paul V.; but in 1626 he was recalled to France by Louis XIII. and made bishop of Pamiers. He abridged and continued Baronius's Ecclesiastical Annals, from 1197 to 1640, and published in folio Annales Sacri a Mundi Creatione, ad ejusdem Redemptionem; with some other works. He died at Thoulouse in 1643.

SPON'DEE, *n. s.* Fr. *spondée;* Lat. *spondæus.* A foot of two long syllables.

We see in the choice of the words the weight of the stone, and the striving to heave it up the mountain: Homer clogs the verse with *spondees,* and leaves the vowels open. *Broome.*

SPONDIAS, Brasilian, or Jamaica plum, in botany, a genus of plants belonging to the class of decandria, and order of pentagynia. The calyx is quinquedentate. The corolla pentapetalous. The fruit contains a quinquelocular kernel. There are only two species; viz. S. mombia, and myrobalanus. But they are so much confounded in the description of different botanists that we cannot venture to describe them.

SPON'DYLE, *n. s.* Fr. *spondile;* Lat. *spondylus;* Gr. σπονδυλος. A vertebra; a joint of the spine.

It hath for the spine or back-bone a cartilaginous substance, without any *spondyles,* processes, or protuberances. *Browne.*

SPONGE, *n. s., v. a.* & *v. n.*
Spon'ger, *n. s.*
Spon'giness,
Spon'gious, *adj.*
Spong'y.
} Lat. *spongia.* A soft porous substance, supposed by some the nidus of animals. It is remarkable for sucking up water. Too often written spunge: as a verb active to blot; wipe away: as a verb neuter suck in like a sponge: a sponger is a sucker of this kind: spongy and spongious, full of cavities like a sponge.

They opened and washed part of their *sponges.* *Sandys.*

Except between the words of translation and the mind of Scripture itself there be contradiction, very little difference should not seem an intolerable blemish necessarily to be *spunged* out. *Hooker.*

When their drenched natures lie as in a death,
What cannot you and I perform upon
The unguarded Duncan? What not put upon
His *spungy* officers, who shall bear the guilt?
Shakspeare.

Sponges are gathered from the sides of rocks, being as a large but tough moss. *Bacon.*

The lungs are the most *spungy* part of the body, and therefore ablest to contract and dilate itself.
Id. Natural History.

The lungs are exposed to receive all the droppings from the brain; a very fit cistern, because of their *spunginess.* *Harvey.*

Into earth's *spungy* veins the ocean sinks,
Those rivers to replenish which he drinks.
Denham.

The body of the tree being very *spongy* within, though hard without, they easily contrive into canoes. *More.*

Return, unhappy swain!
The *spungy* clouds are filled with gathering rain.
Dryden.

Great officers are like *sponges:* they suck till they are full, and, when they come once to be squeezed, their very heart's blood comes away. *L'Estrange.*

The ant lives upon her own, honestly gotten; whereas the fly is an intruder, and a common smell-feast, that *spunges* upon other people's trenchers.
Id.

A generous rich man, that kept a splendid and open table, would try which were friends, and which only trencher-flies and *spungers.* *Id.*

Her bones are all very *spongy,* and more remarkably those of a wild bird, which flies much, and long together. *Grew.*

All thick bones are hollow or *spongeous,* and contain an oleaginous substance in little vesicles, which by the heat of the body is exhaled through these bones to supply their fibres. *Cheyne.*

Here wont the dean, when he 's to seek,
To *spunge* a breakfast once a week. *Swift.*

Sponges may be bleached by soaking and squeezing them first in cold water for several days, and then in warm water. If they be now washed with cold water, slightly acidulated with sulphuric acid, starch will detect iodine in the liquid which contains hydriodate of potash. The calcareous matter of sponge is best removed by a dilute muriatic acid. After washing in water they are to be put into aqueous sulphuric acid, specific gravity 1·034, and left for eight days, being occasionally squeezed.

Sponge, in zoology. See Spongia.

SPONGIA, sponge, in zoology, a genus of animals belonging to the class of vermes, and order of zoophyta. It is fixed, flexible, and very torpid, growing in a variety of forms, composed either of reticulated fibres, or masses of small spines interwoven together, and clothed with a living gelatinous flesh, full of small mouths or holes on its surface, by which it sucks in and throws out the water. So early as the days of Aristotle sponges were supposed to possess animal life; the persons employed in collecting them having observed them shrink when torn from the rocks, thus exhibiting symptoms of sensation. The same opinion prevailed in the time of Pliny. But no attention was paid to the subject till count Marsigli examined them, and declared them vegetables. Dr. Peysonell, in a paper which he sent to the Royal Society in 1752, and in a second in 1757, affirmed they were not vegetables, but the production of animals; and accordingly described the animals, and the process which they performed in making the sponges. Mr. Ellis, in 1762, was at great pains to discover these animals. For this purpose he dissected the spongia urens, and was surprised to find a great number of small worms of the genus of nereis or sea-scolopendra, which had pierced their way through the soft substance of the sponge in quest of a safe retreat. That this was really the case, he was fully assured, by inspecting a number of specimens of the same sort of sponge, just fresh from the sea. He put them in a glass filled with sea water; and then, instead of seeing any of the little animals which Dr. Peysonell described, he observed the papillæ, or small holes with which the papillæ are surrounded, contract and dilate themselves. He examined another variety of the same species of sponge, and plainly perceived the small tubes inspire and expire the water. He therefore concluded that the sponge is an animal, and that the ends or openings of the branched tubes are the mouths by which it receives its nourishment, and discharges its excrements. Fifty species have already been discovered, of which ten belong to the British coasts.

1. S. botryoides, grape sponge, is very tender and branched, as if in bunches; the bunches are hollow, and are made up of oblong oval figures having the appearance of grapes; and each bunch is open at top. The species is of a bright, shining color. The openings at the top are evidently the mouths by which the animal imbibes and discharges moisture. When the surface is very much magnified, it appears covered with little masses of triple, equidistant, shining spines.

2. S. coronata, coronet sponge, is very small, consisting of a single tube surrounded at top by a crown of little spines. The tube is open at the top. The rays that compose the little crown are of a bright, shining, pearl color; the body is of a pale yellow. It has been found in the harbour of Emsworth, between Sussex and Hampshire.

3. S. cristata, or cock's-comb sponge, is flat, erect and soft, growing in the shape of cocks'-combs, with rows of little holes along the tops, which project a little. It abounds on the rocks to the eastward of Hastings in Sussex, where it may be seen at low-water. It is commonly about three inches long, and two inches high, and of a pale yellowish color. When put into a glass vessel of sea water, it has been observed to suck in and squirt out the water through little mouths along the tops, giving evident signs of life.

4. S. dichotoma, dichotomous or forked sponge, is stiff, branched, with round, upright, elastic branches, covered with minute hairs. It is found on the coast of Norway, and also, according to Berkenhout, on the Cornish and Yorkshire coasts. It is of a pale yellow color, and full of very minute pores, guarded by minute spines.

5. S. fluviatilis, river sponge, is green, erect, brittle, and irregularly disposed in numerous branches. It abounds in many parts of Europe, in the fresh rivers of Russia and England, particularly in the river Thames. It scarcely exhibits any symptoms of life; is of a filthy smell: its pores or mouths are sometimes filled with green gelatinous globules. It differs very little from the lacustris.

6. S. lacustris, creeping sponge, has erect, cylindrical, and obtuse branches. It is found in lakes in Sweden and England.

7. S. oculata, or branched sponge, is delicately soft and very much branched; the branches are a little compressed, grow erect, and often united together. They have rows of cells on each margin that project a little. This species is of a pale yellow color, from five to ten inches high. The fibres are reticulated, and the flesh or gelatinous part is so tender that when it is taken out of the water it soon dries away. It is very common round the sea coast of Britain and Ireland. Along the edges and on the surface of the branches are rows of small papillary holes, through which the animal receives its nourishment.

8. S. palmata, palmated sponge, is like a hand with fingers a little divided at the top. The mouths are a little prominent, and irregularly disposed on the surface. It is found on the beach at Brighthelmstone. It is of a reddish color, inclining to yellow, and of the same soft woolly texture with the spongia oculata.

9. S. stuposa, tow sponge or downy branched sponge, is soft like tow, with round branches, and covered with fine pointed hair. It is of a pale yellow color, and about three inches high. It is frequently thrown on the shore at Hastings in Sussex. It is so closely covered with a fine down that the numerous small holes in its surface are not discernible.

10. S. tomentosa, or S. urens, stinging sponge, or crumb of bread sponge, is of many forms, full of pores, very brittle and soft, and interwoven with very minute spines. It is full of small protuberances, with a hole in each, by which it sucks in and throws out the water. It is very common on the British coast; and is frequently seen surrounding fucuses. It is found also on the shores of North America, Africa, and in the East Indies. When newly taken out of the sea it is of a bright orange color, and full of gelatinous flesh; but when dry it becomes whitish, and when broken has the appearance of crum of bread. If rubbed on the hand it will raise blisters; and if dried in an oven its power of stinging is much increased, especially that variety of it which is found on the sea coast of North America.

SPON SOR, *n. s.* Lat. *sponsor*. A surety; one who makes a promise or gives security for another.

In the baptism of a male there ought to be two males and one woman, and in the baptism of a female child two women and one man; and these are called *sponsors* or sureties for their education in the true christian faith. *Ayliffe's Parergon.*

The *sponsor* ought to be of the same station with the person to whom he becomes surety. *Broome.*

The rash hermit, who with impious pray'r
Had been the *sponsor* of another's care. *Harte.*

SPONTA'NEOUS, *adj.* SPONTA'NEOUSLY, *adv.* SPONTANE'ITY, *n. s.* SPONTA'NEOUSNESS. French *spontanée;* Lat. *sponte*. Voluntary; not compelled; acting without compulsion or restraint: the adverb and noun substantives corresponding.

Necessity and *spontaneity* may sometimes meet together, so may *spontaneity* and liberty; but real necessity and true liberty can never.
Bramhall against Hobbes.

They now came forth
Spontaneous; for within them spirit moved
Attendant on their lord. *Milton.*

Many analogal motions in animals, though I cannot call them voluntary, yet I see them *spontaneous:* I have reason to conclude that these are simply mechanical. *Hale.*

The sagacities and instinct of brutes, the *spontaneousness* of many of their animal motions, are not explicable, without supposing some active determinate power connexed to and inherent in their spirits, of a higher extraction than the bare natural modification of matter. *Hale's Origin of Mankind.*

Strict necessity they simple call;
It so binds the will, that things foreknown
By *spontaneity*, not choice, are done. *Dryden.*

While John for nine-pins does declare,
And Roger loves to pitch the bar,
Both legs and arms *spontaneous* move,
Which was the thing I meant to prove. *Prior.*

This would be as impossible as that the lead of an edifice should naturally and *spontaneously* mount up to the root, while lighter materials employ themselves beneath it. *Bentley.*

Begin with sense, of every art the soul,
Parts answering parts shall slide into a whole;
Spontaneous beauties all around advance,
Start even from difficulty, strike from chance;
Nature shall join you, time shall make it grow.
Pope.

Whey turns *spontaneously* acid, and the curd into cheese as hard as a stone. *Arbuthnot on Aliments.*

SPONTANEOUS INFLAMMATION, heat and conflagration produced in combustible bodies, from adventitious causes, without the application of fire. A paper on this subject which appeared in the Repertory of Arts, vol. ii. p. 425, induced the Rev. W. Tooke to publish some remarks in vol. iii. p. 95 of that work, from which, as the paper is long, we shall only give an extract, respecting the spontaneous inflammations of animal and vegetable substances. 'One Rüde,' says he, 'an apothecary at Bautzen, had prepared a pyrophorus from rye-bran and alum. Not long after he had made the discovery there broke out in the next village of Nauslitz a great fire, which did much mischief, and was said to have been occasioned by the treating of a sick cow in the cow-house. Mr. Rüde knew that the countrymen were used to lay an application of parched rye-bran to their cattle for curing the thick neck; he knew also that alum and rye-bran, by a proper process, yielded a pyrophorus; and now to try whether parched rye-bran alone would have the same effect he roasted a quantity of rye-bran by the fire till it had acquired the color of roasted coffee. This roasted bran he wrapped up in a linen cloth; in a few minutes there arose a strong smoke with a smell of burning. Soon after the rag grew as black as tinder, and the bran, now become hot, fell through it on the ground in little balls. Mr. Rüde repeated the experiment, and always with the same result. Who now will doubt that the frequency of fires in cow-houses, which in those parts are mostly wooden buildings, is occasioned by this practice, of binding roasted bran about the necks of the cattle? Montet relates, in the Memoires de l' Académie de Paris, 1748, that animal substances kindle into flame; and that he himself has been witness to the spontaneous accension of dunghills.

The woollen stuff prepared at Sevennes, named emperor's stuff, has kindled of itself, and burnt to a coal. It is not unusual for this to happen to woollen stuffs, when in hot summers they are laid in a heap, in a room but little aired. In June 1781 this happened at a wool-comber's in Germany, where a heap of wool-combings, piled up in a close warehouse seldom aired, took fire of itself. This wool burnt from within outwards, and became quite a coal; though neither fire nor light had been used at the packing. In like manner cloth-workers have certified that, after they have bought wool that was become wet, and packed it close in their warehouse, this wool has burnt of itself. The spontaneous accension of various matters from the vegetable kingdom, as wet hay, corn, and madder, and at times wet meal and malt, are well known. Hemp, flax, and hemp-oil, have also often given rise to dreadful conflagrations. In spring 1780 a fire was discovered on board a frigate lying in the road off Cronstadt, which endangered the whole fleet. After the severest scrutiny, no cause of the fire was to be found; and the matter remained without explanation, but with strong surmises of some wicked incendiary. In August 1780 a fire broke out at the hemp-magazine at St. Petersburgh, by which several hundred thousand poods (about thirty-six pounds English) of hemp and flax were consumed. The walls of the magazine are of brick, the floors of stone, and the rafters and covering of iron; it stands alone on an island in the Neva, on which, as well as on board the ships lying in the Neva, no fire is permitted. In St. Petersburgh, in the same year, a fire was discovered in the vaulted shop of a furrier. In these shops, which are all vaults, neither fire nor candle is allowed, and the doors of them are all of iron. At length the probable cause was found to be that the furrier, the evening before the fire, had got a roll of new cere-cloth, and had left it in his vault, where it was found almost consumed. In the night between the 20th and 21st of April, 1781, a fire was seen on board the frigate Maria, at anchor, with several other ships, in the roads off the island of Cronstadt; the fire was however soon extinguished; and, by the severest examination, nothing could be extorted concerning the manner in which it had arisen. The garrison was threatened with a scrutiny that should cost them dear; and, while they were in this cruel suspense, the wisdom of the sovereign gave a turn to the affair, which quieted the minds of all, by pointing out the proper method to be pursued by the commissioners of enquiry, in the following order to Czernichef:—When we perceived, by the report you have delivered in of the examination into the accident that happened on board the frigate Maria, that, in the cabin where the fire broke out, there were found parcels of matting tied together with packthread, in which the soot of burnt fir-wood had been mixed with oil, for the purpose of painting the ship's bottom, it came into our mind, that at the fire which happened last year at the hemp-warehouses, the following cause was assigned, that the fire might have proceeded from the hemp being bound up in greasy mats, or even from such mats having lain near the hemp: therefore neglect not to guide your further enquiries by this remark. As, upon juridical examination, as well as private enquiry, it was found that, in the ship's cabin, where the smoke appeared, there lay a bundle of matting containing Russian lamp-black, prepared from fir-soot, moistened with hemp-oil varnish, which was perceived to have sparks of fire in it at the time of the extinction, the Russian admiralty gave orders to make various experiments, to see whether a mixture of hemp-oil varnish and the fore-mentioned Russian black, folded up in a mat and bound together, would kindle of itself. They shook forty pounds of fir-wood soot into a tub, and poured about thirty-five pounds of hemp-oil-varnish upon it; this they let stand for an hour, after which they poured off the oil. The remaining mixture they now wrapped up in a mat, and the bundle was laid close to the cabin where the midship-men had their birth. Two officers sealed both the mat and the door with their own seals, and stationed a watch of four officers to take notice of all that passed the whole night through; and, as soon as any smoke should appear, immediately to give information to the commandant of the port. The experiment was made the 26th of April, about 11 o'clock A. M., in presence of all the officers. Early on the 27th, about 6 o'clock A. M., a smoke appeared, of which the chief commandant was immediately informed: he came with speed, and through a small hole in the door saw the mat smoking. He despatched a messenger to the members of the commission; but as the smoke became stronger, and fire began to appear, he found it necessary to break the seals and open the door. No sooner was the air thus admitted than the mat began to burn with greater force, and presently it burst into a flame. The Russian admiralty, being now fully convinced of the self-enkindling property of this composition, transmitted their experiment to the Imperial Academy of Sciences; who appointed Mr. Georgi, a very learned adjunct of the academy, to make farther experiments on the subject. Three pounds of Russian fir-black were slowly impregnated with five pounds of hemp-oil varnish; and, when the mixture stood open five hours, it was bound up in linen. By this process it became clotted; but some of the black remained dry. When the bundle had lain sixteen hours in a chest it was observed to emit a very nauseous, and rather putrid smell, not unlike that of boiling oil. Some parts of it became warm, and steamed much; eighteen hours after the mixture was wrapped up, one place became brown, emitted smoke, and directly afterwards glowing fire appeared. The same thing happened in a second and third place; though other places were scarcely warm. The fire crept slowly around, and gave a thick, gray, stinking smoke. Mr. Georgi took the bundle out of the chest, and laid it on a stone pavement; when, on being exposed to the free air, there arose a slow burning flame a span high, with a strong body of smoke. Not long afterwards there appeared, here and there, several chaps or clefts, as from a little volcano, the vapor issuing from which burst into flames. On his breaking the lump it burst into a very violent flame full three feet high, which soon grew less, and then went out. The smoking

and glowing fire lasted six hours; and the remainder continued to glow without smoke for two hours longer. The gray earthy ashes, when cold, weighed five ounces and a half.' Mr. Tooke concludes with a case of self-accension, noticed by Mr. Hageman, an apothecary at Bremen. He prepared a boiled oil of hyoscyamus, or henbane, in the usual way with common oil. The humidity of the herb was nearly evaporated, when he was called away by other affairs, and was obliged to leave the oil on the fire. The evaporation of the humidity was hereby carried so far that the herb could easily be rubbed to powder. The oil had lost its green color, and had become brownish. In this state it was laid on the straining cloth, and placed in the garden, behind the house, in the open air. In half an hour, on coming again to this place, he perceived a strong smoke there, though he thought the oil must have long been cooled: on closer inspection he found that the smoke did not proceed from the oil, but from the herb on the straining cloth; at the same time the smell betrayed a concealed fire. He stirred the herb about, and blew into it with a bellows, whereupon it broke out into a bright flame.

SPOOM, *v. n.* Probably from spume, or foam, as a ship driven with violence spumes, or raises a foam. To go on swiftly. A sea term.

When virtue *spooms* before a prosperous gale,
My heaving wishes help to fill the sail. *Dryden.*

SPOON, *n. s.* SPOON'BILL, SPOON'FUL, SPOON'MEAT. Belg. *spaen;* Dan. *sponc;* Isl. and Goth. *spoonn.* A concave vessel with a handle, used in eating liquids: spoonbill is a bird with a bill of this shape: a spoonful is the quantity a spoon will hold: spoonmeat, food taken with a spoon.

Wouldst thou drown thyself,
Put but a little water in a *spoon,*
And it shall be as all the ocean,
Enough to stifle such a villain up.
Shakspeare. King John.

Prescribe him, before he do use the receipt, that he take such a pill, or a *spoonful* of liquor. *Bacon.*

Diet most upon *spoonmeats,* as veal or cock broths. *Harvey.*

The shoveller, or *spoonbill;* the former name the more proper, the end of the bill being broad like a shovel, but not concave like a spoon, but perfectly flat. *Grew's Musæum.*

Wretched
Are mortals born to sleep their lives away!
Go back to what thy infancy began,
Eat pap and *spoonmeat;* for thy gugaws cry,
Be sullen, and refuse the lullaby. *Dryden's Persius.*

Surely the choice and measure of the materials of which the whole body is composed, and what we take daily by pounds, is at least of as much importance as of what we take seldom, and only by grains and *spoonfuls.* *Arbuthnot.*

We prescribed a slender diet, allowing only *spoonmeats.* *Wiseman.*

Ducks and geese have such long broad bills to quaffer in water and mud; to which we may reckon the bill of the *spoonbill. Derham's Physico-Theology.*

Or o'er cold coffee trifle with the *spoon,*
Count the slow clock, and dine exact at noon.
Pope.

SPOONING, in the sea-language, is said of a ship, which being under sail in a storm at sea is unable to bear it, and consequently forced to go right before the wind.

SPOONWORT. See COCHLEARIA.

SPORADES, among ancient philosophers, a name given to such stars as were not included in any constellation.

SPORADES; the general name for nineteen islands in the Archipelago, lying to the east of the Cyclades. The principal are Scio, or Chios, Samos, Rhodes, and Lesbos. Patmos, or Pathmos, a small rocky island of the Sporades, is celebrated as the place of St. John's exile. The grotto in which he is said to have written the Apocalypse is still shown, and a monastery, called the *monastery of the Apocalypse,* has been erected in commemoration of the event. The name *Sporades* is derived from the Greek σπειρειν, to sow, indicating the scattered position of the islands: hence the medical phrase *sporadic diseases,* in opposition to *epidemic,* signifying those which seize a few persons at any time or season.

SPORAD'ICAL, *adj.* Fr. *sporadique;* Gr. σποραδικός. Defined in the extract.

SPORADICAL DISEASES, among physicians, are such as seize particular persons at any time or reason, and in any place; in which sense they are distinguished from epidemical and endemical diseases.

SPORT, *n. s., v. a., v. n.* SPORT'FUL, *adj.* SPORT'FULNESS, *n. s.* SPOR'TIVE, *adj.* SPOR'TIVENESS, *n. s.* SPORTS'MAN. Ital. *sporto;* Isl. *spotto,* of barb. Lat. *desporto,* to relax. Play; frolic; that with which one plays; diversion of the field in particular: to sport is, divert; make merry; to game; frolic; wanton; trifle; use field diversions: sportful, merry; wanton; artful: the noun substantive corresponding: sportive, gay; playful; light-hearted: the noun substantive corresponding: a sportsman, one who pursues field-sports.

SPORTS. The national amusements and pastimes of a people form an important feature in the national character. Taking their tone from the manners, habits, and condition of the age or country in which they prevail, they lead us behind the scene on which the great drama of public life is exhibited, to the daily and familiar customs and events of popular life. The sports of a nation are of a religious or martial spirit, gay and mild, or dark and fierce, rude or refined, bodily or intellectual, as they are tinged by its habits and character, on which they reciprocally exercise a powerful influence. Besides numerous local holidays and sports, such as the harvest-home, in honour of Ceres and Bacchus, the panthenæa, celebrated in honour of Minerva, by all the people of Attica, &c., there were four great national festivals among the Greeks, open to all people of the Grecian name. The Olympic, Pythian, Nemæan, and Isthmian games (see the articles), were great public festivals, which inspired that polished people with a love of the arts, and imbued them with the spirit of social life. In these games, which were at once religious festivals and commercial fairs, the gymnastic and musical contests were exhibited in union; and

the productions of genius, poems, and histories, were rehearsed before all that was choice and learned of Greece, surrounded by the masterpieces of statuary, painting, and architecture. The public amusements of the Romans were of a fierce and sanguinary, or of a course and rude character. Their triumphs, their gladiatorial fights, their combats of wild beasts, their religious festivities, which were scenes of boisterous revelry, showed how much behind the Greeks they were in refinement and taste. In the middle ages, religion and war were the chief elements of the social life, and the amusements were chiefly of a religious or military character. Many of the modern popular sports originated from religious festivals: such are morris-dances, theatrical shows (see *Mysteries*, and *Moralities*), &c. Bull-fights continue to form the national amusement of the Spaniards, though the baiting of beasts has nearly gone out of use in England. Cock-fighting, horse-racing, and boxing, national dances, and the field sports of hunting, hawking, or archery, are the favourite amusements of some people. But, in some countries, the progress of industry, the habits of domestic life, and the general diffusion of books, have, in a great measure, superseded the pastimes which were formerly so universal. Among the amusements of most nations, games of chance hold an important place, and are, undoubtedly, of very ancient origin. Those, in which the fingers are the instruments, as in the Italian *mora*, are probably the oldest. The invention of dice is attributed to the Greek Palamedes; that of chess, to the people of India. Both games were known to the Greeks and Romans. The games of mixed chance and skill are also of early origin. These were known to the Romans; but they were principally attached to games of chance (*aleæ*), although they were prohibited by law, and the players reputed infamous. The ancient Germans, according to the description of Tacitus, were passionately devoted to gaming. "They addict themselves," says he, "to dice when sober, and as a serious employment, with such a mad desire of winning or losing, that, when stript of every thing else, they will at last stake their liberty and their very selves. The loser suffers himself to be bound and sold" Cards are of modern invention; and the games at cards are, some of them, purely games of chance, others of chance and skill combined. The laws of some countries, as of England, and many of the U. States, prohibit gaming: those of France, and some other countries of Europe, license gaming houses. Henry VIII. of England issued a proclamation against unlawful games, in consequence of which, dice, cards, tables, and bowls, were seized and destroyed in many places, though he himself was a great gambler; and we read of his losing much of the plunder of the suppressed abbeys at games of chance. Suspected gamesters, in England, may be brought before magistrates, and required to find sureties not to play or bet during twelve months, to the amount of twenty shillings, and, in default of sureties, may be imprisoned.

SPOT, *n. s.* & *v. a.* Spot'less, *adj.* Spot'ty. } Dan. *spette*; Flemish *spotte*. A blot; a mark made by discoloration, a taint; disgrace: hence a marked or particular place: 'upon the spot' is immediately; without changing place: to spot, to stain; discolour; corrupt: spotless, free from spot or stain: spotty, abounding in spots.

This vow receive, this vow of God maintain,
My virgin life no *spotted* thoughts shall stain.
Sidney.

Let him take thee,
And hoist thee up to the shouting plebeians;
Follow his chariot, like the greatest *spot*
Of all thy sex. *Shakspeare. Antony and Cleopatra.*

Have you not seen a handkerchief,
Spotted with strawberries, in your wife's hand?
Shakspeare.

So much fairer
And *spotless* shall mine innocence arise,
When the king knows my truth. *Id.*

That *spot* to which I point is Paradise,
Adam's abode; those lofty shades, his bower.
Milton.

This three years day, these eyes, though clear
To outward view of blemish or of *spot*,
Bereft of sight, their seeing have forgot. *Id.*

The moon, whose orb
Through optick glass the Tuscan artist views
In Valombrosa to descry new lands,
Rivers, or mountains, on her *spotty* globe. *Id.*

I would be busy in the world, and learn;
Not, like a coarse and useless dunghill weed,
Fixed to one *spot*, and rot just as I grow. *Otway.*

As in this grove I took my last farewell,
As on this very *spot* of earth I fell,
So she my prey becomes even here. *Dryden.*

He who, with Plato, shall place beatitude in the knowledge of God, will have his thoughts raised to other contemplations than those who looked not beyond this *spot* of earth, and those perishing things in it. *Locke.*

I counted the patches on both sides, and found the tory patches to be about twenty stronger than the whig: but next morning the whole puppetshow was filled with faces *spotted* after the whiggish manner.
Addison's Spectator.

Yet Chloe sure was formed without a *spot*;
'Tis true, but something in her was forgot. *Pope.*

Here Adrian fell: upon that fatal *spot*
Our brother died. *Granville.*

You graced the several parts of life,
A *spotless* virgin, and a faultless wife. *Waller.*

But serpents now more amity maintain;
From *spotted* skins the leopard does refrain;
No weaker lions by a stronger slain.
Tate's Juvenal.

Eternal sunshine of the *spotless* mind,
Each prayer accepted, and each wish resigned.
Pope.

It was determined upon the *spot*, according as the oratory on either side prevailed. *Swift.*

The Dutch landscapes are, I think, always a representation of an individual *spot*, and each in its kind a very faithful, but very confined portrait.
Reynolds.

Spots, in astronomy, certain places of the sun's or moon's disk, observed to be either more bright or dark than the rest, and accordingly called feculæ et maculæ. See Astronomy, Index.

SPOTSWOOD (John), archbishop of St. Andrew's in Scotland, was descended from the lairds of Spotswood in the Merse, and was born in 1565. He was educated in the university of Glasgow, and succeeded his father in the parsonage of Calder when but eighteen years of age. In 1601 he attended Lodowick, duke of Lennox, as chaplain, in an embassy to the court of France for confirming the ancient amity between the two nations, and returned in his retinue through England. When he entered into the archbishopric of Glasgow, there was not £100 sterling of yearly revenue left; but by economy he greatly improved it. In 1616 he was made archbishop, primate, and metropolitan of Scotland. He presided in several assemblies for restoring the ancient discipline, and bringing the church of Scotland to uniformity with that of England. He continued in high esteem with king James I. and Charles I. who was crowned by him in 1633 at Holyroodhouse. In 1635, upon the death of the earl of Kinnoul, chancellor of Scotland, he was advanced to that post; but had scarcely held it four years, when the confusions beginning in Scotland, he was obliged to retire into England; and died at London in 1639, and was interred in Westminster Abbey. He wrote a history of the Church of Scotland from 203 to the reign of king James VI. in folio.

SPOU'SAL, *adj.* & *n. s.* } Fr. *épouse;* Lat. *sponsa, sponsus.* Nuptial; matrimonial: marriage; nuptials; one joined in marriage: a husband or wife: wedded; joined in matrimony.
Spouse, *n. s.*
Spoused, *adj.*

As man and wife, being two, are one in love,
So be there 'twixt your kingdoms such a *spousal*,
That never may ill office, or fell jealousy,
Thrust in between the paction of these kingdoms,
To make divorce of their incorporate league.
Shakspeare.

She is of good esteem;
Beside, so qualified as may beseem
The *spouse* of any noble gentleman. *Id.*

There shall we consummate our *spousal* rites. *Id.*

They led the vine
To wed her elm; she *spoused* about him twines
Her marriageable arms. *Milton.*

This other, in her prime of love,
Spousal embraces vitiated with gold. *Id.*

The amorous bird of night
Sung *spousal*, and bid haste the evening star,
On his hill top to light the bridal lamp. *Id.*

The *spousals* of Hippolita the queen,
What tilts and tourneys at the feasts were seen!
Dryden.

At once, Farewel, O faithful *spouse!* they said;
At once the encroaching rinds their closing lips invade. *Id.*

To tempt the *spouseless* queen with am'rous wiles,
Resort the nobles from the neighb'ring isles. *Pope.*

Sleepest thou, careless of the nuptial day?
Thy *spousal* ornament neglected lies;
Arise, prepare the bridal train, arise.
Pope's Odyssey.

One of two must still obey,
Nancy, Nancy;
Is it man or woman, say,
My *spouse*, Nancy? *Burns.*

SPOUT, *n. s.*, *v. a.* & *v. n.* } Belg *spuyt.* A
Spout'er, *n. s.* } pipe, or mouth of a pipe or vessel, out of which any thing is poured; water falling as from a spout; to pour or issue with violence: a spouter is an everlasting or vehement speaker.

They laid them down hard by the murmuring musick of certain waters, which *spouted* out of the side of the hills. *Sidney.*

Not the dreadful *spout*,
Which shipmen do the hurricano call,
Constringed in mass by the almighty sun,
Shall dizzy with more clamour Neptune's ear
In his descent, than shall my prompted sword
Falling on Diomede.
Shakspeare. Troilus and Cressida.

She gasping to begin some speech, her eyes
Became two *spouts*. *Id. Winter's Tale.*

We will bear home that lusty blood again,
Which here we came to *spout* against your town.
Shakspeare.

In Gaza they couch vessels of earth in their walls, to gather the wind from the top, and to pass it down in *spouts* into rooms. *Bacon.*

I intend two fountains, the one that sprinkleth or *spouteth* water, the other a fair receipt of water. *Id.*

As waters did in storms, now pitch runs out,
As lead, when a fired church becomes one *spout*.
Donne.

If you chance it to lack,
Be it claret or sack,
I'll make this snout
To deal it about,
Or this to run out,
As it were from a *spout*. *Ben Jonson.*

Next on his belly floats the mighty whale;
He twists his back, and rears his threatening tail:
He *spouts* the tide. *Creech.*

In whales that breathe, lest the water should get unto the lungs, an ejection thereof is contrived by a fistula or *spout* at the head. *Browne.*

She swims in blood, and blood does *spouting* throw
To heaven, that heaven men's cruelties might know.
Waller.

No hands could force it thence, so fixt it stood,
Till out it rushed, expelled by streams of *spouting* blood. *Dryden.*

The force of these motions pressing more in some places than in others, there would fall not showers, but great *spouts* or cascades of water.
Burnet's Theory of the Earth.

In this single cathedral, the very *spouts* are loaded with ornaments. *Addison on Italy.*

It *spouts* up out of deep wells, and flies forth at the tops of them, upon the face of the ground.
Woodward

From silver *spouts* the grateful liquors glide,
And China's earth receives the smoking tide. *Pope.*

All the glittering hill
Is bright with *spouting* rills. *Thomson's Autumn.*

Elihu Palmer, the deistical *spouter*, was, in the small circle of his church, more priestly, more fulminating, and looked for more reverence and adoration from his disciples, than the Lauds and Gardiners of England. Without the means, he affected all the haughtiness of Wolsey. Professing to adore reason, he was in a rage if any body reasoned with him.
Cheetham's Life of Paine

SPRAG, *adj.* Swed. *spraeg.* Vigorous; sprightly. A provincial word.

A good *sprag* memory. *Shakspeare. Merry Wives.*

SPRAIN, *v. a.* & *n. s.* Corrupted from strain To stretch the ligaments of a joint without dislocation of the bone: the injury that ensues.

I was in pain, and thought it was with some *sprain* at tennis. *Temple.*

Should the big last extend the shoe too wide,
The sudden turn may stretch the swelling vein,
Thy cracking joint unhinge, or ancle *sprain.* *Gay.*

SPRANGHER (Bartholomew), a celebrated painter, born at Antwerp in 1546. He went to Rome, where cardinal Farnese patronised him, and introduced him to pope Pius V., for whom he painted many pictures. On his return he became chief painter to Maximilian II., whose successor Rodolphus was so pleased with him, that he gave him a gold chain and medal, ennobled him and his family, lodged him in his palace, and gave him a pension. He made the tour of the Netherlands, returned to Prague, and died in 1623.

SPRAT, *n. s.* Dut. *sprot;* Lat. *sarda.* A small sea fish.

All-saints do lay for porke and sowse,
For *sprats* and spurlings for their house. *Tusser.*

So oft, in feasts with costly changes clad,
To crammed maws a *sprat* new stomach brings. *Sidney.*

Of round fish there are brit, *sprat,* barn, smelts. *Carew.*

SPRAT (Dr. Thomas), bishop of Rochester, was born in 1636. He had his education at Oxford, and became F. R. S., chaplain to George, duke of Buckingham, and chaplain in ordinary to king Charles II. In 1667 he published the History of the Royal Society, and a Life of Mr. Cowley; who, by his last will, left to his care his printed works and MSS., which were accordingly published by him. In 1668 he was appointed prebendary of Westminster, in 1680 canon of Windsor, in 1683 dean of Westminster, and in 1684 bishop of Rochester. He was clerk of the closet to king James II.; in 1685 was made dean of the chapel royal; and in 1686 was appointed one of the commissioners for ecclesiastical affairs. In 1692 his lordship, with several other persons, was charged with treason by two men, who drew up an association, in which the subscribers declared their resolution to restore king James, to seize the princess of Orange, and to be ready with 30,000 men to meet king James when he should land. To this they put the names of Sancroft, Sprat, Marlborough, Salisbury, and others. The bishop was arrested, and kept at a messenger's, under a strict guard, for eleven days. His house was searched and his papers seized, among which nothing was found of a treasonable appearance, except one memorandum in the following words:—Thorough-paced doctrine. This, he said, was only a memorandum of an absurd expression of Daniel Burgess, a preacher. His innocence being proved he was set at liberty, when he published An Account of his Examination and Deliverance; which he commemorated through life by an annual thanksgiving. He died May 20th, 1713, aged seventy-nine. His works, besides the above and a few poems, are The Answer to Sorbiere; The History of the Rye-house Plot; and a volume of Sermons. Dr. Johnson says that each work 'has its distinct and characteristical excellence.'

SPRATT, in agriculture, a name given in some places to a plant, which is found to rise in great abundance, in a spontaneous manner, in most watery situations of the more sound boggy kind. It is stated, in a paper in the third volume of the Transactions of the Highland Society of Scotland, that, though it abounds much in that part of the kingdom, the proper culture of it is by no means well understood. It should, it is said, be suitably manured for with compost manure, once in three years; or watering sometimes answers the same intention very well, in cases where it is grown for hay; the land being preserved from cattle, or other sorts of stock, from the month of March; and the plants cut for hay in July at the latest. The seeding stalks are also stated to have been mown, after the cattle in pasturage, to benefit. Spring frosts occasionally, however, destroy some inches of the tops.

Sheep may eat it safely without danger of rotting; and it raises young cattle, it is said, to a great size of bone. But that, when suffered to run up to seed, it is not palatable; though cattle not unfrequently get it for hay in that state. Where manure is used, and it is cut in the sap, it constitutes, it is observed, a most excellent and abundant kind of hay for black cattle. In this management it has been seen ready for the scythe as soon as rye-grass; and one of the best samples of meadow hay seen in the above part of the country was cut in the year 1804, and consisted of spratt and common poa. Others, however, do not think so highly of it, as it has been noticed in situations in the Highlands where cattle were often stinted or straitened for food, and generally remained untouched by them. The same has likewise been the case in other places of the above districts.

Its strong root is also thought an objection to its being cultivated as a grass crop, even if it were capable of it, as being difficult of extirpation. It has been farther used for making cushions, to be put under the yokes used by oxen in ploughing; for which purpose it seems, it is said, well suited on account of its toughness.

SPRAWL, *v. n.* Dan. *sprille.* To struggle, as in convulsions; with arms and legs spread.

Hang the child, that he may see it *sprawl;*
A sight to vex the father's soul. *Shakspeare.*

Some lie *sprawling* on the ground,
With many a gash and bloody wound. *Hudibras.*

Telamon hap'd to meet
A rising root that held his fastened feet;
So down he fell, whom *sprawling* on the ground
His brother from the wooden gyves unbound. *Dryden.*

The birds were not fledged; but, upon *sprawling* and struggling to get clear of the flame, down they tumbled. *L'Estrange.*

Hence, long before the child can crawl,
He learns to kick, and wince, and *sprawl.* *Prior.*

Did the stars do this feat once only, which gave beginning to human race? who were there then in the world, to observe the births of those first men, and calculate their nativities, as they *sprawled* out of ditches? *Bentley*

He ran, he leapt into a flood,
There *sprawled* awhile, and scarce got out,
All covered over with slime. *Swift.*

SPRAY, *n. s.* Of the same race with SPRIT and SPROUT, which see. The extremity of a branch; foam of the sea.

At sight whereof each bird that sits on *spray*,
And every beast that to his den was fled,
Come forth afresh out of their late dismay,
And to the light lift up their drooping head.
Hubberd's Tale.

Thus droops this lofty pine, and hangs his *sprays*,
Thus Eleanor's pride dies in her younger days.
Shakspeare.

The wind that whistles through the *sprays*
Maintains the concert of the song;
And hidden birds with native lays,
The golden sleep prolong. *Dryden.*

Winds raise some of the salt with the *spray*.
Arbuthnot.

SPRAY, the sprinkling of the sea, which is driven from the top of a wave in stormy weather. It differs from spoon-drift, as being only blown occasionally from the broken surface of a high wave; whereas the latter continues to fly horizontally along the sea, without intermission, during the excess of a tempest or hurricane.

SPREAD, *v. a., v. n.*, & *n. s.* } Saxon ꝼꝼeꝺan; SPREAD'ER, *n. s.* } Belg. *spreyden*. To extend; expand; stretch: expand itself: extent; compass: spreader, one who spreads.

He bought a field where he had *spread* his tent.
Genesis xxxiii.

Rizpah *spread* sackcloth for her upon the rock.
2 *Samuel* xxi.

He arose from kneeling, with his hands *spread* up to heaven, and he blessed the congregation.
1 *Kings* viii. 54.

Can any understand the *spreadings* of the clouds, or the noise of his tabernacle? *Job* xxxvi. 29.

The workman melteth a graven image, and the goldsmith *spreadeth* it over with gold. *Isaiah* xl. 19.

Silver *spread* into plates is brought from Tarshish.
Jeremiah x.

They, when departed *spread* abroad his fame in all that country. *Matthew* ix. 31.

By conforming ourselves we should be *spreaders* of a worse infection than any we are likely to draw from papists, by our conformity with them in ceremonies. *Hooker.*

Spread o'er the silver waves thy golden hair.
Shakspeare.

Make the trees more tall, more *spread*, and more hasty than they use to be.
Bacon's Natural History.

Plants, if they *spread* much, are seldom tall.
Bacon.

No flower hath that *spread* of the woodbind. *Id.*

Faire attendants then
The sheets and bedding of the man of men,
Within a cabin of the hollow keele
Spred and made soft. *Chapman.*

The stately trees fast *spread* their branches.
Milton.

Great Pan, who wont to chase the fair,
And loved the *spreading* oak, was there.
Addison's Cato.

I have got a fine *spread* of improveable lands, and am already ploughing up some, fencing others.
Addison.

Her cheeks their freshness lose and wonted grace,
And an unusual paleness *spreads* her face.
Granville.

Deep in a rich alcove the prince was laid,
Fast by his side Pisistratus lay *spread*,
In age his equal, on a splendid bed. *Pope.*

If it be a mistake, I desire I may not be accused for a *spreader* of false news. *Swift.*

Shall funeral eloquence her colours *spread*,
And scatter roses on the wealthy dead? *Young.*

SPRENT, *part.* Sax. ꝼꝼenzan, ꝼꝼenan; Belg. *sprengen*. The old English word for sprinkle is sprene. Sprinkled. Obsolete.

O lips, that kissed that hand with my tears *sprent*.
Sidney

SPRETZA, a river of Bosnia.

SPRIG, *n. s.* Saxon ꝼꝼec; Welsh *ysbrig*; so Davies: but it is probably of the same race with spring.—Johnson. A small branch; a spray.

The substance is true ivy; after it is taken down, the friends of the family are desirous to have some *sprig* to keep. *Bacon.*

Our chilling climate hardly bears
A *sprig* of bays in fifty years;
While every fool his claim alleges,
As if it grew in common hedges. *Swift.*

SPRIG, in botany. See BOTANY, Index, BRANCH, CION, GRAFTING, and PLANT.

SPRIGHT, *n. s.* & *v. a.* } Sax. ꝼꝼeor. A
SPRIGHT'FUL, *adj.* } contraction of Lat.
SPRIGHT'FULLY, *adv.* } *spiritus*, spirit. It
SPRIGHT'LESS, *adj.* } was anciently writ-
SPRIGHT'LINESS, *n. s.* } ten sprete or spryte.
SPRIGHT'LY, *adv.* } Spirit; shade; soul; incorporeal agent: hence power; animation; courage; an arrow (obsolete): to spright is to haunt as a spright: sprightful is, lively; animated; brisk: the adverb corresponding: sprightless, the opposite adjective, with the noun substantive corresponding: sprightly is also brisk; lively; vigorous.

O chastity! the chief of heavenly lights,
Which makest us most immortal shape to wear,
Hold thou my heart, establish thou my *sprights*;
To only thee my constant course I bear,
Till spotless soul unto my bosom fly;
Such life to lead, such death I vow to die. *Sidney.*

She doth display
The gate with pearls and rubies richly dight,
Through which her words so wise do make their way,
To bear the message of her *spright*. *Spenser.*

The Grecians *spritefully* drew from the darts the corse,
And hearst it, bearing it to fleet. *Chapman's Iliad.*

You have not seene young heiffers, highly kept,
Filled full of daisies at the field, and driven
Home to their hovels; all so *spritely* given,
That no roome can containe them. *Chapman*

I am *sprighted* with a fool. *Shakspeare. Cymbeline*

The spirit of the time shall teach me speed.
—Spoke like a *sprightful* noble gentleman.
Shakspeare.

Norfolk, *sprightfully* and bold,
Stays but the summons of the appellant's trumpet.
Id.

We had in use for sea fight short arrows called *sprights*, without any other heads save wood sharpened; which were discharged out of muskets, and would pierce through the sides of ships where a bullet would not. *Bacon's Natural History.*

Are you grown
Benumbed with fear, or virtue's *sprightless* cold?
Cowley.

Steeds *sprightful* as the light. *Id.*

Happy my eyes when they behold thy face:
My heavy heart will leave its doleful beating
At sight of thee, and bound with *sprightful* joys.
Otway.

While with heavenly charity she spoke,
A streaming blaze the silent shadows broke;
The birds obscene to forests winged their flight,
And gaping graves received the guilty *spright*.
Dryden.

Produce the wine that makes us bold,
And *sprightly* wit and love inspires. *Id.*

The ideas of goblins and *sprights* have no more to do with darkness than light; yet let but a foolish maid inculcate these often on the mind of a child, possibly he shall never be able to separate them again. *Locke.*

The soul is clogged when she acts in conjunction with a companion so heavy; but, in dreams, observe with what a *sprightliness* and alacrity does she exert herself. *Addison.*

Each morn they waked me with a *sprightly* lay:
Of opening heaven they sung, and gladsome day.
Prior.

Of these am I who thy protection claim;
A watchful *sprite*, and Ariel is my name. *Pope.*

The *sprightly* Sylvia trips along the green;
She runs, but hopes she does not run unseen. *Id.*

The *sprites* of fiery termagants in flame
Mount up, and take a salamander's name. *Id.*

Youth has a *sprightliness* and fire to boast,
That in the valley of decline are lost,
And Virtue with peculiar charms appears,
Crowned with the garland of life's blooming years.
Cowper.

If there be *sprites*,
They would have walked there in their *spriteliest* trim,
By way of change from their sepulchral rites,
And show themselves as ghosts of better taste
Than hunting some old Ruin or wild Waste.
Byron.

SPRING, *v.n., v.a.* & *n.s* / SPRINGE, *n. s.* / SPRING'HALT, / SPRING'INESS, / SPRING'LE, / SPRING'TIDE, / SPRIN'GY, *adj.* — Sax. ꝑꝑnnɡan; Teut. *springe*; Belg. and Swed. *springen*; Goth. and Swed. *springâ*. To shoot; grow; arise out of the ground; begin to grow; proceed; arise; appear; issue; bound; leap; fly with elastic power: as a verb active, to start; rouse game; produce unexpectedly; discharge; leap or pass by leaping: as a noun substantive, the season of growth; or when the plants rise from winter; an elastic body; elastic force; active power; a leap; bound; issue of water from the earth; fountain; source; rise; and (obsolete) a youth: springe is a gin; noose: springhalt, a twitching lameness of the horse: springle, a noose: springtide, high tide; tide at the full moon: springy, elastic; full of springs.

By the infinitness of the mersy of oure God, in the which he *springyng* up fro on high hath vi'ted us. *Wiclif. Luk.* 1.

Israel's servants digged in the valley, and found a well of *springing* water. *Genesis* xxvi. 19.

When the day began to *spring*, they let her go. *Judges.*

About the *spring* of the day, Samuel called Saul to the top of the house. 1 *Samuel* ix. 26.

Ye shall eat this year such things as grow of themselves; and in the second year that which *springeth* of the same. 2 *Kings.*

To satisfy the desolate ground, and cause the bud of the tender herb to *spring* forth. *Job* xxxviii. 27.

To them which sat in the region and shadow of death, light is *sprung* up. *Matthew* iv. 16.

Other fell on good ground, and did yield fruit that *sprang* up and increased. *Mark* iv. 8.

He called for a light, and *sprang* in, and fell before Paul. *Acts.*

Our Lord *sprang* out of Juda. *Hebrews* vii. 14.

Before the bull she pictured winged love,
With his young brother sport, light fluttering
Upon the waves, as each had been a dove;
The one his bow and shafts, the other *spring*
A burning tead about his head did move,
As in their sire's new love both triumphing.
Spenser.

Not mistrusting, till these new curiosities *sprong* up, that ever any man would think our labour herein mispent, or the time wastefully consumed. *Hooker.*

All blest secrets,
All you unpublished virtues of the earth,
Spring with my tears; be aidant and remediate
In the good man's distress. *Shakspeare.*

How youngly he began to serve his country,
How long continued; and what stock he *springs* of;
The noble house of Marcius. *Id. Coriolanus.*

I *sprang* not more in joy at first hearing he was a man child, than now in first seeing he had proved himself a man. *Shakspeare.*

Orpheus with his lute made trees,
And the mountain-tops that freeze,
Bow themselves when he did sing:
To his musick plants and flowers
Ever *sprung*, as sun and showers
There had made a lasting *spring*.
Id. Henry VIII.

Now stop thy *springs*; my sea shall suck them dry,
And swell so much the higher by their ebb.
Id. Henry VI.

As a woodcock to my own *springe*, Osrick,
I'm justly killed with mine own treachery.
Shakspeare.

They've all new legs, and lame ones; one would take it,
That never saw them pace before, the spavin
And *springhalt* reigned among them.
Id. Henry VIII.

Springs on the tops of hills pass through a great deal of pure earth, with less mixture of other waters. *Bacon's Natural History.*

Thus I reclaimed my buzzard love to fly
At what, and when, and how, and where I chose;
Now negligent of sport I lie;
And now, as other fawkners use,
I *spring* a mistress, swear, write, sigh, and die;
And the game killed, or lost, go talk or lie. *Donne.*

Each petty hand
Can steer a ship becalmed; but he that will
Govern, and carry her to her ends, must know
His tides, his currents; how to shift his sails:
Where her *springs* are, her leaks, and how to stop 'em
Ben Jonson's Catiline

All these
Shall, like the brethren *sprung* of dragon's teeth,
Ruin each other, and he fall amongst 'em.
Ben Jonson.

The *spring* visiteth not these quarters so timely as the eastern parts. *Carew*

Fly, fly, prophane fogs! far hence fly away,
Taint not the pure streams of the *springing* day
With your dull influence: it is for you
To sit and scoule upon night's heavy brow.
Crashaw

To that great *spring* which doth great kingdoms move,
The sacred *spring* whence right and honour streams;
Distilling virtue, shedding peace and love
In every place, as Cynthia sheds her beams. *Davies.*

This may be performed by the strength of some such *spring* as is used in watches: this *spring* may be applied to one wheel, which shall give an equal motion to both the wings. *Wilkins.*

They found new hope to *spring*
Out of despair. *Milton.*

That *sprung* the game you were to set,
Before you'd time to draw the net. *Hudibras.*

Let the wide world his praises sing,
Where Tagus and Euphrates *spring*;
And from the Danube's frosty banks to those
Where from an unknown head great Nilus flows.
Roscommon.

My doors are hateful to my eyes,
Filled and dammed up with gaping creditors,
Watchful as fowlers when their game will *spring*.
Otway.

Where there is a continued endeavour of the parts of a body to put themselves into another state, the progress may be much more slow; since it was a great while before the texture of the corpuscles of the steel were so altered as to make them lose their former *springiness*. *Boyle.*

Mankind *sprang* from one common original; whence this tradition would be universally diffused. *Tillotson.*

What makes all this but Jupiter the king,
At whose command we perish and we *spring*?
Then 'tis our best, since thus ordained to die,
To make a virtue of necessity.
Dryden's Knight's Tale.

When heaven was named, they loosed their hold again;
Then *sprung* she forth, they followed her amain.
Dryden.

'Tis true from force the noblest title *springs*,
I therefore hold from that which first made kings.
Id.

Thus man by his own strength to heaven would soar,
And would not be obliged to God for more:
Vain, wretched creature, how art thou misled,
To think thy wit these godlike notions bred!
These truths are not the product of thy mind,
But dropt from heaven, and of a nobler kind:
Revealed religion first informed thy sight,
And reason saw not, till faith *sprung* the light. *Id.*

The prisoner with a *spring* from prison broke;
Then stretched his feathered fans with all his might,
And to the neighbouring maple winged his flight.
Id.

The nurse, surprised with fright,
Starts up and leaves her bed, and *springs* a light. *Id.*

Love, like *springtides*, full and high,
Swells in every youthful vein;
But each tide does less supply,
Till they quite shrink in again:
If a flow in age appear,
'Tis but rain, and runs not clear.
Id. Tyrannick Love.

Let goats for food their loaded udders lend;
But neither *springing* nets nor snares employ.
Dryden.

Whether she *sprung* a leak, I cannot find,
Or whether she was overset with wind,
But down at once with all her crew she went. *Id.*

Tall Norway fir their masts in battle spent,
And English oaks *sprung* leaks and planks restore.
Id.

My heart sinks in me while I hear him speak,
And every slackened fibre drops its hold,
Like nature letting down the *springs* of life;
So much the name of father awes me still. *Id.*

He adds the running *springs* and standing lakes,
And bounding banks for winding rivers makes. *Id.*

I move, I see, I speak, discourse and know;
Though now I am, I was not always so:
Then that from which I was must be before,
Whom, as my *spring* of being, I adore. *Id.*

Heavens, what a *spring* was in his arm, to throw!
How high he held his shield, and rose at every blow!
Id.

People discharge themselves of burdensome reflections, as of the cargo of a ship that has *sprung* a leak. *L'Estrange.*

Some have been deceived into an opinion that the inheritance of rule over men, and property in things, *sprang* from the same original, and descend by the same rules. *Locke.*

He that was sharp-sighted enough to see the configuration of the minute particles of the *spring* of a clock, and upon what peculiar impulse its elastick motion depends, would no doubt discover something very admirable. *Id.*

He bathed himself in cold *spring* water in the midst of winter. *Id.*

Nature is the same, and man is the same, has the same affections and passions, and the same *springs* that give them motion. *Rymer.*

Our author shuns by vulgar *springs* to move.
Pope.

Where the sandy or gravelly lands are *springy* or wet, rather marl them for grass than corn.
Mortimer's Husbandry.

A link of horsehair, that will easily slip, fasten to the end of the stick that *springs*. *Id.*

The mountain stag that *springs*
From height to height, and bounds along the plains,
Nor has a master to restrain his course,
That mountain stag would Vanoe rather be
Than be a slave. *Philip's Briton.*

The *spring* must be made of good steel, well tempered; and the wider the two ends of the *spring* stand asunder, the wider it throws the chape of the vice open. *Moxon's Mechanical Exercises.*

Most people die when the moon chiefly reigns; that is, in the night, or upon or near a *springtide*.
Grew's Cosmologia.

Our miners discovered several of the enemies' mines, who have *sprung* divers others which did little execution. *Tatler.*

Do not blast my *springing* hopes,
Which thy kind hand has planted in my soul.
Rowe.

I *sprung* a mine, whereby the whole nest was overthrown. *Addison's Spectator.*

A covey of partridges *springing* in our front, put our infantry in disorder. *Addison.*

A large cock pheasant he *sprung* in one of the neighbouring woods. *Id. Spectator.*

Here I use a great deal of diligence before I can *spring* any thing; whereas in town, whilst I am following one character, I am crossed by another, that they puzzle the chase. *Addison.*

The soul is gathered within herself, and recovers that *spring*, which is weakened when she operates more in concert with the body. *Id.*

He that has such a burning zeal, and *springs* such mighty discoveries, must needs be an admirable patriot. *Collier.*

This vast contraction and expansion seems unintelligible, by feigning the particles of air to be *springy* and ramous, or rolled up like hoops, or by any other means than a repulsive power. *Newton.*

Bodies which are absolutely hard, or so soft as to be void of elasticity, will not rebound from one another; impenetrability makes them only stop. If two

equal bodies meet directly in vacuo, they will by the laws of motion stop where they meet, lose their motion, and remain in rest; unless they be elastick, and receive new motion from their *spring*. *Newton.*

See, awed by heaven, the blooming Hebrew flies
Her artful tongue, and more persuasive eyes;
And, *springing* from her disappointed arms,
Prefers a dungeon to forbidden charms. *Blackmore.*

Had not the Maker wrought the *springy* frame,
Such as it is, to fan the vital flame,
The blood, defrauded of its nitrous food,
Had cooled and languished in the' arterial road;
While the tired heart had strove, with fruitless pain,
To push the lazy tide along the vein.
Id. Creation.

The reason of the quicker or slower termination of this distemper, arises from these three *springs*.
Blackmore.

See how the well-taught pointer leads the way!
The scent grows warm; he stops, he *springs* the prey. *Gay.*

In adult persons, when the fibres cannot any more yield, they must break, or lose their *spring*.
Arbuthnot.

Though the bundle of fibres which constitute the muscles may be small, the fibres may be strong and *springy*. *Id.*

Heroes of old, by rapine and by spoil,
In search of fame did all the world embroil;
Thus to their gods each then allied his name,
This *sprang* from Jove, and that from Titan came.
Granville.

The air is a thin fluid body, endowed with elasticity and *springiness*, capable of condensation and rarefaction. *Bentley.*

If our air had not been a *springy* body, no animal could have exercised the very function of respiration; and yet the ends of respiration are not served by that *springiness*, but by some other unknown quality.
Id. Sermons.

Now from beneath Maleas' airy height
Aloft she *sprung*, and steered to Thebes her flight.
Pope.

Who *sprung* from kings shall know less joy than I.
Id.

Swift fly the years, and rise the' expected morn!
Oh *spring* to light, auspicious babe, be born! *Id.*

Tell me, in what happy fields
The thistle *springs*, to which the lily yields? *Id.*

Even thought meets thought, ere from the lips it part,
And each warm wish *springs* mutual from the heart.
Id.

The friendly gods a *springing* gale enlarged;
The fleet swift tilting o'er the surges flew,
Till Grecian cliffs appeared. *Id.*

With hairy *springes* we the birds betray,
Slight lines of hair surprise the finny prey. *Id.*

Our author shuns by vulgar *springs* to move. *Id.*

The friends to the cause *sprang* a new project; and it was advertised that the Crisis could not appear, till the ladies had shown their zeal against the Pretender. *Swift.*

The first *springs* of great events, like those of great rivers, are often mean and little. *Id.*

Come, gentle *spring*, ethereal mildness, come,
And from the bosom of yon dropping cloud
Upon our plains descend. *Thomson's Spring.*

Unbeseeming skill
To *spring* the fence, to rein the prancing steed.
Thomson.

The haunt o' *spring's* the primrose brae,
The simmer joys the flocks to follow,
How cheery through her shortening day
Is autumn, in her weeds o' yellow! *Burns.*

Spring, in cosmography, denotes one of the seasons of the year; commencing, in the northern parts of the world, on the day the sun enters the first degree of Aries, which is about the tenth day of March, and ending when the sun leaves Gemini; or, more strictly and generally, the spring begins on the day when the distance of the sun's meridian altitude from the zenith, being on the increase, is at a medium between the greatest and least. The end of the spring coincides with the beginning of summer. See Summer.

Spring, in mechanics, denotes a thin piece of tempered steel, or other elastic substance, which, being wound up, serves to put machines in motion by its elasticity, or endeavours to unbend itself; such is the spring of a watch, clock, or the like.

Spring, Elater, in physics, denotes a natural faculty, or endeavour, of certain bodies to return to their first state, after having been violently put out of the same by compressing, or bending them, or the like. This faculty is usually called by philosophers elastic force or elasticity.

Springs. Many have been the conjectures of philosophers concerning the origin of fountains, and great pains have been taken by the members of the Royal Society, and those of the Academy of Sciences at Paris, to ascertain the true cause of it. It was Aristotle's opinion, and held by most of the ancient philosophers after him, that the air contained in the caverns of the earth, being condensed by cold near its surface, was thereby changed into water; and that it made its way through where it could find a passage. And this transmutation of air into water strictly accords with the recent discoveries that water in fact is compounded of nothing else but two kinds of air, though it is hardly to be supposed that Aristotle had the most distant idea of this fact. Those who imagine, that fountains owe their origin to waters brought from the sea by subterraneous ducts, give a tolerable account how they lose their saltness by percolation as they pass through the earth; but they cannot explain by what power the water rises above the level of the sea to near the tops of mountains, where springs generally abound; it being contrary to the laws of hydrostatics that a fluid should rise in a tube above the level of its source. It was a generally received opinion, and much espoused by Mariotte, that the rise of springs is owing to the rains and melted snow. The rain water, he says, which falls upon the hills and mountains, penetrating the surface, meets with clay or rocks contiguous to each other; along which it runs, without being able to penetrate them, till, being got to the bottom of the mountain or to a considerable distance from the top, it breaks out of the ground, and forms springs. To examine this opinion Mr. Perrault, De la Hire, and D. Sideleau, endeavoured to make an estimate of the quantity of rain and snow that falls in a year, to see whether it would be sufficient to afford a quantity of water equal to that which is annually discharged into the sea by the rivers. The result of their enquiries was, that the quantity of rain and snow which fell in a year into a cylindrical vessel would fill it (if secured from evaporating) to the height of about nineteen inches; which quantity, D. Sideleau

showed, was not sufficient to supply the rivers; for that those of England, Ireland, and Spain, discharge a greater quantity of water annually than the rain, according to that experiment, is able to supply. Another observation was made by them, that the quantity of water raised in vapor, one year with another, amounted to about thirty-two inches, which is thirteen more than falls in rain: a plain indication that the water of fountains is not supplied by rain and melted snow. Thus the true cause of the origin of fountains remained undiscovered till Dr. Halley, in making his celestial observations upon the tops of the mountains at St. Helena, about 800 yards above the level of the sea, found that the quantity of vapor which fell there (even when the sky was clear) was so great that it very much impeded his observations, by covering his glasses with water every half quarter of an hour; and upon that he attempted to determine by experiment the quantity of vapor exhaled from the surface of the sea, as far as it rises from heat, to try whether that might be a sufficient supply for the water continually discharged by fountains. His experiment was as follows:—He took a vessel of water salted to the same degree with that of sea-water, in which he placed a thermometer; and, by means of a pan of coals, brought the water to the same degree of heat, which is observed to be that of the air in our hottest summer; this done he fixed the vessel of water, with the thermometer in it, to one end of a pair of scales, and exactly counterpoised it with weights on the other: then, at the end of two hours, he found, by the alteration made in the weight of the vessel, that about a sixtieth part of an inch of the depth of the water was gone off in vapor; and therefore, in twelve hours, one-tenth of an inch would have gone off. Now this accurate observer allows the Mediterranean Sea to be 40° long, and 4° broad, so that its whole surface is 160 square degrees; which must yield at least 5,280,000,000 tons of water: in which account no regard is had to the wind and the agitation of the surface of the sea, both which undoubtedly promote the evaporation. It remained now to compare this quantity of water with that which is daily conveyed into the same sea by the rivers. The only way to do which was to compare them with some known river; and accordingly he takes his computation from the river Thames; and, to avoid all objections, makes allowances, probably greater than were necessary. The Mediterranean receives the rivers Iberus, Rhone, Tiber, Po, Danube, Niester, Borysthenes, Tanais, and Nile. Each of these he supposes to bring down ten times as much water as the Thames, whereby he allows for smaller rivers which fall into the same sea. The Thames, then, he finds by mensuration to discharge about 20,300,000 tons of water a-day. If therefore the above nine rivers yield ten times as much water as the Thames doth, it follows, that all of them together yield but 1,827,000,000 of tons in a day, which is little more than one-third of what is proved to be raised in vapor out of the Mediterranean in the same time. We have therefore a source abundantly sufficient for the supply of fountains. The doctor considers next the manner in which they are raised, and how they are condensed into water again, and conveyed to the sources of springs. He considers that if an atom of water was expanded into a shell or bubble, so as to be ten times as big in diameter as when it was water, that atom would become specifically lighter than air, and therefore would rise so long as the warmth which first separated it from the surface of the water should continue to distend it to the same degree; and, consequently, that vapors may be raised from the surface of the sea in that manner, till they arrive at a certain height in the atmosphere, at which they find air of equal specific gravity with themselves. Here they will float till, being condensed by cold, they become specifically heavier than the air, and fall down in dew; or being driven by the winds against the sides of mountains (many of which far surpass the usual height to which the vapors would of themselves ascend), are compelled by the stream of the air to mount up with it to the tops of them; where, being condensed into water, they presently precipitate, and gleeting down by the crannies of the stones, part of them enters into the caverns of the hills; which being once filled, all the overplus of water that comes thither runs over by the lowest place, and breaking out by the sides of the hills forms single springs. Many of these running down by the valleys between the ridges of the hills, and coming to unite, form little rivulets or brooks; many of these again meeting in one common valley, and gaining the plain ground, being grown less rapid, become a river; and many of these, being united in one common channel, make such streams as the Rhine and the Danube; which last is the sum of all those springs which break out on the south side of the Carpathian mountains, and on the north side of the immense ridge of the Alps. Thus one part of the vapors which are blown on the land is returned by the rivers into the sea whence it came. Another part falls into the sea before it reaches the land; and this is the reason why the rivers do not return so much water into the Mediterranean as is raised in vapor. A third part falls on the low lands, where it affords nourishment to plants; yet it does not rest there, but is again exhaled in vapor by the action of the sun, and is either carried by the winds to the sea to fall in rain or dew there, or else to the mountains to become the sources of springs. Besides these causes some streams arise from rain and melted snow, which, subsiding through the surface of the earth, makes its way into certain cavities, and thence issues out in the form of springs; because the waters of several increase and diminish in proportion to the rain which falls: others again, especially such as are salt, and spring near the sea-shore, owe their origin to sea-water percolated through the earth; and some to both these causes. The above reasoning of Dr. Halley is confirmed by more recent discoveries. It is now found that, though water is a tolerable conductor of the electric fluid, dry earth is an electric per se, consequently the dry lands must always be in an electrified state compared with the ocean, unless in such particular cases as are mentioned under the article EARTHQUAKE. It is also well known that such bodies as are in an electrified

state, whether plus or minus, attract vapor, or other light substances. Hence the vapors that are raised from the ocean must necessarily have a tendency to approach the land in great quantity, even without the assistance of the wind, though this last undoubtedly contributes much to the same purpose. The higher grounds are always in a more electrified state than the lower ones; and hence the vapors, having once left the ocean and approached the shore, are attracted by the high mountains; of which Mr. Pennant gives an instance in Snowdon. See Snowdon. Hence we may see the reason why springs are so common in the neighbourhood of mountains, they being so advantageously formed in every respect for collecting and condensing the vapors into water. But now that the nature and composition of water have been so decisively proved, we need have no hesitation to ascribe the origin of all springs and fountains to this general cause, the meeting of oxygen and hydrogen, and the consequent conversion of these airs into water. This also is probably the cause of rain.

The heat of springs is generally the same with the mean temperature of the atmosphere. The mean temperature of the south of England is 48°; in Scotland, near Edinburgh, it is 45°; in the north of Ireland it is 48°, and on the south coast about 51°. Dr. Hutton makes the mean heat of springs near Edinburgh 47°, and that of London 51°. At Upsal, in Sweden, it is 43°, and in Paris 53°. According to accurate experiments made by eminent philosophers, the heat of the springs in these different countries corresponds with the medium temperature. Though this coincidence of the heat of springs with the mean temperature of the climate where they flow seems to be a general fact, yet it admits of many exceptions. In many parts of the world there are springs which not only exceed the mean temperature, but even the strongest meridian heat ever known in the torrid regions. The following table shows the degrees of heat which different springs possess according to the experiments of philosophers:—

Places.	Springs.	Highest deg. of heat.	Lowest deg. of heat.
Bristol,	St. Vincent's,	84	76
Buxton,	Gentleman's bath,	82	
Matlock,		69	
Bath,	King's bath,	119	113
Aix-la-Chapelle,		146	136
Barege,		122	
Pisa,		104	
Caroline baths in Bohemia,	Prudel,	165	
Iceland,	Geyzer,	212	

In cold countries, where congelation takes place, the heat of the earth is considerably above the freezing point, and continues so through the whole year. From experiments made in mines and deep pits this heat is uniform and stationary at a certain depth. The heat of these springs far exceeds the common heat of the internal parts of the earth; but the causes are not easy to determine. The subterranean heat has been ascribed to the electrical fluid, and to a great body of fire in the centre of the earth. The electrical fluid seems at least a probable cause, but as to the supposition that the heat of springs is owing to a central fire, it is too hypothetical to require any refutation. Hot springs are always found among combustible substances. It is well known that when water is mixed with the sulphuric acid, a degree of heat is produced superior to that of boiling water; and when water meets with pyrites a violent inflammation takes place. If, therefore, we could prove that these materials exist in the strata from which hot springs are derived, we should be enabled to give a satisfactory account of this curious phenomenon. As some ground for this supposition we may add, that most of the hot springs mentioned above have been found by analysis to be impregnated with sulphur, and some of them with iron. It must, however, be acknowledged that the hot springs of Iceland, which are 112°, the heat of boiling water, according to an accurate analysis of their contents by the ingenious Dr. Black, were neither found to contain iron nor sulphur. We must therefore continue to collect facts till the sciences of chemistry and mineralogy shall be so far advanced as to enable us to form a permanent theory on this subject.

Springs are of different kinds. Some are perennial, or continue to flow during the whole year; others flow only during the rainy season; some ebb and flow. At Torbay there is one of this kind which ebbs and flows five or six inches every hour. There is another near Coriso in Italy which ebbed and flowed three times a day in the time of Pliny, and continues to do so still. A spring near Henly sometimes flows for two years together, and then dries up for an equal period. The cause of this is explained under Hydrostatics.

Spring Bock. See Capra.

Springer, in zoology. See Capra.

SPRINGFIELD, a post town and capital of Hampden county, Massachusetts, on the east side of the Connecticut; eighteen miles south of Northampton, twenty-eight north of Hartford, forty-eight W. S. W. of Worcester, and eighty-eight west by south of Boston; is a pleasant and flourishing town, and contains a court house, a jail, a bank, a woollen manufactory, a rope walk, a furnace, two paper mills, two congregational churches, two public libraries, which together contain about 1000 volumes, and a printing office, from which is issued a weekly newspaper. Here is a large, pleasant, and handsome village, which has considerable trade, and contains a number of elegant houses. An excellent covered bridge, connecting this town with West Springfield, was carried away by the rise of the river in 1818.

There is in this town, belonging to the United States, a very extensive establishment for the manufacture of arms. The arsenal is delightfully situated on an elevated plain about half a mile east of the village. The buildings are finely arranged around a level square of twenty acres, and make an elegant appearance. One building is 204 feet by thirty-two, of two stories, with a cupola, which affords an extensive and interesting view of Connecticut River and the surrounding country; another is 100 by forty; a third sixty by thirty-two; all of brick, two

stories high. The second story of the last, forming a spacious hall, is consecrated as a place of public worship. There are also other buildings for workshops, store houses, &c., and seventeen dwelling houses.

The water-works are situated about a mile south of the arsenal, in three divisions, denominated Upper, Middle, and Lower, water shops, on Mill River, a fine stream which falls into the Connecticut. They form the greatest collection of mills and other water-works in the state. The whole comprises five work shops, twenty-eight forges, ten trip hammers, eighteen water-wheels, nine coal houses, three stores, and five dwelling houses.

This establishment employs from 240 to 250 workmen, who complete on an average about forty-five muskets daily. It is estimated that the cost of muskets at Springfield is 1356 dollars each; at Harper's Ferry 1425 dollars.

Springfield, West, a post-town of Hampden county, Massachusetts, on the west side of the Connecticut, opposite Springfield. This is a pleasant and valuable agricultural town, and contains four parishes, in each of which is a meeting-house, and three post-offices, West Springfield, Agawam, and Feeding Hills. This is also the name of numerous smaller townships of the United States.

Springtide. See Astronomy, Index, and Tide.

SPRIN'KLE, *v. a.* & *v. n.* Sax. ꝑꝑenꝁan; Belg. *sprinkelen;* Swed. *sprenga.* To scatter; disperse in small masses or drops; bedew; christen: to perform the act of scattering in this way: sometimes written Springle.

Take handfuls of ashes of the furnace, and let Moses *sprinkle* it towards the heaven. *Exodus* ix. 8.

The priest shall *sprinkle* of the oil with his finger. *Leviticus* xiv.

Sprinkle water of purifying upon them. *Numbers* viii. 7.

Let us draw near with a true heart, in full assurance of faith, having our hearts *sprinkled* from an evil conscience. *Hebrews.*

This is Timon's last,
Who, stuck and spangled with your flatteries,
Washes it off, and *springles* in your faces
Your reeking villany. *Shakspeare. Timon of Athens.*

Woodcocks arrive first on the north coast, where every plash-shoot serveth for *springles* to take them. *Carew.*

Wings he wore
Of many a coloured plume *sprinkled* with gold. *Milton.*

The prince with living water *sprinkled* o'er
His limbs and body; then approached the door,
Possessed the porch. *Dryden's Æneid.*

To content and fill the eye of the understanding, the best authors *sprinkle* their works with pleasing digressions, with which they recreate the minds of their readers. *Dryden.*

Baptism may well enough be performed by *sprinkling*, or effusion of water. *Ayliffe's Parergon.*

When dext'rous damsels twirl the *sprinkling* mop,
And cleanse the spattered sash, and scrub the stairs,
Know Saturday appears. *Gay's Trivia.*

SPRIT, *v. a. v. n.* & *n. s.* Sax. ꝑꝑýꝑꝑan; Belg. *spruyten;* Swed. *spruta;* Goth. *sprida, sprita.* To throw out; eject with force: shoot; germinate: a shoot or sprout: commonly written spirt.

Toads sometimes exclude or *sprit* out a dark and liquid matter behind, and a venomous condition there may be perhaps therein; but it cannot be called their urine. *Browne.*

The barley, after it has been couched four days, will sweat a little, and shew the chit or *sprit* at the root-end of the corn. *Mortimer's Husbandry.*

The Sprit, in botany, consists of two parts; viz. the radical and plume; the latter among malsters is called the acrospire.

Sprit, in boat-building, a small boom or pole which crosses the sail of a boat diagonally from the mast to the upper hindmost corner of the sail, which it is used to extend and elevate; the lower end of the sprit rests in a sort of wreath or collar called the smotter, which encircles the mast in that place.

SPRIT'SAIL, *n. s.* Sprit and sail. The sail which belongs to the boltsprit mast.

Our men quitted themselves of the fireship, by cutting the *spritsail* tackle off with their short hatchets. *Wiseman.*

Spritsail. See Sail and Ship.

Spritsail-topsail. See Sail and Ship.

SPROUT, *v. n.* & *n. s.* Sax. ꝑꝑýꝑꝑan; Belg. *spruyten.* Sprout, sprit, and by a very frequent transposition spirt or spurt, are all radically, as Dr. Johnson says, the same word. To shoot by vegetation; germinate; ramify: a vegetable shoot.

Try whether these things in the *sprouting* do increase weight, by weighing them before they are hanged up; and afterwards again, when they are *sprouted.* *Bacon.*

Stumps of trees, lying out of the ground, will put forth *sprouts* for a time. *Id.*

Vitriol is apt to *sprout* with moisture. *Id.*

The *sprouting* leaves that saw you here,
And called their fellows to the sight. *Cowley.*

Early, ere the odorous breath of morn
Awakes the slumbering leaves, or tassel'd horn
Shakes the high thicket, haste I all about,
Number my ranks, and visit every *sprout.* *Milton.*

We find no security to prevent germination, having made trial of grains, whose ends, cut off, have notwitstanding *sprouted.* *Browne's Vulgar Errours.*

Old Baucis is by old Philemon seen
Sprouting with sudden leaves of sprightly green *Dryden.*

To this kid, taken out of the womb, were brought in the tender *sprouts* of shrubs; and, after it had tasted, it began to eat of such as are the usual food of goats. *Ray on the Creation.*

Rub malt between your hands to get the come or *sprouting* clean away. *Mortimer's Husbandry.*

Envied Britannia, sturdy as the oak
Which on her mountain top she proudly bears,
Eludes the ax, and *sprouts* against the stroke,
Strong from her wounds, and greater by her wars. *Prior.*

Hence *sprouting* plants enrich the plain and wood;
For physick some, and some designed for food. *Blackmore.*

The' enlivening dust its head begins to rear,
And on the ashes *sprouting* plumes appear. *Tickel.*

Sprout, in botany. See Plant and Sprit.

SPRUCE, *adj.* Skinner hesitatingly derives this word from Fr. *preux.* Junius from sprout. I know not whence to deduce it, except from pruce, says Dr. Johnson, a thing costly and elegant, and thence probably came spruce. Mr. Thompson refers to the Teut. *spreisse, spreissen;*

Swed. *spruka, sprutta,* to glitter, be lively. Nice; trim; neat without elegance. It was anciently used of things with a serious meaning; it is now used only, with levity, of persons.

The tree
That wraps that crystal in a wooden tomb,
Shall be took up *spruce,* filled with diamond.
Donne.

Thou wilt not leave me in the middle street,
Though some more *spruce* companion thou dost meet.
Id.

Along the crisped shades and bowers
Revels the *spruce* and jocund spring;
The graces, and the rosy-bosomed hours,
Thither all their bounties bring. *Milton.*

He put his band and beard in order,
The *sprucer* to accost and board her. *Hudibras.*

I must not slip into too *spruce* a style for serious matters; and yet I approve not that dull insipid way of writing practised by many chymists. *Boyle.*

He is so *spruce,* that he can never be genteel.
Tatler.

This Tim makes a strange figure with that ragged coat under his livery: can't he go *spruce* and clean?
Arbuthnot.

SPRUCE FIR. See PINUS.

SPRUCEBEER', *n. s.* From spruce, Germ. *preussin,* a kind of fir. Beer tinctured with branches of fir.

In ulcers of the kidneys, *sprucebeer* is a good balsamick. *Arbuthnot.*

SPRUCE BEER, a cheap and wholesome liquor thus made:—Take of water sixteen gallons and boil the half of it. Put the water thus boiled, while in full heat, to the reserved cold part, which should be previously put into a barrel or other vessel; then add sixteen pounds of treacle or molasses, with a few table spoonfuls of the essence of spruce, stirring the whole well together; add half a pint of yeast, and keep it in a temperate situation, with the bung hole open, for two days, till the fermentation be abated. Then close it up or bottle it off, and it will be fit for being drunk in a few days afterwards. In North America and perhaps in other countries where the black and white spruce firs abound, instead of adding the essence of the spruce at the same time with the molasses, they make a decoction of the leaves and small branches of these trees, and find the liquor equally good. It is a powerful antiscorbutic, and may prove very useful in long sea voyages.

SPRUCELEATH'ER, *n. s.* Corrupted from Prussian leather.

The *leather* was of *Pruce.* *Dryden's Fables.*

SPUD, *n. s.* Irish *spud;* Welsh *yspod.* A short knife used for weeding; a small spade; any short thick thing, in contempt.

My love to Sheelah is more firmly fixt
Than strongest weeds that grow these stones betwixt;
My *spud* these nettles from the stones can part,
No knife so keen to weed thee from my heart.
Swift.

SPUME, *n. s.* } Lat. *spuma.* Foam; froth:
SPU'MOUS, *adj.* } the adjective corresponding.
SPU'MY. }

Materials dark and crude,
Of spirituous and fiery *spume,* till touched
With heaven's ray, and tempered, they shoot forth
So beauteous, opening to the ambient light. *Milton.*

Waters frozen in pans, after their dissolution, leave a froth and *spume* upon them, which are caused by the airy parts diffused by the congealable mixture. *Browne's Vulgar Errours.*

The cause is the putrefaction of the body by unnatural heat: the putrifying parts suffer a turgescence, and, becoming airy and *spumous,* ascend unto the surface of the water. *Browne.*

Not with more madness rolling from afar,
The *spumy* waves proclaim the watery war;
And, mounting upwards with a mighty roar,
March onwards, and insult the rocky shore. *Dryden.*

The *spumous* and florid state of the blood, in passing through the lungs, arises from its own elasticity, and its violent motion, the aërial particles expanding themselves. *Arbuthnot.*

SPUN YARN, among sailors, a small line or cord formed of two or three rope-yarns twisted together by a winch; the yarns, of which it is usually made at sea, are drawn out of the strands of old cables, or other ropes, and are knotted together and tarred. It is employed for several purposes, particularly to fasten one rope to another, to seize block-strops to the shrouds, and to serve ropes which are liable to be chafed, &c.

SPUNGE, *n. s.* & *v. n.* } Lat. *spongia.* A
SPUN'GINGHOUSE, *n. s.* } sponge. See SPONGE.
SPUN'GY, *adj.* } To hang on others

for maintenance: a spunging-house is a house to which bailiffs take debtors and sponge them: spungy, of the nature of sponge; having the quality of imbibing wet.

When he needs what you have gleaned, it is but squeezing you, and, *spunge,* you shall be dry again.
Shakspeare. Hamlet.

I saw Jove's bird, the Roman eagle, winged
From the *spungy* south to this part of the west,
There vanished in the sun-beams. *Id. Cymbeline*

There is no lady of more softer bowels,
More *spungy* to suck in the sense of fear.
Shakspeare.

Some English wool, vexed in a Belgian loom,
And into cloth of *spungy* softness made,
Did into France or colder Denmark roam,
To ruin with worse air our staple trade. *Dryden.*

Considering the motion that was impressed by the painter's hand upon the *spunge,* compounded with the specifick gravity of the *spunge* and the resistance of the air, the *spunge* did mechanically and unavoidably move in that particular line of motion.
Bentley's Sermons.

This will maintain you, with the perquisite of *spunging* while you are young. *Swift to Gay.*

A bailiff kept you the whole evening in a *spunging-house.* *Swift.*

SPUNGE, or SPONGE. See SPONGIA.

SPUNGE is used, in gunnery, for a cylinder of wood, from ten to twelve inches long, of the same diameter with the rammer, with a piece of sheep or lamb-skin wound about its end, to serve for scouring great guns when discharged, before they be charged with fresh powder; hence called spunging. In small guns it is commonly fixed to the other end of the handle of the rammer; but has a separate one in those of a larger calibre.

SPUNGING, in gunnery, the cleaning of the inside of a gun with a spunge, in order to prevent any sparks of fire from remaining in it, which would endanger the life of him that should load it again.

SPUNK, *n. s.* See SPONK. Rotten wood; touch-wood.

To make white powder, the best way is by the powder of rotten willows: *spunk*, or touchwood prepared, might perhaps make it russet.
Browne's Vulgar Errours.

SPUNK, a term used indifferently for half-rotten wood, match for guns, and a substance growing on the sides of trees.

SPUNK, in botany. See BOLETUS.

SPUR, *n.s., v.a.* & *v.n.* } Sax. ꝑpuꝑa; Dan.
SPUR'GALLED, *adj.* } *spore:* Isl. Dut. and Goth. *spor.* A sharp point fixed in the rider's heel, with which he pricks his horse forward; a point on the cock's leg; any prick or stimulus: to prick with a spur; instigate; excite; drive forward: to press forward; travel expeditiously: spurgalled is hurt with the spur.

He borrowing that homely armour for want of a better, had come upon the *spur* to redeem Philoclea's picture. *Sidney.*

Seeing then that nothing can move, unless there be some end, the desire whereof provoketh unto motion, how should that divine power of the soul, that spirit of our mind, ever stir itself into action, unless it have also the like *spur?* *Hooker.*

He presently set *spurs* to his horse, and departed with the rest of the company.
Knolles's History of the Turks.

Whether the body politick be
A horse whereon the governour doth ride,
Who, newly in the seat, that it may know
He can command it, lets it straight feel the *spur.*
Shakspeare.

Grief and patience, rooted in him both,
Mingle their *spurs* together. *Id. Cymbeline.*

The strong-based promontory
Have I made shake, and pluckt up by the *spurs*
The pine and cedar. *Shakspeare.*

I was not made a horse,
And yet I bear a burthen like an ass,
Spurgalled and tired by jaunting Bolingbroke. *Id.*

His laws are deep, and not vulgar; not made upon the *spur* of a particular occasion, but out of providence of the future, to make his people more and more happy. *Bacon.*

Of birds the bill is of like matter with the teeth; as for their *spur*, it is but a nail. *Id.*

Was I for this intitled Sir,
And girt with rusty sword and *spur*,
For fame and honour to wage battle? *Hudibras.*

Reward is the *spur* of virtue in all good arts, all laudable attempts; and emulation, which is the other *spur*, will never be wanting when particular rewards are proposed. *Dryden.*

Your father, when he mounted,
Reined 'em in strongly, and he *spurred* them hard.
Id.

Ascanius took the' alarm, while yet he led,
And, *spurring* on, his equals soon o'erpassed.
Id. Æneid.

The chief, if not only *spur*, to human industry and action, is uneasiness. *Locke.*

Let the awe he has got upon their minds be so tempered with the marks of good will, that affection may *spur* them to their duty. *Id.*

Animals have natural weapons to defend and offend; some talons, some claws, some *spurs* and beaks.
Ray.

Some bold men, though they begin with infinite ignorance and errour, yet, by *spurring* on, refine themselves. *Grew.*

My friend, who always takes care to cure his horse of starting fits, *spurred* him up to the very side of the coach. *Addison.*

Who would be at the trouble of learning when he finds his ignorance is caressed? But, when you brow-beat and maul them, you make them men; for, though they have no natural mettle, yet, if they are *spurred* and kicked, they will mend their pace.
Collier on Pride.

The former may be a *spur* to the latter, till age makes him in love with the study, without any childish bait. *Cheyne.*

What! shall each *spurgalled* hackney of the day,
Or each new-pensioned sycophant, pretend
To break my windows, if I treat a friend? *Pope.*

Thus reputation is a *spur* to wit,
And some wits flag through fear of losing it.
Cowper.

A SPUR is a piece of metal consisting of two branches encompassing a horseman's heel, and a rowel in form of a star advancing out behind. Louis le Debonnair forbade ecclesiastics the wearing of spurs. Anciently the difference between the knight and esquire was that the knight wore gilt spurs, whence the appellation of eques auratus, and the squire silvered ones. Two sorts of spurs seem to have been in use about the time of the Conquest, one called a pryck, having only a single point like the gaffle of a fighting-cock; the other consisting of a number of points of considerable length, radiating from and revolving upon a centre, thence named the rouelle or wheel-spur. Delineations of the first occur in the seals of most of our kings and great barons prior to the reign of Edward III., and also on the engraved and sculptured figures of cross-legged knights. The rouelle is sometimes found on figures of equal antiquity; instances occurring of the same person being delineated with the pryck-spur on one seal and the rouelle on another. Some specimens of the pryck-spur are still to be found in the cabinets of the curious.

SPUR, jingling, a curious spur which was worn in the seventeenth century. Mr. Harte, in his ingenious translation of the Life of Gustavus Adolphus, king of Sweden, has furnished the following particulars respecting it. His words are—'I have seen one of these jingling spurs which was found in the Star Park, on the famous White Mountain, near Prague, where the battle was fought between the imperialists and troops of the union; by the event of which the elector palatine lost the crown of Bohemia. The spur was large and strong; it was made of brass, and had a short curved neck. The box (from whose centre the rowels came) was as broad as a half-crown piece; hollow, and something more than a quarter of an inch. It was of bell-metal gilt, and contained three or four metal balls about the size of a small field pea. The rowels, which were generally four or six, passed through the sides of the box, and measured nearly three inches from opposite point to point.' In the text it is observed (Essay, vol. i. p. 43) that it is thought these spurs were made to jingle in order to animate the horses, and keep them up to their duty, without goring their flanks unmercifully.

SPUR, in agriculture, is the name of a disease which frequently attacks rye, and sometimes wheat. It is found that the grains which have

the spur are thicker and longer than the sound ones, and generally project beyond their husks, appearing sometimes straight, and sometimes more or less crooked; and that their outsides are brown or black; their surface is rough, and three furrows may frequently be perceived in them which run from end to end. Their outward end is always thicker than that which sticks to the chaff, and the most swollen end is sometimes split into two or three parts. It is not unusual to find on their surfaces cavities which seem to have been made by insects.

Spur was anciently a piece of the armour of a cavalier fastened to the talary, that is, the hind part of that piece of a complete armour which covers the legs and feet. At present the spur is a piece of iron or other metal.

Spur, Order of the Golden, in Rome, supposed by several writers to have been instituted by pope Pius IV., in 1559. The badge is a star of eight points *argent*, and between the two bottom points a spur *or*.

Spurs, in old fortifications, are walls that cross a part of the rampart and join to the town wall.

Spurs, in the construction of a wooden bridge, are braces which prop the two pillars that support it. The French use the word éperon.

SPURGE, *n. s.* Fr. *espurge;* Belg. *spurgie;* Lat. *purgo.* A plant violently purgative: a general name in English for various milky purgative plants.

Spurge, in botany. See Euphorbia.

Spurge Laurel. See Daphne.

Spurge Olive. See Daphne.

Spurge Wort is a species of iris.

SPU'RIOUS, *adj.* } Lat. *spurius.* Not ge-
Spu'riousness, *n. s.* } nuine; counterfeit; adulterine; bastard: the noun substantive corresponding.

SPUR'LING, *n. s.* Fr. *esperlan.* A small sea-fish.

Spurling, or Sparling. See Salmo.

SPURN, *v. a. v. n.* & *n. s.* Sax. ꝑꝑoꝑnan, from ꝑꝑoꝑ, the foot. To kick; strike or drive with the foot: hence to reject; scorn: a kick; contemptuous treatment.

SPURT, *v. n.* See *To* Spirt. To fly out with a quick stream.

SPURZHEIM (Dr. G.), a celebrated phrenologist, born at Tonqueits, near Treves, on the Moselle, and, being destined by his father for the clerical profession, educated at the university of Treves. On the invasion of Germany by the French, in 1799, he removed to Vienna, where he became acquainted with Dr. Gall, and from a hearer, was soon converted into an associate in his labours. Having completed his medical studies, he quitted Vienna, in company with Gall, whose doctrines he fully adopted in 1805, and visited Berlin, delivering lectures on the structure of the brain in that city, and elsewhere on the continent. After this period, until 1810, he was engaged, in conjunction with Gall, in preparing for publication in Paris, their great work, entitled "Anatomie et Physiologie du Systeme Nervieuz en generàl, et du Garveau en particulier," in four vols. folio, with a hundred atlas plates, price £40, each copy. After this, Spurzheim published, unassisted, his Observations sur Phrenologie, and treatises on Education. In 1813 he again revisited Vienna, where he took the degree of M. D., and in 1814 came to England; here he published two editions of his "Physiognomical System," his Outlines, and a Dissertation on Insanity. In Great Britain he delivered lectures, which were heard with attention in London, Dublin, Edinburgh, Liverpool, Cork, Bristol, and Bath. On his return to Paris, he contributed to the advancement of Phrenology, by many important discoveries, by a more philosophic arrangement, and by pointing out its application to many useful purposes. In 1825, he revisited London, and delivered lectures at several public rooms, besides several courses on the dissection and anatomy of the brain at St. Thomas's and St. Bartholomew's Hospitals. In England he published his "Phrenology, or the Doctrine of the Mind," &c., and "A View of the Philosophical Principles of Phrenology." He continued to lecture in the various provincial towns of Great Britain and Ireland, for some years longer, and received much applause, in addition to a high degree of esteem which he obtained as a gentleman and scholar. During his latter visit to England he published "The Anatomy of the Brain," and a "A General View of the Nervous System;" "Phrenology in Connection with the Study of Physiognomy;" "A Sketch of the Natural Laws of Man;" besides many pamphlets and letters, defensive of his system. The death of his wife, in 1829, who had made the drawings and lithographic engravings for all his works, induced him to seek alleviation of sorrow in travelling; and in 1832 he sailed for America, where he met a most gratifying reception, and delivered lectures in Boston, to crowded auditories. The climate of America made sudden inroads upon his hitherto sound frame and constitution; and after suffering an attack of the lungs, he caught a violent fever, of which he died on Nov. 10, 1832, in the fifty-sixth year of his age. His body was embalmed, his heart and lungs preserved, and a cast taken from his head and brain. Dr. Troller, German Professor at the University of Havard, delivered a feeling oration over his grave.

SPUTA'TION, *n. s.* Lat. *sputam.* The act of spitting.

A moist consumption receives its nomenclature from a moist *sputation*, or expectoration: a dry one is known by its dry cough. *Harvey on Consumption.*

SPUT'TER, *v. n.* Swed. *sputa;* Lat. *sputo.* To emit moisture in small flying drops; fly out in small particles: hence to speak hastily and obscurely.

If a manly drop or two fall down,
It scalds along my cheeks, like the green wood,
That, *sputtering* in the flame, works outwards into tears. *Dryden.*

Thou dost with lies the throne invade;
Obtending heaven for whate'er ills befall,
And *sputtering* under specious names thy gall. *Id.*

A pinking owl sat *sputtering* at the sun, and asked him what he meant, to stand staring her in the eyes? *L'Estrange.*

They could neither of them speak their rage, and so fell a *sputtering* at one another, like two roasting apples. *Congreve.*

Though he *sputter* through a session,
It never makes the least impression;
Whate'er he speaks for madness goes. *Swift.*

In the midst of caresses, and without the least pretended incitement, to *sputter* out the basest accusations. *Id.*

SPY, *n. s., v. a.* & *v. n.* Welsh *yspio;* Fr. *espion;* Belg. *spie;* Lat. *speculator.* It is observed by a German that spy has been in all ages a word by which the eye, or office of the eye, has been expressed: thus the Arimaspians of old, fabled to have but one eye, were so called from *ari,* which among the nations of Caucasus still signifies *one,* and *spi,* which has been received from the old Asiatic languages for an *eye, sight,* or one that *sees.*—Johnson. One who watches the conduct of others: one sent to gain intelligence of an enemy's movements; an informer: to search; discover; search narrowly; pry.

Moses sent to *spy* out Jaazar, and took the villages. *Numbers.*

We'll hear poor rogues
Talk of court news, and we'll talk with them too,
And take upon's the mystery of things,
As if we were God's *spies.* *Shakspeare. King Lear.*

It is my nature's plague
To *spy* into abuse; and oft my jealousy
Shapes faults that are not. *Id. Othello.*

Light hath no tongue, but is all eye;
If it could speak as well as *spy,*
This were the worst that it could say,
That being well I fain would stay. *Donne.*

Let a lawyer tell he has *spied* some defect in an entail, how solicitous are they to repair that errour! *Decay of Piety.*

Every corner was possessed by diligent *spies* upon their master and mistress. *Clarendon.*

As tyger *spied* two gentle fawns. *Milton.*

I come no *spy,*
With purpose to explore, or to disturb,
The secrets of your realm. *Id. Paradise Lost.*

Such command we had,
To see that none thence issued forth a *spy,*
Or enemy, while God was in his work. *Milton.*

Nothing lies hid from radiant eyes;
All they subdue become their *spies:*
Secrets, as chosen jewels, are
Presented to oblige the fair. *Waller.*

Over my men I'll set my careful *spies,*
To watch rebellion in their very eyes. *Dryden.*

My brother Guyomar, methinks, I *spy;*
Haste in his steps, and wonder in his eye. *Id.*

A countryman *spied* a snake under a hedge, half frozen to death. *L'Estrange.*

Those who attend on their state are so many *spies* placed upon them by the publick to observe them nearly. *Atterbury.*

One in reading skipped over all sentences where he *spied* a note of admiration. *Swift.*

SQUAB, *adj.* } Lat. *ex cubito.* Unfeathered;
SQUAB'BISH. } newly hatched: squabbish is, thick; heavy.

Diet renders them of a *squabbish* or lardy habit of body. *Harvey.*

The eagle took the tortoise up into the air, and dropt him down, *squab,* upon a rock, that dashed him to pieces. *L'Estrange.*

Why must old pigeons, and they stale, be drest,
When there's so many *squab* one's in the nest? *King.*

The nappy ale goes round;
Nor the *squab* daughter nor the wife were nice,
Each health the youths began, Sim pledged it twice *Betterton.*

SQUAB, *n. s.* Lat. *se cubere.* A kind of sofa or couch; a stuffed cushion.

On her large *squab* you find her spread,
Like a fat corpse upon a bed. *Pope.*

SQUABPIE', *n. s.* Squab and pie. A pie made of many ingredients.

Cornwal *squabpie,* and Devon whitepot brings;
And Leister beans and bacon, food of kings. *King.*

SQUAB'BLE, *v. n.* Swed. *kiabla;* Teut. *kabbelen,* of Goth. *keappa.* To quarrel; to debate peevishly; to wrangle; to fight. A low word.

Drunk? and speak parrot? and *squabble?* swagger? oh, thou invincible spirit of wine *Shakspeare. Othello.*

I thought it not improper, in a *squabbling* and contentious age, to detect the vanity of confiding ignorance. *Glanville.*

In popular factions, pragmatick fools commonly begin the *squabble,* and crafty knaves reap the benefit. *L'Estrange.*

If there must be disputes, is not *squabbling* less inconvenient than murder? *Collier on Duelling.*

A man whose personal courage is suspected, is not to drive squadrons before him; but may be allowed the merit of some *squabble,* or throwing a bottle at his neighbour's head. *Arbuthnot.*

The sense of these propositions is very plain, though logicians might *squabble* a whole day, whether they should rank them under negative or affirmative. *Watts's Logick.*

SQUAD (Fr. escuoade), a diminutive of squadron, is used in military matters to express any small number of men, horse or foot, that are collected together for the purposes of drill, &c.

To SQUAD, to divide a troop or company into certain parts, in order to drill the men separately or in small bodies, or to put them under the direction and care of some steady corporal or lance corporal. In every well regulated troop, or company, the men are squadded in such a manner that the most minute concern, with respect to the interior economy, can be instantly accounted for.

Aukward SQUAD. The aukward squad consists not only of recruits at drill, but of formed soldiers that are ordered to exercise with them, in consequence of some irregularity under arms. This term has likewise been used, partly in ridicule and partly in reproach, to mark out those officers who are negligent of their duty. An industrious tactician, in the British army, frequently uses the expression in the latter sense.

SQUA'DRON, *n. s.* } Fr. *escadron;* Ital.
SQUA'DRONED, *adj.* } *squadrone;* Lat. *quadratus.* A body of men drawn up square: hence any considerable part of an army or fleet: the adjective corresponding.

Nothing the Moors were more afraid of, than in a set battle to fight with *squadrons* coming orderly on. *Knolles.*

Eurimidon then reined his horse, that trotted neighing by;
The king a foot-man, and so scowres the *squadron* orderly. *Chapman.*

Those half-rounding guards
Just met, and closing stood in *squadron* joined.
Milton.

They gladly thither haste; and by a choir
Of *squadroned* angels hear his carol sung. *Id.*

Then beauteous Atys, with Iulus bred,
Of equal age, the second *squadron* led. *Dryden.*

Rome could not maintain its dominion over so many provinces, without *squadrons* ready equipt.
Arbuthnot.

Squadron (Fr. escadron), a body of cavalry composed of two troops. The number is not fixed, but is generally from eighty to 120 men. The oldest troop always takes the right of the squadron, the second the left. The most scientific and the most experienced officers have always held the cavalry in high estimation. The services which have been rendered by this body of men; their innumerable successes, of which so many records are preserved both in ancient and modern history, together with the unanimous approbation of those authors who are considered as masters in the art of war; all these circumstances sufficiently evince that cavalry is not only useful but indispensably necessary in war. Marshal Turenne was known to say—Avec une bonne cavalerie, on travaille l'armée de son ennemie par détail; with a body of good cavalry one works, or harasses, the army of one's enemy by detail; meaning thereby, that the desultory and rapid movements of dragoons, if properly managed, are of a nature to destroy the best concerted plans of an adversary, by hanging upon his flanks, driving in his outposts, intercepting his convoys, and by taking advantage of every opening during the heat of engagement. The Austrians had a memorable instance of the latter, when the French general Désaix, at the head of a body of horse, decided the fate of the battle of Marengo. In pursuits the superiority of the cavalry is unquestionable.

Squadron of Ships either implies a detachment of ships employed on any particular expedition, or the third part of a naval armament.

SQUAL'ID, *adj.* Lat. *squalidus.* Foul; nasty; filthy.

A doleful case desires a doleful song,
Without vain art or curious compliments;
And *squalid* fortune into baseness flowing
Doth scorn the pride of wonted ornaments.
Spenser.

Uncombed his locks, and *squalid* his attire,
Unlike the trim of love and gay desire.
Dryden's Knight's Tale.

SQUALL, *v. n.* & *n. s.* Swed. *squala.* To scream out as a child or woman frightened; a gust of wind or rain.

In my neighbourhood, a very pretty prattling shoulder of veal *squalls* out at the sight of a knife.
Spectator.

I put five into my coat-pocket; and, as to the sixth, I made a countenance as if I would eat him alive. The poor man *squalled* terribly. *Swift.*

Cornelius sunk back on a chair; the guests stood astonished; the infant *squalled.*
Arbuthnot and Pope.

There oft are heard the notes of infant woe,
The short thick sob, loud scream, and shriller *squall.*
Pope.

A Squall is a violent blast of wind usually occasioned by the interruption and reverberation of the wind from high mountains. These are very frequent in the Mediterranean, particularly that part of it called the Levant, as produced by the repulsion and new direction which the wind meets with in its passage between the various islands of the Archipelago.

SQUAL'OR, *n. s.* Lat. *squalor.* Coarseness; nastiness; want of cleanliness and neatness.

Take heed that their new flowers and sweetness do not as much corrupt as the others dryness and *squalor.* *Ben Jonson.*

What can filthy poverty give else, but beggary, fulsome nastiness, *squalor,* ugliness, hunger, and thirst? *Burton.*

SQUALUS, the shark, in ichthyology, a genus arranged by Linnæus under the class of amphibia, and the order of nantes; but by Gmelin more properly referred to the class of pisces, and order of chondropterygii. The head is obtuse; on the sides of the neck there are from four to seven semilunar spiracles. The eyes are oblong, vertical, half covered, and before the foramen temporale. The mouth is situated in the interior and lower part of the head, and is armed with several rows of teeth, which are serrated, acute, partly moveable and partly fixed, and unequal in form. The body is oblong, tapering, and rough, with very tender prickles. The ventral fins are much less than the pectoral, and are situated round the anus and genitals. Sharks are seldom destructive in the temperate regions: it is in the torrid zone that their ravages are most frequent. In the West Indies accidents happen from them daily. During the American war, in 1780, while the Pallas frigate was lying in Kingston Harbour, a young north American jumped overboard one evening to make his escape, and perished by a shark in a shocking manner. He had been captured in a small vessel, lost all his property, and was detained by compulsion in the English navy to serve in a depredatory war against his country. But he, animated with that spirit which pervaded every bosom in America, resolved, as soon as he arrived at some port, to release himself from the mortifying state of employing his life against his country, which, as he said when dying, he was happy to lay down as he could not employ it against her enemies. He plunged into the water; the Pallas was a quarter of a mile from the shore. A shark perceived him, and followed him very quietly till he came near the shore; where, as he was hanging by a rope that moored a vessel to a wharf, scarcely out of his depth, the shark seized his right leg, stripped the flesh entirely from the bones, and took the foot off at the ancle. He still kept his hold, and called to the people in the vessel near him, who were standing on the deck and saw the affair. The shark then seized his other leg, which the man by his struggling disengaged from his teeth, but with the flesh cut through down to the bone into a multitude of narrow slips. The people in the vessel threw billets of wood into the water and frightened the shark away. The young man was brought on shore. Dr. Moseley was called to him; but he had lost so much blood before any assistance could be given him that he expired before the mangled limbs could be taken off. A few weeks before this a shark, of twelve feet in length, was

caught in the harbour; and on being opened the entire head of a man was found in his stomach. The scalp and flesh of the face were macerated to a soft pulpy substance, which, on being touched, separated entirely from the bones. The bones were somewhat softened and the sutures loosened.—Moseley on Tropical Diseases. A very extraordinary instance of intrepidity and friendship is given by Mr. Hughes in his Natural History of Barbadoes. It happened about the end of queen Anne's wars at Barbadoes. The sailors of the York Merchant having ventured into the sea to wash themselves, a large shark made toward them; upon which they swam back, and all reached the boat except one, whom the monster overtook, and griping him by the small of his back, soon cut him asunder, and swallowed the lower part of his body; the remaining part was taken up and carried on board, where a comrade of his was, whose friendship with the deceased had been long and reciprocal. When he saw the severed trunk of his friend, with a horror and emotion too great for words to paint, he vowed that he would make the devourer disgorge or be swallowed himself in the same grave, and plunged into the deep armed with a sharp-pointed knife. The shark no sooner saw him but he made furiously toward him; both equally eager, the one for his prey the other for revenge. The moment the shark opened his rapacious jaws, his adversary dexterously diving, and grasping him with his left hand somewhat below the upper fins, successfully employed his knife in his right hand, giving him repeated stabs in the belly; the enraged shark, after many unavailing efforts, finding himself overmatched in his own element, endeavouring to disengage himself, sometimes plunging to the bottom, then mad with pain rearing his uncouth form, now stained with his own streaming blood, above the foaming waves. The crews of the surrounding vessels saw the unequal combat, uncertain from which of the combatants the streams of blood issued; till at length the shark, much weakened by the loss of blood, made toward the shore, and with him his conqueror, who, now assured of victory, pushed his foe with redoubled ardor, and, by the help of an ebbing tide, dragged him on shore, ripped up his bowels, and united and buried the severed carcase of his friend. It is evident (says Dr. Moseley) that digestion in these animals is not performed by trituration, nor by the muscular action of the stomach; though nature has furnished them with a stomach of wonderful force and thickness, and far exceeding that of any other creature. Whatever their force of digestion is it has no effect upon their young ones, which always retreat into their stomachs in time of danger. That digestion is not performed by heat in fish is equally evident. The coolness of the stomach of these fishes is far greater than the temperature of the water out of which they are taken; or of any other part of the fish, or of any other substance of animated nature I ever felt. On wrapping one of them round my hand, immediately on being taken out of the fish, it caused so much aching and numbness that I could not endure it long. Of these voracious sea-monsters there are thirty-three species; of which the following is an exact list, with descriptions of the most remarkable:—

1. S. acanthias, the picked dog-fish. There is another species which has the same English name, and probably the same characters.

2. S. Africanus, the African shark, or galonne, abounds on the coasts of Africa.

3. S. Americanus, the American shark, or liche, swarms on the coasts of America.

4. S. barbatus, the barbu, or bearded shark.

5. S. canicula, the greater dog-fish, or spotted shark, is distinguished by large nostrils, which are covered by a lobe and worm-shaped flap, or by the position of the anal fin, which is at an equal distance from the anus and tail. The body is spotted; the head is small, with a short snout; the eyes are oblong; the iris whitish; the mouth is large and oblong, armed with three rows of teeth; the tongue is cartilaginous; the anus is before the middle of the body; the first dorsal fin is behind the ventral fins; the other, which is less, is almost opposite the anal fin; the caudal fin is narrow and marginated. This species is found in almost every sea, is about four feet long, extremely voracious, generally feeding on fishes, and is long lived. The skin, which is spotted like a leopard, is used when dried for various purposes.

6. S. carcharias, the requiu, or white shark, is often thirty feet long, and, according to Gillius, weighs 4000 lbs. The mouth is sometimes furnished with a six-fold row of teeth, flat, triangular, and exceedingly sharp at their edges, and finely serrated. Mr. Pennant had one rather more than an inch and a half long. Grew says that those in the jaws of a shark two yards in length are not half an inch; so that the fish to which this tooth belonged must have been six yards long, provided the teeth and body kept pace in their growth. This dreadful apparatus, when the fish is in a state of repose, lies quite flat in the mouth; but when he seizes his prey he has power of erecting them by the help of a set of muscles that join them to the jaw. The mouth is placed far beneath; for which reason these, as well as the rest of the kind, are obliged to turn on their backs to seize their prey; which is an observation as ancient as the days of Pliny. The eyes are large; the back broad, flat, and shorter than that of other sharks. The tail is of a semilunar form, but the upper part is larger than the lower. It has vast strength in the tai and can strike with great force; so that the sailors instantly cut it off with an axe as soon as they draw one on board. The pectoral fins are very large, which enables it to swim with great swiftness. The color of the whole body and fins is a light ash. The ancients were acquainted with this fish; and Oppian gives a long and entertaining account of its capture. Their flesh is sometimes eaten, but is esteemed coarse. They are the dread of the sailors in all hot climates, where they constantly attend the ships in expectation of what may drop overboard: a man that has that misfortune perishes without redemption. A master of a Guinea ship informed Mr. Pennant that a rage of suicide prevailed among his new-bought slaves, from a notion the unhappy creatures had, that after death they should be re-

stored again to their families, friends, and country. To convince them at least that they should not re-animate their bodies he ordered one of their corpses to be tied by the heels to a rope and lowered into the sea; and, though it was drawn up again as fast as the united force of the crew could be exerted, yet in that short space the sharks had devoured every part but the feet, which were secured at the end of the cord. Swimmers very often perish by them; sometimes they lose an arm or a leg, and sometimes are bit quite asunder, serving but for two morsels for this ravenous animal: a melancholy tale of this kind is related in a West India ballad, preserved in Dr. Percy's Relics of ancient English poetry. This species inhabits the abyss of the ocean, and only appears on the surface when allured by its prey. It is the most voracious of all animals, not even, it is said, sparing its own offspring, and often swallowing its prey entire. This is probably the species of fish that swallowed the prophet Jonah; for a whale it could not be without an additional miracle.

7. S. catulus, the smaller dog-fish, has a large head; the pupil of the eye is black; the iris white; the snout is of a bright hue; the mouth, which is large, is situated between the nostrils, and is armed with four rows of teeth, serrated with three points bent inwards; those in the middle between the two mandibles are longer than the rest. The tongue is broad and smooth; the spiracles are five; the back is tapering and yellowish; the sides are somewhat compressed; the tail longer than the body, and the caudal fin is narrow and marginated; the anterior anal and dorsal fins are behind the ventral; the posterior dorsal fin is opposite to the anal. They inhabit the Mediterranean, Northern, and Indian Ocean, and are two or three feet long.

8. S. centrina, the humantin.

9. S. cinereus, or the perlon.

10. S. cirratus, the curled shark.

11. S. cornubius, the por-beagle, or Beaumaris shark.

12. S. Fernandinus, the Fernandine shark. This species swarms near Juan Fernandez.

13. S. Galeus, the tope.

14. S. Glaucus, the blue shark, is about seven feet long. The color of the back is a fine blue; the belly a silvery white; the head is flat; the eyes small and roundish; the teeth are almost triangular, elongated, and pointed, but not serrated. The anus is very near the tail; the anterior dorsal fin is situated before the ventral fins, about the middle of the body, and is almost triangular; the posterior dorsal fin is equal to the anal fin, and is placed nearer the tail; the pectoral fins are large, long, and marginated; and the ventral are blue above and white below; the caudal is blue, divided into two lobes, of which the superior is much longer than the inferior lobe. This species is frequent in every sea, and is fierce; but not very destructive in our seas.

15. S. griseus, the griset.

16. S. Indicus, the Indian shark, abounds in the Indian Ocean.

17. S. Isabella has a wrinkled spotted skin, and the anterior dorsal fin is perpendicular to the abdominal fins. The body is somewhat flat; the head short, large, and obtuse. The teeth are disposed in six rows, compressed short, and triangular, having a notch on each side of their bases. The eyes are sunk; the iris is of a copper color, and the pupil is black and oblong. The fins of the back are almost square; the caudal fin is divided into two lobes, and the lateral line is parallel to the back. The upper part of the body is of a reddish ash-color, with blackish spots disposed irregularly. The under part is of a dirty white hue. This species is found near New Zealand, and is about two feet and a half long.

18. S. kumalis, the kumal.

19. S. longicaudus, the long-tailed shark.

20. S. massasa, the massasa.

21. S. maximus, the basking shark, or the sun-fish of the Irish. This species has been long known to the inhabitants of the south and west of Ireland and Scotland, and those of Caernarvonshire and Anglesey; but is described by no English writer except Mr. Pennant; and has been mistaken for, and confounded with, the luna of Rondeletius, which English writers call the sun-fish. The Irish and Welsh give it the same name, from its lying as if to sun itself on the surface of the water; and for the same reason Mr. Pennant calls it the basking shark. It was long taken for a species of whale, till Mr. Pennant pointed out the bronchial orifices on the sides, and the perpendicular site of the tail. These are migratory fish; in a certain number of years they are seen in multitudes on the Welsh seas, though in most summers a single strayed fish appears. They inhabit the northern seas, even as high as the arctic circle. They visited the bays of Caernarvonshire and Anglesey in vast shoals in the summers of 1756 and a few succeeding years, continuing there only the hot months; for they quitted the coast about Michaelmas. These fish visited these seas in vast numbers about fifty years ago. They appear in the Frith of Clyde and among the Hebrides in June, in small droves of seven or eight, but oftener in pairs. They continue in those seas till the end of July. They have nothing of the fierce and voracious nature of the shark's kind, and are so tame as to suffer themselves to be stroked; they generally lie motionless on the surface, commonly on their bellies, but sometimes on their backs. Their food seems to consist entirely of sea plants, no remains of fish being ever discovered in the stomachs of numbers that were cut up, except some green stuff, the half digested parts of algæ, and the like. Linnæus says they feed on medusæ. At certain times they are seen sporting on the waves, and leaping with vast agility several feet out of the water. They swim very deliberately, with the dorsal fins above water. Their length is from three to twelve yards, and sometimes longer. Their form is rather slender. The upper jaw is much larger than the lower, and blunt at the end. The tail is very large, and the upper part remarkably longer than the lower. The upper part of the body is of a deep leaden color; the belly white. The skin is rough like shagreen, but less so on the belly. In the mouth, towards the throat, is a

very short sort of whale-bone. The liver is of a great size, but that of the female is the largest; some weigh above 1000 lbs., and yield a great quantity of pure and sweet oil, fit for lamps, and also much used to cure bruises, burns, and rheumatic complaints. A large fish has afforded to the captors a profit of £20. They are viviparous; a young one about a foot in length being found in the belly of a fish of this kind. One found dead on the shore of Loch Ranza in the Isle of Arran measured as follows:—The whole length twenty-seven feet four inches; first dorsal fin three feet; second one foot; pectoral fin four feet; ventral two feet; the upper lobe of the tail five feet; the lower three. They will permit a boat to follow them without accelerating their motion till it comes almost within contact, when a harpooner strikes his weapon into them as near to the gills as possible. But they are often so insensible as not to move till the united strength of two men have forced in the harpoon deeper. As soon as they perceive themselves wounded they fling up their tail and plunge headlong into the bottom; and frequently coil the rope round them in their agonies, attempting to disengage the harpoon by rolling on the ground, for it is often found greatly bent. As soon as they discover that their efforts are in vain they swim away with amazing rapidity, and with such violence that there has been an instance of a vessel of seventy tons having been towed away against a fresh gale. They sometimes run off with 200 fathoms of line, and with two harpoons in them; and will employ the fishers for twelve and sometimes for twenty-four hours before they are subdued. When killed they are either hauled on shore, or, if at a distance from land, to the vessel's side. The liver (the only useful part) is taken out and melted into oil in kettles. A large fish will yield eight barrels of oil, and two of sediment.

22. S. mustelus, the smooth hound shark.

23. S. ocellatus, the oeille.

24. S. pristis, the sole, or saw-fish, is sometimes fifteen feet long, smooth, black on the upper parts, ash-colored on the sides, and white underneath. The head is flat and conical; the beak or snout projecting from the nose is about five feet long, covered with a coriaceous skin, and armed on each side, generally with twenty-four long, strong and sharp-pointed teeth; but the number varies with age. The teeth are granulated; the eyes large, the iris of a golden color, and the spiracles five. The anterior dorsal fin corresponds to those of the belly; the posterior is situated in the middle, between the former and apex of the tail; the pectoral fins are broad and long, the caudal is shorter than in the other species. It inhabits all the seas from Greenland to Brasil: and is found also in the Indian Ocean. It is harmless.

25. S. spinax, the sagre, or picked dog-fish, takes its name from a strong and sharp spine placed just before each of the back fins, distinguishing it at once from the rest of the British sharks. The nose is long, and extends greatly beyond the mouth, but is blunt at the end. The teeth are disposed in two rows, are small and sharp, and bend from the middle of each jaw towards the corners of the mouth. The back is of a brownish ash-color; the belly white. It grows to the weight of about twenty pounds This species swarms on the coasts of Scotland, where it is taken, split, and dried; and is a food among the common people. It forms a sort of inland commerce, being carried on women's backs fourteen or sixteen miles up the country, and sold or exchanged for necessaries.

26. S. spinosus, the bouelé, or spinous shark.

27. S. squamosus, the ecailleux, or scaly shark.

28. S. squatina, the angel-fish, or rather devil-fish, is from six to eight feet long, has a large head, teeth broad at their base, but slender and very sharp above, and disposed in five rows all round the jaws. Like those of all sharks, they are capable of being raised or depressed by means of muscles uniting them to the jaws, not being lodged in sockets as the teeth of cetaceous fish are. The back is of a pale ash-color, and very rough; along the middle is a prickly tuberculated line; the belly is white and smooth. The pectoral fins are very large, and extend horizontally from the body to a great distance: they have some resemblance to wings, whence its name. The ventral fins are placed in the same manner, and the double penis is placed in them; which forms another character of the males in this genus. This species connects the genus of rays and sharks, partaking somewhat of the character of both; yet it is an exception to each in the situation of the mouth, which is placed at the extremity of the head. It is pretty frequent on most of our coasts, where it prowls about for prey. It is extremely voracious; and feeds on flounders and flat fish, which keep at the bottom of the water. It is exceedingly fierce, and dangerous to be approached. Mr. Pennant mentions a fisherman whose leg was terribly torn by a large one of this species, which lay within his nets in shallow water, and which he went to lay hold of incautiously. The aspect of these, as well as the rest of the genus, have much malignity in them; their eyes are oblong, and placed lengthwise in their head, sunk in it, and overhung by the skin, and seem fuller of malevolence than fire. Their skin is very rough; the ancients made use of it to polish wood and ivory, as we do at present that of the greater dog-fish. The flesh is now but little esteemed on account of its coarseness and rankness; yet Archestratus (as quoted by Athenæus, p. 319) speaking of the fish of Miletus, gives this the first place, in respect to delicacy, of the whole cartilaginous tribe. They grow to a great size; being sometimes nearly a hundred weight.

29. S. stellaris, the greater cat-fish. The head is marked with points; the abdominal fins are united and sharp at the apex; the dorsal fins extend almost to the tail; the skin is reddish, marked with black spots of different sizes, and is of a dirty ash-color below. It is from two to six feet long; resembles the canicula, but is distinguished by larger and fewer spots, by a snout somewhat longer, a tail somewhat shorter, and nostrils almost shut. The female brings forth nineteen or twenty young at a time. They inhabit the European seas, living chiefly on shell

fish, molluscæ, and other small fishes. The dorsal fins are equal; the anterior one being behind the middle of the body, and the posterior one being a little behind the anal.

30. S. tiburo, the pantouflier of Broussonet.

31. S. tigrinus is about fifteen feet long; the body is long, of unequal thickness, black, interspersed with white stripes and spots, irregularly and transversely. The head is large; the mouth low and transverse, the upper jaw having two curls; the upper lip is thick and prominent; there are five spiracles on each side, the last two being united so as to give the appearance only of four; the mandibles are armed with very small pointed teeth; the tongue is short and thick; the eyes small and oblong; the pupil azure colored; the iris black. The abdomen is broad; the pectoral fins are broad, and rounded at the extremity. The anterior dorsal fin is opposite to the ventral fins, and the posterior dorsal fin to the anal. The tail is compressed on both sides, and the fin which terminates it is hollow. They are found in the Indian Ocean, and live chiefly on shell fish.

32. S. vulpes, the sea-fox, is most remarkable for the great length of its tail, the body being about seven feet long, and the tail six feet. The head is short and conical; the eyes are large; the jaws are armed in a dreadful manner with three rows of triangular, compressed, and pointed teeth; the tongue is blunt; the lateral line is straight, the anterior dorsal fin is placed about the middle of the back; the posterior, which consists of two pointed lobes, is opposite to the anal fin; the ventral fins are very near one another; the anal is acuminated; the inferior lobe of the tail is about a foot long; the upper, which is shaped like a scythe, is five times longer. This species inhabits the Mediterranean, the coast of Scotland and England. It is covered with small scales; its back is ash-colored, belly whitish. It is extremely voracious. The ancients styled this fish αλωπηξ, and vulpes, from its supposed cunning. They believed that when it had the misfortune to have taken a bait, it swallowed the hook till it got at the cord, which it bit off and so escaped.

33. S. zygæna, the marteau, or balance-fish, is frequently six feet long, and weighs 500 lbs. The head is elongated on each side; the fore part is bent back, and convex both above and below. At the extremities of the elongated part are the eyes, which are large, prominent and directed downwards; the iris is of a golden color; the mouth is arched, and near the beginning of the trunk. It has a horrible appearance from the teeth, which are arranged in three or four rows, and are broad pointed, and serrated on both sides. The tongue is thick, broad, and like a man's. The trunk is long and tapering; the fins are semicircular on the margin, and black at the basis; the ventral fins are separate; the anal and posterior dorsal fins are small; the anterior dorsal fin is large, and near the head; the caudal is long. This species inhabits the Mediterranean Sea and the Indian Ocean. It is one of the most voracious of the whole tribe.

SQUAMARIA, in botany. See LATHRÆA.

SQUAMOSA RADIX. See BOTANY.

SQUA'MOUS, *adj.* Lat. *squameus.* Scaly; covered with scales.

The sea was repleuished with fish of the cartilaginous and *squamose*, as of the testaceous and crustaceous kinds. *Woodward.*

Those galls and balls are produced in the gems of oak, which may be called *squamous* oak cones. *Derham's Physico-Theo ogy.*

SQUAMOUS, in anatomy, an epithet applied to the spurious or false futures of the skull, because composed of squamæ, or scales like those of fishes.

SQUAN'DER, *v. a.* } Saxon ꝥcendan;
SQUAN'DERER, *n. s.* } Teut. *schwenden.* To scatter lavishly; to spend profusely; to throw away in idle prodigality; scatter: a spendthrift; prodigal; lavisher.

He hath an argosie bound to Tripolis, another to the Indies, and other ventures he hath *squandered* abroad. *Shakspeare.*

The troops we *squandered* first again appear
From several quarters, and inclose the rear.
Dryden

Plenty in their own keeping teaches them from the beginning to be *squanderers* and wasters. *Locke.*

They often *squandered*, but they never gave.
Saville.

We *squander* away some part of our fortune at play. *Atterbury.*

How uncertain it is, whether the years we propose to ourselves shall be indulged to us; uncertain whether we shall have power, or even inclination, to improve them better than those we now *squander* away. *Rogers.*

True friends would rather see such thoughts as they communicate only to one another, than what they *squander* about to all the world. *Pope.*

Never take a favourite waiting-maid, to insinuate how great a fortune you brought, and how little you are allowed to *squander*. *Swift.*

SQUARCIONE (Francis), an eminent Italian painter, born in 1394. He formed his taste on the finest antiques. For that purpose he travelled into Greece, where he copied the relics of antiquity. On his return to Italy he obtained the highest reputation, insomuch that he was styled the father of painting. He died in 1474.

SQUARE, *adj.*, *n. s.*, *v. a.*, } Welsh *ysgwâr*;
SQUARE'NESS, *n. s.* [& *v. n.* } Italian *squadra*; Span. *esquadra*, of Lat. *quadratus.* Rectangular; cornered; parallel; suitable; strong; compact: a figure of this kind; the area of the figure; content of an angle; rule; regularity; for a square number, see below; quaternion; the number four; the astrological situation of planets distant 90°: to square is, to form into a square or into right angles: hence to adjust; measure; fit: as a verb neuter, suit or fit with; also to oppose; go to opposite sides (obsolete): squareness is the state of being square.

All the doors and posts were *square*, with the windows. *Kings*

Catching up in haste his three *square* shield,
And shining helmet, soon him buckled to the field.
Spenser.

Then did a sharped spire of diamond bright;
Ten feet each way, in *square* appear to me,
Justly proportioned up into his height,
So far as archer might his level see. *Id.*

The whole ordinance of that government was at first evil plotted, and through other oversights came

more out of *square*, to that disorder which it is now come unto. *Id. Ireland.*

In St. Paul's time the integrity of Rome was famous; Corinth many ways reproved; they of Galatia much more out of *square*. *Hooker.*

She 's a most triumphant lady, if report be *square* to her. *Shakspeare.*

All have not offended;
For those that were, it is not *square* to take
On those that are, revenge; crimes like to lands
Are not inherited. *Id. Timon of Athens.*

He alone
Dealt on lieutenantry, and no practice had
In the brave *squares* of war. *Shakspeare.*

I profess
Myself an enemy to all other joys
Which the most precious *square* of sense possesses,
And find I am alone felicitate
In your dear love. *Id.*

Stubborn criticks, apt, without a theme
For depravation, to *square* all the sex
By Cressid's rule. *Id.*

How frantickly I *square* my talk! *Id.*

Are you such fools
To *square* for this? would it offend you then
That both should speed? *Id. Titus Andronicus.*

Nothing so much setteth this art of influence out of *square* and rule as education. *Raleigh.*

God has designed us a measure of our undertakings; his word and law, by the proportions whereof we are to *square* our actions. *Decay of Piety.*

The oracle was enforced to proclaim Socrates to be the wisest man in the world; because he applied his studies to the moral part, the *squaring* men's lives. *Hammond.*

O'er Libra's sign a crowd of foes prevails,
The icy goat and crab that *square* the scales. *Creech.*

Raised of grassy turf their table was;
And on her ample *square* from side to side
All autumn piled. *Milton.*

To the' other five
Their planetary motions and aspects,
In sextile, *square*, and trine, and opposite,
Of noxious efficacy. *Id. Paradise Lost.*

Eye me, blest providence, and *square* my trial
To my proportioned strength. *Milton.*

In rectangle triangles the *square* which is made of the side that subtendeth the right angle is equal to the *squares* which are made of the sides containing the right angle. *Browne.*

He employs not on us the hammer and the chizzel, with an intent to wound or mangle us, but only to *square* and fashion our hard and stubborn hearts. *Boyle's Seraphick Love.*

We live not on the *square* with such as these,
Such are our betters who can better please. *Dryden.*

His preaching much, but more his practice wrought;
A living sermon of the truths he taught:
For this by rules severe his life he *squared*,
That all might see the doctrine which they heard. *Id.*

Men should sort themselves with their equals; for a rich man that converses upon the *square* with a poor man, shall certainly undo him. *L'Estrange.*

I shall break no *squares* whether it be so or not. *Id.*

This instrument is for striking lines *square* to other lines or straight sides, and try the *squareness* of their work. *Moxon.*

Some professions can equally *square* themselves to, and thrive under, all revolutions of government. *South.*

The statue of Alexander VII. stands in the large *square* of the town. *Addison on Italy.*

Water and air the varied form confound;
The straight looks crooked, and the *square* grows round. *Prior.*

Circles to *square*, and cubes to double,
Would give a man excessive trouble. *Id.*

His description *squares* exactly to lime. *Woodward.*

These marine bodies do not *square* with those opinions, but exhibit phænomena that thwart them. *Id.*

Advance thy golden mountains to the skies,
On the broad base of fifty thousand rise:
Add one round hundred; and, if that's not fair,
Add fifty more, and bring it to a *square*. *Pope.*

This must convince all such who have, upon a wrong interpretation, presumed to *square* opinions by theirs, and have in loud exclamations shewn their abhorrence of university education. *Swift.*

Motion, *squareness*, or any particular shape, are the accidents of body. *Watts's Logick.*

Square, in geometry, a quadrilateral figure both equilateral and equiangular. See Geometry.

Square, among mechanics, an instrument consisting of two rules or branches, fastened perpendicularly at one end of their extremities, so as to form a right angle. It is of great use in the description and mensuration of right angles, and laying down perpendiculars.

Square, Hollow, in the military art, body of foot drawn up with an empty space in the middle, for the colors, drums, and baggage, faced and covered by the pikes every way, to keep off the horse.

Square Number is the product arising from a number multiplied by itself. Thus 4 is the square of 2, and 16 the square of 4.

The series of square integers is . . . . . 1, 4, 9, 16, 25, 36, &c.
which are the squares of 1, 2, 3, 4, 5, 6, &c.
Or the square fractions $\frac{1}{4}$, $\frac{4}{9}$, $\frac{9}{16}$, $\frac{16}{25}$, $\frac{25}{36}$, $\frac{36}{49}$, &c.
which are the squares of $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{4}{5}$, $\frac{5}{6}$, $\frac{6}{7}$, &c.

Square numbers have remarkable properties, of which the following are some of the most interesting, viz.—1. Every square number is of one of the forms $4n$ or $4n + 1$; that is, every square, when divided by 4, will leave either 0 or 1 for a remainder; and, understanding this expression still in the same sense, the following table will express the forms of square numbers to the moduli or divisors, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12.

Moduli.	Possible Forms of Squares.				
3	$3n$	$3n+1$			
4	$4n$	$4n+1$			
5	$5n$	$5n \pm 1$			
6	$6n$	$6n+1$	$6n+3$	$6n+4$	
7	$7n$	$7n+1$	$7n+2$	$7n+4$	
8	$8n$	$8n+1$	$8n+4$		
9	$9n$	$9n+1$	$9n+4$	$9n+7$	
10	$10n$	$10n \pm 1$	$10n \pm 4$	$10n \pm 5$	
11	$11n$	$11n+1$	$11n+3$	$11n+5$	$11n+9$
12	$12n$	$12n+1$	$12n+4$	$12n+9$	

2. Hence, by exclusion, we may derive the following table of impossible forms, viz.

Moduli.	Impossible Forms for Squares.				
3	$3n+2$				
4	$4n+2$	$4n+3$			
5	$5n+2$	$5n+3$			
6	$6n+2$	$6n+5$			
7	$7n+3$	$7n+5$	$7n+6$		
8	$8n\pm2$	$8n\pm3$	$8n+7$		
9	$9n+2$	$9n\pm3$	$9n+5$	$9n+8$	
10	$10n\pm2$	$10n\pm3$			
11	$11n+2$	$11n+6$	$11n+7$	$11n+8$	$11n+10$
12	$12n\pm2$, $12n+10$	$12n+3$	$12n\pm5$	$12n+6$	$12n+8$

These formulæ, as they involve no higher power of the indeterminate n than the first, are called linear forms; but, by means of them, we easily arrive at a variety of quadratic formulæ, which it is extremely useful to be acquainted with, in practising the diophantine or indeterminate analysis. A person unacquainted with these exclusions, required to find two such numbers, that double the square of one, added to triple the square of the other, should be a square, would see nothing impossible in the proposition, and might therefore lose many useless hours in the research; whereas, by a little attention to the impossible and possible forms, he would find the problem absolutely impossible, and hence spare himself much useless labor.

3. The method of deducing impossible quadratic forms from the linear ones above given will be seen immediately from a single example. Let it be required to ascertain whether the equation $2x^2 + 3y^2 = w^2$ be possible or impossible. First, we may assume x, y, and w, prime to each other; for, if x and y have a common divisor, w must have the same, and the whole equation may be divided by it; whereby it will be reduced to another equation $2x'^2 + 3y'^2 = w'^2$, in which these quantities have no longer a common divisor, or in other words they are prime to each other.

Since, then, x and y are prime to each other, they cannot be both of the form $3n$; for, in this case, they would have a common divisor 3. Let then, first, x^2 be of the form $3n$, and y^2 of the form $3n+1$; then $2x^2$ is of the form $3n'$, and $3y^2$ of the form $3n'+3$, and consequently their sum will have the form $3n$, which is impossible, because, in this case, w and x would have a common divisor 3; and, if we suppose x^2 of the form $3n+1$, and y^2 of the form $3n$, then $2x^2 + 3y^2$ is of the form $3n+2$, which is an impossible form: and, lastly, if we assume both of the form $3n+1$, then $2x^2 + 3y^2$ would have again the same impossible form $3n+2$; therefore, in no case can $2x^2 + 3y^2 = w^2$ be possible in integral numbers.

In the same manner a variety of other impossible forms may be deduced, of which the following are those which most commonly occur.

5. Modulus 3.

$$2t^2 + 3u^2 = w^2$$
$$5t^2 + 3u^2 = w^2$$
$$8t^2 + 3u^2 = w^2$$
$$(3p+2)t^2 + 3u^2 = w^2$$

6. Modulus 5.

$$2p^2 \pm 5u^2 = w^2$$
$$3p^2 \pm 5u^2 = w^2$$
$$7t^2 \pm 5u^2 = w^2$$
$$(5p \pm 2)t^2 \pm 5u^2 = w^2$$

Or the two latter general forms may be rendered more comprehensive, by the introduction of another indeterminate q; observing only that, in this case, the quantity must always be prime to the modulus. With this condition the two latter may be written thus:—

$$(3p+2)t^2 + 3qu^2 = w^2, \text{ and}$$
$$(5p \pm 2)t^2 \pm 5qu^2 = w^2.$$

7. Modulus 7.

$$(7p+3)t^2 \pm 7qu^2 = w^2$$
$$(7p+5)t^2 \pm 7qu^2 = w^2$$
$$(7p+6)t^2 \pm 7qu^2 = w^2$$

8. Modulus 11.

$$(11p+2)t^2 \pm 11qu^2 = w^2$$
$$(11p+6)t^2 \pm 11qu^2 = w^2$$
$$(11p+7)t^2 \pm 11qu^2 = w^2$$

9. Modulus 13.

$$(13p \pm 2)t^2 \pm 13qu^2 = w^2$$
$$(13p \pm 5)t^2 \pm 13qu^2 = w^2$$
$$(13p \pm 6)t^2 \pm 13qu^2 = w^2$$
$$(13p \pm 7)t^2 \pm 13qu^2 = w^2$$

10. Modulus 17.

$$(17p \pm 3)t^2 \pm 17qu^2 = w^2$$
$$(17p \pm 5)t^2 \pm 17qu^2 = w^2$$
$$(17p \pm 6)t^2 \pm 17qu^2 = w^2$$
$$(17p \pm 7)t^2 \pm 17qu^2 = w^2$$

A great variety of impossible forms might have been given to other moduli; but the above are sufficient for our present purpose.

There are also many formulæ, which, though possible singly, become impossible in pairs; such are the following:—

11. $\begin{cases} x^2 + y^2 = z^2 \\ x^2 - y^2 = w^2 \end{cases}$ 12. $\begin{cases} x^2 + y^2 = 2w^2 \\ x^2 - y^2 = 2w^2 \end{cases}$

13. $\begin{cases} 2x^2 + y^2 = z^2 \\ 2x^2 - y^2 = w^2 \end{cases}$ 14. $\begin{cases} x^2 + 2y^2 = 2z^2 \\ x^2 - 2y^2 = 2w^2 \end{cases}$

15. $\begin{cases} x^2 + 2y^2 = z^2 \\ x^2 - 2y^2 = w^2 \end{cases}$ 16. $\begin{cases} 2x^2 + y^2 = 2z^2 \\ 2x^2 - y^2 = 2w^2 \end{cases}$

These might also be carried to a much greater extent and many collateral properties drawn from them relative to the impossibility of some higher powers; we must not, however, carry the subject farther in this place. The reader who is desirous of more detailed information may consult Barlow's Elementary Investigation of the Theory of Numbers, where this part of the doctrine of Numbers is carried to a considerable extent. We shall merely select a few other distinct properties of squares, as they are given by the same author in his Mathematical Dictionary.

17. The sum of two odd squares cannot be a square.

18. An odd square, taken from an even square, cannot leave a square remainder.

19. If the sum of two squares be itself a square, one of the three squares is divisible by 5.

20. Square numbers must terminate in one of the digits 0, 1, 4, 5, 6, or 9.

21. No number of repetend digits can be a square.

22. The area of a rational right-angled triangle cannot be equal to a square.

23. The two following series are remarkable for being such as, when reduced to improper fractions, the sum of the squares of each numerator and denominator is a complete square; or, which is the same, they are the sides of rational right-angled triangles. These series are as follow, viz.:—

$$1\tfrac{1}{3},\ 2\tfrac{3}{5},\ 3\tfrac{3}{7},\ 4\tfrac{4}{9},\ 5\tfrac{5}{11},\ \&c.\ \&c.$$
$$1\tfrac{7}{8},\ 2\tfrac{11}{16},\ 3\tfrac{15}{16},\ 4\tfrac{19}{20},\ 5\tfrac{23}{24},\ \&c.\ \&c.$$

24. The second differences of consecutive square numbers are equal to each other, thus:—

Squares	1,	4,	9,	16,	25,	&c.
First difference		3,	5,	7,	9,	&c.
Second difference			2,	2,	2,	&c.

To these we may also add the following; which are more particularly applicable to the indeterminate and diophantine analysis.

25. If a number be the sum of two squares, its double is also the sum of two squares; for

$$(x^2 + y^2) \times 2 = (x + y)^2 + (x - y)^2.$$

Hence also the sum of two squares, multiplied by any power of 2, is the sum of two squares.

26. The product of two numbers, each being the sum of two squares, is itself the sum of two squares; for

$$(x^2 + y^2) \times (x'^2 + y'^2) = \begin{cases} (x x' + y y')^2 + (x y' - x' y)^2, \text{ or} \\ (x x' - y y')^2 + (x y' + x' y)^2 \end{cases}$$

$$\begin{aligned} \text{Thus,}\quad 5 &= 2^2 + 1^2 \\ 13 &= 3^2 + 2^2 \\ \hline \text{Product } 65 &= 8^2 + 1^2 \text{ or } 7^2 + 4^2 \end{aligned}$$

27. The product of the sum of four squares, by the sum of four other squares, is itself the sum of four squares; thus:—

$$(w^2 + x^2 + y^2 + z^2) \times (w'^2 + x'^2 + y'^2 + z'^2) = \begin{cases} (w w' + x x' + y y' + z z')^2 + (w x' - x w' \\ \quad + y z' - y z')^2 + \\ (y' w - x z' - y w' + z x')^2 + (w z' + x y' \\ \quad - y x' - z w')^2 \end{cases}$$

as will appear by the development of these formulæ.

28. Every integral number is either a square, or the sum of two, three, or four squares. The latter is one of the celebrated numerical theorems of Fermat, first demonstrated by Lagrange.

Square Measures, the squares of the lineal measures; as in the following table of square measures:—

Square Inches.	Square Feet.	Sq. Yards.	Sq. Poles.	S. Chs.	Acres.	S. Miles
144	1					
1296	9	1				
39204	272¼	30¼	1			
627264	4356	484	16	1		
6272640	43560	4840	160	10	1	
4014489600	27878400	3097600	102400	6400	640	1

Square Root. See Algebra.

SQUARE-RIGGED, an epithet applied to a ship whose yards are very long. It is also used in contradistinction to all vessels whose sails are extended by stays or lateen-yards, or by booms and gaffs; the usual situation of which is nearly in the plane of the keel; and hence,

SQUARE-SAIL, is a sail extended to a yard which hangs parallel to the horizon, as distinguished from the other sails which are extended by booms and stays placed obliquely. This sail is only used in fair winds, or to scud under in a tempest. In the former case, it is furnished with a large additional part called the bonnet, which is then attached to its bottom, and removed when it is necessary to scud. See Scudding.

SQUARING the Circle is the making or finding a square whose area shall be equal to that of any proposed circle. See Quadrature. This problem has never yet been solved so as to be precisely exact; but mathematicians, it is said, can come so near it as not to err so much in the area as a grain of sand would cover in a circle, whose diameter is equal to the diameter of Saturn's orbit. The following proportions are near enough to the truth for any real use that can arise from this problem. As 100000000 is to the diameter of the given circle, so is 88622692 to the side of the square required. Therefore,

If the Diameter of the Circle be	The Side of the Square will be
100000000	88622692·
10000000	8862269·2
1000000	886226·92
100000	88622·692
10000	8862·2692
1000	886·22692
100	88·622692
10	8·8622692
1	0·88622692

And as 100000000 is to the side of a given square, so is 112837917 to the diameter of a circle very nearly equal to the square. Therefore,

If the Side of the Square be	The Diameter of the Circle will be
100000000	112837917·
10000000	11283791·7
1000000	1128379·17
100000	112837·917
10000	11283·7917
1000	1128·37917
100	112·837917
10	11·2837917
1	1·12837917

SQUASH, *n. s.* From quash. Any thing soft and easily crushed: hence perhaps the plant of this name: any thing unripe; a sudden fall or shock.

Not yet old enough for a man, nor young enough for a boy; as a *squash* is before it is a peascod, or a codling when it is almost an apple. *Shakspeare. Twelfth Night.*

How like I then was to this kernel,
This *squash*, this gentleman. *Id. Winter's Tale.*

Since they will overload my shoulders, I shall throw down the burden with a *squash* among them. *Arbuthnot.*

My fall was stopped by a terrible *squash*, that sounded louder than the cataract of Niagara. *Swift.*

Squash is an Indian kind of pumpion that grows apace. *Boyle.*

SQUAT, *v. n.* & *adj.* Ital. *quattare.* To sit cowering; sit close to the ground: cowering; close to the ground.

Bruises, *squats*, and falls, which often kill others, can bring little hurt to those that are temperate. *Herbert.*

Him there they found,
Squat like a toad close at the ear of Eve. *Milton.*

A stitch-fallen cheek that hangs below the jaw;
Such wrinkles as a skilful hand would draw
For an old grandam ape, when with a grace
She sits at *squat*, and scrubs her leathern face. *Dryden.*

The squill-insect is so called from some similitude to the squillfish: the head is broad and *squat*. *Grew.*

Alma in verse, in prose the mind,
Throughout the body, *squat* or tall,
Is bona fide all in all. *Prior.*

Her dearest comrades never caught her
Squat on her hams. *Swift.*

SQUAT, *n. s.* From the adjective probably. A sort of mineral; a flat thin bed of ore.

The *squat* consists of tin ore and spar incorporated. *Woodward.*

SQUATINA. See SQUALUS.

SQUEAK, *v. n.* & *n. s.* Swed. *sqwaka.* To set up a sudden dolorous cry; to cry out with pain; to cry with a shrill acute tone: a shrill cry; a cry of pain.

The sheeted dead
Did *squeak* and gibber in the Roman streets. *Shakspeare.*

Cart wheels *squeak* not when they are liquored. *Bacon.*

I see the new Arion sail,
The lute still trembling underneath thy nail:
At thy well sharpened thumb from shore to shore,
The trebles *squeak* for fear, the bases roar. *Dryden.*

Blunderbusses, planted in every loop-hole, go off at the *squeaking* of a fiddle, and the thrumming of a guitar. *Id.*

Ran cow and calf, and family of hogs,
In panick horrour of pursuing dogs:
With many a deadly grunt and doleful *squeak*,
Poor swine! as if their pretty hearts would break. *Id.*

Who can endure to hear one of the rough old Romans *squeaking* through the mouth of an eunuch? *Addison.*

How like brutes organs are to ours;
They grant, if higher powers think fit,
A bear might soon be made a wit;
And that, for any thing in nature,
Pigs might *squeak* love-odes, dogs bark satire. *Prior.*

In florid impotence he speaks,
And, as the prompter breathes, the puppet *squeaks*. *Pope*

Zoilus calls the companions of Ulysses the *squeaking* pigs of Homer. *Id. Odyssey.*

SQUEA'MISH, *adj.* SQUEA'MISHLY, *adv.* SQUEA'MISHNESS, *n. s.* For quawmish, or qualmish, from qualm. Nice; fastidious; easily disgusted; apt to take offence. It is used always in dislike either real or ironical: the adverb and noun substantive correspond.

Yet, for countenance sake, he seemed very *squamish* in respect of the charge he had of the princess Pamela. *Sidney.*

Quoth he, that honour's very *squeamish*,
That takes a basting for a blemish;
For what 's more honourable than scars,
Or skin to tatters rent in wars? *Hudibras.*

Upon their principles they may revive the worship of the host of heaven; it is but conquering a little *sqeamishness* of stomach. *Stillingfleet.*

There is no occasion to oppose the ancients and the moderns, or to be *squeamish* on either side. He that wisely conducts his mind in the pursuit of knowledge, will gather what lights he can from either. *Locke.*

It is rare to see a man at once *squeamish* and voracious. *South.*

The thorough-paced politician must laugh at the *squeamishness* of his conscience, and read it another lecture. *Id.*

To administer this dose, fifty thousand operators, considering the *squeamishness* of some stomachs, and the peevishness of young children, is but reasonable. *Swift.*

His muse is rustick, and perhaps too plain
The men of *squeamish* taste to entertain. *Southern.*

SQUEEZE, *v. a.*, *v. n.* & *n. s.* Sax. cpiran; Teut. *quetschen*; Welsh *ysgwasgu.* To press, crush between two bodies: to act in consequence of compression; force a way: compression; pressure.

It is applied to the *squeezing* or pressing of things downwards, as in the presses for printing. *Wilkins.*

He reaped the product of his laboured ground,
And *squeezed* the combs with golden liquor crowned *Dryden.*

In a civil war people must expect to be crushed and *squeezed* toward the burden. *L'Estrange.*

Many a public minister comes empty in; but, when he has crammed his guts, he is fain to *squeeze* hard before he can get off. *Id.*

A subtle artist stands with wonderous bag,
That bears imprisoned winds, of gentler sort
Than those that erst Laertes' son enclosed:
Peaceful they sleep; but let the tuneful *squeeze*

Of labouring elbow rouze them, out they fly
Melodious, and with spritely accents charm.
Philips.

The sinking of the earth would make a convulsion of the air, and that crack must so shake or *squeeze* the atmosphere as to bring down all the remaining vapours. *Burnet.*

A concave sphere of gold filled with water and soldered up, upon pressing the sphere with great force, let the water *squeeze* through it, and stand all over its outside in multitudes of small drops, like dew, without bursting or cracking the body of the gold.
Newton's Opticks.

What crowds of these, impenitently bold,
In sounds and jingling syllables grown old,
Still run on poets, in a raging vein,
Even to the dregs and *squeezings* of the brain.
Pope.

SQUELCH, *n. s.* From Quash. Heavy fall. A low ludicrous word.

He tore the earth which he had saved
From *squelch* of knight, and stormed and raved.
Hudibras.

So soon as the poor devil had recovered the *squelch*, away he scampers, bawling like mad. *L'Estrange.*

SQUIB, *n. s.* Ital. *schioppo.* A small pipe of paper filled with wild fire: any petty fellow.

Asked for their pass by every *squib*,
That list at will them to revile or snib. *Spenser.*

The armada at Calais, Sir Walter Raleigh was wont prettily to say, were suddenly driven away with *squibs*; for it was no more than a stratagem of fireboats manless, and sent upon them.
Bacon's War with Spain.

The forest of the south compareth the French valour to a *squib*, or fire of flax, which burns and crackles for a time, but suddenly extinguishes.
Howel's Vocal Forest.

Lampoons, like *squibs*, may make a present blaze;
But time, and thunder, pay respect to bays.
Waller.

The *squibs*, in the common phrase, are called libellers. *Tatler.*

Furious he begins his march,
Drives rattling o'er a brazen arch:
With *squibs* and crackers armed, to throw
Among the trembling crowd below. *Swift.*

SQUILL, *n. s.* Fr. *squille;* Lat. *squilla, scilla.* A plant; a fish; an insect.

Seed or kernels of apples and pears, put into a *squill*, which is like a great onion, will come up earlier than in the earth itself.
Bacon's Natural History.

'Twill down like oxymel of *squills*. *Roscommon.*

The self-same atoms
Can, in the truffle, furnish out a feast;
And nauseate, in the scaly *squill*, the taste. *Garth.*

It hath a large acrid bulbous root, like an onion; the leaves are broad; the flowers are like those of ornithogalum, or the starry hyacinth: they grow in a long spike, and come out before the leaves.
Miller.

The *squill* insect is so called from some similitude to the *squill* fish, in having a long body covered with a crust, composed of several rings; the head broad and squat. *Grew.*

Squill, in botany. See Scilla.

SQUILLA, the name of a species of cancer. See Cancer.

SQUI'NANCY, *n. s.* Fr. *squinance, squinancie;* Ital. *squinantia.* An inflammation in the throat; a quinsey.

Used for *squinancies* and inflammations of the throat, it seemeth to have a mollifying and lenifying virtue. *Bacon.*

In a *squinancy* there is danger of suffocation.
Wiseman.

SQUINT, *adj., v. n.* & *v. a.* Squint'eyed, *adj.* Squintife'go, Squin'y, *v. n.* Belg. *squinte*, oblique, transverse. Looking obliquely; looking not directly; looking suspiciously: to look obliquely; to form or turn the eye obliquely: the two adjectives both mean having the sight oblique: to squiny is to look askant or obliquely.

He was so *squinteyed* that he seemed spitefully to look upon them whom he beheld.
Knolles's History of the Turks.

I remember thine eyes well enough:
Dost thou *squiny* at me? *Shakspeare. King Lear.*

This is the foul Flibertigibbet; he gives the web and the pin, *squints* the eye, and makes the hairlip.
Shakspeare.

Some can *squint* when they will; and children set upon a table, with a candle behind them, both eyes will move outwards, to seek the light, and so induce *squinting*. *Bacon.*

Perkin began already to *squint* one eye upon the crown, and another upon the sanctuary.
Id. Henry VII.

This is such a false and *squinteyed* praise,
Which, seeming to look upwards on his glories,
Looks down upon my fears. *Denham.*

Where an equal poise of hope and fear
Does arbitrate the event, my nature is
That I incline to hope rather than fear,
And gladly banish *squint* suspicion. *Milton.*

The timbrel and the *squintifego* maid
Of Isis awe thee; lest the gods, for sin,
Should with a swelling dropsy stuff thy skin.
Dryden.

Not a period of this epistle but *squints* towards another over against it. *Pope.*

Squinting, or Strabismus, an affection of the eyes, occasioned by the optic axis not converging; in consequence of which the organs of sight appear distorted. Improper habits frequently induce this defect, while the eye and its muscles are perfect; for instance, in children, who accustom themselves to view different things at one time; or who are placed obliquely towards any object that may attract their attention. Another cause is malconformation of the retina, or such parts as serve to convey impressions to the point of vision; so that persons thus situated are obliged to turn the eye from the object to be investigated, in order that they may be enabled to behold it more distinctly.—Farther, it often proceeds from weakness or defect of either eye, so that both cannot be mutually employed. Besides, it may be consequent on affections of the brain, epilepsy, terror, and defluxions of rheumatic humors.

The method of cure to be adopted in this unpleasant distortion varies according to the cause. Thus, in children, and in cases of weakness of the eyes, it may be remedied by mechanical contrivances. Hence, when there is no organic defect in either eye, which is frequently the case with persons who squint from a depraved habit of moving their eyes, the disease may often be cured.

Dr. Darwin remarks (Philosophical Transac-

tions, vol. lxviii.), that in all the squinting people he had occasion to attend, one eye was less perfect than the other; these patients are, in his opinion, certainly curable, by covering the best eye many hours in the day; as, by a more frequent use of the weak eye, it not only acquires a habit of turning to the objects which the patient wishes to see, but gains at the same time a more distinct vision: in both these respects, the better eye is under some disadvantage, which also facilitates the cure. This ingenious physician relates, in the same paper, a remarkable case of a boy, then five years old (now or lately a reputable English clergyman at Edinburgh), who had the misfortune of viewing every object with one eye only at a time. Dr. Darwin directed a paper gnomon to be made, and affixed to a cap; and when this artificial nose was placed over the patient's real nose, so as to project an inch between his eyes, the child, rather than turn his head so far to look at oblique objects, immediately began to exert the eye which was nearest to them. But, having the misfortune to lose his father, soon after this method was begun to be followed, the child was neglected for six years, during which time the habit was confirmed in such a manner as seemed to leave little room to hope for a cure. Dr. Darwin, however, being again called, attempted a second time to remove the deformity, by a similar contrivance. A gnomon of thin brass was made, to stand over his nose, with a half-circle of the same metal to go round his temples: these were covered with black silk; and, by means of a buckle behind his head, and a cross-piece over the crown of his head, this gnomon was worn without any inconvenience, and projected before his nose about two inches and a half. By the use of this machine, he soon found it less inconvenient to view all oblique objects with the eye next to them, instead of the eye opposite to them. After this habit was weakened, by a week's use of the gnomon, two bits of wood, about the size of a goose-quill, were blackened all but a quarter of an inch at their summits; these were frequently presented to him to look at; one being held on one side the extremity of his black gnomon, and the other on the opposite. In viewing these, they were gradually brought forward beyond the gnomon, and then one was concealed behind the other: by such means, in another week, he could bend both his eyes on the same object for half a minute together; and, by continuing the use of the same machine, he was in a fair way of being cured.

Lastly, if squinting arise from any adventitious circumstance, such as terror, defluxions of humors, &c., the removal of those causes will also cure the disorder; but, where it originates from mal-conformation of the organs of vision, or has been so long neglected as to become confirmed, it is not in the power of art to afford any relief. See MEDICINE.

SQUIRE, *n. s.* Contraction of esquire. Fr. *escuyer*. See ESQUIRE. A gentleman next in rank to a knight.

He will maintain you like a gentlewoman.—Ay, that I will, come cut and long tail under the degree of a *squire*. *Shakspeare.*

The rest are princes, barons, knights, *squires*,
And gentlemen of blood. *Id. Henry V.*

Return with her!—I could as well be brought
To knee his throne, and *squire*-like pension beg,
To keep base life a-foot. *Id. King Lear.*

Old Butes' form he took, Anchises' *squire*,
Now left to rule Ascanius. *Dryden's Æneid.*

Knights, *squires*, and steeds, must enter on the stage. *Pope.*

SQUIRE (Samuel), D.D. and F.R.S. &c., a late eminent English prelate, born at Warminster, in Wilts, in 1714, and educated at St. John's College, Cambridge, of which he became a fellow. His father was an apothecary. In 1749 he graduated, and was made rector of Topsfield; in 1750 rector of St. Anne, Westminster; in 1760 dean of Bristol; and in 1761 bishop of St. David's. He died May 7th, 1766. He was a fellow of the Royal and Antiquarian Societies, and a constant attendant. His chief works are, 1. An Enquiry into the Nature of the English Constitution, or an Historical Essay on the Anglo-Saxon Government. 2. The Ancient History of the Hebrews vindicated; Cambridge, 1741. 3. Two Essays: i. A Defence of the Ancient Greek Chronology: ii. An Enquiry into the Origin of the Greek Language; Cambridge, 1741. 4. An Essay on the Balance of Civil Power in England, 1742. 5. Plutarchi de Iside et Osiride liber, 1744.

SQUIR'REL, *n. s.* Fr. *escurueil;* Lat. *sciurus*. A small animal that lives in woods, remarkable for leaping from tree to tree.

One chanced to find a nut,
In the' end of which a hole was cut,
Which lay upon a hazel-root,
There scattered by a *squirrel*,
Which out the kernel gotten had;
When quoth this fay, Dear queen, be glad,
Let Oberon be ne'er so mad,
I'll set you safe from peril. *Drayton.*

SQUIRREL, in zoology. See SCIURUS.

SQUIRT, *v. a., v. n.* & *n. s.* Of uncertain etymology. To throw out in a quick stream: let fly: an instrument for either purpose.

Water those with *squirts* of an infusion of the medicine in dunged water. *Bacon's Natural History.*

He with his *squirt*-fire could disperse
Whole troops. *Hudibras.*

You are so given to *squirting* up and down, and chattering, that the world would say I had chosen a jack-pudding for a prime minister. *L'Estrange.*

Sir Roger she mortally hated, and used to hire fellows to *squirt* kennel water upon him as he passed along. *Arbuthnot.*

The *squirters* were at it with their kennel water; for they were mad for the loss of their bubble. *Id.*

His weapons are, a pin to scratch, and a *squirt* to bespatter. *Pope.*

SRADHA, a ceremony among the Hindoos in honor of departed ancestors. The 'Hindoo Pantheon' furnishes some particulars explanatory of this interesting and affecting ceremony, which, the author tells us, is an oblation of daily recurrence with Brahmans and rigid Hindoos who can afford it. It is offered not only in honor of deceased ancestors, but for their comfort; as the manes, as well as the gods connected with them, enjoy, like the gods of the Greeks, the incense of such offerings; which are farther of an expiatory

nature, similar, it may be presumed, in their efficacy, as well as in the motives that induce them, to the masses of the Romish church. Over these ceremonies of Sradha, Yama presides, in his character of Sradhadeva, or lord of the obsequies.

Mr. Colebrooke says (As. Res. vol. vii.) that the priests, in the performance of the Sradha, meditate the gayatri, and thrice repeat, 'Salutation to the gods, to the manes of ancestors, and to mighty saints; to Swaha (goddess of fire); to Swadha (the food of the manes); salutation to them for ever and ever.'

In the third chapter of the Institutes of Menu, the rules for the performance of the Sradha are detailed with prolixity. Among other particulars of the most important of those ceremonies, we learn that Brahmans only ought to be invited to the feast, which forms one important rite; and such Brahmans should be of holy and learned habits. A Sudra, that is, one of the fourth or servile class, is urgently prohibited as a guest. Let the housekeeper, it is said, who knows his duty, perform each day a Sradha with boiled rice, and the like, or with water, or with milk, roots, and fruit: for thus he obtains favor from departed progenitors, &c., &c., &c.

The following extract is from Colebrooke's Dissertation on the Religious Ceremonies of the Hindoos, in the seventh volume of the Asiatic Researches; which article contains much valuable matter, and many curious particulars of the Sradha, or feast attending funeral obsequies. "A dying man, when no hopes of his surviving remain, should be laid on a bed of Kusa grass (see Kusa), in the open air, his head sprinkled with water drawn from the Ganges, and smeared with clay brought from the same river. A salagrama stone (see Salagrama) should be placed near him, holy strains from the Veda (see Veda) should be chaunted aloud, and leaves of holy basil scattered over his head. When he expires, the corpse must be washed, perfumed, and decked with wreaths of flowers, and carried by the nearest relations to some spot in the forest, or near water: the funeral pile is lighted from the consecrated fire maintained by the deceased. See of this under our articles Sagnika and Sami. The nearest relation applies the flaming brand to the pile, hung round with flowers; and the attendant priests recite the appropriate invocations: 'Fire! thou wast lighted by him; may he, therefore, be reproduced from thee, that he may attain the regions of celestial bliss. May this offering be auspicious!' All who followed the corpse walk round the pile, but may not view the fire. They then proceed to the river, and, after bathing, present oblations of water to the manes of the deceased, saying, 'May this oblation reach thee!' Elegiac verses, such as the following, are then recited.

'Foolish is he who seeks for permanence in the human state; insolid, like the stem of the plantain-tree; transient, like the foam of the ocean.'

'When a body, formed of five elements, to receive the reward of deeds done in its own former person, reverts to its own five original principles, what room is there for regret?'

'The earth is perishable; the ocean, the gods themselves pass away: how should not that bubble, mortal man, meet destruction?'

'All that is low must finally perish; all that is elevated must ultimately fall; all compounded bodies must end in dissolution; and life be concluded by death."

Exclusive of the daily sradhas, or feasts, given by wealthy individuals, formal obsequies are performed ninety-six hours in every year, on particular days. 'It should be observed,' Mr. Colebrooke says, 'respecting the practice of giving food at these obsequies, that Brahmans generally give it to one or more of their own relations. A stranger, unless indigent, would be very unwilling to accept the food, or attend at a sradha, for the purpose of eating it. The use of flesh meat is positively enjoined to Hindoos at certain obsequies, and recommended at all.' See Inst. of Menu, c. iii. v. 124, 268, &c. But the precepts of their lawgivers are, by some, deemed obsolete in the present age; and are evaded by others, who acknowledge the cogency of these laws. These commonly make a vow of abstaining from flesh meat, and consider that vow as more binding than the precepts here alluded to. Others, again, not only eat meat at obsequies and solemn sacrifices, but make it their common diet, in direct breach of their religion.' It hence appears clear that the idea so common in Europe, of the universal abstinence of Hindoos from flesh meat, is as erroneous as general. Some pages of the Hindoo Pantheon are devoted to prove this fact; and it is fully proved that not only all Hindoos may, but that a great majority of those who can obtain it, including Brahmans themselves, actually do eat meat. The feast attendant on the ceremonies of the Sradha can be given only by the son, the grandson, or male issue of the defunct; and as the greatest importance is attached by Brahmans and others to the due performance of these ceremonies, default of male issue is deprecated as among the heaviest of misfortunes. The Hindoo books, therefore, abound in instances of the efficacy of prayers, sacrifices, alms to Brahmans, pilgrimages, austerities, &c., in obtaining this grand object of comfort to departed souls. Appeasing the manes, by the Sradha, is as common in the mind of a Hindoo, as relieving the pains of purgatory by masses is in that of a Papist. Though the ceremonies differ, the principle is strikingly similar. Being childless is felt as an angry visitation of the gods inflicted partly for sins in a former state of existence: they are, therefore, propitiated by alms, pilgrimages, &c. One mode of removing sterility is by circumambulating an image, or tree, sacred to some deity. Of this see under Pradakshna, the name of this ceremony. If every thing fail, there is, however, still a remedy by adoption, accompanied by certain ceremonies, expensive, according to the means of the party. Another is by giving daughters in marriage with like ceremonies; all of which are minutely detailed in the ritual. For all these proceedings divine authority can be quoted. Holy men, of even divinities, in the times of their terrestrial sojournments, are related to have done the like 'He,' says Menu, 'who has no son, may appoint

a daughter to raise up a son for him, saying, 'The male child who shall be born from her in wedlock shall be mine, for the purpose of performing my obsequies.' In this manner Daksha himself, lord of created beings, anciently appointed all his fifty daughters to raise up sons to him, for the sake of multiplying his race.'

SRADHADEVA, in Hindoo mythology, a name of the Pluto of their infernal regions. It means lord of the sradha, a feast often, by many daily, offered in commemoration of deceased ancestors. The more common name for the lord of the obsequies is YAMA, which see.

SRAVAKA, the name of the laity of the Jainas, a sect of schismatic Hindoos. Their priests are called Yati. A name also of the god Budha, or Boodh. See Moor on Hindoo Infanticide, p. 174. Among the Mahrattas, the sravakas are called shevari.

SRI, in the Hindoo mythology, is a name given to several goddesses; oftenest perhaps to Lakshmi, the goddess of prosperity and abundance. This name is in the first case Sris, which Sir William Jones remarked as resembling, both in name and character, the goddess of abundance of the Latins; and he says, that in very ancient temples near Gaya there are images of Lakshmi, with full breasts, and a cord twisted under her arm, like a horn of plenty, which looks very much like the old Grecian and Roman figures of Ceres. See LAKSHMI. The word Sri, however, although given as a name or epithet to the Ceres of India, and to the other great goddesses Parvati and Saraswati, is not confined to them: it means fortunate, happy, &c., as well as blessed or divine; and is sometimes prefixed to the names both of gods and men.

SRI BHAGAVATA, the title of a work in the Sanscrit language, of great celebrity among the Hindoos. It is usually ascribed to Vyasa, the reputed compiler or author of the Vedas, Puranas, Mahabarat, and other works. But the real author of the Sri Bhagavata is Vopadeva, who, in attempting to revive the leading doctrines of Vyasa, opened a door to the reconciliation of the various sects of Hindoos, numerously divided and subdivided as they are, and, as far as historical evidence can be traced, ever have been.

The main subject of the Bhagavat is the life and actions of Krishna; including the extravagant and mystical details of his incarnation, miracles, debaucheries, and various fooleries; intermixed, however, with sublime effusions of pure theology and morals. See MYSTICAL POETRY. Like most of the other respected writings of the Hindoos, it contains much to applaud and admire; but more, whether viewed philosophically or morally, to reprehend. It is comprised in twelve books, and, like the other poems bearing the common denomination of Purana, contains, besides the general thread of sectarial theology interwoven throughout, five subjects, viz. primary creation, or creation of matter in the abstract; secondary creation, or the production of subordinate beings, both spiritual and material; chronological account of their grand periods of time called Manwantara; genealogical rise of families, particularly of those who have reigned in India; and lastly a history of the lives of particular families. This work is in general estimation, and is found in most of the vulgar dialects of India, and in the Persian language. It has also appeared in a very imperfect and abridged form, in French, under the title of Bagavadam, translated from the Tamul version. Its title is derivable from Bhagavan, one of the names of Krishna and Vishnu; and Bhagavan from Bhaga, meaning, it is said, the author of existence, or lord of nature. See SIVA. Sri is a prefixture of respect, extensively applied. See SRI. The modern sect, who adhere to the liberal doctrine expounded in this work, are called Bhagavatas.

But we must again refer to our article SECTS OF HINDOOS, for an explanation of the nature of the Hindoo sectarial distinctions. See also KRISHNA, for an account of the hero of the Bhagavat.

SRIPADA (Hind. a *divine footstep*). On the top of the mountain, in the island of Ceylon, which European geographers call Adam's Peak, the Hindoos fancy there is a sripad; and accordingly pilgrimages are made to it from distant parts of India. Vishnu, it is said, alighted on this spot, and left the holy and indelible impression. In the neighbourhood of temples, or at their threshold, it is not unusual to see a flat stone embossed or engraved with the impression of two feet, joined from heel to toe; such being the attitude of adoration; and it is said that such stones are the last terrene substance pressed by the feet of the unhappy victims of superstition, who burn themselves alive on the pile of their husbands. They step from these flat stones upon the pile, and then appertain more to the next world than to this. The next step is into the presence of the gods; or, in the case of temples, to their holy place. The Hindoos are not the only people who have a veneration for the mystical impressions of feet. The sripad above mentioned on Ceylon was said by our early zealous missionaries to have been left by Adam; they endeavouring to establish the fact of that chosen island having been the Eden of our first parents. In the holy land miraculous sripada, or footsteps, are still shown and reverenced, as left by the last pressure of our Saviour on the earth. On this subject the reader will find some interesting remarks in Dr. Clarke's Travels, vol. ii. p. 584.

STAAL (Madam de), a celebrated French lady of the eighteenth century, who wrote her own Memoirs, but without mentioning the year of her birth. She was the daughter of M. De Launai, a painter, and was educated in a convent, by the favor of the abbess; but, her patroness dying, she became waiting maid to the duchess of Maine. A letter which she wrote to the celebrated Fontenelle raised her literary fame, and attracted the attention of the wits of Paris. She married lieutenant De Staal of the Swiss guards, afterwards Mareschal. She died in 1750; and her Memoirs, in 4 vols. 12mo., with two of her comedies, were published soon after.

STAB, *v. a.*, *v. n.*, & *n. s.* Teut. *stab*, a stick; old Dutch *staven*. To pierce with a pointed weapon; wound mortally or mischievously: to give a wound with a pointed weapon; offer to wound: the wound given; a stroke; blow

Hear the lamentations of poor Anne,
Wife to thy Edward, to thy slaughtered son;

Stabbed by the self-same hand that made these wounds. *Shakspeare.*

Thou hid'st a thousand daggers in thy thoughts,
Which thou hast whetted on thy stony heart,
To *stab* at my frail life. *Id. Henry IV.*

He speaks poinards, and every word *stabs.* *Shakspeare.*

None shall dare
With shortened sword to *stab* in closer war,
But in fair combat fight. *Dryden's Knight's Tale.*

Killing a man with a sword or a hatchet are looked on as no distinct species of action; but, if the point of the sword first enter the body, it passes for a distinct species where it has a distinct name; as in England, where it is called *stabbing.* *Locke.*

He had a scripture ready to repel them all; every pertinent text urged home being a direct *stab* to a temptation. *South.*

Cleander,
Unworthy was thy fate thou first of warriours,
To fall beneath a base assassin's *stab.* *Rowe.*

Porcius, think thou seest thy dying brother
Stabbed at his heart, and all besmeared with blood,
Storming at thee! *Addison's Cato.*

What tears will then be shed!
Then, to complete her woes, will I espouse
Hermione: 'twill *stab* her to the heart! *A. Philips.*

STABBING, in law. The offence of mortally stabbing another, though done upon sudden provocation, is punished as murder; the benefit of clergy being taken away from it by statute. For, by James I. c. 8, when one thrusts or stabs another, not then having a weapon drawn, or who hath not then first stricken the party stabbing, so that he dies thereof within six months after, the offender shall not have the benefit of clergy, though he did it not of malice aforethought. This statute was made on account of the frequent quarrels and stabbings with short daggers between the Scotch and the English, at the accession of James I.; and, being therefore of a temporary nature, ought to have expired with the mischief which it meant to remedy. For, in point of solid and substantial justice, it cannot be said that the mode of killing, whether by stabbing, strangling, or shooting, can either extenuate or enhance the guilt; unless where, as in the case of poisoning, it carries with it internal evidence of cool and deliberate malice. But the benignity of the law hath construed the statute so favorably in behalf of the subject, and so strictly when against him, that the offence of stabbing now stands almost upon the same footing as it did at the common law. Thus (not to repeat the cases mentioned under MANSLAUGHTER, of stabbing an adulteress, &c., which are barely manslaughter, as at common law), in the construction of this statute it hath been doubted, whether, if the deceased had struck at all before the mortal blow given, this does not take it out of the statute, though in the preceding quarrel the stabber had given the first blow; and it seems to be the better opinion that this is not within the statute. Also it hath been resolved that the killing a man, by throwing a hammer or other weapon, is not within the statute; and whether a shot with a pistol be so or not is doubted. But if the party slain had a cudgel in his hand, or had thrown a pot or a bottle, or discharged a pistol at the party stabbing, this is a sufficient reason for having a weapon drawn on his side within the words of the statute.

STABEN (Henry), an eminent painter, born in Flanders in 1578. He was a disciple of Tintoretto, was capital in history and perspective, and died in 1658.

STABIL'IMENT, or STABIL'ITY, *n. s.* STA'BLE, *adj.* STA'BLENESS, *n. s.* Lat. *stabilis.* Support; firmness; act of making firm; fixedness: stability is the more usual word: stable is fixed, steady, constant: stableness is, the power to stand; steadiness.

The king becoming graces,
As justice, verity, temp'rance, *stableness,*
Bounty, persev'rance, I have no relish of them. *Shakspeare.*

If man would be invariable,
He must be like a rock, or stone, or tree;
For even the perfect angels were not *stable,*
But had a fall more desperate than we. *Davies.*

He began to try
This and that hanging stone's *stability.* *Cotton.*

Since fluidness and *stability* are contrary qualities, we may conceive that the firmness or *stability* of a body consists in this, that the particles which compose it do so rest, or are intangled, that there is among them a mutual cohesion. *Boyle.*

By the same degrees that either of these happen, the *stability* of the figure is by the same lessened. *Temple.*

He perfect, *stable;* but imperfect we,
Subject to change. *Dryden's Knight's Tale.*

This region of chance and vanity, where nothing is *stable,* nothing equal; nothing could be offered today but what to-morrow might deprive us of *Rogers.*

These mighty girders which the fabrick bind,
These ribs robust and vast in order joined,
Such strength and such *stability* impart,
That storms above, and earthquakes under ground,
Break not the pillars. *Blackmore.*

They serve for *stabiliment,* propagation, and shade. *Derham.*

STA'BLE, *n. s., v. n.,* & *v. a.* STA'BLEBOY, *n. s.* STA'BLEMAN. Lat. *stabulum.* A house for beasts: to kennel; dwell as beasts: the compounds corresponding.

I will make Rabbah a *stable* for camels. *Ezra*

I would with jockeys from Newmarket dine,
And to rough riders give my choicest wine;
I would caress some *stableman* of note,
And imitate his language and his coat. *Bramstone.*

In their palaces,
Where luxury late reigned, sea-monsters whelped
And *stabled.* *Milton.*

Slothful disorder filled his *stable,*
And sluttish plenty decked her table. *Prior.*

As soon as you alight at the inn deliver your horses to the *stableboy.* *Swift.*

If the gentleman hath lain a night get the *stablemen* and the scullion to stand in his way. *Id. Directions to the Butler.*

STABLE, in rural economy, a building or house constructed for horses and other animals, being furnished with stalls and proper contrivances to contain their food and other matter. See RURAL ARCHITECTURE.

STABLESTAND, *n. s.* In law. One of the four evidences or presumptions, whereby a man is convinced to intend the stealing of the king's deer in the forest: 'and this is when a man is found at his standing in the forest, with a crossbow bent, ready to shoot at any deer; or with a

long bow; or else standing close by a tree with greyhounds in a leash ready to slip.'—Cowell.

I'll keep my *stablestand* where I lodge my wife;
I'll go in couples with her. *Shakspeare.*

STAB'LISH, *v. a.* Lat. *stabilio;* Fr. *establir.* To establish; fix; settle.

Comfort your hearts, and *stablisn* you in every good work. 2 *Thess.* ii. 17.

Then she began a treaty to procure,
And *stablish* terms betwixt both their requests.
Spenser.

Stop effusion of our Christian blood,
And *stablish* quietness on every side.
Shakspeare. Henry VI.

Poor hereticks in love there be,
Which think to *stablish* dangerous constancy;
But I have told them, since you will be true,
You shall be true to them who're false to you.
Donne.

His covenant sworn
To David, *stablished* as the days of heaven. *Milton.*

STABLO. See Stavelo.

STACHYS, in botany, a genus of plants belonging to the class of didynamia, and order of gymnospermia; natural order forty-second, verticillatæ. The upper lip of the corolla is arched; the lower lip is reflexed, and the larger intermediate lacina is marginated. The stamina, after shedding the farina, are bent towards the sides. There are sixteen species, viz. 1. S. æthiops; 2. alpina; 3. annua; 4. arvensis; 5. Canariensis; 6. cretica; 7. Germanica; 8. glutinosa; 9. hirta; 10. lanata; 11. maritima; 12. orientalis; 13. Palæstina; 14. palustris; 15. recta; and, 16. sylvatica. Of these only four are natives of Britain; viz. 1. S. arvensis, corn stachys, petty ironwort, or all-heal. The stalk is ten or twelve inches high, square, branched, and hairy. The leaves are heart-shaped, obtuse, bluntly serrated, and less hairy. The calyx is hairy and sessile, and deeply divided into five acute dents of equal length. The flowers are flesh-colored, and grow from three to six in a whirl. The lower lip is trifid; the middle segment spotted with red, but not emarginated according to the character of the genus. It is frequent in corn-fields, and grows from June to August. 2. S. Germanica, base horehound. The stem is downy, and about two feet high. The leaves are white, downy, wrinkled, and indented. The flowers are white, purplish within, and grow in multiflorous whirls. It grows in England. 3. S. palustris, clown's all-heal. The roots are white and tuberous. The stalk is branched at the bottom, and two or three feet high. The flowers are red or purple, from six to ten in a whirl, ending in a long spike. The leaves are sessile, narrow, pointed, and in part surrounding the stem. This plant has a fetid smell and bitter taste, and is reckoned a good vulnerary. It grows on the sides of rivers and lakes, in low moist grounds, and sometimes in corn-fields. 4. S. sylvatica, hedge nettle. The plant is hairy all over, erect, a yard high, and branched; the hairs are jointed. The flowers are of a deep red color, six or eight in a whirl, which terminates in a long spike destitute of leaves. The leaves are heart-shaped, and grow on foot-stalks. The whole plant has a strong fetid smell. It grows commonly in woods and shady places, and flowers in July or August.

STACK, *n. s.* & *v. a.* Ital. *stacca;* Goth. and Swed. *stack.* A large quantity of hay, corn, or wood, heaped up; a number of chimneys built together: to pile up.

So likewise a hovel will serve for a room,
To *stack* on the pease. *Tusser.*

Against every pillar was a *stack* of billets above a man's height, which the watermen that bring wood down the Seine laid there. *Bacon's Natural History.*

While the marquis and his servant on foot were chasing the kid about the *stack*, the prince from horseback killed him with a pistol.
Wotton's Buckingham.

While the cock
To the *stack* or the barn-door
Stoutly struts his dame before. *Milton.*

The prices of *stacking* up of wood I shall give you.
Mortimer.

Stacks of moist corn grow hot by fermentation.
Newton.

A mason making a *stack* of chimneys the foundation of the house sunk. *Wiseman's Surgery.*

An inundation, says the fable,
O'erflowed a farmer's barn and stable;
Whole ricks of hay and *stacks* of corn
Were down the sudden current borne. *Swift.*

STACKHOUSE (Thomas), a learned and pious English divine, who was many years curate of Finchley, and afterwards vicar of Beenham, in Berkshire. He first attracted the public attention by his treatise On the Miseries of the Inferior Clergy, 1722. He acquired still greater fame by his New History of the Bible, in 2 vols. folio; which has been often reprinted, in 6 or 8 vols. 8vo. He also wrote several other works; and died in 1752.

STADIUM, an ancient Greek long measure containing 125 geometrical paces, or 625 Roman feet, corresponding to our furlong. The word is said to be formed from the Greek word στασις, a station, or ἱστημι, to stand, because it is reported that Hercules, having run a stadium at one breath, stood still at the end of it. The Greeks usually measured distances by stadia, which they called σταδιασμος. Stadium also signified the course on which their races were run.

STADIUS (John), a learned mathematician, born at Loenhout, near Antwerp, in 1527. He became professor of history at Louvain, and afterwards of mathematics and history at Paris; where he died in 1579. He published, 1. Ephemerides: Cologne, 1556 and 1570. 2. Tabula Æquabilis et apparentis motus cælestium corporum: 3. Commentarius Lucium Florum.

STAD'LE, *n. s.* & *v. a.* Sax. ꝥꝼꝺel, a foundation. Any thing which serves for support; staff; crutch: to furnish with stadles. Obsolete.

Leave growing for *staddles* the likeliest and best,
Though seller and buyer dispatched the rest. *Tusser.*

First see it well fenced, ere hewers begin;
Then see it well *staddled* without and within. *Id.*

He cometh on, his weak steps governing
And aged limbs on cypress *stadle* stout,
And with an ivy twine his waist is girt about.
Spenser.

Coppice-woods, if you leave in them *staddles* too thick, will run to bushes and briars, and have little clean underwood. *Bacon.*

STADTHOLDER. This office was abolished by the French and Dutch republicans, in 1795. For

its institution, in favor of William I., see United Provinces.

STADTHOLDERATE, the office and dignity of stadtholder.

STÆHELINA, in botany, a genus of plants belonging to the class of syngenesia, and order of polygamia æqualis; natural order forty-ninth, compositæ. The receptacle is paleaceous, the chaff being very short; the pappus is branchy, and the antheræ caudated. There are eight species; viz. 1. S. arborescens; 2. chamæpeuce; 3. corymbosa; 4. dubia; 5. fruticosa; 6. gnaphaloides; 7. ilicifolia; and, 8. imbricata.

STAEL Holstein (Anne Louise Germaine Necker, baroness de), a late celebrated female writer, was the daughter of M. Necker, the French financier, and born at Paris, April 22d, 1766. She soon displayed signs of genius; and at the age of fifteen was capable of discussing with her father the most serious and important subjects. Theatrical compositions at this time also particularly interested her; and before she was twenty she wrote a comedy in three acts, entitled Sophie, ou les Sentiments secrets; and the year following she produced a tragedy on the story of Lady Jane Gray. In 1786 she was married to the baron de Stael Holstein, the Swedish ambassador, through the patronage of the queen of France; and was consequently introduced at court. Her Lettres sur J. J. Rousseau, soon after published, attracted great notice. In August, 1788, she had the pleasure of announcing to her father his appointment to the ministry; but this triumph was not of long duration, for M. Necker was dismissed from office, and he left France accompanied by his daughter. He had scarcely reached Basil, when he was recalled, only, however, to experience the inconstancy of popular favor, as he was soon obliged again to resign. Mad. de Stael followed him in his retreat to Coppet; but she revisited France in 1792, when she endeavoured to save some of the victims of revolutionary fury. Her own life was endangered, however, and she only escaped through the care of Manuel, attorney of the commune of Paris. She returned to Switzerland, and subsequently went to England, where she heard of the execution of Louis XVI. She immediately rejoined her father, and published an elegant Défense de la Reine. After the fall of Robespierre she produced two anonymous pamphlets, Réflections sur la Paix, addressées à M. Pitt et aux Français; and Réflections sur la Paix Intérieure. Under the Directory she again returned to France, where she, through her influence with Barras, was the means of procuring the elevation of Talleyrand to the post of minister of foreign affairs. In December, 1797, she for the first time saw Buonaparte at Paris, preparing for his expedition to Egypt; and the admiration with which she had regarded the conqueror of Italy was succeeded by a sentiment bordering on aversion, which seems to have become mutual. She continued in France after the return of Buonaparte, and her influence was frequently employed in opposition to his views. She at length left France, and went to reside with her father. She remained about twelve months at this time in her retreat, and composed the romance of Delphine, which was not published till 1803. She returned to Paris; but this work, and a tract entitled Les Derniéres Vues de Politique et de Finance, published by M. Necker, had given so much offence that Napoleon, at the close of the year 1803, banished madame de Stael. She was consequently obliged to leave her father, whom she never afterwards saw. After visiting Germany and Italy, she was permitted to return to Coppet in 1805; and subsequently resided at Auxerre and at Rouen. In 1807 appeared her Corinne, a novel, the sentiments of which revived the anger of the French ruler, and she was again exiled to Coppet. In this retirement she was visited by a young French officer, M. de Rocca, whom she afterwards married, and by whom she had a son; but the union was kept a secret till after her death. In 1812 she took a journey into Austria; thence she went to Russia, and afterwards visited Sweden and England. She was in London at the period of the taking of Paris; and, on the restoration of Louis XVIII., she returned to France. On the escape of Buonaparte from Elba, she retired to Coppet; and after the battle of Waterloo, and the decree of the 5th of September, 1815, made her appearance at Paris, with her daughter, then married to the duke de Broglio. She was favorably received by Louis XVIII.; and obtained an order on the royal treasury for the payment of £2,000,000, which had been deposited there by M. Necker. In 1816 she went to Italy, and resided at Pisa. Returning to France, her death took place July 14th, 1817. Her works, beside those already mentioned, are, Considerations sur les principaux Evénemens de la Revolution Française; De la Littérature considérée dans ses Rapports avec les Institutions Sociales; and, L'Allemagne, or Observations on Germany, &c., have been published since her death.

STAFF, *n. s.* } Plur. staves. Sax. ȝtæȝ
Staff'ish, *adj.* } Dan. *staff;* Belg. *staf;* Goth. *stafa,* is to command. A stick with which a man supports himself in walking; a club; an ensign of office: staffish is stiff; harsh.

A wit in youth not over dull, heavy, knotty, and lumpish, but hard, tough, and though somewhat *staffish,* both for learning and whole course of living, proveth always best. *Ascham.*

It much would please him,
That of his fortunes you would make a *staff*
To lean upon. *Shakspeare. Antony and Cleopatra.*

The boy was the very *staff* of my age, my very prop *Shakspeare.*

I cannot strike at wretched kernes, whose arms
Are hired to bear their *staves.* *Id. Macbeth.*

Methought this *staff,* mine office badge in court,
Was broke in twain. *Id. Henry VI.*

All his officers brake their *staves;* but at their return new *staves* were delivered unto them. *Hayward on Edward VI.*

Grant me and my people the benefit of thy chastisements, that thy rod as well as thy *staff* may comfort us. *King Charles.*

If a subject be a son, then ought he to be a *staff* unto his father, wherewith not to strike, but to sustain him. *Holiday.*

He forthwith from the glittering *staff* unfurled
The imperial ensign.

Descending and ascending by ladders, I ascended at one of six hundred and thirty-nine *staves*, or eighty nine fathoms. *Browne's Travels.*

With forks and *staves* the felon they pursue.
Dryden.

He that bought the skin ran greater risque than t'other that sold it, and had the worse end of the *staff*. *L'Estrange.*

To his single eye that in his forehead glared,
Like a full moon or a broad burnished shield,
A forky *staff* we dexterously applied,
Which, in the spacious socket turning round,
Scoopt out the big round gelly from its orb.
Addison.

Is it probable that he, who had met whole armies in battle, should now throw away his *staff* out of fear of a dog? *Broome.*

The author of Davideis is commended by Dryden for having written it in couplets, because he discovered that any *staff* was too lyrical for an heroic poem. *Johnson.*

STAFF, *n. s.* Isl. *stef.* A stanza; a series of verses regularly disposed, so as that, when the series is concluded, the same order begins again. See STAVE.

Cowley found out that no kind of *staff* is proper for an heroick poem, as being all too lyrical; yet though he wrote in couplets, where rhyme is freer from constraint, he affects half verses. *Dryden.*

When Crito once a panegyric showed,
He beat him with a *staff* of his own ode. *Harte.*

STAFF, in music, five lines, on which, with the intermediate spaces, the notes of a song or piece of music are marked.

STAFF, in naval affairs, is a light pole erected in different parts of a ship, whereon to hoist and display the colors. The principal of these is reared immediately over the stern, to display the ensign; another is fixed on the bowsprit, to extend the jack; three more are erected at the three mast heads, or formed by their upper ends, to show the flag or pendant of the respective squadron or division to which the ship is appropriated. See ENSIGN, JACK, MAST, and PENDANT.

STAFF, in military matters, consists of a quarter-master-general, adjutant-general, and majors of brigade. The staff properly exists only in time of war. See QUARTER-MASTER GENERAL, &c.

STAFF, REGIMENTAL, consists of the adjutant, quarter-master, chaplain, surgeon, &c.

STAFFA, one of the Western Islands of Scotland, remarkable for its basaltic pillars. It was visited by Sir Joseph Banks, who communicated the following account of it to Mr. Pennant. Staffa lies fifteen miles west of Mull, and nine north-east of Icolumbkill; 'Its greatest length is about an English mile, and its breadth about half a one. On the west side of the island is a small bay, where boats generally land; a little to the south of which the first appearance of pillars is to be observed: they are small; and, instead of being placed upright, lie down on their sides, each forming a segment of a circle. Thence you pass a small cave, above which the pillars, now larger, incline in all directions; in one place, in particular, a small mass of them very much resembles the ribs of a ship. Hence having passed the cave, which, if it is not low-water you must do in a boat, you come to the first ranges of pillars, which are still not above half as large as those a little beyond. Over against this place is a small island, called in Erse Boo-sha-la, separated from the main by a channel not many fathoms wide This whole island is composed of pillars, without any stratum above them; they are still small, but by much the neatest formed of any about the place The first division of the island (for at high water, it is divided into two) makes a kind of cone, the pillars converging together towards the centre; on the other they are in general laid down flat: and in the front next to the main you see how beautifully they are packed together, their ends coming out square with the bank which they form. All these have their transverse sections exact, and their surface smooth; which is by no means the case with the large ones, which are cracked in all directions. I much question, however, if any part of this whole island of Boo-sha-la is two feet in diameter. The main island opposite to Boo-sha-la, and farther towards the north-west, is supported by ranges of pillars pretty erect, and, though not tall (as they are not uncovered to the base), of large diameters; and at their feet is an irregular pavement, made by the upper sides of such as have been broken off, which extends as far under water as the eye can reach. Here the forms of the pillars are apparent: these are of three, four, five, six, and seven sides; but the number of five and six are by much the most prevalent. The largest I measured was of seven: it was four feet five inches in diameter. The surfaces of these large pillars, in general, are rough and uneven, full of cracks in all directions; the transverse figures in the upright ones never fail to run in their true directions. The surfaces upon which we walked were often flat, having neither concavity nor convexity; the larger number, however, were concave, though some were very evidently convex. In some places, the interstices within the perpendicular figures were filled up with a yellow spar; in one place a vein passed in among the mass of pillars, carrying here and there small threads of spar. Though they were broken and cracked through, in all directions, yet their perpendicular figures might easily be traced; whence it is easy to infer that, whatever the accident might have been that caused the dislocation, it happened after the formation of the pillars.—Hence, proceeding along shore, you arrive at Fingal's cave. Its dimensions I have given in the form of a table:—

	Feet.	In.
Length of the cave from the rock without	371	6
From the pitch of the arch . . .	250	0
Breadth of ditto at the mouth . .	53	7
At the farther end	20	0
Height of the arch at the mouth . .	117	6
At the end	70	0
Height of an outside pillar . . .	39	6
Of one at the north-west corner . .	54	0
Depth of water at the mouth . .	18	0
At the bottom	9	0

The cave runs into the rock at the direction of north-east by east, by the compass. Proceeding

farther to the north-west, you meet with the highest ranges of pillars; the magnificent appearance of which is past all description. Here they are bare to their very basis, and the stratum below them is also visible: in a short time, it rises many feet above the water, and gives an opportunity of examining its quality. Its surface is rough, and has often large lumps of stone sticking in it as if half immersed; itself, when broken, is composed of a thousand heterogeneous parts, which together have very much the appearance of a lava; and the more so, as many of the lumps appear to be of the very same stone of which the pillars are formed. This whole stratum lies in an inclined position, dipping gradually towards the south-east. As hereabouts is the situation of the highest pillars, I shall mention my measurements of them, and the different strata in this place, premising that the measurements were made with a line, held in the hand of a person who stood at the top of the cliff, and reaching to the bottom; to the lower end of which was tied a white mark, which was observed by one who staid below for the purpose: when this mark was set off from the water, the person below noted it down, and made a signal to him above, who made then a mark in his rope: whenever this mark passed a notable place, the same signal was made, and the name of the place noted down as before: the line being all hauled up, and the distances between the marks measured and noted down, gave, when compared with the book kept below, the distances; as, for instance, in the cave, No. 1 in the book below, was called from the water to the foot of the first pillar in the book above; No. 1 gave thirty-six feet eight inches, the highest of that ascent which was composed of broken pillars.

	Feet.	In.
No. 1. Pillar at the west corner of Fingal's cave.		
1 From the water to the foot of the pillar	12	10
2 Height of the pillar	37	3
3 Stratum above the pillar . . .	66	9
No. 2. Fingal's cave.		
1 From the water to the foot of the pillar	36	8
2 Height of the pillar	39	6
3 From the top of the pillar to the top of the arch	31	4
4 Thickness of the stratum above . .	34	4
By adding together the three first measurements, we got the height of the arch from the water	117	6
No. 3. Corner pillar west of Fingal's cave.		
Stratum below the pillar of lava-like matter	11	0
Length of the pillar	54	0
Stratum above the pillar . . .	61	6
No. 4. Another pillar to the west.		
Stratum below the pillar	17	1
Height of the pillar	50	0
Stratum above	51	1
No. 5. Another pillar farther to the west.		
Stratum below the pillar	19	8
Height of the pillar	55	1
Stratum above	54	7

The stratum above the pillars, which is here mentioned, is uniformly the same, consisting of numberless small pillars, bending and inclining in all directions, sometimes so irregularly that the stones can only be said to have an inclination to assume a columnar form; in others more regular, but never breaking into or disturbing the stratum of large pillars, whose tops everywhere keep a uniform and regular line. Proceeding now along the shore, round the north end of the island, you arrive at Oua na scarve, or the Corvorant's cave. Here the stratum under the pillars is lifted up very high; the pillars above it are considerably less than those at the north-west end of the island, but still very considerable. Beyond is a bay, which cuts deep into the island, rendering it in that place not more than a quarter of a mile over. On the sides of this bay, especially beyond a little valley, which almost cuts the island into two, are two stages of pillars, but small; however, having a stratum between them exactly the same as that above them, formed of innumerable little pillars, shaken out of their places, and leaning in all directions. Having passed this bay, the pillars totally cease; the rock is of a dark brown stone, and no signs of regularity occur till you have passed round the south-east end of the island (a space almost as large as that occupied by the pillars), which you meet again on the west side, beginning to form themselves irregularly, as if the stratum had an inclination to that form, and soon arrive at the bending pillars where I began. The stone of which the pillars are formed is a coarse kind of basaltes, very much resembling the Giant's Causeway in Ireland, though none of them are near so neat as the specimens of the latter which I have seen at the British Museum; owing chiefly to the color, which in ours is a dirty brown, in the Irish a fine black; indeed the whole production seems very much to resemble the Giant's Causeway.'

STAFFORD, the county town of Staffordshire, in the Pirehill hundred of the county, twelve miles north-west from Litchfield, and 135 from London. It is a borough, consisting of two parishes united, situated on the banks of the Sow; the houses are well built, and covered with slate, and the streets are well paved. Formerly it was surrounded by a strong wall, and had four gates. The church of St. Mary has an octagonal tower, and a very antique font. St. Chad's is an old decayed building. Here are several dissenting chapels: the town-hall is a neat new building. Stafford has also a good hospital, free-school, twelve alms-houses, and a spacious market-place, with two banks. In the suburbs, and on the green, were formerly several free-chapels and hospitals. It was an exempt jurisdiction, under a dean and thirteen prebendaries, but the dean's house is now converted into a school. The assizes for the county are held here in the county-hall, a large handsome building; and near the town is the new infirmary, nearly opposite to which is the county-gaol. A lunatic asylum has lately been erected near. This is a very ancient borough, being first incorporated by king John; it sends two members to parliament. It is governed by a mayor, recorder, ten aldermen, ten common-councilmen, &c. The town has a considerable traffic, by

means of its canal, communicating with all the neighbouring counties. Its chief manufactures are cloth and shoes. Market on Saturday. Fairs, February 10, May 14, June 27, September 16, October 2, and December 4.

STAFFORDSHIRE. Stafford, the county town, gives name to this shire. This county belonged to the ancient Connavii, the division of Flavia Cæsariensis of the Romans, and the kingdom of Mercia during the Saxon Heptarchy. Bede calls the inhabitants Angli Mediterranei, the Midland English. Some have derived the name of Stafford from the river Sow, which skirts the western and southern sides of that town. It is probable that the Sow had at one time the letter *t* in its orthography; and if so there will be very little difficulty in discovering a rational etymology for Stafford and Staffordshire. In support of this opinion it is certain that the passage through the fords of the river into Stafford is in the recollection of many of the inhabitants of that borough.

Staffordshire is an inland county, lying nearly in the centre of the kingdom. It is a long and narrow tract, something in the form of a rhombus; bounded on the north by Cheshire and Derbyshire, on the east by Leicestershire, on the west by Shropshire, and on the south by Warwickshire and Worcestershire. Its greatest length from N. N. E. to S. S. W. is about sixty miles; and its greatest breadth, from Newton Salney to the western point of Terbey Heath, near Market Drayton in Shropshire, is thirty-eight miles. It contains about 780,800 acres of land. It is divided into five hundreds, one city, six boroughs, and sixteen market-towns. There are 181 parishes, reckoning, according to Mr. Pitt's Agricultural Survey, every tract of land to be a parish which has a place of worship, and united in some degree by a common or mutual interest. It is in the diocese of Litchfield and Coventry, except two parishes. It is included in the Oxford circuit.

The *climate* of this county is rather inclining to wet. The air is generally good; but in the northern parts extremely sharp, impressing the nerves with a greater degree of cold than in most other counties of England. The annual rains are calculated, supposing them to stagnate without waste or evaporation, at upwards of thirty-six inches, an excess of nearly sixteen inches above the computed rains in the metropolis. The quantity of snow which falls in the Moorlands during winter is very great; a circumstance which no doubt contributes much to the piercing coldness of this district.

This county exhibits as great a variety of *soils* as any other in England of proportionate extent. Mr. Pitt says the arable soils may in general be divided into, first, the stiff and strong clayey (argillaceous); secondly, the loose and light (arenaceous); thirdly, although the county have no chalk, yet, in the limestone district, lime earth (calcareous); fourthly, the mixed or compound soil or loam composed of the above, with the addition of stones and other matters (terra composita) The argillaceous soil is most prevalent in the hundred of Cuttlestone, and in those portions of the hundred of Offlow to the south of the Trent and east of the Tame, together with the southern parishes in the hundreds of Pyrehill and Totmanslow. The arenaceous soil predominates chiefly in the hundred of Offlow to the south of the Trent, and in the lands adjoining to Pattingham Womfum, Himley, and King's Swinford in the hundred of Leisdon. The calcareous district is of small extent, and situated chiefly eastward of a semicircular line which may be supposed to be drawn from Farley by Kingsale and Ipstones to Warton, in the hundred of Totmanslow. The other districts of that hundred, and all the central portions of the county, or on the south side of the river Trent, are composed of the mixed compound soil. The meadow grounds, which for the most part lie in the vicinity of the canals and rivers, usually partake of the arable soils in their neighbourhood, with the addition of the sediment of water, when within reach of the streams. In some particular spots peat earth forms the soil in the meadow ground reaching different degrees of thickness in different places. This species of earth consists principally of the decayed roots of aquatic vegetables. Sometimes it contains trunks of trees, of which many curious specimens have been found near Stonehall in the parish of Shenstone. When properly drained, consolidated, and meliorated, this kind of soil becomes valuable pasture and meadow land.

Staffordshire is plentifully watered by rivers, but none of them are navigable within its boundaries. The principal are the Trent, the Dove, the Tame, and the Sow. The first is esteemed the third river in England. Its proper rise is in the hills beyond Newcastle-under-Line, at Newpool near Biddulph. During its passage through Staffordshire its banks are covered with rich and luxuriant meadows, between which the water glides along in silver beauty. As it approaches Derbyshire it forms a number of small islands; and, upon reaching the confines of that county, sweeps rapidly to the north, and becomes the boundary between it and Staffordshire till its junction with the river Dove. This latter river takes its rise among the hills in the Moorlands, near the points where the three counties of Stafford, Derby, and Chester meet. Having been increased by the union of the Manifold near Thorp Cloud Hill, the Hamps at Ham, and the Charnet near Leek, it finally falls into the Trent not far from Tutbury. The Tame springs from several sources in the vicinity of Walsall and Coleshill, and forms a junction with the Trent at the point where that river reaches the borders of Derbyshire. The Blythe, which falls into the Trent near King's Bromley, may also be reckoned among the considerable rivers of this county. It rises in the neighbourhood of Wetley Moor in the northern district. Its line of direction is nearly parallel to the Trent. The Sow from Eccleshall, and the Penk from the vicinity of Somerford near Penkridge, forming a junction below Stafford, proceed together to Great Haywood, where they likewise precipitate themselves into the Trent. The Stour and the Dove also in part belong to this county. Though the rivers in this county are not navigable, the deficiency is amply compensated by the many

conveniences which it enjoys arising from canals. The Grand Trunk Canal unites the three ports of Bristol, Liverpool, and Hull. It enters this county near Lawton. It has numerous branches in almost every convenient direction, and in its passage through Staffordshire generally follows a course parallel to the Trent, which it intersects at different points, and falls into it at Wilden in Derbyshire. The Staffordshire and Worcestershire canal, the Wirley and Essington canal, the Birmingham canal, and Sir Nigel Gresley's canal, all contribute to the facilities of trade, &c., in this county. There are not many lakes or springs in Staffordshire. The principal one is that of Aquelate, which measures 1848 yards in length, and 672 yards in breadth. Ladford Pool has been drained for some years. Salt springs, however, are found in various parts; the most important of which are at Shirlywich, in the parish of Weston. Here also are a few sulphureous springs. The other productions of this county are chiefly of a mineral kind, and these both numerous and valuable. Upwards of 50,000 acres have been ascertained to contain an almost inexhaustible store of coal, near enough the surface of the ground to be easily raised. Limestone is still more abundant than coal. Iron ore is also plentiful. Very excellent freestone is found in several quarries. Alabaster, marble, and above all potter's clay, are dug here. The agricultural products have nothing very remarkable in them.

This county sends seventeen members to Parliament; viz., four for the shire, two for the city of Lichfield, two for Stafford, two for Newcastle-under-line, and two for Tamworth. The additions by the Reform Bill are, two for Wolverhampton, two for Stoke-upon-Trent, and one for Walsall.

Staffordshire is not very copious in its biography; but among the natives of eminence from thence we find some of distinguished character and celebrity. We may notice the following:—Thomas Allen, a mathematician. Born at Uttoxeter in 1542. Died 1632. Alexander Gardner, a distinguished naval commander. Born at Uttoxeter, 1742. Died 1810.—Lord George Anson, the circumnavigator. Born at Hugborough, 1697. Died 1762.—Elias Ashmole, philosopher and antiquary. Born at Litchfield, 1617. Died 1692.—Thomas Astle, the antiquary. Born at Yoxall, 1735. Died 1803.—Lord James Audley, a distinguished warrior. Born at Heleigh, 1314. Died 1386.—Simeon Ashmole, a Nonconformist divine. Died 1662.—Isaac Hawkins Browne, poet. Born at Burton-upon-Trent, 1705. Died 1760.—Charles Cotton, the poet. Born at Beresford. Died about 1687.—Dr. Richard Hurd, bishop of Worcester. Born at Cotgreve. Died 1808, in the eighty-ninth year of his age.—Elijah Fenton, the poet. Born at Shelton. Died 1730.—Dr. R. James, inventor of the fever powders bearing his name. Born at Kinverston, 1703. Died 1716.—Dr. Samuel Johnson, the great lexicographer. Born at Litchfield in 1709. Died 1784.—Dr. J. Lightfoot. Born at Stafford, 1602. Died 1675.—The learned bishop Newton, author of the Dissertations on the Prophecies. Born at Litchfield, 1703. Died 1782.—Rev. Stebbing Shaw, topographer. Born at Stone, 1762. Died 1802.—Dr. G. Smallridge, bishop of Bristol. Born at Litchfield, 1666. Died 1719.—The amiable Isaac Walton, the angler. Born at Stafford, 1593. Died 1683.—William Wollaston, a distinguished philosophical writer. Born at Coton Clomford, in 1659.—Josiah Wedgwood, the ingenious potter. Born 1731. Died 1795.—John Goodwin, the celebrated Arminian, was born in this county, at Newcastle, about 1593. Died 1665.—Nor should we by any means omit to mention the name of Sampson Erdeswicke, the genealogist and antiquary, who was born at Sandon. Died 1603.—William Mountfort, the actor, was born in this county in 1659. Died 1692.—Rev. R. Meadowcroft, critic and annotator on Milton. Born 1697. Died 1769.

This is a very important manufacturing county. The manufactures of hardware, glass, toys, japanned goods, potters' ware, cotton, silk, leather, woollen, linen, the making of brass from copper with lapis calaminaris, the dipping of iron plates to make what is called tin, &c. &c., are very extensive. The hardware manufacture is carried on to a very great extent; and Wolverhampton and its neighbourhood produce locks of every kind, and of the very best quality; buckles are also manufactured there. The steel toys, watch-chains, edge-tools, files, augers, and japanned goods of this town are unrivalled in their quality; shoe-buckles and chapes, sadlers' ironmongery, &c., are manufactured in great quantities at Walsall and the neighbourhood. The manufacture of nails in Staffordshire is exceedingly extensive, particularly at Ledgely, Rowley, Westbromwich, Smethwich, Wombourne, Pelsall, the Foreign of Walsall, and many other places. Plated, lackered, japanned, and even enamelled goods are made at Bilston. Wednesbury does something in the gun trade. Tobacco and snuff-boxes of iron or steel, and finished in various ways, are got up at Darlaston, Willenhull, and in their neighbourhood. Shoes, boots, and cutlery, both for home consumption and exportation; and the tanning, and other different branches of the leather trade, and also the manufacture of hats, are carried on upon a very large scale in Stafford and other towns in the county. Leek does a great deal of business in the silk and mohair way; the manufactured goods from which are sewing silks, twist, buttons, ribands, silk ferrets, shawls, and handkerchiefs. There are also some cotton mills in the neighbourhood, where weft is spun for the Manchester market. Cheadle and Jean have a considerable manufacture of tape. But neither the woollen nor linen manufactures are very large: cotton is spun in large quantities at Rocceter, Fazeley, and Tamworth, as also at Burton and Tutbury; the ale of the former place has been long celebrated. But the pottery manufac ure is that for which, beside hardware, this county is most celebrated. This manufacture is chiefly carried on in the north of the county; and the name of Wedgwood is renowned throughout Europe for his inventions and discoveries in this business. The potteries consist of a number of scattered villages, occupying an extent of about ten miles, and may contain about 22,000 inhabitants, in-

cluding those who depend on them for employment and subsistence. The war had a lamentable effect on this trade, especially the war with America; but the prospects of the manufacturers have since brightened, and the population increased.

STAFFTREE. See CELASTRUS.

STAG, *n. s.* Goth. *stæk;* the male hind when his horns are grown. Thus Dan. *sta'g*, is the point of a horn. The male red deer; the male of the hind.

To the place a poor sequestered *stag*,
That from the hunter's aim had ta'en a hurt,
Did come to languish. *Shakspeare. As You Like it.*

The swift *stag* from under ground
Bore up his branching head. *Milton.*

The inhabitants of seas and skies shall change;
And fish on shore, and *stags* in air shall range.
Dryden.

The *stag*
Hears his own feet, and thinks they sound like more,
And fears his hind legs will o'ertake his fore. *Pope.*

STAG, in zoology. See CERVUS.

STAG BEETLE. See LUCANUS.

STAGE, *n. s.* & *v. a.* STAGECOACH, *n. s.* STAGEPLAY, STAGEPLAYER, STAGER. Fr. *estage*, of Lat. *statio*. A floor raised to view, on which any thing is exhibited; the theatre; a place of scenic entertainments; a station of rest or pause on a journey: hence a single step of progress: to stage is to exhibit publicly (obsolete): a stager, a player; an old practitioner: the other compounds seem to need no explanation.

Those two Mytelene brethren, basely born, crept out of a small galliot unto the majesty of great kings. Herein admire the wonderful changes and chances of these worldly things, now up, now down, as if the life of man were not of much more certainty than a *stage* play. *Knolles's History.*

When we are born, we cry that we are come
To this great *stage* of fools. *Shakspeare. King Lear.*

I love the people;
But do not like to *stage* me to their eyes:
Though it do well, I do not relish well
Their loud applause. *Id. Measure for Measure.*

The quick comedians
Extemp'rally will *stage* us, and present
Our Alexandrian revels. *Id. Antony and Cleopatra.*

The changes and vicissitudes in wars are many; but chiefly in the feats or *stages* of the war, the weapons, and the manner of the conduct.
Bacon's Essays.

And much good do't you then,
Brave plush and velvet men:
Can feed on ort; and, safe in your stage clothes,
Dare quit, upon your oaths,
The *stagers* and the *stage* wrights too. *Ben Jonson.*

I've heard old cunning *stagers*
Say, fools for argument use wagers. *Hudibras.*

I shall put you in mind where it was you promised to set out, or begin your first *stage;* and beseech you to go before me as my guide.
Hammond's Practical Catechism.

This rough-cast unhewn poetry was instead of *stageplays* for one hundred and twenty years.
Dryden's Juvenal, Dedication.

One Livius Andronicus was the first *stage-player* in Rome. *Id.*

I maintain, against the enemies of the *stage*, that patterns of piety, decently represented, may second the precepts. *Dryden.*

Some *stagers* of the wiser sort
Made all these idle wonderments their sport:
But he, who heard what every fool could stay,
Would never fix his thought but trim his time away.
Dryden.

One experienced *stager*, that had baffled twenty traps and tricks before, discovered the plot.
L'Estrange.

Our next *stage* brought us to the mouth of the Tiber. *Addison.*

The story was told me by a priest, as we travelled in a *stage-coach*. *Id.*

From thence compelled by craft and age,
She makes the head or latest *stage*. *Prior.*

To prepare the soul to be a fit inhabitant of that holy place to which we aspire, is to be brought to perfection by gradual advances through several hard and laborious *stages* of discipline. *Rogers.*

When late their miry sides *stage-coaches* show,
And their stiff horses through the town move slow,
Then let the prudent walker shoes provide. *Gay.*

We must not expect that our journey through the several *stages* of this life should be all smooth and even. *Atterbury.*

The first *stage* of healing, or the discharge of matter, is by surgeons called digestion. *Sharp's Surgery.*

This is by some called the first *stage* of a consumption, but I had rather call it an ill habit preparatory to that distemper. *Blackmore.*

By opening a passage from Muscovy to China, and marking the several *stages*, it was a journey of so many days. *Baker.*

Men drop so fast, ere life's mid *stage* we tread,
Few know so many friends alive as dead. *Young.*

Knights, squires, and steeds must enter on the *stage*. *Pope.*

Be by a parson cheated!
Had you been cunning *stagers*,
You might yourselves be treated
By captains and by majors. *Swift.*

The STAGE, in the modern drama, is the place of action and representation included between the pit and the scenes, and answering to the proscenium or pulpitum of the ancients. See AMPHITHEATRE, and THEATRE.

STAG'GER, *v. n.*, *v. a.*, & *n. s.* Belg. *staggeren*, of Goth. *staka*, to stumble. To reel or stumble in walking; not to stand or walk steadily: hence to hesitate; fall in doubt; give way: to make to stagger; to revolt; shock; alarm: a disease of the horse (used in the plural); applied also by Shakspeare to human madness.

He *staggered* not at the promise of God through unbelief; but was strong in faith. *Romans* iv. 20.

A man may, if he were fearful, *stagger* in this attempt. *Shakspeare.*

That hand shall burn in never quenching fire,
That *staggers* thus my person. *Id. Richard II.*

The question did at first so *stagger* me,
Bearing a state of mighty moment in't.
Id. Henry VIII.

His horse past cure of the fives, stark spoiled with the *staggers*. *Shakspeare.*

I will throw thee from my care for ever
Into the *staggers*, and the careless lapse
Of youth and ignorance. *Id.*

Three means to fortify belief are experience, reason, and authority: of these the most potent is authority; for belief upon reason, or experience, will *stagger*. *Bacon*

No hereticks desire to spread
Their light opinions like these Epicures;

For so their *staggering* thoughts are comforted,
And other men's assent their doubt assures.
Davies.

If thou confidently depend on the truth of this, without any doubting or *staggering*, this will be accepted by God. *Hammond.*

Whosoever will read the story of this war, will find himself much *staggered*, and put to a kind of riddle. *Howel.*

He began to appear sick and giddy, and to *stagger*; after which he fell down as dead. *Boyle.*

But let it inward sink and drown my mind:
Falsehood shall want its triumph: I begin
To *stagger*; but I'll prop myself within. *Dryden.*

When a prince fails in honour and justice, 'tis enough to *stagger* his people in their allegiance.
L'Estrange.

Them revelling the Tentyrites invade,
By giddy heads and *staggering* legs betrayed. *Tate.*

The enemy *staggers*: if you follow your blow, he falls at your feet; but, if you allow him respite, he will recover his strength. *Addison.*

The immediate forerunners of an apoplexy are a vertigo, *staggering*, and loss of memory. *Arbuthnot.*

The shells being lodged with the belemnites, selenites, and other like natural fossils, it was enough to *stagger* a spectator, and make him ready to entertain a belief that these were so too. *Woodward.*

STAGGERS. See VETERINARY ART.

STAGIRA, in ancient geography, a town on the borders of Macedonia, near the bay of Contessa, into which the Strymon runs, at the south of Amphipolis; founded A.A.C. 665. It is famous for being the birth place of Aristotle. It is now called Lyba Nova, and lies sixteen miles from Contessa.

STAGIRITE, a native of Stagira; an epithet very generally given to Aristotle, by both ancient and modern authors.

STAG'NANT, *adj.* } Latin *stagnans*. Motionless; still; not agitated; not flowing: to lie or be motionless: the state of being so.
STAG'NATE, *v. n.*
STAGNA'TION, *n. s.*

As the Alps surround Geneva on all sides, they form a vast bason, where there would be a constant *stagnation* of vapours, did not the north wind scatter them from time to time. *Addison.*

What does the flood from putrefaction keep!
Should it be *stagnant* in its ample seat,
The sun would through it spread destructive heat.
Blackmore.

To what great ends subservient is the wind!
Behold, where'er this active vapour flies,
It drives the clouds, and agitates the skies:
This from *stagnation* and corruption saves
The' aerial ocean's ever-rolling waves. *Id.*

The aliment moving through the capillary tubes *stagnates*, and unites itself to the vessel through which it flows. *Arbuthnot.*

'Twas owing to this hurry and action of the water that the sand now was cast into layers, and not to a regular settlement, from a water quiet and *stagnant*.
Woodward.

The water which now arises must have all *stagnated* at the surface, and could never possibly have been refunded forth upon the earth, had not the strata been thus raised up. *Id.*

Where creeping waters ooze,
Where marshes *stagnate*. *Thomson.*

Immured and buried in perpetual *sloth*,
That gloomy slumber of the *stagnant* soul. *Irene.*

STAHL (George Ernest), an eminent German chemist, born in Franconia in 1660, and chosen professor of medicine at Hall, when a university was founded in that city in 1694. The excellency of his lectures while he filled that chair, the importance of his various publications, and his extensive practice, soon raised his reputation very high. He received an invitation to Berlin in 1716, which having accepted, he was made counsellor of state and physician to the king. He died in 1734, in the seventy-fifth year of his age. Stahl is without doubt one of the greatest men of which the annals of medicine can boast; his name marks the commencement of a new era in chemistry. He was the author of the doctrine of phlogiston, which, though now completely overturned by the discoveries of Lavoisier and others (see CHEMISTRY, Index), was not without its use; as it served to combine the scattered fragments of former chemists into a system, and as it gave rise to more accurate experiments and a more scientific view of the subject, to which many of the subsequent discoveries were owing. This theory maintained its ground for more than half a century, and was received and supported by some of the most eminent men which Europe has produced; a sufficient proof of the ingenuity and the abilities of its author. He was the author also of A Theory of Medicine, founded upon the notions, which he entertained, of the absolute dominion of mind over body; in consequence of which he affirmed that every muscular action is a voluntary action of the mind, whether attended with consciousness or not. This theory he and his followers carried a great deal too far, but the advices which he gives to attend to the state of the mind of the patient are worthy of the attention of physicians. His principal works are, 1. Experimenta et Observationes Chemicæ et Physicæ, Berlin, 1731, 8vo.; 2. Dissertationes Medicæ, Hall, 2 vols. 4to. This is a collection of theses. 3. Theoria Medica vera, 1737, 4to.; 4. Opusculum Chymico-physico Medicum, 1740, 4to.; 5. A Treatise on Sulphur, both Inflammable and Fixed, written in German. 6. Negotium Otiosum, Hall, 1720, 4to. It is in this treatise chiefly that he establishes his system concerning the action of the soul upon the body. 7. Fundamenta Chymicæ Dogmaticæ et Experimentalis, Nuremberg, 1747, 3 vols. 4to.; 8. A Treatise on Salts written in German. 9. Commentarium in Metallurgium Beccheri, 1723.

STAHREMBERG (Conrad Balthasar), count of, a brave German general, who was governor of Vienna, when it was besieged by the Turks, in 1683. He acquired great glory by the brave defence he made of that city. He died at Vienna in 1687.

STAHREMBERG (Guido Balde), count of, another brave German general, born in 1657. He displayed his military talents on various occasions, particularly at the battle of Zenta, where he commanded under prince Eugene. In 1710 he gained the battle of Saragossa; and distinguished himself greatly in Spain, in favor of the archduke Charles. At the end of that war he retired to Vienna, where he died in 1737.

STAIN, *v. a.* & *n. s.* } Isl. *stena*; Swed. *stana*; Goth. *steina*, Welsh *ystuenio*. To blot; spot; maculate;
STAIN'LESS, *adj.*

hence to brand character; disgrace: the adjective corresponding.

Hereby I will lead her that is the praise, and yet the *stain*, of all womankind. *Sidney.*

The phenix wings are not so rare
For faultless length and *stainless* hue. *Id.*

Our opinion, concerning the force and virtue which such places have, is, I trust, without any blemish or *stain* of heresy. *Hooker.*

Lend me a looking-glass;
If that her breath will mist or *stain* the stone,
Why then she lives. *Shakspeare. King Lear.*

I cannot love him;
Yet I suppose him virtuous, know him noble,
Of great estate, of fresh and *stainless* youth.
Shakspeare.

Of honour void, of innocence, of faith, of purity,
Our wonted ornaments now soiled and *stained*.
Milton.

Then heaven and earth, renewed, shall be made pure
To sanctity, that shall receive no *stain*. *Id.*

Embrace again, my sons; be foes no more,
Nor *stain* your country with your children's gore.
Dryden.

Nor death itself can wholly wash their *stains*,
But long contracted filth even in the soul remains,
The reliques of inveterate vice they wear,
And spots of sin. *Id. Æneid.*

We nowhere meet with a more pleasing show than what appears in the heavens at the rising and setting of the sun, which is wholly made up of those different *stains* of light that shew themselves in clouds of a different situation. *Addison.*

Swift trouts, diversified with crimson *stains*:
And pikes, the tyrants of the watery plains. *Pope.*

Ulysses bids his friends to cast lots; for, if he had made the choice himself, they whom he had rejected might have judged it a *stain* upon them for want of merit. *Broome.*

STAINES, a market town and parish in Spelthorne hundred, Middlesex, situate on the banks of the Thames, sixteen miles and a half west of London. The town is neat, and much improved of late years, and the market house, which stood in the centre of the street, has been removed. An iron bridge was erected across the river in 1803. The church is situate at some distance from the main part of the town. Here are chapels for quakers, and other dissenters, and also a Lancasterian school. The name is supposed to be derived from the Saxon word Stana, a stone, from the London markstone, which stands above the bridge at Coln Ditch, denoting the boundary of the jurisdiction of the city of London on the river; this stone bears the date of 1280. Staines is a lordship of the crown, and is governed by two constables, with four headboroughs, chosen annually by the king's stewards. Market on Friday. Fairs, May 11th, and September 10th. It is a vicarage, with Laleham and Ashford chapels annexed.

STAIR, *n. s.* } Sax. ſtæger; Belg. *steghe;*
STAIR'CASE. } Teut. *steige;* Goth. *stigr.* Steps by which we rise from the lower part of a building to the upper. Stair was anciently used for the whole order of steps; but stair now, if it be used at all, signifies, as in Milton, only one flight of steps: staircase is that part of a building which contains the stairs.

A good builder to a high tower will not make his *stair* upright, but winding almost the full compass about, that the steepness be the more insensible. *Sidney.*

Slaver with lips as common as the *stairs*
That mount the capitol. *Shakspeare.*

I would have one only goodly room above *stairs*, of some forty foot high. *Bacon's Essays.*

Sir James Tirrel repairing to the Tower by night attended by two servants, stood at the *stair*-foot, and sent these two villains to execute the murder. *Bacon.*

To make a complete *staircase* is a curious piece of architecture. *Wotton.*

The *stairs* were such as whereon Jacob saw
Angels ascending and descending.
Milton's Paradise Lost

Satan now on the lower *stair*,
That scaled by steps of gold to heaven gate,
Looks down with wonder at the sudden view
Of all this world. *Id.*

Trembling he springs,
As terror had increased his feet with wings;
Nor staid for *stairs*, but down the depth he threw
His body; on his back the door he drew. *Dryden.*

I cannot forbear mentioning a *staircase*, where the easiness of the ascent, the disposition of the light, and the convenient landing, are admirably contrived. *Addison on Italy.*

STAIRCASE, in architecture, is an ascent enclosed between walls, or a balustrade consisting of stairs or steps, with landing places and rails, serving to make a communication between the several stories of a house. See ARCHITECTURE, Index.

Vitruvius, in his description of the houses of the ancients, makes no mention of stairs; yet even in the supposition that these dwellings had only a ground floor, still means would be requisite to mount to the roof. Those staircases conducting to the upper stories of the lesser houses of Rome often ran up the outside of the building, and were secured by a separate door. From this it should seem that there was no interior communication between the several floors. The staircase was not, however, altogether an extraneous erection, but excavated, as it were, in the main wall of the building, and might have been intended to render the different stories more independent of each other—a desirable thing when each was occupied by a separate tenant. In their more recent constructions, however, as well as in houses of a higher order, the staircase was no doubt disposed much in the same manner as at the present day. The building called the country house, at Pompeii, and several others, have staircases of modern appearance, saving that they are narrow and incommodious: the steps are sometimes a foot high. We find occasionally, likewise, private staircases, as in Pliny's Tuscan villa, where it was situated by the side of the dining-room, and destined for the use of the slaves who served the repast. There were also staircases in many of the ancient temples for the purpose of reaching the roof, &c.

In modern architecture, great skill is often displayed in the disposition of the staircase, in order that it may possess convenience of access without interfering with the handsome size and distribution of the various apartments. In houses of the middling size and character, it is

generally of wood; but in the residences of the nobility, as well as in public edifices, it is commonly constructed in stone or marble. In fact, this should always be done, where possible; since a double purpose is answered thereby: namely, solidity and freedom from prompt ignition in case of fire. One most desirable point is, to afford to all the several divisions of a staircase the strongest possible proportion of light. The balustrade should be light, and at the same time ornamental; and the wall on the other side, as well as the ceiling above, produces a fine effect if adorned with paintings, as in the mansions of many of our nobles. With regard to form, all kinds of varieties have been in use at different periods. The commonest shape is that in which right lines are employed. Circular staircases have often a very pleasant and handsome effect; but the artist must be a good deal regulated by his space, and the peculiar nature of the ground.

STAKE, *n. s.* & *v. a.* Saxon ꝥaca; Belg. *stueck;* Swed. *stake;* Ital. *stuc;* Span. *estuca.* A post or strong stick fixed in the ground; something deposited or made fast: hence a pledge; wager: to fasten; support; pledge; wager; hazard.

The more I shaked the *stake* which he had planted in the ground of my heart, the deeper still it sunk into it. *Sidney.*

His credit in the world might stand the poor town in great stead, as hitherto their ministers foreign estimation hath been the best *stake* in their hedge. *Hooker.*

He wanted pikes to set before his archers;
Instead whereof sharp *stakes*, plucked out of hedges,
They pitched in the ground.
Shakspeare. Henry VI.

We are at the *stake*,
And bayed about with many enemies.
Id. Julius Cæsar.

In France the grapes that make the wine grow upon low vines bound to small *stakes*, and the raised vines in arbors make but verjuice.
Bacon's Natural History.

When he heard that the lady Margaret was declared for it, he saw plainly that his kingdom must again be put to the *stake*, and that he must fight for it. *Id. Henry VII.*

That hollow I should know: what are you? speak:
Come not too near, you fall on iron *stakes* else.
Milton.

Are not our liberties, our lives,
The laws, religion, and our wives,
Enough at once to lie at *stake*,
For covenant and the cause's sake *Hudibras.*

'Tis time short pleasure now to take,
Of little life the best to make,
And manage wisely the last *stake*. *Cowley.*

O then, what interest shall I make
To save my last important *stake*,
When the most just have cause to quake?
Roscommon.

He ventures little for so great a *stake*. *More.*

Or sharpen *stakes*, or head the forks, or twine
The sallow twigs to tie the straggling vine.
Dryden.

Of my crown thou too much care dost take;
That which I value more, my love, 's at *stake*. *Id.*

The' increasing sound is borne to either shore,
And for their *stakes* the throwing nations fear. *Id.*

Stake and bind up your weakest plants and flowers against the winds, before they in a moment prostrate a whole year's labour. *Evelyn's Kalendar.*

The honour of the nation being in a manner at *stake* to make good several deficiencies. *Davenant.*

Is a man betrayed in his nearest concerns? The cause is, he relied upon the services of a pack of villains, who designed nothing but their own game, and to *stake* him while they played for themselves. *South.*

They durst not *stake* their present and future happiness on their own chimerical imaginations. *Addison.*

Every moment Cato's life's at *stake*. *Id.*

I'll *stake* yon' lamb that near the fountain plays,
And from the brink his dancing shade surveys. *Pope.*

Hath any of you a great interest at *stake* in a distant part of the world? Hath he ventured a good share of his fortune? *Atterbury.*

The game was so contrived that one particular cast took up the whole *stake;* and, when some others came up, you laid down. *Arbuthnot.*

STALACTICAL, *adj.* } Of Gr. στυλαζω.
STALACTI'TES, *n. s.* } Resembling an icicle: spars in the shape of an icicle.

A cave was lined with those *stalactical* stones on the top and sides. *Derham's Physico-Theology.*

Stalactites is only spar in the shape of an icicle, accidentally formed in the perpendicular fissures of the stone. *Woodward.*

STALACTITÆ. See next article.

STALACTITES, in mineralogy, are crystalline spars formed into oblong, conical, round, or irregular bodies, composed of various crusts, and usually found hanging in form of icicles from the roofs of grottoes, &c.

STALACTITICAL. See STALACTICAL; but Stalactitical, by all the rules of analogy and derivation, ought to be preferred.

STALAGMITIS, in botany, a genus of the monœcia order, belonging to the polygamia class of plants; and in the natural method ranking under the thirty-eighth order, tricoccæ. The calyx is either quadriphyllous or hexaphyllous; the corolla consists of four or six petals: the receptacle is fleshy, and somewhat square-shaped; the filaments about thirty. In the hermaphrodite flower the stylus is short, thick, and erect; the fruit is a berry of a globular shape, unilocular, and crowned with the stylus and stigma: they contain three oblong jointed triangular seeds. Of this there is only one species, viz. S. cambogioides, a native of the East Indies, and of the warmer parts of America. From this plant is obtained the gutta cambogia, or gum gamboge of the shops. See GAMBOGE. Till very lately botanists were at a loss for the true nature of the plant which yields this gum. Koenig, a native of Ireland, and an excellent botanist, travelled over a great part of India, and collected a great number of new plants, and among the rest the stalagmitis. These he bequeathed to Sir Joseph Banks, president of the Royal Society.

STALBEMT (Adrian), a landscape painter of Antwerp, born in 1580. His scenes are well chosen, and often solemn; his figures properly introduced; and his trees extremely natural. He died in 1660.

STALE, *adj.* & *v. a.* Sax. ꝥealhian (of Goth. *sta*, to stand); Belg. *stelle.* Old; long kept; altered by time: to make old; wear out. Stale, says Johnson, is not used of persons otherwise

tnan in contempt: except when it is applied to beer, it commonly means worse for age.

Age cannot wither her, nor custom *stale*
Her infinite variety.
Shakspeare. Antony and Cleopatra.

Were I a common laughter, or did use
To *stale* with ordinary oaths my love
To every new protestor. *Id. Julius Cæsar.*

The beer and wine, as well within water as above, have not been palled; but somewhat better than bottles of the same drinks and *staleness* kept in a cellar.
Bacon's Natural History.

The duke regarded not the muttering multitude, knowing that rumours grow *stale*, and vanish with time. *Hayward.*

All your promised mountains
And seas I am so *stalely* acquainted with.
Ben Jonson.

About her neck a pacquet mail,
Fraught with advice, some fresh, some *stale*.
Hudibras.

Many things beget opinion; so doth novelty; wit itself, if *stale*, is less taking. *Grew's Cosmologia.*

A *stale* virgin sets up a shop in a place where she is not known. *Spectator.*

Provided our landlord's principles were sound, we did not take any notice of the *staleness* of his provisions. *Addison.*

This, Richard, is a curious case:
Suppose your eyes sent equal rays
Upon two distant pots of ale,
Not knowing which was mild or *stale;*
In this sad state your doubtful choice
Would never have the casting voice. *Prior.*

They reason and conclude by precedent,
And own *stale* nonsense which they ne'er invent.
Pope.

Pompey was a perfect favourite of the people; but his pretensions grew *stale*, for want of a timely opportunity of introducing them upon the stage.
Swift.

STALE, *n. s.* From Sax. ꝥælan, to steal.—Johnson. But Mr. Thomson, from the verb to stale, i. e. deposit, place. Something exhibited or offered as an allurement to draw others to any place or purpose: a prostitute. Obsolete.

His heart being wholly delighted in deceiving us, we could never be warned; but rather one bird caught, served for a *stale* to bring in more. *Sidney.*

Still as he went he crafty *stales* did lay,
With cunning trains him to entrap unwares;
And privy spials placed in all his way,
To weet what course he takes and how he fares.
Spenser.

The trumpery in my house bring hither,
For *stale* to catch these thieves.
Shakspeare. Tempest.

I stand dishonoured, that have gone about
To link my dear friend to a common *stale*.
Shakspeare.

It may be a vizor for the hypocrite, and a *stale* for the ambitious. *Decay of Piety.*

This easy fool must be my *stale*, set up
To catch the people's eyes: he's tame and merciful;
Him I can manage. *Dryden's Don Sebastian.*

A pretence of kindness is the universal *stale* to all base projects; by this men are robbed of their fortunes, and women of their honour.
Government of the Tongue.

STALE, *n. s.* Belg. *stele*, a stick. A handle.

But, seeing the' arrow's *stale* without, and that the head did goe
No further than it might be seene, he called his spirits again. *Chapman.*

It hath a long *stale* or handle, with a button at the end for one's hand. *Mortimer's Husbandry.*

STALE, *v. n.* From the noun, or rather from the verb to STALE, deposit. To make water.

Having tied his beast t' a pale,
And taken time for both to *stale*. *Hudibras.*

STALE, among sportsmen, a living fowl put in a place to allure and bring others where they may be taken. For want of these, a bird shot, his entrails taken out, and dried in an oven in his feathers, with a stick thrust through to keep it in a convenient posture, may serve as well as a live one.

STALIMENE, an island in the Grecian Archipelago, anciently called Lemnos; fifteen miles long and eleven broad. It abounds with mountains and fertile valleys, which produce much fruit. Two of its mountains were anciently volcanoes, whence the poets fabled it to be the place where Vulcan kept his forges. See LEMNOS. It is a Greek bishop's see. Cochino, the ancient Hephestias, and Lemno, the ancient Myron, are the two chief towns.

STALK, *n. s.* & *v. n.* STALK'INGHORSE, *n. s.* STALK'Y, *adj.* Sax. ꝥælg, ꝥealcan; Swed. *stalk*. The stem of a plant; a stay; handle; support: to walk with high and stately steps. It is used commonly in a sense of dislike: a stalkinghorse is a real or fictitious horse behind which a fowler conceals himself; a pretence: stalky, stiff; like a stalk.

Behind it forth there leapt
An ugly fiend, more foul than dismal day;
The which with monstrous *stalk* behind him stept,
And ever as he went due watch upon him kept.
Spenser.

His monstrous enemy
With sturdy steps came *stalking* in his sight. *Id.*

Shall your city call us lord,
In that behalf by which we challenged it?
Or shall we give the signal to our rage,
And *stalk* in blood to our possession?
Shakspeare. King John.

The king asked how far it was to a certain town: they said six miles. Half an hour after he asked again: one said six miles and a half. The king alighted out of his coach, and crept under the shoulder of his led horse: and when some asked his majesty what he meant, I must *stalk*, said he; for yonder town is shy, and flies me.
Bacon's Apophthegms.

A stock-gillyflower, gently tied on a stick, put into a steep glass full of quicksilver, so that the quicksilver cover it; after five days you will find the flower fresh, and the *stalk* harder and less flexible than it was.
Bacon.

Let the counsellor give counsel not for faction but for conscience, forbearing to make the good of the state the *stalkinghorse* of his private ends.
Hakewill on Providence.

Small store will serve, where store,
All seasons, ripe for use, hangs on the *stalk*.
Milton.

That amber attracts not basil, is wholly repugnant unto truth; for, if the leaves thereof, or dried *stalks*, be stripped unto small straws, they arise unto amber, wax, and other electricks, no otherways than those of wheat and rye. *Browne.*

Unfold the' eternal door:
You see before the gate what *stalking* ghost
Commands the guard, what sentries keep the post.
Dryden.

Roses unbid, and every fragrant flower,
Flew from their *stalks* to strew thy nuptial bower.
Id.

They pass their precious hours in plays and sports,
'Till death behind came *stalking* on unseen. *Id.*

Hypocrisy is the devil's *stalkinghorse*, under an affectation of simplicity and religion. *L'Estrange.*

It grows upon a round *stalk*, and at the top bears a great *stalky* head. *Mortimer.*

Viewed with a glass, they appear made up of little bladders, like those in the plume or *stalk* of a quill. *Grew.*

Then *stalking* through the deep
He fords the ocean, while the topmast wave
Scarce reaches up his middle side. *Addison.*

Great Milton next, with high and haughty *stalks*,
Unfettered in majestick numbers walks. *Id.*

Vexatious thought still found my flying mind,
Nor bound by limits, nor to place confined;
Haunted my nights, and terrified my days,
Stalked through my gardens, and pursued my ways,
Nor shut from artful bower, nor lost in winding maze.
Prior.

Scornful turning from the shore
My haughty step, I *stalked* the valley o'er.
Id. Odyssey.

STALK, ANIMATED. This remarkable animal was found by Mr. Ives at Cuddalore; and he mentions several kinds of it: some appearing like dry straws tied together, others like grass; some have bodies much larger than others, with the addition of two scaly imperfect wings; their neck is no bigger than a pin, but twice as long as their bodies; their heads are like those of a hare, and their eyes vertical and very brisk. They live upon flies, and catch these insects very dexterously with the two fore feet, which they keep doubled up in three parts close to their head, and dart out very quick on the approach of their prey; and, when they have caught it, they eat it very voraciously, holding it in the same manner as a squirrel does its food. On the outer joints of the fore feet are several very sharp hooks for the easier catching and holding of their prey; while, with the other feet, which are four in number, they take hold of trees or any other thing, the better to surprise whatever they lie in wait for. They drink like a horse, putting their mouths into the water. Their excrements, which are very white, are almost as large as the body of the animal, and, as the natives say, dangerous to the eyes.

STALL, *n. s.* & *v. a.* } Sax. ȝreal; Belg.
STALL'FED, *adj.* } *stal*; Teut. *stall*; Ital. *stalla*. Strictly, a fixed station, or abiding place: hence a crib in which an ox or horse is fed or kept; a shed, shop, or depôt for goods; the seat of a clergyman in a choir: to keep in a stall or stable; to instal; invest: stallfed is fed in a stall or with dry food.

Solomon had forty thousand *stalls* of horses.
1 *Kings* iv.

All these together in one heap were thrown,
Like carcases of beasts in butcher's *stall*;
And in another corner wide were strown
The antique ruins of the Romans fall. *Spenser.*

For such encheason, if you go nie,
Few chimneys reeking you will espy;
The fat ox, that won't lig in the stall,
Is now fast *stalled* in his crumenal. *Id. Pastorals.*

Stalls, bulks, windows,
Are smothered up, leads filled, and ridges horsed
With variable complexions; all agreeing
In earnestness to see him. *Shakspeare. Coriolanus.*

For my part he keeps me rustically at home; or, to speak more properly, sties me here at home unkept: for call you that keeping, for a gentleman of my birth, that differs not from the *stalling* of an ox? *Shakspeare.*

Long mayst thou live to wail thy children's loss;
And see another, as I see thee now,
Decked in thy rights as thou art *stalled* in mine. *Id.*

We could not *stall* together in the world. *Id.*

A herd of oxen then he carved, with high raised heads, forged all
Of gold and tin, for color mixt, and, bellowing from their *stall*,
Rushed to their pastures. *Chapman's Iliad.*

Every one must every day sustaine
The load of one beast, the most fat and best
Of all the *stall-fed*, to the woer's feast. *Chapman.*

They are nature's coarser wares that lie on the *stall*, exposed to the transient view of every common eye. *Glanville.*

His fellow sought what lodging he could find;
At last he found a *stall* where oxen stood. *Dryden.*

Nisus the forest passed,
And Alban plains, from Alba's name so called,
Where king Latinus then his oxen *stalled*. *Id.*

Bess Hoy first found it troublesome to bawl,
And therefore placed her cherries on a *stall*. *King.*

The pope creates a canon beyond the number limited, and commands the chapter to assign unto such canon a *stall* in the choir and place in the chapter. *Ayliffe's Parergon.*

Stall-fed oxen, and crammed fowls, are often diseased in their livers. *Arbuthnot on Aliments.*

How pedlars *stalls* with glittering toys are laid,
The various fairings of the country maid. *Gay.*

Harley, the nation's great support,
Returning home one day from court,
Observed a parson near Whitehall
Cheapening old authors on a *stall*. *Swift.*

The dignified clergy, out of mere humility, have called their thrones by the names of *stalls*. *Warburton.*

STAL'LION, *n. s.* Welsh *ysdalwyn*. 'The one is derived from the other; but which from which I cannot certainly tell.'—Wotton. Fr. *estallion*; Ital. *stallone*; Belg. *stallhengst*. Junius thinks it derived from ȝtælan, to leap. A horse kept for mares.

The present defects are breeding without choice of *stallions* in shape or size. *Temple.*

If fleet Dragon's progeny at last
Prove jaded, and in frequent matches cast,
No favor for the *stallion* we retain,
And no respect for the degenerate strain. *Dryden.*

STALLION, or STONE-HORSE, in the manege, is designed for the covering of mares, to propagate the species. He ought to be sound, 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 those above-mentioned, and are very little degenerated. The stallions of Italy, and especially the Neapolitan, are very good. The best stallions for draught or carriage horses are those of Naples, Denmark, Holstein, and Freezeland. The stallions for saddle horses should be from fourteen to fifteen hands high, and for draught horses at least fifteen hands. Neither ought the color of stallions to be overlooked: as a fine black,

gray, bay, sorrel, &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 or bad qualities, whether natural or acquired. The mare contributes no less to the beauty of her offspring than the stallion; but she contributes perhaps more to their constitution and stature; for these reasons it is necessary that the mares for breed be perfectly sound, and make good nurses. For elegant horses, the Spanish and Italian mares are best; but, for draught horses, those of Britain and Normandy are preferable. However, when the stallions are good, the mares of any country will produce fine horses, provided they be well made and of a good breed. See HORSE.

STALL'WORN, *adj.* Stall and worn. Long kept in the stable. Probably a mistake for stalworth. Sax. ꝥtapelꝥeꝼð, stout.

His *stallworn* steed the champion stout bestrode.
Shakspeare.

STAMEN, in botany, the male genital organ of plants, found generally within the corolla, near the pistil. Stamens were formerly called chives. They are various in number in different flowers, from one to some hundreds. This organ is essential to a plant, no one having yet been discovered, after the most careful research, that is destitute of it, either in the same flower with the pistils, or a separate one of the same species.

A stamen consists of three parts. 1. The filamentum, or filament, the part which supports the anther. 2. The anthera, placed on the filament, and the most essential part of all. 3. The pollen, or powder adhering to the anther.

STAMFORD, a borough and market town, consisting of five parishes, in Ness hundred, parts of Kesteven, Lincolnshire, eighty-six miles and a half north from London. It is situate on the river Welland, on the borders of Northamptonshire, and Rutlandshire. The houses are well built, and chiefly of freestone, covered with slate. The out-parish of St. Martin's, Stamford Bridge, which is situate in Northamptonshire, on the opposite side of the Welland, is reckoned a part of the town, and rated with it in the taxes. Some of the churches are well built, and adorned with lofty spires; two of them are so near together as to resemble one building; St. Martin's church contains some noble monuments. This town was anciently much more considerable, and had fourteen parish churches, but nearly half that number were destroyed during the wars of the houses of York and Lancaster. There were many friaries and hospitals in the neighbourhood; one of them, at the south end of Stamford Bridge, is now converted into an alms house, for a warden and twelve poor men, and there is another for the same kind, within the town; besides a school for girls on Dr. Bell's system, and numerous other charitable foundations. In early times this was a strong garrison town, and had a castle on the south side of the river; there was also another castle erected within the town, but no remains are to be seen of either. In the reign of Edward III. a quarrel having arisen at the university of Oxford, among the students, many of them retired hither, and formed various literary establishments; but they were of short duration. The town is governed by a mayor, twelve aldermen, and twenty-four burgesses. It returns two members to parliament, the number of voters being about 500, and the returning officer the mayor. Here the custom of borough-English prevails, by which the younger son inherits from a father dying intestate. Over the Welland is a fine stone bridge of five arches. The town hall, at the end of the bridge, is a handsome building, and contains in it a guildhall, and a gaol. It has also a neat theatre, an assembly room, and near the town is a course for horse races. The chief trade of this town is in malt, coal, and freestone, which is chiefly promoted by the navigation of the Welland. Here is a commercial bank. Near this town is the elegant residence of the marquis of Exeter. Markets on Monday and Friday. Fairs, Tuesday before February 13th, Monday before Midlent, Monday before May 12th, and after Corpus-Christi, August 5th, and November 8th.

STAM'INA, *n. s.* Lat. *stamina.* The first principles of any thing; the solids of a human body; in botany, those little fine threads or capillaments which grow up within the flowers of plants, encompassing round the style, and on which the apices grow at their extremities.

STAMINA, in the animal body, are those simple original parts which existed first in the embryo or the seed; and by whose distinction, augmentation, and accretion by additional juices, the animal body at its utmost bulk is supposed to be formed.

STAMINA, in botany, are those upright filaments which, on opening a flower, we find within the corolla surrounding the pistillum. They are the male organs of generation, and prepare the pollen. Each stamen consists of two parts, viz. the filamentum and the anthera. See BOTANY, Index.

STAM'MEL, *n. s.* From *darnel*, doe-colored. A species of red color.

Reedhood, the first that doth appear
In *stammel*: scarlet is too dear. *Ben Jonson.*

STAM'MER, *v. n.* } Sax. ꝥtamen. Belg.
STAM'MERER, *n. s.* } *stamelen, stameren.* To speak with unnatural hesitation; to utter words with difficulty: the noun substantive corresponding.

Sometimes to her news of myself to tell
I go about; but then is all my best
Wry words, and *stammering*, or else doltish dumb
Say then, can this but of enchantment come?
Sidney.

I would thou couldest *stammer*, that thou mightest pour out of thy mouth, as wine comes out of a narrow-mouthed bottle, either too much at once or none at all. *Shakspeare.*

A *stammerer* cannot with moderation hope for the gift of tongues, or a peasant to become learned as Origen. *Taylor.*

She *stammers*; oh, what grace in lisping lies;
If she says nothing, to be sure she's wise. *Dryden.*

Legean juice,
Which *stammering* tongues and staggering feet produce. *Id.*

Cornelius hoped he would come to *stammer* like Demosthenes. *Arbuthnot's Martinus Scriblerus.*

Your hearers would rather you should be less correct, than perpetually *stammering*, which is one of the worst solecisms in rhetorick. *Swift.*

STAMMERING, in physiology, that hesitation or interruption of speech which seems generally to arise from fear, eagerness, or some violent passion, that prevents a child's articulating rightly, by the confusion which it occasions in the vibrations that descend into the muscular system. It does not therefore begin, in general, till children are of an age to distinguish right from wrong in respect of pronunciation, and to articulate with some kind of propriety. A nervous disorder of the muscles of speech may have a like effect.

When stammering has once begun to take place in a few words, it will extend itself to more and more from very slight resemblances, and particularly to all the first words of sentences, because then the organs pass in an instant from inactivity to action, whereas the subsequent parts of words and sentences may follow the foregoing from association; just as in repeating, memoriter, one is most apt to hesitate at the first word in each sentence. A defect of memory from passion, natural weakness, &c., so that the proper word does not occur readily, also occasions stammering, and, like all other modes of speaking, it is caught, in some cases, by imitation. Sometimes stammering takes place only in the utterance of such words as begin with certain letters, which are generally some of the labial or guttural consonants, as *b*, *p*, *m*, *c*, *g*, &c. Some persons, on the contrary, stammer in the utterance of all words indiscriminately, with whatever letter they begin, whether they be vowel or consonant, at certain times only; as *e. g.* when the speaker is placed in any situation that occasions hurry or embarrassment. Agreeably to the observations already made, we find that persons of great nervous irritability, and lively consciousness, are most liable to stammering. This sort of impediment is a bad habit, founded upon this constitutional susceptibility: and in attempting to remove stammering, while every attention should be paid to such means as physical and medical science will point out for the strengthening of the corporeal system, it is of the utmost importance to induce the persons affected with it to reason on the subject. Let them practise the formation of the component parts of words (that is, simple vocal sounds and the powers of the consonants), singly, and in combination, alternately, till a facility and habit of subjecting the muscles concerned in speech to the will be acquired or regained. They should be accustomed to consider that which is true in fact, that the organs of speech are moved by muscles which, from the laws of animal economy, are the instruments of the will; though we are conscious of an act of the will only at the commencement of such actions.

To counteract stammering, therefore, we are told, we must appeal to the understanding, and endeavour to arouse the will into vigilant and vigorous control of the muscles. When a hesitation happens, let a volition or direct act of this power take place: first to cease muscular motion altogether, and then to commence a new series. The greatest deliberation and recollection should be used in ordinary conversation: and the act of speaking, as such, should be constantly present to the mind, till the wrong habit be overcome, and the right so confirmed as to leave no room to apprehend a relapse. The voice should be carefully pitched at that tone which nature in the individual points out as easiest to the organs, and most agreeable to the ear; and by no means should a hurried pronunciation, or fictitious voice, be resorted to. It should be studiously remembered that we are accountable to no one for the innocent and decorous exercise of our muscular powers—that over them we ourselves alone ought to have control—that speech, on proper occasions, is not only an innocent and a decorous, but, in the eyes of others, a necessary and an agreeable exercise of our muscles. Why then be thrown into perturbation and confusion, when we are to perform an action confessedly in our power; and which others have not only no right to prevent, but are desirous that we should perform? If this train of reasoning be fairly entered upon, many other arguments will suggest themselves, and must inevitably produce good.

The following directions, with variations according to circumstances, will be found to be attended with advantage. In order to raise a voice, or that material of which speech is formed, let the vowels be practised in a natural key, but with firmness and strength, for ten minutes or a quarter of an hour, at least, every morning. Then let the powers of the consonants be formed, in their order, singly, and variously combined with the vowels. After a little rest, if imagination supply a subject, by all means let an imaginary conversation take place for twenty minutes, half an hour, or even an hour, in a firm and natural tone of voice, using every effort of fancy, to suppose it directed to persons indiscriminately; that is, sometimes to servants, sometimes to equals in age and rank, and sometimes to elders, or those considered as superior in consequence and rank in society, from whatever cause. But, if imagination do not furnish a topic, then let the time be spent in reading, in a tone as nearly approaching to the ease of familiar conversation as possible, taking care to manage the fancy as above. This will furnish the lesson: and, after an interval of a few hours, the same sort of conversation or reading should be repeated, two or three times more in the course of a day. And, on mixing with real auditors, every exertion should be made to associate the ideas of their imaginary, with their actual presence.

These directions, it will be perceived, are founded upon the principle of the association of ideas; than which a more powerful principle, in the formation of human habits, cannot be conceived. An ingenious writer, whose observations we are now citing, is of opinion that it may be laid down as an incontrovertible position, that persons possessing an ordinary mental capacity, with an adequate share of industry and strength, may certainly overcome the habit

of stammering, by means such as here pointed out. See Instruction of the Deaf and Dumb, &c., by Joseph Watson, LL. D., 2 vols. 8vo., 1809.

STAMP, *v. a., v. n.*, & *n. s.* } Belg. *stampen;*
STAMP'ER, *n. s.* } Dan. *stamper;*
Goth. and Swed. *stampe*. To strike by pressing the foot hastily downwards; strike with the foot; pound; impress; fix a mark by pressure; mint; form; coin; give a character to: as a verb neuter to strike the foot downwards: a stamp is an instrument for stamping; the thing marked or stamped; the impression or mark made; make; form; cast; currency: a stamper is a pounding instrument.

I took the calf you had made, burnt it with fire, and *stamped* and ground it very small. *Deut.* ix. 21.

The men shall howl at the noise of the *stamping* of the hoofs of his strong horses. *Jer.* xlvii. 3.

Out of mere ambition, you have made
Your holy hat be *stampt* on the king's coin.
Shakspeare.

What a fool art thou,
A ramping fool, to brag, to *stamp*, and swear,
Upon my party! Thou cold-blooded slave,
Hast thou not spoke like thunder on my side? *Id.*

If speaking truth
In this fine age were not thought flattery,
Such attribution should this Douglas have
As not a soldier of this season's *stamp*
Should go so general current through the world. *Id.*

Some apothecaries, upon *stamping* of coloquintida, have been put into a great scouring by the vapour only. *Bacon.*

But to the pure refined ore
The *stamp* of kings imparts no more
Worth, than the metal held before. *Carew.*

From the stamping mill it passeth through the crazing-mill; but of late times they mostly use wet *stampers*. *Id.*

These prodigious conceits in nature spring out of framing abstracted conceptions, instead of those easy and primary notions which nature *stamps* in all men of common sense. *Digby.*

Of the same *stamp* is that which is obtruded upon us, that an adamant suspends the attraction of the loadstone. *Browne's Vulgar Errours.*

Some other nymphs, with colours faint
And pencil slow, may Cupid paint,
And a weak heart in time destroy:
She has a *stamp*, and prints the boy. *Waller.*

No constant reason of this can be given, but from the nature of man's mind, which hath this notion of a deity born with it, and *stampt* upon it; or is of such a frame that in the free use of itself it will find out God. *Tillotson.*

If Arcite thus deplore
His sufferings, Palemon yet suffers more:
He frets, he fumes, he stares, he *stamps* the ground;
The hollow tower with clamours rings around.
Dryden.

'Tis gold so pure,
It cannot bear the *stamp* without allay. *Id.*

When one man of an exemplary improbity charges another of the same *stamp* in a court of justice, he lies under the disadvantage of a strong suspicion. *L'Estrange.*

Though God has given us no innate ideas of himself; though he has *stampt* no original characters on our minds, wherein we may read his being; yet, having furnished us with those faculties our minds are endowed with, he hath not left himself without witness. *Locke.*

If two pennyweight of silver, marked with a certain impression, shall here in England be equivalent to three-pennyweight marked with another impression, they will not fail to *stamp* pieces of that fashion, and quickly carry away your silver. *Id.*

Where reason or scripture is expressed for any opinion, we may receive it as of divine authority; but it is not the strength of our own persuasions which can give it that *stamp*. *Id.*

There needs no positive law or sanction of God to *stamp* an obliquity upon such a disobedience. *South.*

The persons here reflected upon are of such a peculiar *stamp* of impiety that they seem formed into a kind of diabolical society for the finding out new experiments in vice. *Id.*

What titles had they had, if nature had not
Strove hard to thrust the worst deserving first,
And *stamped* the noble mark of eldership
Upon their baser metal?
Rowe's Ambitious Stepmother.

There is such an echo among the old ruins and vaults, that, if you *stamp* but a little louder than ordinary, you hear the sound repeated. *Addison.*

At Venice they put out very curious *stamps* of the several edifices which are most famous for their beauty and magnificence. *Id. on Italy.*

Let a friend to the government relate to him a matter of fact, he gives him the lye in every look; but, if one of his own *stamp* should tell him that the king of Sweden would be suddenly at Perth, he hugs himself at the good news. *Addison.*

Here swells the shelf with Ogilby the great;
There, *stamped* with arms, Newcastle shines complete.
Pope.

They got to the top, which was flat and even, and, *stamping* upon it, they found it was hollow. *Swift.*

Indeed the paper *stamp*
Did very much his genius cramp;
And, since he could not spend his fire,
He now intended to retire. *Id.*

What an unspeakable happiness would it be, to a man engaged in the pursuit of knowledge, if he had but a power of *stamping* his best sentiments upon his memory in indelible characters. *Watts.*

A king of heaven's own *stamp*, not vulgar make;
Blessed in giving, and averse to take. *Harte.*

He cannot bear the astonishing delight,
But starts, exclaims, and *stamps*, and raves, and dies. *Dennis.*

STAMP-DUTIES, in English law, are a branch of the perpetual revenue of this kingdom. They are a tax imposed upon all parchment and paper whereon any legal proceedings, or private instruments of almost any nature whatever are written: and also upon licenses for retailing wines, letting horses to hire, and numerous other purposes. And upon all almanacs, newspapers, advertisements, cards, dice, and pamphlets containing less than six sheets of paper. These imposts are very various, according to the nature of the thing stamped or taxed, rising gradually from one penny to ten pounds; and, indeed, in many cases, as legacies, administrations, conveyances, &c., to an amount proportioned to the property conveyed. The first institution of the Stamp-duties was by stat. 5 and 6 W. & M. c. 21; and they have since been increased to an amount which nothing but the absolute necessity of their being imposed could prevent us from styling enormous. These duties are managed by commissioners appointed for the purpose. They now extend to such an astonishing variety of articles, and de-

pend on such a multiplicity of statutes, which are continually varying (by increasing) the amount, that no table or compendium which could be framed, would probably be of any service to the reader after one session of parliament; nor would it be consistent with the general nature of a work like the present to enter into any further elucidation of the subject.

STANCH, *v. a., v. n.*, & *adj.* } Fr. *estancher;*
STANCH'LESS, *adj.* } Ital. *stagnare.*
To stop blood; hinder from running: to stop: as an adjective firm; sound; trusty: stanchless is, not to be stopped.

A woman touched the hem of his garment and immediately her issue *stanched.* *Luke* viii. 44.

If I knew
What hoop would hold us *stanch* from edge to edge
O' th' world, I would pursue it.
Shakspeare. Antony and Cleopatra.

There grows,
In my most ill-composed affection, such
A *stanchless* avarice, that, were I king,
I should cut off the nobles for their lands.
Id. Macbeth.

Iron or a stone, laid to the neck, doth *stanch* the bleeding of the nose. *Bacon's Natural History.*

She unto Scythia sent, for hunger him to gnaw,
And thrust her down his throat, into his *stanchless* maw. *Drayton.*

Leeches, inwardly taken, fasten upon the veins, and occasion an effusion of blood, which cannot be easily *stanched.* *Browne's Vulgar Errours.*

What we endeavoured in vain may be performed by some virtuoso that shall have *stancher* vessels, and more sunny days. *Boyle.*

He fought to hinder fighting, and assayed
To *stanch* the blood by breathing of the vein.
Dryden.

You will lose their love; this is to be kept *stanch,* and carefully watched. *Locke.*

The standing absurdity, without the belief of which no man is reckoned a *stanch* churchman, is, that there is a calf's-head club. *Addison.*

In politicks, I hear, you're *stanch,*
Directly bent against the French. *Prior.*

They mean to convince, not the grovelling herd, or giddy populace, but the grave and *stanch* men, men of sobriety and firmness. *Waterland.*

Each *stanch* polemick stubborn as a rock,
Each fierce logician still expelling Locke,
Came whip and spur. *Pope.*

STANCHIONS are small pillars of wood or iron, used for various purposes in a ship; as to support the decks, the quarter-rails, the nettings, the awnings, &c. The first of these are two ranges of small columns fixed under the beams, throughout the ship's length between decks; one range being on the starboard and the other on the larboard side of the hatchways. They are chiefly intended to support the weight of the artillery.

STAND, *v. n., v. a.*, & *n. s.* } Sax. ꝥanban
STANDER, *n. s.* } Goth. and Swed. *standa;* Teut. *standen.* To be on the feet; be erect; stop; stay; halt: hence to support; persist; hold good; remain in force or consistent; abide by: taking *by, for, off, out, to, under, up, upon,* &c., as prepositions, whose use is exemplified below: to stand, as a verb active, is to endure; resist without flinching; await; abide: as a noun substantive, a station; post; stop; difficulty; perplexity; mark; acme; support: a stander is one who stands; a tree that has long stood: a stander-by is one present; a mere spectator.

I *stood* between the Lord and you, to shew you the Lord's word. *Deut.* v. 5.

The king granted the Jews to gather themselves together, and *stand* for their life. *Esth.* viii. 11.

My mercy will I keep for him, and my covenant shall *stand* fast with him. *Psalm* lxxxiv. 28.

Stand in awe and sin not; commune with your own heart upon your bed, and be still. *Id.* iv. 4.

Their eyes *stand out* with fatness. *Id.* lxxiii. 7.

He turned the wilderness into a *standing* water. *Id.* cvii.

I will punish you, that ye may know that my words shall surely *stand* against you for evil. *Jer.* xliv. 29.

When the accusers *stood up,* they brought none accusation of such things as I supposed. *Acts* xxv. 18.

If meat make my brother offend, I will eat no flesh while the world *standeth.* 1 *Cor.* viii. 13.

Watch ye, *stand* fast in the faith, quit you like men, be strong. *Id.* xvi. 13.

Put on the whole armour of God, that ye may be able to *stand* against the wiles of the devil. *Eph.* vi. 11.

That could not make him that did the service perfect, as pertaining to the conscience, which *stood* only in meats and drinks. *Heb.* ix. 10.

The young spring was pitifully nipt and overtrodden by very beasts; and also the fairest *standers* of all were rooted up and cast into the fire. *Ascham's Schoolmaster.*

God was not ignorant that the judges, whose sentence in matters of controversy he ordained should *stand,* oftentimes would be deceived. *Hooker.*

The cause must be presumed as good on our part as on theirs, till it be decided who have *stood* for the truth, and who for error. *Id.*

His faithful people, whatsoever they rightly ask, the same shall they receive, so far as may *stand* with the glory of God and their own everlasting good; unto either of which it is no virtuous man's purpose to seek any thing prejudicial. *Id.*

Explain some statute of the land to the *standers by.* *Id.*

This reply *standeth* all by conjectures. *Whitgifte.*

If he would presently yield, Barbarossa promised to let him go free; but, if he should *stand* upon his defence, he threatened to make him repent his foolish hardiness. *Knolles.*

Such ordnance as he brought with him, because it was fitter for service in field than for battery, did only beat down the battlements, and such little *standings.* *Id. History.*

Thou shalt see me at Tullus' face:
What, art thou stiff? *stand'st out?* *Shakspeare.*

If you unite in your complaints,
And force them with a constancy, the cardinal
Cannot *stand under* them. *Id. Henry VIII.*

Does it not *stand* me now *upon?* *Id. Hamlet.*

A rascally, yea-forsooth knave, to bear a gentleman in hand, and then *stand upon* security. *Shakspeare.*

None durst *stand* him;
Here, there, and every where, enraged he flew. *Id.*

I have found you out a *stand* most fit,
Where you may have such 'vantage on the duke,
He shall not pass you. *Id. Measure for Measure.*

We are come off
Like Romans; neither foolish in our *stands,*
Nor cowardly in retire. *Shakspeare.*

The leaders, having charge from you to *stand;*
Will not go off until they hear you speak. *Id.*

Seeing how lothly opposite I *stood*
To his unnatural purpose, in fell motion

With his prepared sword he charges home
My unprovided body. *Id. King Lear.*
From enemies heaven keep your majesty;
And, when they *stand* against you, may they fall.
Shakspeare.
A thing within my bosom tells me,
That no conditions of our peace can *stand*.
Id. Henry VI.
My very enemy's dog,
Though he had bit me, should have *stood* that night
Against my fire. *Id. King Lear.*
So it *stands:* and this I fear at last,
Hume's knavery will be the duchess' wreck.
Id. Henry VI.
The broil doubtful long *stood*,
As two spent swimmers that do cling together
And choke their art. *Shakspeare.*
It remains,
To gratify his noble service, that
Hath thus *stood* for his country. *Id. Coriolanus.*
The fool hath planted in his memory
An army of good words; and I do know
A many fools that *stand* in better place,
Garnished like him, that for a tricksy word
Defy the matter. *Id. Merchant of Venice.*
Yourself, renowned prince, then *stood* as fair
As any comer I have looked on,
For my affection. *Id.*
I'll tell you who time ambles withal, who time gallops withal.—Whom *stands* it still withal?—With lawyers in the vacation; for they sleep between term and term, and then they perceive not how time moves.
Shakspeare.
Have I lived to *stand in* the taunt of one that makes fritters of English? *Id. Merry Wives.*
Stand no more *off*,
But give thyself unto my sick desires. *Shakspeare.*
There's his chamber,
His *standing* bed and truckle bed. *Id.*
The king knowing well that it *stood* him *upon*, by how much the more he had hitherto protracted the time, by so much the sooner to dispatch with the rebels. *Bacon.*
The greatest part of trade is driven by young merchants, upon borrowing at interest; so as, if the usurer either call in or keep back his money, there will ensue presently a great *stand* of trade. *Id.*
This nation of Spain runs a race still of empire, when all other states of Christendom *stand* at a stay.
Id.
Their lives and fortunes were put in safety, whether they *stood to* it or ran away. *Id. Henry VII.*
Our company assembled, I said, My dear friends, let us know ourselves, and how it *standeth* with us.
Bacon.
A philosopher disputed with Adrian the emperor, and did it but weakly: one of his friends, that *stood by*, said, Methinks you were not like yourself last day in argument with the emperor; I could have answered better myself. Why, said the philosopher, would you have me contend with him that commands thirty legions? *Id.*
It is so plain that it needeth not to be *stood upon*.
Id.
His coming is in state; I will provide you a good *standing to* see his entry. *Id.*
It was by the sword they should die, if they *stood upon* defence; and by the halter, if they should yield. *Hayward.*
All which grace
I now will amplify, and tell what case
Thy household *stands in*. *Chapman.*
Then the lightning-loving Deity cast
A foule flight on my soldiers: nor *stood* fast
One man of all. *Id.*
Freedom we all *stand for*. *Ben Jonson.*
Pontinius knows not you,
While you *stand out* upon these traiterous terms.
Id.
Picture is best when it *standeth off* as if it were carved; and sculpture is best when it appeareth so tender as if it were painted, when there is such a softness in the limbs as if not a chissel had hewed them out of stone, but a pencil had drawn and stroaked them in oil. *Wotton's Architecture.*
The hirelings *stand* at a certain wages. *Carew.*
He that will pass his land,
As I have mine, may set his hand
And heart unto this deed, when he hath read;
And make the purchase spread
To both our goods, if he *to* it will *stand*. *Herbert.*
We make all our addresses to the promises, hug and caress them, and in the interim let the commands *stand by* neglected. *Decay of Piety.*
Despair would *stand to* the sword,
To try what friends would do, or fate afford.
Daniel.
Father, since your fortune did attain
So high a *stand*, I mean not to descend. *Id.*
Some instances of fortune cannot *stand with* some others; but if you desire this you must lose that.
Taylor.
Never *stand in* a lye when thou art accused; but ask pardon and make amends.
Id. Rule of Living Holy.
The *standers by* see clearly this event,
All parties say they're sure, yet all dissent.
Denham.
At the soldierly word *stand*, the flyers halted a little. *Clarendon.*
The earl of Northampton followed the horse so closely that they made a *stand*, when he furiously charged and routed them. *Id.*
This excellent man, who *stood* not *upon* the advantage ground before, provoked men of all qualities.
Id.
The presbyterians of the kirk, less forward to declare their opinion in the former point, *stand upon* the latter only. *Sanderson.*
He *stood* to be elected one of the proctors for the university. *Id. Life.*
Then from his lofty *stand* on that high tree
Down he alights among the sportful herds. *Milton.*
To *stand* or fall,
Free in thine own arbitrement it lies. *Id.*
Chariot and charioteer lay overturned,
And fiery foaming steeds: what *stood*, recoiled
O'erwearied through the faint Satanick host,
Defensive scarce; or, with pale fear surprised,
Fled ignominious. *Id. Paradise Lost.*
The sea,
Awed by the rod of Moses so to *stand*,
Divided. *Milton.*
Chariots winged
From the armoury of God, where *stand* of old
Myriads. *Id.*
I in thy persevering shall rejoice,
And all the blest *stand* fast. *Id.*
Why *stand* we longer shivering under fears? *Id.*
This made their flowing shrink
From *standing* lake to tripping ebb. *Id.*
It *stands* me much *upon*
T' enervate this objection. *Hudibras.*
We are often constrained to *stand* alone against the strength of opinion.
Browne's Preface to Vulgar Errours.
Men *stand* very much *upon* the reputation of their understandings, and of all things hate to be accounted fools; the best way to avoid this imputation is to be religious. *Tillotson.*

The wand did not really *stand* to the metals, when placed under it, or the metalline veins. *Boyle.*

I will *stand* to it that this is his sense, as will appear from the design of his words. *Stillingfleet.*

Standing armies have the place of subjects, and the government depends upon the contented and discontented humours of the soldiers. *Temple.*

If the ladies will *stand out*, let them remember that the jury is not all agreed. *Dryden.*

Palinurus cried aloud,
What gusts of weather from that gathering cloud
My thoughts presage! ere that the tempest roars
Stand to your tackles, mates, and stretch your oars.
Id.

Turning at the length, he *stood* his ground,
And missed his friend. *Id.*

After supper a *stand* was brought in, with a brass vessel full of wine, of which he that pleased might drink; but no liquor was forced.
Id. Life of Cleomenes.

At every turn she made a little *stand*,
And thrust among the thorns her lily hand
To draw the rose. *Dryden.*

Mute, and amazed, my hair with horror *stood*;
Fear shrunk my senses, and congealed my blood.
Id.

Her hair *stood* up; convulsive rage possessed
Her trembling limbs. *Id. Æneid.*

My mind on its own centre *stands* unmoved,
And, stable as the fabrick of the world,
Propt on itself. *Dryden.*

That sots and knaves should be so vain
To wish their vile resemblance may remain;
And *stand* recorded, at their own request,
To future days a libel or a jest! *Id.*

Where Ufens glides along the lowly lands,
Or the black water of Pomptina *stands*. *Id.*

If we meet with a repulse, we must throw off the fox's skin, and put on the lion's: come, gentlemen, you'll *stand by* me. *Id. Spanish Fryar.*

Stand off, and let me take my fill of death.
Dryden.

Laughed all the powers who favour tyranny,
And all the *standing* army of the sky. *Id.*

A fool may so far imitate the mien of a wise man, as at first to put a body to a *stand* what to make of him. *L'Estrange.*

The ass hoped the dog would *stand by* him, if set upon by the wolf. *Id.*

He that will know, must by the connexion of the proofs see the truth and the ground it *stands* on.
Locke.

I will not trouble myself, whether these names *stand* for the same thing, or really include one another. *Id.*

They will suspect they shall make but small progress, if, in the books they read, they must *stand* to examine and unravel every argument. *Id.*

Money being looked upon as the *standing* measure of other commodities, men consider it as a *standing* measure; though, when it has varied its quantity, it is not so. *Id.*

We highly esteem and *stand* much upon our birth, though we derive nothing from our ancestors but our bodies; and it is useful to improve this advantage, to imitate their good examples.
Ray on the Creation.

Oh! had bounteous heaven
Bestowed Hippolitus on Phædra's arms,
So had I *stood* the shock of angry fate. *Smith.*

Let not men flatter themselves, that though they find it difficult at present to combat and *stand out* against an ill practice, yet that old age will do that for them, which they in their youth could never find in their hearts to do for themselves. *South.*

An utter unsuitableness disobedience has to the relation which man necessarily *stands* in towards his Maker. *Id.*

When just as by her *stand* Arsaces past,
The window by design or chance fell down,
And to his view exposed her blushing beauties.
Rowe.

He was a gentleman of considerable practice at the bar, and *stood* fair for the first vacancy on the bench. *Id.*

Bid him disband the legions,
Submit his actions to the publick censure,
And *stand* the judgment of a Roman senate.
Addison's Cato.

The male bird, whilst the hen is covering her eggs, generally takes his *stand* upon a neighbouring bough, and diverts her with his songs during her sitting.
Id. Spectator.

Three persons entered into a conspiracy to assassinate Timoleon, as he was offering up his devotions in a certain temple: in order to it they took their several *stands* in the most convenient places.
Addison.

The *standers by* suspected her to be a duchess.
Id.

This poet's tomb *stood* on the other side of Naples, which looks towards Vesuvio. *Id. On Italy.*

Readers, by whose judgment I would *stand* or fall, would not be such as are acquainted only with the French and Italian criticks. *Id. Spectator.*

He struck the snakes, and *stood* again
New sexed, and straight recovered into man.
Addison.

Each thinks he *stands* fairest for the great lot, and that he is possessed of the golden number.
Id. Spectator.

Such a one, by pretending to distinguish himself from the herd, becomes a *standing* object of raillery.
Addison.

When famed Varelst this little wonder drew
Flora vouchsafed the growing work to view,
Finding the painter's science at a *stand*,
The goddess snatched the pencil from his hand;
And, finishing the piece, she smiling said,
Behold one work of mine that ne'er shall fade.
Prior.

Such behaviour frights away friendship, and makes it *stand off* in dislike and aversion.
Collier of Friendship.

Should this circulation cease, the formation of bodies would be at an end, and nature at a perfect *stand*. *Woodward.*

Although the ancients were of opinion that Egypt was formerly sea; yet this tract of land is as old, and of as long a *standing*, as any upon the continent of Africa. *Id.*

Scarce can a good-natured man refuse a compliance with the solicitations of his company, and *stand out* against the raillery of his familiars. *Rogers.*

Thus doth he advise them to erect among themselves *standing* courts by consent. *Kettleworth.*

They expect to be favoured, who *stand* not possessed of any one of those qualifications that belonged to him. *Atterbury.*

Though nothing can be more honourable than an acquaintance with God, we *stand off* from it, and will not be tempted to embrace it. *Id.*

The common *standing* rules of the gospel are a more powerful means of conviction than any miracle.
Id.

Sprightly youth and close application will hardly *stand* together. *Felton.*

Amongst liquids endued with this quality of relaxing, warm water *stands* first.
Arbuthnot on Aliments.

Some middle prices shew us in what proportion the value of their lands *stood*, in regard to those of our own country. *Arbuthnot.*

The sea, since the memory of all ages, hath continued at a *stand*, without considerable variation. *Bentley.*

That not for fame, but virtue's better end,
He *stood* the furious foe, the timid friend,
The damning critick. *Pope.*

Immense the power, immense were the demand,
Say, at what part of nature will they *stand?* *Id.*

Persians and Greeks like turns of nature found,
And the world's victor *stood* subdued by sound. *Id.*

Full for the port the Ithacensians *stand*,
And furl their sails, and issue on the land.
Id. Odyssey.

The world is inclined to *stand by* the Arundelian marble. *Id. Essay on Homer.*

Great *standing* miracle that heaven assigned;
'Tis only thinking gives this turn of mind. *Pope.*

The urchin from his private *stand*
Took aim and shot with all his strength. *Swift.*

Stand by when he is going. *Id.*

I wish your fortune had enabled you to have continued longer in the university, till you were of ten years *standing*. *Id.*

The emperors *standing* upon the advantage he had got by the seizure of their fleet, obliged them to deliver. *Gulliver's Travels.*

Theology would truly enlarge the mind, were it studied with that freedom and that sacred charity which it teaches: let this therefore *stand* always chief. *Watts.*

God, who sees all things intuitively, does not want these helps; he neither *stands* in need of logick, nor uses it. *Baker.*

STAND, in commerce, a weight from two hundred-weight and a half to three hundred-weight of pitch.

STAN'DARD, *n. s.* } Fr. *estandart;* Swed.
STAN'DARDBEARER. } *standa;* Belg. *standaert;* Ital. *standardo.* An ensign in war, particularly the ensign of the horse. This word is originally derived from stand: hence it also signifies a test; that which is of standing or undoubted authority; a settled rate; that which has been tested; a standing stem or tree: the standardbearer is he who carries a military standard.

They shall be as when a *standardbearer* faintetn. *Isa.* x. 18.

The device of king Henry VII. was profound, in making farms of a *standard*, that is, maintained with such a proportion of lands as may breed a subject to live in plenty. *Bacon.*

A *standard* of a damask rose, with the root on, was set upright in an earthen pan, full of fair water, half a foot under the water, the *standard* being more than two foot above it. *Id. Natural History.*

His armies, in the following day,
On those fair plains their *standards* proud display.
Fairfax.

Erect the *standard* there of ancient night,
Yours be the advantage all, mine the revenge.
Milton.

The dogmatist gives the lye to all dissenting apprehenders, and proclaims his judgment the fittest intellectual *standard*. *Glanville.*

Our measures of length I cannot call *standards*, for *standard* measures must be certain and fixed. *Holder.*

A *standard* might be made, under which no horse should be used for draught; this would enlarge the breed of horses. *Temple.*

In France, part of their gardens is laid out for flowers, others for fruits; some *standards*, some against walls. *Temple.*

Behold Camillus loaded home
With *standards* well redeemed, and foreign foes o'ercome. *Dryden.*

When people have brought right and wrong to a false *standard*, there follows an envious malevolence. *L'Estrange.*

That precise weight and fineness, by law appropriated to the pieces of each denomination, is called the *standard*. *Locke.*

Plant fruit of all sorts and *standard*, mural, or shrubs which lose their leaf. *Evelyn's Kalendar.*

The Romans made those times the *standard* of their wit, when they subdued the world. *Sprat.*

These are the *standardbearers* in our contending armies, the dwarfs and squires who carry the impresses of the giants or knights. *Spectator.*

In comely rank call every merit forth;
Imprint on every act its *standard* worth. *Prior.*

When I shall propose the *standard* whereby I give judgment, any may easily inform himself of the quantity and measure of it. *Woodward.*

By the present *standard* of the coinage, sixty-two shillings is coined out of one pound weight of silver. *Arbuthnot.*

From these ancient *standards* I descend to our own historians. *Felton.*

First follow nature, and your judgment frame
By her just *standard*, which is still the same. *Pope.*

The English tongue, if refined to a certain *standard*, perhaps might be fixed for ever. *Swift.*

STANDARD, in commerce, the original of a weight, measure, or coin, committed to the keeping of a magistrate, or deposited in some public place, to regulate, adjust, and try the weights used by particular persons in traffic. See MONEY.

STANDARD, is used among goldsmiths synonymously with sterling; thus standard or sterling gold or silver means gold or silver of equal purity with the gold or silver coin of Great Britain.

STANDARD (from the Fr. *estandart*, &c., *signum vexillum*), in the general signification, is an ensign in war. And it is used for the standing measure of the king, to the scantling whereof all the measures in the land are, or ought to be, framed, by the clerks of markets, aulnagers, or other officers, according to Magna Charta and divers statutes. This is not without good reason called a standard, because it standeth constant and immoveable, having all measures coming towards it for their conformity; even soldiers in the field have their standard or colors, for their direction in their march, &c., to repair to. Britton, c. 30. There is a standard of money, directing what quantity of fine silver and gold, and how much allay, are to be contained in coin of old sterling, &c. And standard of plate and silver manufactures. Stat. 6 Geo. I., c. 11. See COINS, WEIGHTS, and MEASURES.

STANDARD, in war, is a sort of banner or flag, carried as a signal for joining together the several troops belonging to the same body.

The *military standard* is usually a piece of silk one foot and a half square, on which are embroidered the arms, device, or cypher, of the prince or colonel of a regiment. It is fixed on a lance, eight or nine feet long, and carried in the centre of the first rank of a squadron of horse, by the cornet.

Standards belonging to the Cavalry. Standards are posted in the following manner:—The king's with the right squadron. The second with the left; and the third with the centre. In advancing to the front on foot, the advanced standards and their serjeants must not slacken their pace, or deviate from right to left, as the lieutenant-colonel, or leading-officer, may happen to do; but if he be in their way they must call to him, because they alone regulate the march. The standards must always be brought to the parade by the troop, viz., by that which has its private parade nearest to head-quarters. They must be accompanied by as many trumpeters as can conveniently assemble with that troop. Swords must be drawn and the march sounded. The cornets parade, of course, with that troop to receive the standards. The standards are received by the regiment, or squadron, at open ranks, with swords drawn, officers saluting, and the march sounding by the remaining trumpeters. They must march off from head-quarters, and be lodged with the same form.

STANDARD-HILL, the Durolerum of the Romans, a hill of England, in Kent, south of Newington, by Sittingbourne, on which it is said Julius Cæsar encamped. Also a hill in Sussex, near Battel, now called Beacon-hill, where William the Conqueror raised his standard the day before the battle of Hastings.

STANDARDUS, true standard, or legal weight or measure.—Cartular S. Edmund, MS. 268.

STAN'DEL, *n. s.* From stand. A tree of long standing.

The Druinians were nettled to see the princely *standel* of their royal oak return with a branch of willows. *Howel.*

STAND'ISH, *n s.*. Stand and dish. A case for pen and ink.

A Grubstreet patriot does not write to secure, but get something: should the government be overturned, he has nothing to lose but an old *standish.* *Addison.*

I bequest to Dean Swift, esquire, my large silver *standish*, consisting of a large silver plate, an ink-pot, and a sand-box. *Swift.*

STANDON, a market-town and parish in Braugin hundred, Herts, situate on the river Rib, eight miles north-east from Hertford, and twenty-seven from London. The church has nothing remarkable, except that the chancel floor is elevated seven steps above the level of the church, and the altar three steps above the chancel. Market on Friday. Fair, October 13th. It is a vicarage.

STANEMORE, a barren district of Westmoreland, in the east corner of the county. It has relics of Rerecross, an ancient boundary between Scotland and England, set up when Cumberland belonged to the former.

STANG, *n. s.* Sax. ȝtæng. A perch.

These fields were intermingled with woods of half a *stang*, and the tallest tree appeared to be seven feet high. *Swift.*

STANHOPE (George), D. D., an eminent divine, born at Hertishorn in Derbyshire, in 1660. His father was rector of that place, vicar of St. Margaret's church in Leicester, and chaplain to the earls of Chesterfield and Clare. His grandfather, also Dr. George Stanhope, was chaplain to James I. and Charles I.; chancellor, canon, residentiary, and a prebend of York, and was rector of Weldrake. He was for his loyalty driven from his home with eleven children; and died in 1644. Our author was sent to school, first at Uppingham in Rutland, then at Leicester; afterwards removed to Eaton; and thence chosen to King's College in Cambridge. He took the degree of B. A. in 1681; A. M. 1658; was elected minister of Qoi near Cambridge, and vice proctor 1688; and rector of Tring in Hertfordshire. He was in 1689 appointed vicar of Lewisham in Kent, by lord Dartmouth, to whom he had been chaplain. He was also appointed chaplain to William and Mary, and continued under queen Anne. He commenced D. D. July 5th, 1697; and was made vicar of Deptford, and dean of Canterbury in 1703; thrice chosen prolocutor of the lower house of convocation. He was endowed with excellent parts, and acquired a large stock of learning, with the purest diction, and a just elocution. The character of the Christian and the gentleman in him were happily united. He died March 18th, 1728, aged sixty-eight. The dean was twice married: 1. to Olivia Cotton, by whom he had one son and four daughters; 2. To a sister of Sir Charles Wager, who survived him till October 1st, 1730, aged fifty-four. One of his daughters was married to a son of bishop Burnet. His writings are, A Paraphrase and Comment upon the Epistles and Gospels, 4 vols., 1705, 8vo.; Sermons at Boyle's Lectures, 1706, 4to.; Fifteen Sermons, 1700, 8vo.; Twelve Sermons, 1727, 8vo.; Parson's Christian Directory, 1716, 8vo.; A Funeral Sermon on Mr. Richard Stare, bookseller, 1724, 4to: Twenty Sermons, between 1692 and 1724; Private Prayers, translated from the Greek of bishop Andrews, with Additions, 1730. He also published editions of Epictetus, Thomas à Kempis, and Rochefoucault.

Stanhope (Philip Dormer), earl of Chesterfield, was born in 1695, and educated in Trinity-Hall, Cambridge; which place he left in 1714, when, by his own account, he was an absolute pedant; in this character he went abroad, where a familiarity with good company soon convinced him he was totally mistaken in almost all his notions; and an attentive study of the air, manner, and address of the people of fashion, soon polished a man whose predominant desire was to please; and who, as it afterwards appeared, valued exterior accomplishments beyond any other human acquirement. While lord Stanhope, he got an early seat in parliament; and in 1722 succeeded to his father's estate and titles. In 1728, and in 1745, he was appointed ambassador extraordinary and plenipotentiary to Holland; which high character he supported with the greatest dignity; serving his own country, and gaining the esteem of the states general. Upon his return from Holland, he was sent lord lieutenant of Ireland; and, during his administration there, gave general satisfaction to all parties. He left Dublin in 1746, and in October succeeded the earl of Harrington as secretary of

state, in which post he officiated until February 6th, 1748. Being seized with a deafness in 1752 that incapacitated him for the pleasures of society, he from that time led a private and retired life, amusing himself with books and his pen; in particular, he engaged largely as a volunteer in a periodical miscellaneous paper called The World, in which his contributions have a distinguished degree of excellence. He died in 1773, leaving a character for wit and abilities that had few equals. He distinguished himself by his eloquence in parliament on many important occasions. He was an active promoter of the bill for altering the style; on which occasion, as he writes in one of his letters to his son, he made so eloquent a speech in the house that every one was pleased. Lord Macclesfield, one of the greatest mathematicians in Europe, and who had a principal hand in framing the bill, spoke afterwards, with all the clearness that a thorough knowledge of the subject could dictate; but, not having a flow of words equal to lord Chesterfield, the latter gained the applause from the former. The high character lord Chesterfield supported during life received no small injury soon after his death, from a fuller display of it by his own hand. He left no issue by his lady, but had a natural son, Philip Stanhope, esq., whose education was for many years a close object of his attention, and who was afterwards envoy extraordinary at the court of Dresden, but died before him. When lord Chesterfield died, Mr. Stanhope's widow published a course of letters written by the father to the son, filled with instructions suitable to the different gradations of the young man's life to whom they were addressed. These letters contain many fine observations on mankind, and rules of conduct; but it is observable that he lays a greater stress on exterior accomplishments and address than on intellectual qualifications and sincerity; and allows greater latitude to fashionable pleasures than good morals will justify, especially in paternal instructions. Hence the celebrated Dr. Samuel Johnson observed of these letters, that they inculcate only the morals of a loose woman, with the manners of a dancing master.

Stanhope (Charles), the third earl of Stanhope, was born August 3d, 1753. He received his education at Eton, and Geneva, where his genius led him to pay a close attention to the mathematics; and such was his progress that he obtained a prize from the society of Stockholm for a memoir on the pendulum. In 1774 he stood candidate for Westminster without success; but was introduced by the earl of Shelburne into parliament as member for the borough of Wycombe, which he represented until 1786, when the death of his father called him to the house of Peers. He regarded with pleasure the dawn of the French Revolution; openly avowed republican sentiments, and went so far as to lay aside the external ornaments of the peerage. He was also a frequent speaker against the war. As a man of science he ranked high both as an inventor and patron; and among other things was the author of a method for securing buildings from fire, an arithmetical machine, a new printing-press, a monochord for tuning musical instruments, and a vessel to sail against wind and tide. He was twice married, first to lady Hester Pitt, daughter of the first earl of Chatham, by whom he had three daughters; and secondly to Miss Grenville, by whom he had three sons. This scientific but eccentric nobleman published several philosophical and a few political tracts. He died 14th of December 1816.

STANISLAUS (Leczinski), king of Poland, was born at Leopold the 20th of October, 1677. His father was a Polish nobleman, distinguished by his rank and the important offices which he held, but still more by his firmness and courage. Stanislaus was sent ambassador in 1704, by the assembly of Warsaw, to Charles XII. of Sweden, who had conquered Poland. He was at that time twenty-seven years old, was general of Great Poland, and had been ambassador extraordinary to the grand seignior in 1699. Charles was so delighted with the frankness and sincerity of his deportment, and with the firmness and sweetness which appeared in his countenance, that he gave him the crown of Poland, and ordered him to be crowned at Warsaw in 1705. He accompanied Charles XII. into Saxony, where a treaty was concluded with king Augustus in 1705, by which that prince resigned the crown, and acknowledged Stanislaus king of Poland. See Poland. The new monarch remained in Saxony with Charles till 1707, when they returned into Poland and attacked the Russians, whom they obliged to evacuate that kingdom in 1708. But Charles, being defeated by Peter the Great in 1709, Augustus returned into Poland, and, being assisted by a Russian army, obliged Stanislaus to retire first into Sweden, and afterwards into Turkey. Soon after he took up his residence at Weissenburg in Alsace. Augustus despatched Sum his envoy to France, to complain of this; but the duke of Orleans, then regent, returned this answer:—'Tell your king, that France has always been the asylum of unhappy princes.' Stanislaus lived in obscurity till 1725, when Louis XV. espoused the princess Mary his daughter. Upon the death of Augustus, in 1733, he returned to Poland in hopes of remounting the throne. A large party declared for him; but his competitor, the young elector of Saxony, being supported by the emperor Charles VI. and the empress of Russia, was chosen king, though the majority was against him. Dantzic, to which Stanislaus had retired, was quickly taken, and the unfortunate prince made his escape in disguise with great difficulty, after hearing that a price was set upon his head by the Russians. When peace was concluded in 1736 between the emperor and France, it was agreed that Stanislaus should abdicate the throne, but that he should be acknowledged king of Poland and grand duke of Lithuania, and continue to bear these titles during life; that all his effects and those of the queen his spouse should be restored; that an amnesty should be declared in Poland for all that was past, and that every person should be restored to his possessions, rights, and privileges; that the elector of Saxony should be acknowledged king of Poland by all the powers who acceded to the treaty; that Stanislaus should be put in possession of the duchies

of Lorrain and Bar; but that immediately after his death these duchies should be united for ever to the crown of France. Stanislaus succeeded a race of princes in Lorrain who were beloved and regretted; and his subjects found their ancient sovereigns revived in him. He tasted then the pleasure which he had so long desired, the pleasure of making men happy. He assisted his new subjects; he embellished Nancy and Lunéville; he made useful establishments; he founded colleges and built hospitals. He was engaged in these noble employments, when an accident occasioned his death. His night-gown caught fire and burnt him so severely, before it could be extinguished, that he was seized with a fever, and died February 23d, 1766. His death occasioned a public mourning; the grief of his subjects was genuine. In his youth he had accustomed himself to fatigue, and had strengthened his mind and constitution. He was temperate, liberal, adored by his vassals, gentle, affable, compassionate, treating his subjects like equals, and alleviating their misfortunes. His revenues were small, but were we to judge of them by what he did, we might reckon him the richest potentate in Europe. He gave 18,000 crowns to the magistrates of Bar to be employed in purchasing grain, when at a low price, to be sold out again to the poor at a moderate rate, when the price should rise above a certain sum. He was a protector of the arts and sciences; he wrote several works of philosophy, politics, and morality, which were collected and published in France in 1765, in 4 vols. 8vo, under the title of Oeuvres du Philosophe Bienfaisant, 'the Works of the Benevolent Philosopher.'

Stanislaus Augustus (Poniatowski), the last king of Poland, was the son of count Poniatowski, a Polish nobleman, by a lady of royal descent, and born in 1732. After receiving a very liberal education, he went abroad and resided for a considerable time in England; where he became intimate with Sir Charles Hanbury Williams, whom he accompanied in his embassy to Petersburgh. Being uncommonly handsome, he soon attracted the attention of the grand duchess, afterwards Catharine II. To increase his importance, he was appointed ambassador from Augustus king of Poland, and invested with the insignia of the white eagle; but his intrigue with the grand duchess being discovered, the empress Elizabeth was so much offended that she expressed her displeasure to the king of Poland who immediately recalled him. Upon the immorality of this amour we need make no comment. Moral principles are seldom regarded by the great when they interfere with their pursuits of pleasure or of power. But it will be seen how she rewarded him. When Catharine ascended the throne, on the murder of her husband, Poniatowski, thinking he would be a welcome visitant, set out for Petersburgh; but, to his surprise and mortification, he received a message from his old mistress, when on the frontiers, advising him to return to Warsaw. However, on the death of king Augustus, in 1763, Catharine announced her intention of placing her favorite on the throne of Poland; a measure which, though disagreeable to many of the Polish nobles, she effected in 1764. See Poland. The disturbances which soon after commenced between the Roman Catholics and the Dissidents; the interference of Russia and the other partitioning powers; the seizure of the king's person by conspirators, with his astonishing escape; the beautiful but short lived revolution, and new constitution; the first and second partitions of Poland by the surrounding powers; with the bloody operations of the Russians under Suwarrow, the massacre of Prague, and the capture of Warsaw, are fully recorded under Poland. The unfortunate monarch was obliged to resign his crown in November 1795, and retire to Petersburgh; where he died April 11th, 1798. He was one of the most accomplished men of his age; had read the best authors ancient and modern; and could converse in various languages. Under the last constitution he would have made an excellent monarch, and a happy people, if the other powers of Europe had assisted him and the brave Poles against their oppressors.

STANISLAWOW, a circle of Austrian Galicia, situated in the south-east of the province, adjacent to Hungary and the circles of Stryi and Tarnopol. It has a territorial extent of 1955 square miles.

Stanislawow, a trading town of Austrian Poland, the capital of the preceding circle. It is surrounded by a wall, and is well fortified, has a Catholic and an Arminian church, a gymnasium, and a central school. It has also a government depôt of tobacco and snuff. Inhabitants 6200. Eighty miles south by east of Lemberg, and 172 north-west of Jassy.

STANK, *adj.* Ital. *stanco.* Weak; worn out. Obsolete.

Diggon, I am so stiff and so *stank*,
That unneth I may stand any more,
And how the western wind bloweth sore,
Beating the withered leaf from the tree. *Spenser.*

STANLEY (Sir Thomas), knt., of Cumberlow Green, in Herefordshire, a learned writer of the seventeenth century, who published two volumes of Poems; the one in 1649, and the other in 1651.

Stanley (Thomas), son of Sir Thomas, became still more famous for his learning. He was born at Cumberlow about 1644, and educated in his father's house, whence he removed to the university of Cambridge. He afterwards travelled through France, Italy, and Spain, and, upon his return to England, prosecuted his studies in the Middle Temple. He married Dorothy, the eldest daughter of Sir James Engan of Flower in Northamptonshire. He wrote, 1. A Volume of Poems. 2. A Translation of Ælian's Various History. 3. History of Philosophy and Lives of the Philosophers. 4. A Translation of Æschylus, with a Commentary; and several other works. He died in 1678.

Stanley (John), an eminent composer and performer of music, born in 1713. He was blind from his infancy, but acquired so profound a knowledge of music that he became master of his majesty's band of musicians, and organist to the society of the temple and of St. Andrew's, Holborn. He died in 1786.

STAN'NARY, *adj.* Lat. *stannum.* Relating to the tin-works.

A steward keepeth his court once every three weeks: they are termed *stannary* courts, of the Latin *stannum*, and hold plea of action of debt or tresspass about white or black tin. *Carew.*

STANNARY is also used for the mines and works wherein tin is dug and purified; as in Cornwall, Devonshire, &c. See CORNWALL and TIN.

STANNARY COURTS, in Devonshire and Cornwall, courts held for the administration of justice among the tinners therein. They are held before the lord warden and his substitutes, in virtue of a privilege granted to the workers in the tin mines there, to sue and be sued only in their own courts, that they may not be drawn from their business, which is highly profitable to the public, by attending their law suits in other courts. The privileges of the tinners are confirmed by a charter 33 Edw. I., and fully expounded by a private statute, 50 Edw. III., which has since been explained by a public act, 16 Car. I. c. 15. What relates to our present purpose is only this: that all tinners and laborers in and about the stannaries shall, during the time of their working therein, bona fide, be privileged from suits of other courts, and be only pleaded in the stannary court in all matters, excepting pleas of land, life, and member. No writ of error lies hence to any court in Westminster-hall; as was agreed by all the judges, in 4 Jac. I. But an appeal lies from the steward of the court to the under warden; and from him to the lord warden; and thence to the privy council of the prince of Wales, as duke of Cornwall, when he has had livery or investiture of the same. And thence the appeal lies to the king himself, in the last resort.

STANNI PULVIS. Tin finely divided is exhibited internally as a vermifuge. It acts mechanically, and the fine filings are more effectual than the powder.

STANOVOY, a chain of mountains in Asiatic Russia, forming part of the great northern chain which here crosses the breadth of the continent. It receives this name after turning to the north, near the source of the Aldane, whence it runs parallel to the gulf of Okhotsh, leaving only a narrow plain intervening. It opposes serious difficulty to travellers proceeding to this extremity of the Russian empire, and is supposed to continue uninterrupted, though with some diminution of magnitude, to Cape Tchoutchi, at the north-eastern extremity of Asia; the Aleutian and Fox Isles may probably be considered in some degree as a continuation of it. An important and lofty branch passes into Kamtschatka and the Kurile Islands. This chain consists chiefly of granite and porphyry, though there are whole mountains composed of green jasper.

STANYHURST (Richard), an Irish historian, poet, and divine, born at Dublin about 1545, and educated at University College, Oxford. He afterwards studied the law at Furnival's and Lincoln's Inns; but, turning Roman Catholic, he went to the Continent, where he entered into orders; and at Brussels was made chaplain to Albert, archduke of Austria, then governor of the Spanish Netherlands. He published several learned works; particularly, 1. Harmonia, seu catena dialectica in Porphyrium; folio 1570. 2. De Rebus in Hibernia gestis; 4to. 1584. 3. De Vita S. Patricii; 12mo. 1587. 4. The first four books of Virgil's Æneid, in English hexameters; 12mo. 1583. He died in 1618.

STAN'ZA, *n. s.* Ital. *stanza*; Fr. *stance.* A number of lines regularly adjusted to each other; so much of a poem as contains every variation of measure or relation of rhyme. Stanza is originally a room of a house, and came to signify a subdivision of a poem; a staff.

So bold as yet no verse of mine has been,
To wear that gem on any line;
Nor, till the happy nuptial house be seen,
Shall any *stanza* with it shine. *Cowley.*

Horace confines himself strictly to one sort of verse or *stanza* in every ode. *Dryden.*

Before his sacred name flies every fault,
And each exalted *stanza* teems with thought. *Pope.*

STAPELIA, a genus of plants belonging to the class pentandria, and the order digynia. The generic characters are these: CAL. monophyllous, quinquefid, acute, small, and permanent: COR. monopetalous, flat, large, and divided, deeper than the middle, into five parts, with broad, flat pointed laciniæ. The nectarium is small, star-shaped, flat, quinquefid, with linear laciniæ; and embracing with its ragged points the seed-forming parts. Another small star, which is also flat and quinquefid, covers the seminiferous parts with its entire acute laciniæ. The stamina are five in number; the filaments are erect, flat, and broad; and the antheræ are linear, on each side united to the side of the filament. The pistillum has two germina, which are oval and flat on the inside. There are no styles; and the stigmata are obsolete. The seed-vessel consists of two oblong, awl-shaped, unilocular and univalved follicles. The seeds are numerous, imbricated, compressed, and crowned with a pappus or down. This singular tribe of plants is peculiar to the sandy deserts of Africa and Arabia. They are extremely succulent. From this peculiarity of structure, the power of retaining water to support and nourish them, they are enabled to live during the prevalent droughts of those arid regions. On this account the stapelia has been denominated the camel of the vegetable kingdom. The peculiar economy in the stapelia and other succulent plants seems to exist in the absorbent and exhalant systems. The power of absorption is as much increased as the power of the exhalant or perspiratory vessels is diminished. In these plants a small quantity of nourishment is required. There is no solid part to be formed, no large fruit to be produced. They generally have very small leaves, often are entirely naked; so that, taking the whole plant, a small surface only is exposed to the action of light and heat, and consequently a much smaller proportion of water is decomposed than in plants which are much branched and furnished with leaves. Two species of stapelia only were known at the beginning of the eighteenth century. The unfortunate Forskal, the companion of Niebhur, who was sent out by the king of Denmark to explore the interior of Arabia, and who fell a

sacrifice to the pestilential diseases of those inhospitable regions, discovered two new species. Thunberg, in his Prodromus, has mentioned five more. Forty new species have been discovered by Mr. Masson of New Gardens, who was sent out by his majesty George III. for the purpose of collecting plants round the Cape of Good Hope. Descriptions of these, with elegant and highly finished colored engravings, have lately been published. They are chiefly natives of the extensive deserts called Karro, on the western side of the Cape.

STAPES OF THE EAR. See ANATOMY, Index, and SOUND.

STAPHIS, Gr. σταφις, strictly a grape, or a bunch of grapes; whence, from their likeness thereunto, it is applied to many other things, especially the glands of the body, whether natural or diseased.

STAPHISAGRIA, Gr. σταφις αγρια, wild vine; from its resemblance of its leaves to those of the vine.

STAPHYLÆA, bladder-nut, in botany, a genus of plants belonging to the class of pentandria and order of trigynia; natural order twenty-third, trihilatæ: CAL. quinquepartite. There are five petals. The capsules are three, inflated and joined together by a longitudinal suture. The seeds are two, and are globose with a scar. There are two species, the pinnata and trifolia.

1. S. pinnata, or bladder-nut-tree, is a tall tree. The leaves are pinnated; the pinnæ are generally five, oblong, pointed, and notched round the edges. The flowers are white, and grow in whirls on long pendulous foot-stalks. This plant flowers in June, and is frequent in hedges about Pontefract and in Kent.

2. S. trifolia, or three-leaved bladder-nut, is a native of Virginia.

STAPHYLE, Gr. σταφυλη, a grape or raisin: so called from its resemblance. The uvula.

STAPHYLINUS, a genus of animals belonging to the class of insectæ, and order of coleoptera. The antennæ are moniliform; the feelers four in number; the elytra are not above half the length of the abdomen; the wings are folded up and concealed under the elytra; the tail or extremity of the abdomen is single, is provided with two long vesicles which the insect can shoot out or draw back at pleasure. Gmelin enumerates 117 species, of which five only are natives of Great Britain, viz.

1. S. chrysomelinus is black; the thorax, elytra, and feet, being testaceous. It is found in the north of Europe.

2. S. maxillosus is black, with ash-colored stripes, and jaws as long as the head. It inhabits the woods.

3. S. murinus. The head is depressed. The color is gray, clouded with black. The length is six lines. It lives among horse-dung.

4. S. riparius is of a reddish-brown color; but the elytra are azure-colored; and the head, antennæ, and two last rings of the abdomen, are black. It is frequent on the banks of rivers in Europe.

5. S. rufus is of an orange-color; but the posterior part of the elytra and abdomen is black, as are also the thighs at their base. These insects have a peculiarity to be met with in almost every species of this genus, which is, that they frequently turn up their tail, or extremity of the abdomen, especially if you chance to touch them; in which case the tail is seen to rise immediately, as if the insect meant to defend itself by stinging. Yet that is not the place where the insect's offensive weapons are situated. Its tail has no sting, but it bites and pinches strongly with its jaws; and care must be taken, especially in laying hold of the larger species. Their jaws are strong, shoot out beyond the head, and are subservient to the animal in seizing and destroying its prey. They feed on all other insects they can catch; even frequently two staphylini of the same species bite and tear each other. Though this insect has very small elytra, yet its wings are large; but they are curiously folded up, and concealed under the elytra. The insect unfolds and expands them when he chooses to fly, which he does very lightly. Among the small species of this genus, there are several whose colors are lively and singularly intermingled. Some of them are found upon flowers, but they chiefly inhabit the dung of cows. Their larvæ, which resemble them so much as to be scarcely distinguishable, live in damp places under ground. They are by some called Rove beetles.

STAPHYLOMA. See SURGERY.

STAPLE, *n. s.* & *adj.* Fr. *estape*; Belg. *stapel*, perhaps from Lat. *stabilis*. A settled mart; an established emporium; the original material of a manufacture: settled, established in commerce.

At Leister, for her wool whose *staple* doth excel,
And seems to overmatch the golden Phrygian fell.
Drayton.

Some English wool, vexed in a Belgian loom,
And into cloth of spongy softness made,
Did into France or colder Denmark roam,
To ruin with worse ware our *staple* trade. *Dryden.*

A *staple* of romance and lyes,
False tears, and real perjuries. *Prior.*

The customs of Alexandria were very great, it having been the staple of the Indian trade.
Arbuthnot on Coins.

What needy writers would not solicit to work under such masters, who will take off their ware at their own rates, and trouble not themselves to examine whether it be *staple* or no? *Swift.*

STAPLE, *n. s.* Sax. ꝥapul, a prop. A loop of iron; a bar bent and driven in at both ends.

I have seen *staples* of doors and nails born.
Peacham.

The silver ring she pulled, the door reclosed:
The bolt, obedient to the silken cord,
To the strong *staple's* inmost depth restored,
Secured the valves. *Pope's Odyssey.*

STAPLE signifies a public market, whither merchants, &c., are obliged to bring their goods for sale; as the Greve, or the places along the Seine, for sale of wines and corn at Paris, whither the merchants of other parts are obliged to bring those commodities. Formerly the merchants of England were obliged to carry their wool, cloth, lead, and other staple commodities of this realm, to expose them by wholesale; and these staples were appointed to be constantly kept at York, Lincoln, Newcastle-upon-Tyne, Norwich, Westminster, Canterbury,

Chichester, Winchester, Exeter, and Bristol; in each of which a public mart was appointed to be kept, and each of them had a court of the mayor of the staple, for deciding differences, held according to the law merchant, in a summary way.

Staple Commodities, such wares and merchandises as are commonly and readily sold in a market, or exported abroad; being for the most part the proper produce or manufacture of the country.

STAPLETON (Thomas), a celebrated Roman Catholic divine, born in Sussex in 1535. He was educated at Canterbury and Winchester, and then sent to New College, Oxford, where he became a fellow. On the accession of queen Elizabeth he went to Louvain, where he was appointed regius professor in divinity, canon of St. Peter's, and dean of Hillerbeck. He died in 1598. His works were published at Paris in 1620, in 4 vols. folio.

STAPYLTON (Sir Robert), the third son of Richard Stapylton, of Carleton, Yorkshire, was born in Yorkshire, and educated in the Roman faith, in the college of English Benedictines, at Douay, in France. On his return to England he turned Protestant, and was appointed gentleman usher to the prince of Wales, afterwards Charles II. When king Charles I. was obliged to fly from London, he went with him, and was knighted in 1642. After the battle of Edgehill he attended the king to Oxford, and was created LL. D. During the Commonwealth, and Cromwell's usurpation, he spent his time in retirement and study; but, after the Restoration, he was promoted to some offices by Charles II. He published several dramatic works, and died in 1669.

STAR, *n. s.*
Star'gazer,
Star'less, *adj.*
Star'light, *n. s.* & *adj.*
Star'like, *adj.*
Star'paved,
Star'proof,
Star'red,
Star'ry,
Star'shoot, *n. s.*

Saxon ſteorra; Teut. *sterre;* Belg. *star;* Latin *astrum;* Gr. αστρον. One of the luminous bodies that appear in the nocturnal sky; particular configurations of the stars; the pole star; a mark of reference: a stargazer is a familiar name of an astrologer or astronomer: starless, devoid of stars; dark: starlight, the lustre of, or lighted by the stars: starlike, stellated; resembling the stars in lustre: starpaved, studded with stars: starproof, impervious to starlight: starred, influenced by or decorated with stars. starry, abounding with stars: starshoot is an emission from a star.

Let the astrologers, the *stargazers*, and the monthly prognosticators, stand up and save thee.
Isa. xlvii. 13.

Such is his will, that paints
The earth with colors fresh,
The darkest skies with store
Of *starry* lights. *Spenser.*

Then let the pebbles on the hungry beech,
Fillop the *stars;*
Murdering impossibility, to make
What cannot be, sligh twork. *Shakspeare. Coriolanus.*

Well, if you be not turned Turk, there is no more sailing by the *star*. *Id. Much Ado About Nothing.*

From forth the fatal loins of these two foes
A pair of *star*-crost lovers take their life. *Shakspeare.*

My third comfort
Starred most unluckily, is from my breast
Hal'd out to murder. *Id. Winter's Tale.*

Now they never meet in grove or green,
By fountain clear or spangled *starlight* sheen.
Shakspeare.

Tears had dimmed the lustre of her *starry* eyes.
Id. Illust.

Hither the Syracusan's art translates
Heaven's form, the course of things, and human fates;
The included spirit, serving the *star*-decked signs,
The living work in constant motions winds.
Hakewill.

Such his fell glances as the fatal light
Of *starring* comets that look kingdoms dead.
Crashaw.

As from a cloud his fulgent head,
And shape *star* bright, appeared. *Milton.*

In progress through the road of heaven *starpaved.*
Id.

Under the shady roof
Of branching elm *starproof*. *Id.*

That *starred* Ethiop queen, that strove
To set her beauty's praise above
The sea-nymphs. *Id.*

A boundless continent,
Dark, waste, and wild, under the frown of night
Starless exposed. *Id. Paradise Lost.*

Nor walk by moon,
Or glittering *starlight*, without thee is sweet. *Milton.*

The having turned many to righteousness shall confer a *starlike* and immortal brightness.
Boyle's Seraphick Love.

I have seen a good quantity of that jelly, by the vulgar called a *starshoot*, as if it remained upon the extinction of a falling *star*. *Boyle.*

These reasons moved her *starlike* husband's heart;
But still he held his purpose to depart. *Dryden.*

Heaven and earth's compacted name,
And flowing waters, and the *starry* flame,
And both the radiant lights, one common soul
Inspires and feeds, and animates the whole. *Id.*

Cato might give them furlos for another world;
But we, like sentries, are obliged to stand
In *starless* nights, and wait the appointed hour. *Id.*

They danced by *starlight* and the friendly moon.
Id.

Owls, that mark the setting sun, declare
A *starlight* evening and a morning fair. *Id. Virgil.*

We are apt to do amiss, and lay the blame upon our *stars* or fortune. *L'Estrange.*

A *stargazer*, in the height of his celestial observations, stumbled into a ditch. *Id.*

Nightshade tree rises with a wooden stem, green-leaved, and has *starlike* flowers.
Mortimer's Husbandry.

He furious hurled against the ground
His sceptre *starred* with golden studs around. *Pope.*

Daphne wondering mounts on high,
Above the clouds, above the *starry* sky! *Id.*

Remarks worthy of riper observation, note with a marginal *star*. *Watts.*

When an astronomer uses the word *star* in its strict sense, it is applied only to the fixt *stars:* but in a large sense it includes the planets. *Id*

Star, in astronomy, is a general name for all the heavenly bodies, which, like so many brilliant studs, are dispersed throughout the whole heavens. The stars are distinguished from the phenomena of their motion &c., into fixed, and erratic or wandering stars; these last are again

distinguished into the greater luminaries, viz. the sun and moon; the planets, or wandering stars, properly so called; and the comets. See ASTRONOMY. As to the fixed stars, they are so called, because they seem to be fixed, or perfectly at rest, and consequently appear always at the same distance from each other.

STAR is also a badge of honor, worn by the knights of the garter, bath, and thistle. See GARTER.

STAR, in fortification, denotes a small fort, having five or more points, or salient and re-entering angles, flanking one another, and their faces ninety or 100 feet long.

STARAJA RUSSA, a town of European Russia, in the government of Novgorod, on the river Polista, not far from the lake Ilmen. It has a considerable trade in hemp and flax; but the most important establishment is a salt work belonging to the government. Inhabitants 5300. Thirty-four miles south of Novgorod and 137 south by east of Petersburg.

The STAR APPLE is a species of chrysophyllum.

STAR HYACINTH, a species of scilla.

STAR OF ALEXANDRIA, a species of ornithogalum.

STAR OF BETHLEHEM. See ORNITHOGALUM.

STAR OF CONSTANTINOPLE, STAR OF NAPLES, other two species of ornithogalum.

STARS, FALLING. See IGNIS FATUUS, METEOR, and METEOROLOGY.

STAR THISTLE, in botany. See CENTAUREA.

STAR'BOARD, *n. s.* Sax. ȝteorbord. Is the right hand side of the ship, as larboard is the left. Sax. ȝteor, signifies high, particularly in authority, and would be applied to those officers who had a right to walk on the right side of the ship.

On shipboard the mariners will not leave their *starboard* and larboard, because some one accounts it gibrish. *Bramhall.*

STARBOARD is the right side of the ship when the eye of the spectator is directed forward.

STAR'CH, *n. s.* & *v. a.* } Teut. *starc.* A vis-
STAR'CHED, *adj.* } cous matter used in stiffening linen: to apply starch: stiffened with starch; stiff.

Has he
Disliked your yellow *starch*, or said your doublet
Was not exactly Frenchified?
Fletcher's Queen of Cor.

With *starch* thin laid on, and the skin well stretched, prepare your ground.
Peacham on Drawing.

Her goodly countenance I've seen
Set off with kerchief *starched* and pinners clean.
Gay.

Does the Gospel any where prescribe a *starched* squeezed countenance, a stiff formal gait, or a singularity of manners? *Swift.*

STARCH is a fecula or sediment found at the bottom of vessels wherein wheat has been steeped in water; of which fecula, after separating the bran from it by passing it through sieves, they form a kind of loaves, which, being dried in the sun or an oven, are afterwards cut into little pieces, and so sold. The best starch is white, soft, and friable, and easily broken into powder. Such as require fine starch do not content themselves, like the starchmen, with refuse wheat, but use the finest grain. The process is as follows:—The grain, being well cleaned, is put to ferment in vessels full of water, which they expose to the sun while in its greatest heat; changing the water twice a day, for the space of eight or twelve days according to the season. When the grain bursts easily under the finger, they judge it sufficiently fermented. The fermentation perfected, and the grain thus softened, it is put, handful by handful, into a canvas bag, to separate the flour from the husks; which is done by rubbing and beating it on a plank laid across the mouth of an empty vessel that is to receive the flour. As the vessels are filled with this liquid flour, there is seen swimming at top a reddish water, which is to be carefully scummed off from time to time, and clean water is to be put in its place, which, after stirring the whole together, is also to be strained through a cloth or sieve, and what is left behind put into the vessel with new water, and exposed to the sun for some time. As the sediment thickens at the bottom, they drain off the water four or five times, by inclining the vessel, but without passing it through the sieve. What remains at bottom is the starch, which they cut in pieces to get out, and leave it to dry in the sun. When dry it is laid up for use.

STARCH is commonly made of wheat, and the very best starch can perhaps be made of nothing else. Wheat, however, is too valuable an article of food to be employed as the material of starch, if any thing else will answer the purpose; and it has long been known that an inferior kind of starch may be made of potatoes. Potatoes, however, are themselves a valuable article of food; and it is therefore an object of importance to try if starch may not be made of something still less useful. On the 8th of March, 1796, a patent was granted to lord William Murray for his discovery of a method by which starch may be extracted from horse chestnuts. But the description of the method is too tedious for our admitting it.

Chemically starch may be described as a white, insipid, combustible substance, insoluble in cold water, but forming a jelly with boiling water. It exists chiefly in the white and brittle parts of vegetables, particularly in tuberose roots, and the seeds of graminêous plants. It may be extracted by pounding these parts, and agitating them in cold water; when the parenchyma, or fibrous parts, will first subside; and, these being removed, a fine white powder, diffused through the water, will gradually subside, which is the starch. Or the pounded or grated substance, as the roots of arum, potatoes, acorns, or horse chestnuts, for instance, may be put into a hair-sieve, and the starch washed through with cold water, leaving the grosser matters behind. Farinaceous seeds may be ground and treated in a similar manner. Oily seeds require to have the oil expressed from them before the farina is extracted. If starch be subjected to distillation, it gives out water impregnated with empyreumatic acetous acid, a little red or brown oil, a

great deal of carbonic acid, and carburetted hydrogen gas. Its coal is bulky, easily burned, and leaves a very small quantity of potash and phosphate of lime. If when diffused in water it be exposed to a heat of 60° Fahrenheit, or upward, it will ferment and turn sour; but much more so, if it be not freed from the gluten, extract, and coloring matter. Thus, in starch-making, the farina ferments and becomes sour, but the starch that does not undergo fermentation is rendered the more pure by this process. Some water, already soured, is mixed with the flour and water, which regulates the fermentation, and prevents the mixture from becoming putrid; and in this state it is left about ten days in summer, and fifteen in winter, before the scum is removed, and the water poured off. The starch is then washed out from the bran, and dried, first in the open air, and finally in an oven.

With boiling water starch forms a nearly transparent mucilage, emitting a peculiar smell, neither disagreeable nor very powerful. This mucilage may be dried, and will then be semitransparent and much resembling gum, all the products of which it affords. When dissolved it is much more easily digested and nutritious than before it has undergone this operation. Both acids and alkalis combined with water dissolve it. It separates the oxides of several metals from their solutions, and takes oxygen from many of them. It is found naturally combined with all the immediate principles of vegetables, and may easily be united with most of them by art. When starch is triturated with iodine, it forms combinations of various colors. When the proportion of iodine is small, these compounds are violet; when somewhat greater, blue; and when still greater, black.

We can always obtain the finest blue color, by treating starch with an excess of iodine, dissolving the compound in liquid potash, and precipitating by a vegetable acid. The color is manifested even at the instant of pouring water of iodine into a liquid which contains starch diffused through it. Hence iodine becomes an excellent test for detecting starch; and starch for detecting iodine. Besides these combinations, it appears that there is another of a white color, in which the iodine exists in very small quantity. All of them possess peculiar properties, which have been described by MM. Colin and Gauthier Claubry (Annal. de Chimie, xc. 92), and M. Pelletier (Bulletin de Pharmacie, vi. 289).

Starch is not affected in the cold, by water, alcohol, or ether. But it dissolves readily when triturated with potash water. When to the solution of starch in hot water, we pour in a boiling hot solution of sub-nitrate of lead, and leave the mixture for a considerable time at rest, a precipitate falls, which is found after washing and drying to consist of 100 starch and 38·89 protoxide of lead.—Berzelius, Ann. de Chimie, xcv. 82. Starch is convertible into sugar by dilute sulphuric acid. To produce this change we must take 2000 parts of starch, diffuse them in 8000 parts of water, containing forty parts of strong oil of vitriol; and boil the mixture for thirty-six hours in a basin of silver or lead, taking care to stir the materials with a wooden rod during the first hour of ebullition. At the end of this time the mass having become liquid, does not require to be stirred, except at intervals. In proportion as the water evaporates, it ought to be replaced. When the liquor has been sufficiently boiled, we must add to it chalk and animal charcoal; then clarify with white of egg, filter the mixture through a flock of wool, and then concentrate the liquid till it has acquired a syrupy consistence. After this the basin must be removed from the fire, in order that, by cooling, the greater part of the sulphate of lime may fall down. The pure syrup is now to be decanted off, and evaporated to the proper dryness. The greater the quantity of acid employed, the less ebullition is required to convert the starch into the saccharine matter. —Vogel, Ann. de Chimie, lxxxii. 148.

The discovery of the preceding process is due to M. Kirchoff of St. Petersburgh. M. Th. de Saussure has ascertained that no gas is given off during the operation; that the access of air is not essential to it; that the sulphuric acid is not decomposed; and that 100 parts of starch produce 110·14 of sugar.

The presence of sulphuric acid is not indispensable for obtaining sugar from starch. It may also be obtained by leaving the starch to itself, either with or without contact of air, or by mixing it with dried gluten. At the same time, indeed, several other products are formed. M. Th. de Saussure's interesting observations on this subject are published in the Annales de Chimie et de Physique, xi. 379. The starch, brought to the state of a pulpy mass, must be left to spontaneous decomposition. The products are, 1st, a sugar, like the sugar of grapes; 2d, gum, like that from roasted starch; 3d, amidine, a body whose properties are intermediate between those of starch and gum; and, 4th, an insoluble substance like ligneous matter. In these experiments, the mass on which he operated was made by pouring twelve parts of boiling water on one of starch. When it was fermented by dry gluten, he obtained—

	Without contact of air.	With contact of air.
Sugar . .	47·4	49·7
Gum . .	23·0	9·7
Amadine . .	8·9	5·2
Amilaceous lignin	10·3	9·2
Lignin with charcoal,	A trace	0·3
Undecomposed starch	4·0	3·8

Potatoe starch differs perceptibly from that of wheat; it is more friable; is composed of ovoid grains about twice the size of the other; it requires a lower temperature to reduce it into a jelly with water; it is soluble in more dilute alkaline leys, and is less readily decomposed by spontaneous fermentation. It also contains more hygrometric water; for 100 parts of it dried at the temperature of boiling water lost 16·41 parts of water; whilst wheat starch lost by the same process only 13·66. They had both been previously exposed for some time to a dry atmosphere, at the heat of 72·5° Fahrenheit. Starch is composed of—

	Gay Lussac & Thenard.	Berzelius.	Saussure.
Carbon .	43·55	43·481	45·39
Oxygen .	49·68	49·455	48·31
Hydrogen	6·77	7·064	5·90
	100·00	100·000	99·60
		Azote .	0·4
			100·00

When starch is roasted at a moderate heat in an oven, it is converted into a species of gum, employed by the calico printers. Potatoe starch answers best for this purpose.

M. Caventou considers starch paste made with hot water as containing the same thing as the amidine of M. de Saussure. Salop, according to him, is composed of a little gum, very little starch, and much bassorine. Sago is a uniform substance, soluble in cold water, more so in hot, precipitated blue by iodine, and differing from common starch in the first property. Tapioca seems to be identical in composition with sago. Arrow-root is nearly pure starch, agreeing in all respects with the starch of the potatoe, which may be converted by heat into something similar to sago and tapioca.—Annales de Chimie et Physique, xxxi. 337.

Starch is the principal alimentary substance contained in our bread. In a medical point of view it is to be considered as a demulcent; and accordingly, it forms the principal ingredient of an officinal lozenge in catarrhs, and a mucilage prepared from it often produces excellent effects, both taken by the mouth and in the form of clyster, in dysenteries and diarrhœa, from irritation of the intestines. Milk and starch, with the addition of suet finely shred, and incorporated by boiling, was the soup employed by Sir John Pringle in dysenteries, where the mucous membrane of the intestines had been abraded. Externally, surgeons apply it as an absorbent in erysipelas.

Star Chamber, Court of, (camera stellata), a famous, or rather infamous, English tribunal, said to have been so called either from a Saxon word signifying to steer or govern; or from its punishing the crimen stellionatus, or cosenage; or because the room wherein it sat, the old council-chamber of the palace of Westminster (Lamb. 148) which was afterwards converted into the lottery-office, and forms the east side of New Palace Yard, was full of windows; or (to which Sir Edward Coke, 4 Inst. 66, accedes), because haply the roof thereof was at the first garnished with gilded stars. All these are merely conjectures (for no stars are now in the roof, nor are any said to have remained there so late as the reign of queen Elizabeth); and another conjectural etymology, as far-fetched as any of them, has been derived from starra or starrs, a corruption of the Hebrew word shetar, a covenant; which Jewish covenants, it is alleged, were lodged in this chamber by Richard I. before the Jews were banished. (See Tovey's Angl. Judaic, 32. Selden. Tit. of Hon. ii. 34. Uxor Ebraic. i. 14.) But, whatever was the origin of the name, this court was of very ancient original; but new-modelled by stats. 3 Hen. VII. c. 1, and 21 Hen. VIII. c. 20, consisting of divers lords spiritual and temporal, being privy-counsellors, together with two judges of the courts of common-law, without the intervention of any jury. Their jurisdiction extended legally over riots, perjury, misbehaviour of sheriffs, and other notorious misdemeanors, contrary to the laws of the land. 'Yet this was afterwards,' says lord Clarendon, 'stretched to the asserting of all proclamations and orders of state; to the vindicating of illegal commissions and grants of monopolies; holding for honorable that which pleased, and for just that which profited; and becoming both a court of law to determine civil rights, and a court of revenue to enrich the treasury; the council-table by proclamations enjoining to the people that which was not enjoined by the laws, and prohibiting that which was not prohibited; and the star-chamber, which consisted of the same persons in different rooms, censuring the breach and disobedience to those proclamations by very great fines, imprisonments, and corporal severities: so that any disrespect to any acts of state, or to the persons of statesmen, was in no time more penal, and the foundations of right never more in danger to be destroyed.' For which reasons it was finally abolished by stat. 16 Car. I. c. 10, to the general joy of the whole nation. See King's Bench. There is in the British Museum (Harl. MSS. vol. I. No. 126) a very full account of the constitution and course of this court, compiled by William Hudson of Gray's Inn, an eminent practitioner therein. A short account of the same, with copies of all its process, may also be found in 18 Rym. Foed. 192, &c.

STA'RE, *v. n.* } Sax. ꝼeaꝼian; Belg. and
Sta'rer, *n. s.* } Teut. *sterren*. To look with fixed eyes; expressing wonder, impudence, confidence, stupidity, or horror: to stare in the face is to be undeniable: a stare is a fixed look: starer corresponds.

Their *staring* eyes sparkling with fervent fire,
And ugly shapes, did nigh the man dismay,
That, were it not for shame, he would retire.
Spenser.

Look not big, nor *stare* nor fret:
I will be master of what is mine own. *Shakspeare.*

They were never satisfied with *staring* upon their masts, sails, cables, ropes, and tacklings. *Abbot.*

I hear
The tread of many feet steering this way;
Perhaps my enemies, who come to *stare*
At my affliction, and perhaps to insult.
Milton's Agonistes.

A satyr, that comes *staring* from the woods,
Must not at first speak like an orator. *Waller.*

And, while he *stares* around with stupid eyes,
His brows with berries and his temples dyes.
Dryden.

What dost thou make a shipboard?
Art thou of Bethlem's noble college free,
Stark *staring* mad, that thou shouldst tempt the sea?
Id.

Break out in crackling flames to shun thy snare,
Or hiss a dragon, or a tyger *stare*. *Id. Virgil.*

Why dost thou not
Try the virtue of that gorgon face,
To *stare* me into statue? *Dryden.*

Is it possible for people without scruple to offend against the law which they carry about them in indelible characters, and that *stares* them in the face whilst they are breaking it? *Locke.*

Take off all the *staring* straws and jaggs in the hive, and make them smooth.
Mortimer's Husbandry.

The wit at his elbow gave him a touch upon the shoulder, and *stared* him in the face with so bewitching a grin that the whistler relaxed his fibres.
Addison.

She paid a tradesman once, to make him *stare.*
Pope.

One self-approving hour whole years outweighs
Of stupid *starers*, and of loud huzzas. *Id.*

Through nature and through art she ranged,
And gracefully her subject changed:
In vain; her hearers had no share
In all she spoke, except to *stare.* *Swift.*

STARFISH, *n. s.* Star and fish. A fish branching out into several points. See ASTERIAS.

This has a ray of one species of English *starfish.*
Woodward.

STARGARD, an inland town of Pomerania, in a pleasant and fertile district on the river Ihna, which falls, at the distance of twenty miles, into the Oder. It is surrounded with a wall, has three small suburbs. It contains manufactures of woollens, soap, and tobacco; also breweries and distilleries; and exports the corn of the neighbouring country by the Ihna, which is navigable without interruption to the Oder, and the Baltic. Here are several schools for education on the usual plan: also one for teaching mechanical arts, on a more scientific plan than is generally done by masters to their workmen. Stargard suffered severely from war in the sixteenth and seventeenth centuries. In 1758 it was taken by the Russians. Inhabitants about 8600. Twenty-one miles east by south of Stettin.

STARGARD, a lordship of Germany, in the grand duchy of Mecklenburg-Strelitz, which forms a considerable part of that principality. Its superficial extent is 6350 square miles; its population about 60,000. The chief town is Stargard or Old Stargard, a small place with 900 inhabitants. Five miles S. S. E. of New Brandenburg.

STAR-HAWK, or GOS-HAWK. See FALCO.

STARK, *adj.* & *adv.* } Sax. ꝥeꝛc, ꝥꝛꝛac; Teutonic *stark;* Belg. *sterck.* Stiff; strong; rugged: in the highest degree; stiffly; strongly.
STARK'LY, *adv.* }

Then are the best but *stark* naught; for open suspecting others, comes of secret condemning themselves.
Sidney.

His heavy head devoid of careful cark,
Whose senses all were straight benumbed and *stark.*
Spenser.

The fruitful headed beast, amaz'd
At flashing beams of that sun-shiny shield,
Became *stark* blind, and all his senses doz'd,
That down he tumbled. *Id.*

The north is not so *stark* and cold. *Ben Jonson.*

Many a nobleman lies *stark* and stiff
Under the hoofs of vaunting enemies.
Shakspeare. Henry IV.

As fast locked up in sleep as guiltless labour,
When it lies *starkly* in the traveller's bones.
Shakspeare.

Those seditious, that seemed moderate before, became desperate, and those who were desperate seemed *stark* mad; whence tumults, confused hallooing and howlings. *Hayward.*

He is *stark* mad, whoever says
That he hath been in love an hour. *Donne.*

Men and women go *stark* naked. *Abbot.*

They both dance much; and, for more nimbleness, sometimes *stark* naked. *Heylin.*

To turn *stark* fools, and subjects fit
For sport of boys, and rabble wit. *Hudibras.*

Who, by the most cogent arguments, will disrobe himself at once of all his old opinions, and turn himself out *stark* naked in quest of new notions?
Locke.

He pronounces the citation *stark* nonsense.
Collier.

In came squire South, all dressed up in feathers and ribbons, *stark* staring mad, brandishing his sword.
Arbuthnot.

So soon as this spring is become *stark* enough, it breaks the case in two, and slings the seed.
Denham's Physico-Theology.

STARK (John), of Killermont, of an ancient and respectable Scottish family, was a covenanter; and having appeared in arms against his sovereign at the battle of Bothwell bridge, in 1679, became obnoxious to the government, and, to conceal himself, withdrew into Ireland. After residing a few years in the country which he had chosen for the scene of his banishment, he married Elizabeth, daughter of Thomas Stewart, Esq., of Balydrene, in the north of Ireland, decended of the noble family of Galloway. By this lady Mr. Stark had several children; particularly—

STARK (Thomas), his second son, who settled at Manchester as a wholesale linen-draper, and married Margaret Stirling, daughter of William Stirling, Esq., of Northwood side, in the neighbourhood of Glasgow, by whom he had the doctor.

STARK (the Rev. John), another son of the covenanter, was minister of Lecropt, in Perthshire; and, under his care, the doctor, his nephew, upon whom we are chiefly to enlarge, received the rudiments of that education which, from the character of the master, and the relation between him and his pupil, was well calculated to store the mind of Dr. Stark with those virtuous principles which influenced his conduct through life.

STARK (William), M. D., the son of Thomas, grandson of the covenanter, and nephew of the parson, was born at Manchester in July 1740, and educated by his uncle John above mentioned.—From Lecropt young Stark was sent to the university of Glasgow, where, under the tuition of Drs. Smith and Black, he learned the rudiments of science, and acquired that mathematical accuracy and contempt of hypotheses with which he prosecuted all his studies. Having chosen physic for his profession, he removed from the university of Glasgow to that of Edinburgh, where he was soon distinguished, and honored with the friendship of the late Dr. Cullen. Mr. Stark, in 1765, went to London, and devoted himself to the study of physic and surgery; and, looking upon anatomy as the principal pillar of both these arts, he endeavoured to complete with Dr. Hunter what he had begun with Dr. Monro; and under these two eminent professors he appears to have acquired a high degree of anatomical knowledge. He likewise en-

tered about this time a pupil at St. George's hospital; for, being disgusted with the inaccuracy of the most of practical writers, he determined to have, from his own experience, a standard, by which he might judge of the experience of others. With what success he prosecuted this plan, may be seen in a series of Clinical and Anatomical Observations made by him during his attendance at the hospital, and published after his death by his friend Dr. Carmichael Smyth. Whilst attending the hospital, he likewise employed himself in making experiments on the blood, and other animal fluids; and also in a course of experiments in chemical pharmacy; but these experiments have not yet been published. In 1767 Mr. Stark went to Leyden, and took the degree of M. D., publishing an inaugural dissertation on the dysentery. On his return to London he recommenced his studies at the hospital. In 1769 he commenced a series of Experiments on Diet, which he was encouraged to undertake by Sir John Pringle and Dr. Franklin, from whom he received many hints respecting the plan and its execution. But the imprudent zeal with which he prosecuted these, proved, in the opinion of his friends, fatal to himself; for he began them on the 12th of July 1769, in perfect health and vigor, and from that day, though his health varied, it was seldom if ever good, till the 23d of February 1770, when he died, after suffering much uneasiness. His biographer Dr. Smyth thinks that other causes, particularly chagrin and disappointment, had no small share in hastening his death; but his opinion seems not well-founded; for the pernicious effects of the experiments are visible in Dr. Stark's own journal. When he entered upon them, his body weighed twelve stone three pounds avoirdupois, which in a very few days was reduced to eleven stone ten pounds eight ounces: and it continued on the whole to decrease till the day of his death. This can excite no wonder. Though the professed object of his experiments was to prove that a pleasant and varied diet is equally conducive to health with a more strict and simple one, most of the dishes which he ate during these experiments were neither pleasant nor simple, but compounds, such as every stomach must nauseate. He began with bread and water; from which he proceeded to bread, water, and sugar; then to bread, water, and oil of olives; then to bread and water with milk; afterwards he tried bread and water with roasted goose; bread and water with boiled beef; stewed lean of beef with the gravy and water without bread; stewed lean of beef with the gravy, oil of fat, or suet and water; flour, oil of suet, water, and salt; flour, water, and salt; and a number of others infinitely more disagreeable to the stomach; such as bread, fat of bacon ham, and bread or flour with honey and the infusion of rosemary. Dr. Stark's experiments certainly indicate eccentricity of genius; but had the doctor calculated the effects of starvation upon the animal system, with the accuracy of the celebrated Napier the inventor of the logarithms, who was his ancestor, by both parents, he would have put a stop to them in time. But these experiments, of which a full account is given along with his clinical and anatomical observations, display an uncommon degree of fortitude, perseverance, self-denial, and zeal for the promoting of useful knowledge in their author; and, with respect to his moral character, Dr. Smyth with great justice compared him to Cato, by applying to him what was said of that virtuous Roman by Sallust:—'Non divitiis cum divite, neque factione cum factioso; sed cum strenuo virtute, cum modesto pudore, cum innocente abstinentia, certabat; esse quam videri bonus malebat.'—*Sallust. Bell. Cat.*

STARK, a county of the east part of Ohio, United States, which has Harrison and Tuscarawa counties on the south, Columbiana and Wayne counties on the east, and Portage on the north. The first settlement of this county commenced in 1806: since which time the emigration has equalled, if not surpassed, any thing ever witnessed in any part of the state. In 1815 the population was estimated at 9450.

STARKENBURG, one of the three large provinces of the grand duchy of Hesse-Darmstadt. It lies between the Rhine and the Maine, the one forming the west, the other the north boundary. Its extent is about 1060 square miles; population nearly 200,000. It forms the southern part of the grand duchy, contains the Bergstrass and one of the most picturesque parts of Germany. The vegetables consist of wheat, barley, oats, and flax; also of the fruits of the kind usual in this latitude, among which, in favorable situations, are vines. Offenbach is the only manufacturing place in the province. The chief town is Darmstadt, the capital of the principality; but the province takes its name from a castle situated on an eminence in the Bergstrass, near the town of Heppenheim. See HESSE-DARMSTADT.

STAR'LING, *n. s.* Sax. ſtæɼlinɡ; Lat *sturnus.* A small singing bird.

I will have a *starling* taught to speak
Nothing but Mortimer, and give it him,
To keep his anger still in motion.

Shakspeare. Henry IV.

STARLING. See STURNUS.

STARLINGS, or STERLINGS, the name given to the strong pieces of timber which were driven into the bed of the river to protect the piles, on the top of which were laid the flat beams upon which were built the bases of the stone-piers that support the arches of London bridge. In general, starlings are large piles placed on the outside of the foundation of the piers of bridges, to break the force of the water, and to protect the stonework from injury by floating ice. They are otherwise called jettes, and their place is often supplied by large stones thrown at random round the piers of bridges, as may be seen at Stirling bridge when the river is low; and as was done by Mr. Smeaton's direction round the piers of the centre arch of London bridge, when it was thought in danger of being undermined by the current. See SMEATON.

STARNINA (Gerard), an historical painter, born at Florence in 1354. He was a disciple of Venetiano, and was much employed and patronized by Alphonso XI. king of Castile. He died in 1403.

STAROSITY. The government of a castle; the same with capitaneate.

STAR'RING, *adj.* Lat. *stellans*, from star. Shining with stellar light; blazing with sparkling light.

STAR-SHOOT, or STAR-SHOT, a gelatinous substance often found in fields, and supposed by the vulgar to have been produced from the meteor called a falling-star: but, in reality, the half-digested food of herons, sea-mews, and the like birds; which have been found, when shot, to disgorge a substance of the same kind.

STAR-STONES, in the old mineralogy, fossil stones, resembling radiated stars, with a greater or smaller number of rays in the different species: they are usually found about an inch in length, and of the thickness of a goose-quill. Some have five angles or rays, others only four; in some the angles are equidistant, in others irregularly so: in some they are short and blunt, in others long, narrow, and pointed; and some have their angles very short and obtuse. The several joints in the same specimen are usually all of the same thickness; but in some they are larger at one end, and in others at the middle, than in any other part of the body; and some species have one of the rays bifid, so as to emulate the appearance of a six-rayed kind. See ASTERIA.

START, *v. n.*, *v. a.*, & *n. s.*
START'ER, *n. s.*
START'INGLY, *adv.*
STAR'TLE, *v. n.*, *v. a.*, & *n. s.*
START'UP, *n. s.*
} Teut. *startzen*; Belgic, *sterten*. To feel a sudden and involuntary twitch of the animal frame; hence to rise or move suddenly; to wince; shrink; deviate; set out on a race or pursuit: as a verb active to alarm; make to fly; rouse; hence to discover; put suddenly out of place: a start is a sudden motion or twitch, fit or sally; act of starting: 'to get the start' is, to get off before another: a starter either one who suddenly shrinks from his purpose or, by a singular mutation of language, one who first moves a question or objection: the adverb corresponds with start and startle: to startle is, to shrink: to affright; shock; deter; cause to deviate: a startle, a sudden shock or alarm: a startup, one who comes suddenly into notice.

The present occasion has *started* the dispute amongst us. *Lesley.*

The lords and gentlemen take all the meaner sort upon themselves; for they are best able to bring them in, whensoever any of them *starteth* out.
Spenser on Ireland.

There *started* up, in queen Elizabeth's reign, a new presbyterian sect, which tendered a form of discipline to the queen and to the state. *Whitgifte.*

A shape appeared
Bending to look on me: I *started* back,
It *started* back. *Shakspeare.*

What trick, what *starting* hole, can'st thou find out, to hide thee from this open shame?
Id. Henry IV.

Direness familiar to my slaught'rous thoughts,
Cannot once *start* me. *Shakspeare.*

The blood more stirs,
To rouse a lion than to *start* a hare. *Id.*

These flaws and *starts* would well become
A woman's story at a winter's fire,
Authorized by her grandam. *Shakspeare.*

How much had I to do to calm his rage!
Now fear I this will give it *start* again. *Id. Hamlet.*

Thou art like enough through vassal fear,
Base inclination, and the *start* of spleen,
To fight against me under Percy's pay. *Shakspeare.*

Methought her eyes had crossed her tongue;
For she did speak in *starts* distractedly. *Id.*

You stand like greyhounds in the slips,
Straining upon the *start*. *Id. Henry V.*

Get the start of the majestick world.
Id. Julius Cæsar.

Why do you speak so *startingly* and rash?
Id. Othello.

That young *start up* hath all the glory of my overthrow. *Shakspeare.*

Starting is an apprehension of the thing feared, and in that kind it is a motion of shrinking; and likewise an inquisition, in the beginning, what the matter should be, and in that kind it is a motion of erection; and, therefore, when a man would listen suddenly to any thing, he *starteth*; for the *starting* is an erection of the spirits to attend.
Bacon's Natural History.

If a man deal with another upon conditions, the *start* of first performance is all. *Bacon.*

All pretorian courts, if any of the parties be laid asleep, under pretence of arbitrement, and the other party during that time doth cautelously *get the start* and advantage at common law, yet the pretorian court will set back all things in statu quo prius.
Bacon's War with Spain.

Both cause the string to give a quicker *start*.
Bacon.

All leapt to chariot,
And every man then for the *start* cast in his proper lot. *Chapman.*

Thy forms are studied arts,
Thy subtile ways be narrow straits,
Thy curtesy but sudden *starts*,
And what thou call'st thy gifts are baits.
Ben Jonson.

An open enemy to flattery, especially from a friend, from whom he *started* to meet the slightest appearance of that servile kindness. *Fell.*

Doubtless some other heart
Will *get the start*;
And, stepping in before,
Will take possession of the sacred store
Of hidden sweets. *Crashaw.*

The flowers, called out of their beds,
Start and raise up their drowsy heads. *Cleaveland.*

What exception can possibly be *started* against this stating? *Hammond*

Th' old drudging sun from his long-beaten way
Shall at thy voice *start* and misguide the day;
The jocund orbs shall break their measured pace,
And stubborn poles change their allotted place.
Cowley.

Should some god tell me, that I should be born
And cry again, his offer I should scorn;
Ashamed, when I have ended well my race,
To be led back to my first *starting* place. *Denham.*

I rank him with the prodigies of fame,
With things which *start* from nature's common rules,
With bearded infants, and with teeming mules.
Creech.

They would find occasions enough, upon the account of his known affections to the king's service, from which it was not possible to remove or *startle* him. *Clarendon.*

Such whispering waked her, but with *startled* eye
On Adam. *Milton.*

To hear the lark begin his flight,
And singing *startle* the dull night
From his watch-tower in the skies,
Till the dappled dawn doth rise. *Id.*

Stand to it boldly, and take quarter,
To let thee see I am no *starter*. *Hudibras.*
Ere the night could do his part,
The squire had *got* so much *the start*,
H' had to the lady done his errand,
And told her all his tricks aforehand. *Id.*

The reason why the mathematicks and mechanick arts have so much *got the start* in growth of other sciences, may be resolved into this, that their progress hath not been retarded by that reverential awe of former discoveries. *Glanville.*

Charmed by these strings, trees *starting* from the ground,
Have followed with delight the powerful sound. *Roscommon.*

Fair course of passion, where two lovers *start*,
And run together, heart still yoked with heart. *Waller.*

It seems to be rather a terminus a quo than a true principle, as the *starting* post is none of the horse's legs. *Boyle.*

The sensual men agree in pursuit of every pleasure they can *start*. *Temple.*

As his doubts decline,
He dreads just vengeance and he *starts* at sin. *Dryden.*

They *starting* up beheld the heavy sight. *Id.*

A spirit fit to *start* into an empire,
And look the world to law. *Id. Cleomene.*

The fright awakened Arcite with a *start*;
Against his bosom bounced his heaving heart. *Dryden.*

She might have forsaken him if he had not *got the start* of her. *Id. Æneid. Dedication.*

The *startling* steed was seized with sudden fright,
And, bounding, o'er the pomel cast the knight. *Dryden.*

People, when they have made themselves weary, set up their rest upon the very spot where they *started*. *L'Estrange.*

Nature does nothing by *starts* and leaps, or in a hurry; but all her motions are gradual. *Id.*

The very print of a fox-foot would have *started* ye. *Id.*

The mind often works in search of some hidden idea, though sometimes they *start* up in our minds of their own accord. *Locke.*

The supposition that angels assume bodies needs not *startle* us, since some of the most ancient and most learned fathers seemed to believe that they had bodies. *Id.*

Incest! Oh name it not!
The very mention shakes my inmost soul:
The gods are *startled* in their peaceful mansions,
And nature sickens at the shocking sound. *Smith.*

How could water make those visible *starts* upon freezing, but by some subtile freezing principle which as suddenly shoots into it? *Grew's Cosmologia Sacra.*

It was unadvisedly done, when I was enforcing a weightier design, to *start* and follow another of less moment. *Sprat.*

After having recovered from my first *startle*, I was very well pleased at the accident. *Spectator.*

The French year has *got the start* of ours more in the works of nature than in the new style. *Addison.*

Why shrinks the soul
Back on herself, and *startles* at destruction? *Id. Cato.*

Are they not only to disguise our passions,
To set our looks at variance with our thoughts,
To check the *starts* and sallies of the soul? *Id.*

Insignificant cavils may be *started* against every thing that is not capable of mathematical demonstration. *Addison.*

An ambiguous expression, a little chagrin, or a *start* of passion, is not enough to take leave upon. *Collier.*

His books had been solemnly burnt at Rome as heretical: some people, he found, were *startled* at it; so he was forced boldly to make reprisals, to buoy up their courage. *Atterbury.*

One, by a fall in wrestling, *started* the end of the clavicle from the sternon. *Wiseman's Surgery.*

I *started* from its vernal bower
The rising game, and chaced from flower to flower. *Pope.*

Might Dryden bless once more our eyes,
New Blackmores and new Milbourns must arise
Nay, should great Homer lift his awful head,
Zoïlus again would *start* up from the dead. *Id.*

She at the summons rolled her eyes around,
And snatched the *starting* serpents from the ground. *Id.*

Keep your soul to the work when ready to *start* aside, unless you will be a slave to every wild imagination. *Watts.*

Now the leaf
Incessant rustles, from the mournful grove
Oft *startling* such as studious walk below,
And slowly circles through the waving air. *Thomson.*

If Sheridan was not the staunchest hound in the pack he was at least the best *starter*. *Delany.*

STARVE, *v. n.* & *v. a.* } Sax. ꝥeapꝑan;
STARVE'LING, *adj.* & *n. s.* } Belg. *sterven;* Goth. *starva.* To perish; be destroyed: particularly to perish with hunger or cold; be killed with cold; suffer extreme destitution: as a verb active to kill with hunger, or cold; deprive of force or vigor: starveling is hungry; lean; a thin or lean animal; a pining wretch.

Have I seen the naked *starve for* cold,
While avarice my charity controlled? *Sandys.*

Thy desires
Are wolfish, bloody, *starved*, and ravenous. *Shakspeare.*

If I hang, I'll make a fat pair of gallows; for old sir John hangs with me, and he's no *starveling*. *Id.*

Now thy alms is given, the letter's read;
The body risen again, the which was dead;
And thy poor *starveling* bountifully fed. *Donne.*

To her came message of the murderment,
Wherein her guiltless friends should hopeless *starve*. *Fairfax.*

From beds of raging fire to *starve* in ice
Their soft ethereal warmth, and there to pine
Immoveable, infixed, and frozen round. *Milton.*

He would have worn her out by slow degrees,
As men by fasting *starve* the untamed disease. *Dryden.*

The fat ones would be making sport with the lean, and calling them *starvelings*. *L'Estrange.*

Were the pains of honest industry, and of *starving* with hunger and cold, set before us, no body would doubt which to chuse. *Locke*

The powers of their minds are *starved* by disuse, and have lost that reach and strength which nature fitted them to receive. *Id.*

The thronging clusters thin
By kind avulsion; else the *starveling* brood,
Void of sufficient sustenance, will yield
A slender autumn. *Philips.*

Hunger and thirst, or guns and swords,
Give the same death in different words·
To push this argument no further,
To *starve* a man in law is murther. *Prior.*

An animal that *starves of* hunger, dies feverish and delirious. *Arbuthnot.*

Had the seeds of the pepper-plant been borne from Java to these northern countries, they must have *starved* for want of sun.
Woodward's Natural History.

Sometimes virtue *starves* while vice is fed:
What then? is the reward of virtue bread? *Pope.*

If they had died through fasting, when meat was at hand, they would have been guilty of *starving* themselves. *Id.*

Poor *starveling* bard, how small thy gains!
How unproportioned to thy pains! *Swift.*

All Europe must agree
Ten *starveling* hermits suffer less than he. *Cowper.*

STATE, *n. s.* & *v. a.* STATE'LY, *adj.* & *adv.* STATE'LINESS, *n. s.* STATES'MAN, STATES'WOMAN, STA'TIST. Fr. *etate;* Lat. *status.* Condition; circumstances of nature or fortune; crisis; height: hence national dignity or rank; signiory; estate; possession: dignity: a commonwealth; civil power; to regulate or settle condition or terms: to represent circumstantially: stately is august; grand; magnificent: used by Milton as an adverb: the noun substantive following corresponding: a statesman is one versed in arts of government; a politician: a stateswoman, a politician in petticoats: a statist is a statesman.

The same criminal may be absolved by the church and condemned by the *state;* absolved or pardoned by the *state,* yet censured by the church.
Lesley.

If such actions may have passage free,
Bond-slaves and pagans shall our *statesmen* be.
Shakspeare. Othello.

This chair shall be my *state,* this dagger my sceptre, and this cushion my crown.
Id. Henry IV.

Fair dame, I am not to you known,
Though in your *state* of honour I am perfect.
Shakspeare.

My thought, whose murther yet is but fantastical,
Shakes so my single *state* of man, that function
Is smothered in surmise. *Id. Macbeth.*

I do believe,
Statist though I am none or like to be,
That this shall prove a war. *Id. Cymbeline.*

A *statelier* pyramid to her I'll rear,
Than Rhodope's or Memphis' ever was.
Id. Henry VI.

These regions have abundance of high cedars, and other *stately* trees casting a shade.
Raleigh's History.

I am no courtier, nor versed in *state* affairs: my life hath rather been contemplative than active.
Bacon.

Over the chair is a *state* made round of ivy, somewhat whiter than ours; and the *state* is curiously wrought with silver and silk. *Id.*

She instructed him how he should keep *state,* and yet with a modest sense of his misfortunes.
Id. Henry VII.

The *state* hath given you licence to stay on land for the space of six weeks. *Bacon.*

It is better the kingdom should be in good estate, with particular loss to many of the people, than that all the people should be well, and the *state* of the kingdom altogether lost. *Hayward.*

High *state* the bed is where misfortune lies.
Fairfax.

It looks grave enough
To seem a *statesman.* *Ben Jonson.*

A *state's* anger
Should not take knowledge either of fools or women.
Id.

How she was in debt, and where she meant
To raise fresh sums: she's a great *stateswoman! Id.*

It is a bad exchange to wound a man's own conscience, thereby to *state* sores. *King Charles.*

Were our case *stated* to any sober heathen, he would never guess why they who acknowledge the necessity of prayer, and confess the same God, may not ask in the same form. *Decay of Piety.*

This is so *stated* a rule that all casuists press it in all cases of damage. *Id.*

Strong was their plot,
Their *states* far off, and they of wary wit. *Daniel.*

What he got by fortune,
It was the *state* that now must make his right. *Id.*

No *state* can be named wherein any part of the body of those imperial laws hath the just force o a law, otherwise than as custom hath particularly induced it. *Selden.*

Their sins have the aggravation of being sins against grace, and forsaking and departing from God; which respect makes the *state* of apostates, as the most inexcuseable, so the most desperately dangerous *state.* *Hammond.*

Many other inconveniences are consequent to this *stating* of this question; and particularly that, by those which thus *state* it, there hath never yet been assigned any definite number of fundamentals.
Id. On Fundamentals.

The swan rows her *state* with oary feet. *Milton.*

He many a walk traversed
Of *stateliest* covert, cedar, pine, or palm. *Id.*

Ye that *stately* tread or lowly creep. *Id.*

I do not
Infer as if I thought my sister's *state*
Secure. *Id.*

The bold design
Pleased highly those infernal *states.* *Id.*

Their orators thou then extollest, as those
The top of eloquence, *statists* indeed,
And lovers of their country.
Id. Paradise Regained.

Since they all live by begging, it were better for the *state* to keep them. *Graunt.*

Its present *state stateth* it to be what it now is.
Hale.

He was staid, and in his gait
Preserved a grave majestick *state.* *Butler.*

The deer, that endureth the womb but eight months, and is complete at six years, cannot live much more than thirty, as having passed two general motions, that is, its beginning and increase; and having but two more to run through, that is its *state* and declination. *Browne's Vulgar Errours.*

I found the whole city highly concerned for the hazardous *state* of Candia, which was lost soon after. Dominico Cantarini, the present duke, was sedulous in that affair. *Browne's Travels.*

When in triumphant *state* the British muse,
True to herself, shall bab'rous aid refuse.
Roscommon.

For *stateliness* and majesty what is comparable to a horse? *More's Antidote against Atheism.*

For you we staid, as did the Grecian *state*
Till Alexander came. *Waller.*

Such cheerful modesty, such humble *state,*
Moves certain love. *Id.*

Keep the *state* of the question in your eye.
Boyle.

They feared nothing from a *state* so narrow in compass of land, and so weak, that the strength of

their armies has ever been made up of foreign troops. *Temple.*

Agenor, glad such punctual ready bliss
Did on his own design itself obtrude,
Swelled his vast looks to bigger *stateliness.*
Beaumont's Psyche.

Council! What's that? a pack of bearded slaves,
The scavengers that sweep *state* nuisances,
And are themselves the greatest.
Dryden's Cleomenes.

These are the realms of unrelenting fate;
And awful Rhadamanthus rules the *state;*
He hears and judges. *Id. Æneid.*

Relate what Latium was;
Declare the past and present *state* of things. *Id.*

He maintains majesty in the midst of plainness, and is *stately* without ambition, which is the vice of Lucan. *Id.*

Let my attendants wait; I'll be alone:
Where least of *state,* there most of love is shown.
Id.

To *state* it fairly, imitation is the most advantageous way for a translator to shew himself, but the greatest wrong which can be done to the memory of the dead. *Id.*

She hated *stateliness;* but wisely knew
What just regard was to her title due. *Betterton.*

Absolute power is not a plant that will grow in this soil; and *statesmen,* who have attempted to cultivate it here, have pulled on their own and their master's ruin. *Davenant.*

It is a weakness which attends high and low; the *statesman* who holds the helm, as well as the peasant who holds the plough. *South.*

Truth, like a *stately* dome, will not show herself at the first visit. *Id.*

We may collect the excellency of the understanding then by the glorious remainders of it now, and guess at the *stateliness* of the building by the magnificence of its ruins. *Id.*

Several objects may innocently be ridiculed, as the passions of our *stateswomen.* *Addison.*

A British minister must expect to see many friends fall off, whom he cannot gratify; since, to use the phrase of a late *statesman,* the pasture is not large enough. *Id.*

He is capable of corruption who receives more than what is the *stated* and unquestioned fee of his office. *Id.*

At home surrounded by a servile crowd,
Prompt to abuse, and in detraction loud,
Abroad begirt with men, and swords, and spears,
His very *state* acknowledging his fears. *Prior.*

To appear in their robes would be a troublesome piece of *state.* *Collier.*

This is to *state* accounts, and looks more like merchandize than friendship. *Id. On Friendship.*

I pretended not fully to *state,* much less demonstrate, the truth contained in the text. *Atterbury.*

The brain was her study, the heart her *state* room.
Arbuthnot.

Tumours have their several degrees and times; as beginning, augment, *state,* and declination.
Wiseman.

The corruption of a poet is the generation of a *statesman.* *Pope.*

Can this imperious lord forget to reign,
Quit all his *state,* descend, and serve again?
Id. Statius.

Like the papist's is your poet's *state,*
Poor and disarmed. *Pope.*

Here Britain's *statesmen* oft the fall foredoom
Of foreign tyrants, and of nymphs at home. *Id.*

I am accused of reflecting upon great *states*-folks.
Swift.

Thus have his prayers for others altered and amended the *state* of his own heart. *Law.*

Though I don't pretend to *state* the exact degree of mischief that is done by it, yet its plain and natural tendency to do harm is sufficient to justify the most absolute condemnation of it. *Id.*

He will consider, not what arts, or methods, or application will soonest make him richer and greater than his brethren, or remove him from a shop to a life of *state* and pleasure; but will consider what arts, what methods, what application can make worldly business most acceptable to God, and make a life of trade a life of holiness, devotion, and piety. *Id.*

States, or Estates, a term applied to several orders or classes of people assembled to consult of matters for the public good.

States General was the name of the ci-devant assembly consisting of the deputies of the seven United Provinces. These were usually thirty in number, some provinces sending two, others more; and, whatever resolution the states general took, must be confirmed by every province, and by every city and republic in that province, before it had the force of a law. The deputies of each province had only but one voice, and were esteemed as but one person, the votes being given by provinces: each province presided in the assembly in its turn, according to the order settled among them; Guelderland first, then Holland, &c.

States of Holland were the deputies of eighteen cities, and one representative of the nobility, constituting the states of the province of Holland: the other provinces have likewise their states, representing their sovereignty; deputies from which make what they call the states-general. In an assembly of the states of a particular province one dissenting voice prevents their coming to any resolution.

States, United See America.

STATICE, thrift, or sea pink, in botany, a genus of plants belonging to the class pentandria, order pentagynia; natural order forty-eighth, aggregatæ: cal. monophyllous, entire, folded, and scariose. There are five petals with one superior seed. There are twenty-two species, viz. 1. S. armeria; 2. aurea; 3. cordata; 4. eschinus: 5. echioides; 6. ferulacea; 7. flexuosa; 8. incana; 9. limonium; 10. linifolia; 11. lobata; 12. minuta; 13. monopetala; 14. mucronata; 15. pruinosa; 16. pseud-armeria; 17. purpurata; 18. reticulata; 19. sinuata; 20. speciosa; 21. suffruticosa; and, 22. Tartarica. Of these, three species are natives of Britain, viz:—

1. S. armeria, thrift or sea gilly-flower, has a simple naked stem, about six inches high. The radical leaves are like grass. The flowers are terminal, pale red, with a round head, and not very large. This plant flowers in July or August, and grows in meadows near the sea.

2. S. limonium, sea-lavender. The stem is naked, branched, and about a foot high. The radical leaves are long, pointed, and grow on foot-stalks. The flowers are blue, and grow on long spikes on the tops of the branches. It grows on the sea-coast in South Britain.

3. S. reticulata, matted sea-lavender. The stem is prostrate, and terminated by a panicle of

flowers. The branches are naked, barren, and bent back. The leaves are wedge-shaped. This species are also found on the sea-coast of South Britain.

STA'TICS, *n. s.* } Gr. στατικη; Fr. *sta-*
STA'TICAL, *adj.* } *tique.* The science which considers the weight of bodies: the adjective corresponding.

A man weigheth some pounds less in the height of winter, according to experience, and the *statick* aphorisms of Sanctorius. *Browne's Vulgar Errours.*

If one by a *statical* engine could regulate his insensible perspiration, he might often, by restoring of that, foresee, prevent, or shorten a fit of the gout. *Arbuthnot on Diet.*

This is a Catholick rule of *staticks*, that if any body be bulk for bulk heavier than a fluid it will sink to the bottom; and if lighter it will float upon it, having part extant, and part immersed, as that so much of the fluid as is equal in bulk to the immersed part be equal in gravity to the whole. *Bentley.*

STATICS is a term which the modern improvements in the arts have made necessary to introduce into physico-mathematical science. It was found convenient to distribute the doctrines of universal mechanics into two classes, which required both a different mode of consideration and different principles of reasoning. Till the time of Archimedes little science of this kind was possessed by the ancients, from whom we have received the first rudiments. His investigation of the centre of gravity, and the theory of the lever, are the foundations of our knowledge of common mechanics; and his theory of the equilibrium of floating bodies contains the greatest part of our hydrostatical knowledge. But it was as yet limited to the simplest cases; and there were some in which Archimedes was ignorant, or was mistaken. The marquis Guido Ubuldi, in 1578, published his Theory of Mechanics, in which the doctrines of Archimedes were well explained and considerably augmented. Stevinus, the celebrated Dutch engineer, published about twenty years after an excellent System of Mechanics, containing the chief principles which now form the science of equilibrium among solid bodies. In particular, he gave the theory of inclined planes, which was unknown to the ancients, though it is of the very first importance in almost every machine. He even states in the most express terms the principle, afterwards made the foundation of the whole of mechanics, and published as a valuable discovery by Varignon, viz. that three forces, whose directions and intestines are as the sides of a triangle, balance each other. His theory of the pressure of fluids, or hydrostatics, is no less estimable, including every thing that is now received as a leading principle in the science. When we consider the ignorance, even of the most learned of that age, in mechanical or physico-mathematical knowledge, we must consider those performances as the works of a great genius, and we regret that they are so little known, being lost in a crowd of good writings on those subjects which appeared soon after. Hitherto the attention had been turned entirely to equilibrium, and the circumstances necessary for producing it. Mechanicians indeed saw that the energy of a machine might be somehow measured by the force which could be opposed or overcome by its intervention; but they did not remark that the force which prevented its motion, but did no more than prevent it, was an exact measure of its energy, because it was in immediate equilibrio with the pressure exerted by that part of the machine with which it was connected. If this opposed force was less, or the force acting at the other extremity of the machine was greater, the mechanicians knew that the machine would move, and that work would be performed; but what would be the rate of its motion, or its performance, they hardly pretended to conjecture. They had not studied the action of moving forces, nor conceived what was done when motion was communicated. The great Galileo opened a new field of speculation, in his work on Local Motion. He there considers a change of motion as the indication and exact and adequate measure of a moving force; and he considers every kind of pressure as competent to the production of such changes.—He contented himself with the application of this principle to the motion of bodies by the action of gravity, and gave the theory of projectiles, which remains to this day without change, and only improved by considering the changes which are produced in it by the resistance of the air. See PROJECTILES.

Sir Isaac Newton took up this subject nearly as Galileo had left it. For, if we except the theory of the centrifugal forces arising from rotation, and the theory of pendulums published by Huygens, hardly any thing had been added to the science of motion. Newton considered the subject in its utmost extent; and in his mathematical principles of natural philosophy he considers every conceivable variation of moving force, and determines the motion resulting from its action. His first application of these doctrines was to explain the celestial motions: and the magnificence of this subject caused it to occupy for a while the whole attention of the mathematicians. But the same work contained propositions equally conducive to the improvement of common mechanics, and to the complete understanding of the mechanical actions of bodies. Philosophers began to make these applications also. They saw that every kind of work which is to be performed by a machine may be considered abstractedly as a retarding force; that the impulse of water or wind, which are employed as moving powers, act by means of pressures which they exert on the impelled point of the machine; and that the machine itself may be considered as an assemblage of bodies moveable in certain limited circumstances, with determined directions and proportions of velocity. From all these considerations resulted a general abstract condition of a body acted on by known powers. And they found that, after all conditions of equilibrium were satisfied, there remains a surplus of moving force. They could now state the motion which will ensue, the new resistance which this will excite, the additional power which this will absorb; and they at last determined a new kind of equilibrium, not thought of by the ancient mechanicians, between the resistance to the machine performing work and the moving power, which

exactly balance each other, and is indicated, not by the rest, but by the uniform motion of the machine. In like manner, the mathematician was enabled to calculate that precise motion of water which would completely absorb, or, in the new language, balance the superiority of pressure by which water is forced through a sluice, a pipe, or canal, with a constant velocity. Thus the general doctrines of motion came to be considered in two points of view, according as they balanced each other in a state of rest or of uniform motion. These two ways of considering the same subject required both different principles and a different manner of reasoning. The first has been named statics, as expressing that rest which is the test of this kind of equilibrium. The second has been called dynamics, or universal mechanics, because the different kinds of motion are characteristic of the powers or forces which produce them. A knowledge of both is indispensably necessary for acquiring any useful practical knowledge of machines; and it was ignorance of the doctrines of accelerated and retarded motions which made the progress of practical mechanical knowledge so very slow and imperfect. The mechanics, even of the moderns, before Galileo, went no further than to state the proportion of the power and resistance which would be balanced by the intervention of a given machine, or the proportion of the parts of a machine by which two known forces may balance each other. This view of the matter introduced a principle which even Galileo considered as a mechanical axiom, viz. that what is gained in force by means of a machine is exactly compensated by the additional time which it obliges us to employ. This is false in every instance, and not only prevents improvement in the construction of machines, but leads us into erroneous maxims of construction. The true principles of dynamics teach us that there is a certain proportion of the machine, dependent on the kind and proportion of the power and resistance, which enables the machine to perform the greatest possible work. It is highly proper therefore to keep separate these two ways of considering machines, that both may be improved to the utmost, and then to blend them together in every practical discussion. Statics therefore is preparatory to the proper study of mechanics; but it does not hence derive all its importance. It is the sole foundation of many useful parts of knowledge. This will be best seen by a brief enumeration. 1. It comprehends all the doctrines of the excitement and propagation of pressure through the parts of solid bodies, by which the energies of machines are produced. A pressure is exerted on the impelled point of a machine, such as the float-boards or buckets of a mill-wheel. This excites a pressure at the pivots of its axle, which act on the points of support. This must be understood, both as to direction and intensity, that it may be effectually resisted. A pressure is also excited at the acting tooth of the cog-wheel on the same axle, by which it urges round another wheel, exciting similar pressures on its pivots and on the acting tooth perhaps of a third wheel. Thus a pressure is ultimately excited in the working part of the machine, perhaps a wiper, which lifts a heavy stamper, to let it fall again on some matter to be pounded. Now statics teaches us the intensities and direction of all those pressures, and therefore how much remains at the working point of the machine unbalanced by resistance. 2. It comprehends every circumstance which influences the stability of heavy bodies; the investigation and properties of the centre of gravity; the theory of the construction of arches, vaults, and domes; the attitudes of animals. 3. The strength of materials, and the principles of construction, so as to make the proper adjustment of strength and strain in every part of a machine, edifice, or structure of any kind. Statics therefore furnishes us with what may be called a theory of carpentry, and gives us proper instructions for framing floors, roofs, centres, &c. 4. Statics comprehends the whole doctrine of the pressure of fluids, whether liquid or aëriform, whether arising from their weight or from any external action. Hence therefore we derive our knowledge of the stability of ships, or their power of maintaining themselves in a position nearly upright, in opposition to the action of the wind on their sails. We learn on what circumstances of figure and stowage this quality depends, and what will augment or diminish it. See HYDRAULICS.

STATION, *n. s.* } Fr. *station*; Lat. *statio.*
STA'TIONARY, *adj.* } The act of standing; state
STA'TIONER, *n. s.* } of rest; position; employment; office; rank: to fix in a certain rank, or position: the adjective corresponding: a stationer, originally one who had a fixed place for selling paper or books.

Their manner was to stand at prayer, whereupon their meetings unto that purpose on those days had the names of *stations* given them. *Hooker.*

In *station*, like the herald, Mercury,
New lighted on a heaven-kissing hill.
Shakspeare. Timon.

The seditious remained within their *station*, which, by reason of the nastiness of the beastly multitude, might more fitly be termed a kennel than a camp.
Hayward.

To single *stations* now what years belong,
With planets joined, they claim another song.
Creech.

The planets in their *station* listening stood. *Milton.*

Michael in either hand leads them out of Paradise, the fiery serpent waving behind them, and the cherubims taking their *stations* to guard the place. *Id.*

All progression is performed by drawing on or impelling forward some part which was before in *station* or at quiet, where there are no joints.
Browne's Vulgar Errours.

The same harmony and *stationary* constitution, as it happened in many species, so doth it fall out in individuals. *Browne.*

I can be contented with an humbler *station*, in the temple of virtue, than to be set on the pinnacle.
Dryden.

Some modern tragedies are beautiful on the stage, and yet Tryphon the *stationer* complains they are seldom asked for in his shop. *Id.*

No member of a political body so mean, but it may be used in some *station* or other. *L'Estrange.*

By spending this day in religious exercises, we acquire new strength and resolution to perform God's will in our several *stations* the week following.
Nelson.

The fig and date, why love they to remain
In middle *station*, and an even plain;
While in the lower marsh the gourd is found,
And while the hill with olive-shade is crowned?
Prior.

Between the descent and ascent, where the image seemed *stationary*, I stopped the prism, and fixed it in that posture that it should be moved no more.
Newton's Opticks.

With authors, *stationers* obeyed the call;
Glory and gain the industrious tribe provoke,
And gentle Dulness ever loves a joke
Pope's Dunciad.

They believe that common size of the human understanding is fitted to some *station* or other.
Swift.

STATIONARY, in astronomy, the state of a planet when, to an observer on the earth, it appears for some time to stand still, or remain immoveable in the same place in the heavens. For as the planets, to such an observer, have sometimes a progressive motion, and sometimes a retrograde one, there must be some point between the two where they must appear stationary.

STATIONES [Latin], post-offices, in Roman antiquity. See POST.

STATIRA, the daughter of Darius Codomannus, who was taken prisoner, and afterwards married by Alexander; and her sister Drypetis to his friend Hephæstion. After Alexander's death she was barbarously murdered by Roxana, another of Alexander's Persian queens. See MACEDON.

STATISTICAL PHILOSOPHY, a term applied by Sir John Sinclair to that new and important branch of science, statistics: a branch of science, or philosophy, the most useful and comprehensive of all others, as it comprehends indeed every thing interesting and important to mankind here and hereafter. Men of letters, in all ages and nations, have spent much time and labor in investigating the antiquities of their respective countries. The knowledge of these is useful in its place, nor does the science of statistics exclude antiquities; but it is only by a thorough knowledge of the present state of a country and its inhabitants, with their present customs, habits, morals, grievances, and manner of living (which are the chief objects of statistical philosophy), that a country can be improved, or the condition and circumstances of the people ameliorated. See the next article.

STATISTICS [from status, Latin, state, condition, &c.], a new and important branch of science lately introduced. The definition and illustration of the term, and its adjective, we shall give in the words of Sir John Sinclair:—'Many people,' says he, Stat. Acc. vol. XX. p. xiii., 'were at first surprised at my using the new words statistics and statistical, as it was supposed that some term in our own language might have expressed the same meaning. But, in the course of a very extensive tour through the northern parts of Europe, which I happened to take in 1786, I found that in Germany they were engaged in a species of political enquiry to which they had given the name of statistics; and though I apply a different idea to that word, for by statistical is meant, in Germany, an enquiry for the purpose of ascertaining the political strength of a country, or questions respecting matters of state; whereas the idea I annex to the term is an enquiry into the state of a country, for the purpose of ascertaining the quantum of happiness enjoyed by its inhabitants, and the means of its future improvement; yet, as I thought that a new word might attract more public attention, I resolved on adopting it, and I hope that it is now completely naturalised and incorporated with our language.' Impressed with these ideas, Sir John Sinclair commenced, carried on, and completed, the Statistical Account of Scotland, a work perhaps of the greatest magnitude, importance, and public utility, ever attempted by any individual. We shall here only add a few interesting particulars respecting the history and nature of this system of statistical philosophy. On the 25th May, 1790, Sir John circulated among the clergymen of the established church a series of 166 queries, accompanied by a proper circular letter, respecting the following and many other important particulars, in their respective parishes:—'The ancient and modern names of the parish; its situation and extent; number of acres; the soil and surface; nature and extent of the sea-coast; lakes, rivers, islands, hills, rocks, caves, woods, orchards, &c.; climate and diseases; instances of longevity; state of property; number of proprietors, resident and non-resident; mode of cultivation; implements of husbandry; manures; seed-time and harvest; remarkable good and bad seasons; quantity and value of crops; total value of the whole annual produce; total real and valued rent; prices of grain and provisions; quantity of grain and other articles consumed; wages and prices of labor; services exacted or abolished; commerce; manufactures; kelp, its amount, and the number employed in it; fisheries; towns and villages; police; inns and alehouses; roads and bridges; harbours; ferries, and their state; number of ships, vessels, and seamen; state of the church; stipend, manse, glebe, and patron; number of poor; parochial funds, and management; schools, and number of scholars; ancient and present state of population; causes of its increase or decrease; number of families; division of the inhabitants, by their birth places, ages, religious persuasions, occupations, and situation in life; residence, in town, village, or country; number of houses, inhabited or uninhabited; number of dove-cots, and to what extent they are destructive to the crops; number of horses, cattle, sheep, and swine, with their nature and value; minerals; mineral springs; fuel; eminent men; antiquities; parochial records; miscellaneous observations; character of the people; manners, customs, stature, &c.; advantages and disadvantages; means by which their situation could be meliorated.' Sir John, having received a number of returns to these queries in 1790, commenced the work, in January 1791, by printing statistical accounts of the first four parishes he had received, and dispersing 1000 extra copies of them with a second circular letter among the clergy. By such great and continued exertions, the first volume was published on the 25th May, 1791, and gave very general satisfaction. It is unnecessary to detail the history of every volume

of this important work. After writing many thousand letters, urging the clergy to transmit their accounts, Sir John found that on the 1st of June, 1792, no less than 413 accounts were still wanting. From the beginning of the publication the public-spirited baronet had devoted the profits of the work to the Society for the Benefit of the Sons of the Clergy. He had also, by the recommendation of Mr. Secretary Dundas, procured his majesty's royal grant of £2000 to that society. Still, however, a great number of the clergy continued dilatory in giving in their statistical reports, though the measure was publicly approved and recommended by the general assembly; as well as by the duke of Argyle, the earl of Leven, the earl of Fife, and other great men and patrons in the church. Sir John, however, being determined to complete the work, sent statistical missionaries to those parts of the kingdom from which he had received no returns; and thus, 'at last,' says he, 'on the 1st day of January 1798, or seven years, seven months, and seven days, from the commencement of the attempt, an account of every parish in Scotland was either given in, or might be relied on in a few days.' Sir John adds, in a note (p. xix.) 'only four accounts were wanting on that day.' The important work, unparalleled in the annals of literature,—the work of an individual who had the courage and perseverance to procure the assistant exertions of above 900 of the most learned men in the nation,—was completed by the publication of the twenty-first volume on the 20th May 1799. 'If similar surveys,' says the founder of British statistics—we say British, because the Parliamentary survey of England and Wales, in 1801, was also a suggestion of Sir John Sinclair's—'were instituted in the other kingdoms of Europe, it might be the means of establishing, on sure foundations, the principles of that most important of all sciences, viz. political or statistical philosophy; that is, the science which, in preference to every other, ought to be held in reverence. No science can furnish, to any mind capable of receiving useful information, so much real entertainment; none can yield such important hints for the improvement of agriculture, for the extension of commercial industry, for regulating the conduct of individuals, or for extending the prosperity of the state; none can tend so much to promote the general happiness of the species.' We have only to add that Sir John, in his twenty-first volume, announces that it is his 'intention, as soon as leisure from other pursuits will admit of it, to draw up the result of the whole enquiry in a publication, to be entitled Analysis of the Political State of Scotland, with a view of the Principles of Statistical Philosophy.'

STATIVA Castra, in archaiology, standing camps. The ancient Romans accustomed their troops to remain occasionally under canvass, both in winter and summer; but these encampments were of short duration. At first they were only for a single night, and they were then named lodgments: but if they lasted several nights they were called stativa. The winter camps were always better supplied with provisions and warlike stores than the summer ones. Whilst Rome was governed by emperors their armies were constantly in the field, or encamped upon the frontiers of the empire, both in peace and war. They were certainly less considerable in the first than in the latter instance, and they always remained in the camp during the winter as well as the summer months. Particular care was taken to have these camps well fortified, and abundantly provided with stores and provisions.

STATIUS (Cæcilius), a comic poet who flourished in the age of Ennius. He was a native of Gaul, and originally a slave. Of course his Latinity was bad, yet he acquired great reputation by his comedies. He died about A. A. C. 160, a few years after Ennius.

Statius (Publius Papinius), a celebrated Latin poet of the first century, born at Naples. He was the son of Statius, a native of Epirus, who went to Rome to teach poetry and eloquence, and had Domitian for his scholar. Statius the poet also obtained the favor and friendship of that prince; and dedicated to him his Thebais in twelve books, and Achilles in two. He died at Naples about the year 100. Besides the above poems there are also still extant his Sylvæ, in five books; the style of which is purer, more agreeable, and more natural, than that of his Thebais and Achilles.

STATOR, a surname of Jupiter, among the Romans, given him by Romulus, because he stopped their flight in a battle with the Sabines. Romulus built a temple to Jupiter Stator.—Liv. i. c. 12.

STATORES, in Roman antiquity, posts. See Post.

Statuary (statuaire, Fr. vide statue). A sculptor. Although this latter word applies to the most elevated practisers of the art, which indeed derives its name therefrom, yet it seems desirable, even in common usage, to distinguish the sculptor who makes statues from him whose skill is chiefly displayed in architectural or other ornaments. The Latins used the word statuarius to designate the artist who made figures in bronze In this sense it is employed by Pliny, who denominates the artist working in marble sculptor or marmorum sculptor. This distinction appears to be just. The author of a bronze statue is not a sculptor, but a modeller. Statuary, in its general sense, is the art of casting or carving statues. Phidias was the greatest statuary among the ancients, and Michael Angelo among the moderns.

Statuary, a branch of sculpture, employed in the making of statues. See Sculpture, and Statue. Statuary is one of those arts wherein the ancients surpassed the moderns; and indeed it was much more popular, and more cultivated, among the former than the latter. It is disputed between statuary and painting which of the two is the more difficult and the more artful.

STA'TUE, *n. s.* & *v. a.* } Fr. *statue;* Lat.
STA'TUARY, *n. s.* } *statua.* An image; solid representation of any living being: to place as a statue: a statuary is one who makes statues; also the art of making them.

The princess heard of her mother's *statue*, a piece many years in doing, and now newly performed by that rare Italian master. *Shakspeare. Winter's Tale.*

Thou shalt be worshipped, kissed, loved, and adored;
And, were there sense in his idolatry,
My substance should be *statued* in thy stead.
Shakspeare.

Architects propounded unto Alexander to cut the mountain Athos into the form of a *statue*, which in his right hand should hold a town capable of containing ten thousand men, and in his left a vessel to receive all the water that flowed from the mountain.
Wilkin's Mathematical Magick.

The northern nations, that overwhelmed it by their numbers, were too barbarous to preserve the remains of learning more carefully than they did those of architecture and *statuary*. *Temple.*

A *statue* of Polycletus, called the rule, deserves that name for having so perfect an agreement in all its parts, that it is not possible to find a fault in it.
Dryden's Dufresnoy.

On other occasions the *statuaries* took their subjects from the poets. *Addison.*

How shall any man, who hath a genius for history, undertake such a work with spirit and chearfulness, when he considers that he will be read with pleasure but a very few years? This is like employing an excellent *statuary* to work upon mouldering stone. *Swift.*

A Statue is defined to be a piece of sculpture in full relievo, representing a human figure. Daviler more scientifically defines statue a representation, in high relievo and insulate, of some person distinguished by his birth, merit, or great actions, placed as an ornament in a fine building, or exposed in a public place, to preserve the memory of his worth. In Greece, one of the highest honors to which a citizen could aspire was to obtain a statue. Statues are formed with the chisel, of several matters, as stone, marble, plaster, &c. They are also cast of various kinds of metal, particularly gold, silver, brass, and lead. For the method of casting statues, see Foundry. Statues are usually distinguished into four kinds: 1. Those less than the life; of which kind we have several statues of great men, of kings, and of gods themselves. 2. Those equal to the life; in which manner the ancients, at the public expense, used to make statues of persons eminent for virtue, learning, or the services they had done. 3. Those that exceed the life; among which those that surpassed the life once and a half were for kings and emperors; and those double the life for heroes. 4. Those that exceeded the life twice, thrice, and even more, and were called colossuses. See Colossus. Every statue resembling the person whom it is intended to represent is called statua iconica. Statues acquire various other denominations. 1. Thus the allegorical statue is that which, under a human figure or other symbol, represents something of another kind; as a part of the earth, a season, age, element, temperament, hour, &c. 2. Curule statues are those which are represented in chariots drawn by bigæ or quadrigæ, that is, by two or four horses; of which kind there are several in the circuses, hippodromes, &c., or in cars, as we see some, with triumphal arches, on antique medals. 3. Equestrian statue, that which represents some illustrious person on horseback, as that famous one of Marcus Aurelius at Rome; that of king Charles I. at Charing-Cross; king George II. in Leicester Square, &c. 4. Greek statue denotes a figure that is naked and antique; it being in this manner the Greeks represented their deities, athletæ of the Olympic games, and heroes; the statues of heroes were particularly called Achillean statues, by reason of the great number of figures of Achilles in most of the cities of Greece. 5. Hydraulic statue is any figure placed as an ornament of a fountain or grotto, or that does the office of a jet d'eau, a cock, spout, or the like, by any of its parts, or by any attribute it holds: the like is to be understood of any animal serving for the same use. 6. Pedestrian statue, a statue standing on foot; as that of king Charles II. in the Royal Exchange, and of king James II. in the Privy gardens. 7. Roman statue is an appellation given to such as are clothed, and which receive various names from their various dresses. Those of emperors with long gowns over their armour were called statuæ paladutæ; those of captains and cavaliers with coats of arms thoracatæ; those of soldiers with cuirasses loricatæ; those of senators and augurs trabeatæ; those of magistrates with long robes togatæ; those of the people with a plain tunica tunicatæ; and lastly, those of women with long trains stolatæ. In repairing a statue cast in a mould they touch it up with a chisel, graver, or other instrument, to finish the places which have not come well off: they also clear off the barb, and what is redundant in the joints and projectures.

Statue, in sculpture and statuary, a work of sculpture or modelling which represents the figure of a man or woman in full relief. The word is sometimes applied likewise to figures of animals executed in the same manner. In the most remote ages we find indications that several eastern nations possessed the art as well as practice of making and of erecting statues, but the Grecians were the first people who executed them skilfully. In the first place, the several heathen deities were represented by human figures, and after awhile the heroes of antiquity were also sculptured forth, and subsequently living characters of eminence, or such as had recently expired. These statues were erected in the public places to which the citizens generally resorted, to the end that the memory of the great men might be perpetuated. In the sequel, this particular taste became so widely spread that there was no other branch of the fine arts to which equal attention was paid.

In the early times of the republic, Rome possessed but a small number of statues of gods and distinguished men. After having, however, accomplished the conquest of Greece, and at different epochs transported from that country to Rome a great number of Grecian statues, the taste for this kind of performance became by degrees so ardent and general that, according to the expression of an ancient author, they were able to count at one particular period more statues in the imperial city than inhabitants! They did not content themselves with raising statues to deceased worthies, but awarded that honor to sundry living characters of merit. It was very customary among them to erect statues upon the tombs of their deceased patriots or chiefs; and such veneration was felt for the statues of their princes that the law prohibited a master from

punishing an offending slave who had sought refuge near the statue of an emperor. In the age of Tiberius it was a kind of crime to have merely changed a garment before his statues. The erection of statues of public men is by no means equally common in our days: but it is not the less important.

A statue, when it is intended to perpetuate the recollection of a man estimable for his patriotism or merit, should be placed in some conspicuous spot, where it would be most likely to attract the observation of the people. Mere resemblance of feature is by no means the only, or even the principal desideratum in a statue; it should display in a striking manner the elevation of soul, the grandeur of character, which might have rendered the object worthy of calling forth the exercise of the sculptor's chisel. Whether he might have been distinguished by probity and benevolence, or by intrepidity in the midst of dangers, or by any other elevated virtue, the expression of this should be preserved in the statue. Many of the statues of antiquity, which express the ideal of great characters, or of divinities, prove that the art of the sculptor is fully equal to this task. Indeed a considerable number of them are merely allegorical representations of various abstract qualities and properties. It is thus that Jupiter is the image of severe majesty joined to goodness; and Pallas that of the most consummate wisdom, &c. The general character of a man may be more justly gathered when he is in a state of repose than when agitated by any particular and transitory passion; and according to this theory it is fair to presume that a tranquil attitude is best adapted to express the prevailing character of the personage represented by a statue. This opinion, however, is to be received with some reservation, although the ancients will be found to have generally adopted it.

It will not, we suspect, be deemed a questionable affirmation that a fine statue is one of the most beautiful productions of genius and of art. The Greeks admired Phidias even more than any other of their illustrious men. The critical examination of a statue requires no inconsiderable portion of knowledge, taste, and skill. The first point to which the attention of the critic should be directed is the marble, from a careful scrutiny of which, the period when the statue was made may often be ascertained. For instance, the certainty that any given statue is of marble of Luna renders it evident that its age cannot be anterior to that of Augustus, since it was under that prince's reign the Luna quarries were discovered. The critic should proceed to take the exact measure of the statue; to describe its attitude; to indicate what restorations it might have undergone; to decide whether it is the representation of a divinity or hero, or simply of some distinguished ancient, &c. &c. It is also desirable that he should be acquainted with its history, traditional or otherwise, the authors who have mentioned it, the period of its discovery, the different prints engraved of it, &c.

The principal works in which the student will find representations of the most celebrated statues are the following:—J. B. Carollerii, Antiquæ Statuæ, Rome, 1585, fol. J. J. De Rubeis, Insigniores Statuarum urbis Romæ Icones, Rome, 1645, 4to. Maffei, Raccolta di Statue Antiche e Moderne, Rome, 1707, fol. La Galeria Giustianea.—Vetera Monumenta quæ in hortis cœlimontanis et in ædibus Matthœorum adservantur, 3 vols. fol. Rome, 1770—9. Zanetti, Delle antiche Statue Greche e Romane che nell' Antisala della Libreria di San Marco, e in altri luoghi publici di Venezia si Trovano, Venice, 1740, 2 vols. fol. Les Marbres de Dresde, by Le Plat, Dresden, 1733, fol. The first three vols. of Museo Pio Clementino, by Visconti. The third vol. of Museum Capitolinum. Le Musée Napoléon, by Piroli. La Villa Pinciana, and Monumenti Gabini. The Augusteum of M. Becker, &c. &c.

STATU QUO, or STATU QUO PRIUS, i. e. in the same state as before; an expression much used respecting treaties of peace, when all captures are restored, and every thing is put, or agreed to be put, on the same footing as before the war. This would answer extremely well if the lives of all the men murdered on both sides were also restored, without which there can be no real status quo.

STAT'URE, *n. s.* Fr. *stature;* Lat. *statura.* The height of any animal.

A creature who might erect
His *stature,* and upright with front serene
Govern the rest. *Milton.*

What *stature* we attain at seven years we sometimes double, most times come short of at one and twenty. *Browne.*

Foreign men of mighty *stature* came. *Dryden.*

Thyself but dust, thy *stature* but a span;
A moment thy duration, foolish man! *Prior.*

We have certain demonstration from Egyptian mummies, and Roman urns and rings, and measures and edifices, and many other antiquities, that human *stature* has not diminished for above two thousand years. *Bentley's Sermons.*

STAT'UTE, *n. s.* } Fr. *statut;* Lat. *statu-*
STAT'UTABLE, *adj.* } *tum.* A law; edict of the legislature: statutable is according to statute.

Not only the common law, but also the *statutes* and acts of parliament, were specially intended for its benefit. *Spenser.*

Blood hath been shed,
Ere human *statute* purged the general weal
Shakspeare.

There was a *statute* against vagabonds; wherein note the dislike the parliament had of gaoling them as chargeable and pesterous. *Bacon.*

Know the *statutes* of heaven and laws of eternity, those immutable rules of justice. *Tillotson.*

O queen! indulged by favour of the gods
To build a town, with *statutes* to restrain
The wild inhabitants beneath thy reign.
Dryden's Æneid.

I met with one who was three inches above five feet, the *statutable* measure of that club.
Addison's Guardian.

STATUTE more immediately signifies an act of parliament made by the three estates of the realm; and such statutes are either general, of which the courts at Westminster must take notice without pleading them; or they are special and private, which last must be pleaded.

STATUTE, STATUTUM, in English law, has divers significations: First, it signifies an act of parliament; and, secondly, it is a short writing

called a STATUTE-MERCHANT, or STATUTE-STAPLE (see those articles), which are in the nature of bonds, &c., and called statutes, as they are made according to the form expressly provided in certain statutes.

The acts of parliament, statutes, or edicts, made by the king's majesty, by and with the advice and consent of the lords spiritual and temporal and commons in parliament assembled, compose the leges scriptæ, the written laws of the kingdom. The earliest statute of which any record exists is the statute of Gloster, 6. Edw. I., which is entered on a statute roll at the tower. There are six of these rolls, the latest containing the statutes of 12 Edw. IV. The previous statutes of Merton, 20 Hen. III.: Marleberge, 52 Hen. III., and Westminster the first, 3 Edw. I., are found in all printed collections, and in numerous ancient MSS. of the statutes. The general printed collections of the statutes are preceded by Magna Charta, 9 Hen. III., as confirmed and entered on the statute roll of 25 Edw. I., or the charter roll, 28 Edw. I., and that charter has now the force of a statute, and had such force, if not at the time of its being granted, certainly very soon after. The mode of making these statutes is stated under the title 'BILL BROUGHT INTO PARLIAMENT.' To what is there said we may here only add, that the royal assent, when given, is written upon the several acts. That to the end of the third year of Henry VII. the statutes were entered of record in French or Latin: though the bills brought into parliament began to be in English in the time of Henry VI. By 33 Geo. III. c. 13, it is enacted that, when the operation of an act of parliament is not directed to commence from any time specified within it, the clerk of the parliaments shall indorse upon it the day upon which it receives the royal assent (and which, since this act, is added in the printed statutes immediately after the title): and that day shall be the date of its commencement.—This statute has obviated much inconvenience (not to say injustice) which arose from the former maxim, that an act of parliament operated from the first day of the session; the whole session, like the whole term, being considered as one day; and thus many statutes had the force of ex post facto laws.

By 48 Geo. III. c. 106, when bills for continuing temporary acts shall not pass before such acts expire, such acts shall be continued from the time of their expiration, except as to penalties, &c.

The method of citing these acts of parliament is various. Many of our ancient statutes are called after the name of the place where the parliament was held that made them; as the statutes of Merton and Marleberge (Marlborough), of Westminster, Gloucester, and Winchester. Others are denominated entirely from their subject; as the statutes of Wales and Ireland, the Articula Cleri, and the Prærogativa Regis. Some are distinguished by their initial words, a method of citing very ancient: as the statute of Quia Emptores, and that of Circumspecté Agatis. But the most usual method of citing them, especially since the time of Edward II., is by naming the year of the king's reign in which the statute was made, together with the chapter or particular act, according to the numeral order. All the acts of one session of parliament taken together make properly but one statute: and therefore, when two sessions have been held in one year, we usually mention stat. 1, or stat. 2. Thus the bill of rights is cited, as 1 W. & M. stat. 2, c. 2; signifying that it is the second chapter or act, of the second statute (or the laws made in the second session of parliament), in the first year of king William and queen Mary.

These statutes, or acts of parliament, were anciently promulgated by means of exemplifications thereof under the great seal: which were sent to the sheriffs of the several counties, with writs requiring them to be published in such places of the county as the sheriffs thought fit. Writs of this nature appear annexed to the statutes on the statute rolls in the Tower from 6 Edward I. down to the reign of Henry V. Not very long after that time printing came into use, and then the statutes of each session were printed at the end of the session, and thus made known to the public; though proclamations were not entirely superseded in particular instances til a much later date. See the stat. 25 Hen. VIII. c. 22. The earliest sessional publications of statutes was that of the acts passed in the first and only parliament of Richard III. From that time until the year 1796 these sessional publications were the only mode of promulgation adopted; and these were not generally obtainable, except by private purchase, the delivery of them being confined to about 1100 copies (issued at the public cost) to the members of each house of parliament, the privy council, and some great officers of state. In consequence of several reports made by committees of the house of commons specially appointed to consider of the promulgation of the statutes, 5500 copies are now distributed throughout the United Kingdom of Great Britain and Ireland, to the houses of parliament, great officers and departments of state, public libraries, courts of justice, sheriffs, municipal magistrates, and clerks of the peace. By stat. 41 Geo. III. c. 90, it is enacted that the statutes printed by the king's printer, in Great Britain and Ireland respectively, shall be evidence of all such statutes prior to the union in 1801.

An edition of the Statutes of the Realm, from original records and authentic MSS., was undertaken in the year 1801, under the authority of the commissioners on the public records in Great Britain. The first volume, containing the statutes from 20 Henry III. to the end of the reign of Edward III., preceded by a complete collection of the Charters of Liberties, from Henry I. to Edward III., was published in 1811. The second volume, including the statutes from Richard II. to the end of Henry VII., appeared in 1816. These two volumes contain the whole of what may be termed the ancient part of the statute law.—A long Introduction with an appendix thereto, prefixed to the first volume, and the notes throughout that and the second volume, afford information, on the subject of statute law, not much known even to the best lawyers of the present day. The preface to the quarto edition of the statutes, published by the king's printer,

subsequent to the Union, and two prefaces prefixed to the first volume of the Collection of Statutes, in 10 vols. 4to., from Magna Charta to 1801, also published by the king's printer, will be found useful, with reference to the history of former printed editions of the statutes.—The authentic collection has been continued by the commissioners on the records, by subsequent volumes, to the reign of William III.; from which time the sessional collections printed by the king's printers are sufficiently accessible. Two volumes of the acts of parliament of Scotland have also been printed by the same commissioners. The commissioners on the records of Ireland are about in like manner to publish an authentic collection of the acts of the parliaments of Ireland.

STATUTE-MERCHANT, in law, is a bond of record acknowledged before the clerk of the statutes-merchant, and lord mayor of the city of London, or two merchants assigned for that purpose; and before the mayors of other cities and towns, or the bailiff of any borough, &c.; sealed with the seal of the debtor and the king; upon condition that, if the obligor pays not the debt at the day, execution may be awarded against his body, lands, and goods; and the obligee shall hold the lands to him, his heirs and assigns, till the debt is levied.—Terms de la Ley.

Estates by statute-merchant and statute-staple are classed by Blackstone among the species of estates defeasible on condition subsequent; and are said to be very nearly related to the vivum vadium, or estate held till the profits thereof shall discharge a debt liquidated or ascertained. For both the statute-merchant and statute-staple are securities for money; the one entered into before the chief magistrate of some trading town, pursuant to the stat. 13 Edw. I. stat. 3, de mercatoribus, and thence called a statute-merchant; the other pursuant to the stat. 27 Edw. III. c. 9. before the mayor of the staple, that is to say, the grand mart for the principal commodities or manufactures of the kingdom, formerly held by act of parliament in certain trading towns: whence this security is called a statute-staple. They are both securities for debts acknowledged to be due; and originally permitted only among traders, for the benefit of commerce; whereby not only the body of the debtor may be imprisoned, and his goods seized in satisfaction of the debt, but also his lands may be delivered to the creditor, till out of the rents and profits of them the debt may be satisfied. And, during such time as the creditor so holds the lands, he is tenant by statute-merchant or statute-staple. There is also a similar security, the recognizance, in the nature of a statute-staple acknowledged before either of the chief Justices, or (out of term) before their substitutes, the mayor of the staple at Westminster, and the recorder of London; whereby the benefit of this mercantile transaction is extended to all the king's subjects in general, by virtue of the stat. 23 Hen. VIII. c. 6 amended by stat. 8, Geo. I. c. 25; which direct such recognizances to be enrolled and certified into chancery. But these, by the statute of frauds, 29 Car. II. c. 3, are only binding upon the lands. in the hands of bonâ fide purchasers, from the day of their enrolment, which is ordered to be marked on the record. —2 Comm. c. 10, p. 160.

These estates, though sometimes referred to in argument, seem now nearly unknown in practice; but as the law relating to them is in force, and as it may serve to elucidate other subjects by analogy, the following information on the subject has been preserved, as useful to the student, if not to the practitioner. The statute of Acton Burnel, 11 Ed. I. and stat. de mercatoribus, 13 Ed. I. stat. 3, enact, that the merchant shall cause his debtor to appear before the mayor of the city of London, or other city or town, and there acknowledge the debt, &c., by recognizance, which is to be enrolled; the roll whereof must be double, one part to remain with the mayor, and the other with the clerk appointed by the king; and then one of the clerks is to write the obligation, which shall be sealed with the debtor's seal, and that of the king, &c.

By these statutes, if the debt be not paid at the day upon the merchant's account, the mayor is to cause the debtor to be imprisoned, if to be found, and in prison to remain until he hath agreed the debt; and, if the debtor cannot be found, the mayor shall send the recognizance into the Chancery, whence a writ shall issue to the sheriff of the county where the debtor is, to arrest his body, and keep him in prison till he agree the debt; and, within a quarter of a year, his lands and goods shall be delivered to him to pay the debt; but, if the debtor do not satisfy the debt within that time, all his lands and goods shall be delivered to the merchant by a reasonable extent, to hold until the debt is levied thereby; and in the mean time he shall remain in prison; but, when the debt is satisfied, the body of the debtor is to be delivered together with his lands. If the sheriff return a non est inventus, &c., the merchant may have writs to all the sheriffs where he hath any land; and they shall deliver all the goods and lands of the debtor by extent; and the merchant shall be allowed his damage, and all reasonable costs, &c. All the lands in the hands of the debtor, at the time of the recognizance acknowledged, are chargeable (but see stat. 29 Car. II. c. 3, before referred to); though, after the debt is paid, they shall return to grantees, if they are granted away, as shall the rest to the debtor: the debtor or his sureties dying, the merchant shall not take the body of the heir, &c., but shall have his lands until the debt is levied. If the debtor have sureties, they shall be proceeded against in like manner as the debtor; but, so long as the debt may be levied of the goods of the debtor, the sureties are to be without damage. Also the merchant shall, besides the payment of his debt, be satisfied for his stay and detainer from his business. In London, out of the commonalty, two merchants are to be chosen and sworn by this statute, and the seal shall be opened before them, whereof one piece is to be delivered to the said merchants, and the other remain with the clerk; and before these merchants, &c., recognizances may be taken. A fee of 1*d.* per pound is allowed to the clerk for fixing the

king's seal; and a seal is to be provided that shall serve for fairs, &c.; but the statute extends not to Jews.—Cro. Car. 440, 457.

Statutes-merchant were contrived for the security of merchants only, to provide a speedy remedy to recover their debts; but at this day they are used by others who follow not merchandize, and are become one of the common assurances of the kingdom.—Bridg. 21: Owen 82. And all obligations made to the king are of the nature of these statutes-merchant.—12 Rep. 2, 3.

STATUTE-STAPLE is a bond of record, acknowledged before the mayor of the staple, in the presence of all or one of the constables; to this end, says the statute, there shall be a seal ordained, which shall be affixed to all obligations made on such recognizance acknowledged in the staple: this seal of the staple is the only seal the statute requires to attest this contract; but it is no more under the power or disposal of the mayor, than that appointed by the statute-merchant; for, though the statute appoints him the custody of it, yet it is in such a manner, that he cannot affix it to any obligation without their consent, it being to remain in the mayor's hands under the security of their own seals.—2 Roll. Abr. 466: stat. 27 Ed. III. c. 9.

To understand a little of the original and constitution of the staple, and the advantage the nation had by this establishment, we must observe that the place of residence, whither the merchants resorted with their staple commodities, was anciently called estaple, which signifies no more than mart or market: and this was formerly appointed out of the realm, as at Calais, Antwerp, &c., and other ports on the continent, which were nearest to us, and whither the merchants might with safety coast it. 4 Inst. 238. But, besides these staple ports appointed abroad, there were others appointed at home: whither all the staple commodities were carried in order to their exportation, such as London, Westminster, Hull, &c. This was found to be of great use and consequence to the prince in particular, and to the interest and credit of the nation in general; for at these staple ports were the king's customs easily collected, and were by the officers of the staple, at two several payments, returned into the exchequer; besides, at these staples, all merchants' goods were carefully viewed and marked by the proper officers of the staple; and this necessarily avoided the exportation of decayed goods, or ill-wrought manufactures, and consequently fixed a stamp of credit on the merchandizes exported, which, upon the view, always answered the expectation of the buyer. —Maline's Lex Merc. 337, 338.

The staple merchandizes, according to lord Coke, are only wool, woolfells, leather, lead, and tin; others, butter, cheese, and cloths: but whatever they were, the mayor and constables had not only conusance of all contracts and debts relating to them, but they had likewise jurisdiction over the people, and all manner of things touching the staple. This power was given them, lest the merchants should be diverted and drawn from their business and trade, by applying to the common law, and running through the tedious forms of it, for a determination of their differences; and for the greater encouragement of merchants, that they might have all imaginable security in their contracts and dealings, and the most expeditious method of recovering their debts, without going out of the bounds of the staple.—4 Inst. 238. Maline's Lex. Mer. 337. By this it appears that this security was only designed for the merchants of the staple, and for debts only on the sale of merchandises brought thither; yet in time others began to apply it to their own ends, and the mayor and constable would take recognizances from strangers, surmising it was made for the payment of money for merchandises brought to the staple. To prevent this mischief, the parliament, in 23 Hen. VIII., reduced the statute-staple to its former channel, and laid a penalty of £40 on the mayor and constables who should extend the benefit of the statute to any but those of the staple. But though the stat. 23 Hen. VIII. c. 6 deprived them of this benefit, yet it framed the new sort of security known by the name of a recognizance, in the nature of a statute-staple; so called because this act limits and appoints the same process, execution, and advantage, in every particular, as is set down in the statute-staple.—Co. Litt. 290.

A recognizance, therefore, in nature of a statute-staple, as the words of the act declare, is the same with the former, only acknowledged under other persons; for, as the statute runs, the chief justice of the king's bench and common pleas, or, in their absence, out of term, the mayor of the staple, at Westminster, and the recorder of London, jointly together, shall have power to take recognizances for payment of debt in the form set down in the statute. In this, as in the former cases, the king appoints a seal to attest the contract.—Co. Litt. 290, a: 4 Inst. 238: 2 Roll. Abr. 466: Co. Ent. 12. Debt lies as well upon a statute-staple as upon a bond: and a statute acknowledged on lands is a present duty, and ought to be satisfied before an obligation; a debt due on an obligation being but a chose in action, and recoverable by law, and not a present duty by law, as a debt upon a statute, judgment, or recognizance is, upon which present execution is to be taken without farther suit.—Cro. Eliz. 355. 461. 494: 2 Lill. Abr. 536.

But a judgment in a court of record shall be preferred, in case of execution, before a statute: though if one acknowledge a statute, and afterwards confess judgment, if the land be extended thereon, the cognisee shall have a scire facias to avoid the extent upon the judgment. It is otherwise as to goods: for there, he that comes first shall be first served.—6 Rep. 45: 1 Brownl. 37. The cognisor of a statute grants his estate to the cognisee; by this the execution of the statute will be suspended.—2 Cro. 424. But if the cognisee, before execution of a statute, release to the cognisor all his right to the land, it will not be a discharge of the whole execution; for, notwithstanding, he may sue execution of his body and goods.—3 Shep. Abr. 326. Upon a statute-staple, a capias and extent of lands, goods, and chattels, are contained in one writ; but it is not so on a statute-merchant.—Jenk

Cent. 163. In chancery, the proceedings on a statute-staple are in the petty-bag office; and statutes-staple are suable in the king's bench or common pleas, as well as in chancery.—Cro. Eliz. 208. Chancery will give relief against an infant in case of a statute-staple, though it is not extendible against him at law.—1 Lev. 198. On a statute's being satisfied, it is to be vacated by entering satisfaction, &c. Statutes-staple and statutes-merchant are to be entered within six months, or shall not be good against purchasers.—Stat. 27 Eliz. c. 4.—See stat. 16 & 17 Car. II. c. 5, for preventing delays and extending statutes.

He that is in possession of lands on a statute-merchant, or staple, is called tenant by statute-merchant, or statute-staple, during the time of his possession: and creditors shall have freehold in the lands of debtors, and recovery by novel disseisin, if put out; but if tenant by statute-merchant or statute-staple hold over his term, he that hath right may sue out a venire facias ad computand, or enter, as upon an elegit.—Stat. 27 Edw. III. c. 9.

STAUBBACH, a celebrated cataract of Switzerland, in the canton of Bern, near Lauterbrunnen, which rushes down a precipice 930 feet high with the most tremendous impetuosity and noise, dispersing the water in a grand spray, and occasioning a kind of tempest by the agitation of the air. The brook from which this torrent rises is named Kupfer Bachlein, or Rivulet of copper.

STAVE, *v. a.* & *v. n.* From staff, in the plural staves. To break in pieces: used originally of barrels made of small parts or staves: to push off; to furnish with staves: as a verb neuter (obsolete) to fight with staves.

The seared disorders that might ensue thereof have been an occasion that divers times all the wine in the city hath been *staved.* *Sandys's Travels.*

This was the shameful end of Aloysus Grittus, Solyman's deputy in Hungary; who, climbing too fast up the evil *staved* ladder of ambition, suddenly fell, and never rose more. *Knolles.*

How can they escape the contagion of the writings, whom the virulency of the calumnies have not *staved* off from reading? *Ben Jonson.*

Equal shame and envy stirred
I' the enemy, that one should beard
So many warriours, and so stout,
As he had done, and *staved* it out. *Hudibras.*

If an irreverent expression, or a thought too wanton, are crept into my verses, let them be *staved* or forfeited like contrabanded goods. *Dryden.*

The condition of a servant *staves* him off to a distance; but the gospel speaks nothing but allurement, attraction, and invitation. *South.*

STAVELEY (Thomas), esq., a learned English writer, born at Cussington, in Leicestershire, and educated at Cambridge. He entered councillor in 1654. In 1664 he published the Romish Horse Leech, and the History of Churches. He died in 1683.

STAVEREN, a town of Holland, and the most ancient of Friesland, supposed to have been built one year before the commencement of the Christian era, and to have taken its name from an ancient idol, worshipped by the inhabitants called Stavon. Great part of the ancient town having been destroyed by the sea, the inhabitants rebuilt it in the place where it now stands, as being less exposed. It was anciently a very rich, powerful, and populous city, with the best harbour in that country. The ancient kings of Friesland made it their ordinary residence, in a palace built by Richolde, the first king, about the year 400. Radbode VI., after he had conquered all the country as far as Utrecht, called his conquests the kingdom of Staveren, which shows the flourishing state of the town at that time, and was the occasion of its being included in the league of the German Hanse towns. It was surrounded with walls and ditches, about the year 339, by Obidalde VI., duke of Friesland. It is since reduced very much from its ancient grandeur, the harbour being choaked up; however there remains enough of its former splendor to make it a considerable town; and they still carry on some trade, especially in fishing, and in passage boats over the pools and lakes of the neighbourhood. In 1799 the town was taken by a British fleet; forty miles north of Amsterdam. Lat. 52° 56′ N., long. 5° 16′ E.

STAUNTON (sir George Leonard), bart., a modern traveller, was a native of the county of Galway in Ireland. He was destined for the medical profession, with a view to which he studied at Montpelier, and took the degree of M.D. About 1762 he established himself in practice in the island of Grenada in the West Indies, where he obtained the patronage of lord Macartney, who made him his secretary; and he likewise held the office of attorney-general, till the taking of that island by the French. His lordship, being appointed governor of Madras, took Mr. Staunton with him to the East Indies, where he was employed in the arrest of general Stuart, who had opposed the authority of the governor. He also induced the French admiral Suffren to suspend hostilities before Gondelour; and negociated a treaty with Tippoo Saib. Returning to England, the East India Company repaid his services with a pension of £500. a-year, the king created him a baronet, and the university of Oxford bestowed on him the diploma of LL.D. When lord Macartney went as ambassador to China, sir George accompanied him as secretary, with the provisional title of envoy extraordinary and minister plenipotentiary. Of that mission and of the empire and people of China he published an account in 1797, 2 vols. 4to., which was translated into French and German. He died in London January 1801.

Staunton, a principal branch of the Roanoke, Virginia, rises on the west side of the Blue Ridge, and has the name of Roanoke, but after its passage through the Blue Ridge it takes that of Staunton, which it retains to its junction with the Dan, on the west border of Mecklenburg county. After the junction it resumes the name of Roanoke.

STAUROLITE, in mineralogy, grenatite, or prismatic garnet.

STAUROTIDE, grenatite, prismatic garnet, or staurolite. Color dark reddish-brown. Only crystallised in forms which may be reduced to a prism of 129° 30′. The following are secondary forms:—a very oblique four-sided prism,

truncated on the acuter lateral edges, forming an unequiangular six-sided prism; the same acutely bevelled on the extremities; and a twin crystal, formed by two perfect six-sided prisms. Splendent, resino-vitreous. Cleavage in the smaller diagonal. Fracture small-grained uneven. Opaque, or translucent. Scratches quartz feebly. Brittle. Specific gravity 3·3 to 3·8. Infusible. Its constituents are, alumina 44, silica 33, lime 3·84, oxide of iron 13, oxide of manganese 1, loss 5·16.—Vauquelin. The geognostic relations of this mineral are nearly the same with those of precious garnet. It occurs in clay-slate near Ardonald, between Keith and Huntly, in Aberdeenshire; and in a micaceous rock at the Glenmalur lead-mines in the county of Wicklow, Ireland.

STAY, *v. n.*, *v. a.*, & *n. s.* STAY'ED, *adj.* STAY'EDLY, *adv.* STAY'EDNESS, *n. s.* STAY'ER, STAY'LACE, STAYS, *plu.* Belg. *staen*; Dan. *stae*. To continue in a place or state; forbear departure, or motion; stop; dwell; belong: as a verb active to repress; withhold; obstruct; delay; hold in place; hold up: as a noun substantive, stand; continuance; obstruction; restraint; a fixed state; prop; support: stayed means settled; fixed; sedate: the adverb and noun substantive following corresponding: a stayer is one who stops, holds, or supports: staylace, the lace of the female stays, a kind of boddice, or waistcoat.

Aaron and Hur *stayed* up his hands, the one on the one side, and the other on the other.
Exod. xvii. 12.

Would ye tarry for them 'till they were grown? would ye *stay* for them from having husbands?
Ruth i. 13.

Because ye trust in oppression, and *stay* thereon, this shall be as a breach ready to fall. *Isa.* xxx. 12.

They call themselves of the holy city, and *stay* themselves upon God. *Id.* xlviii. 2.

They were come upon the *stays*, when one of the sailors descried a galley. *Sidney.*

When she list pour out her larger spright,
She would command the hasty sun to *stay*,
Or backward turn his course. *Spenser.*

For her son,
In her own hand the crown she kept in store,
Till riper years he raught, and stronger *stay*. *Id.*

The joyous Time will not be *stayed*
Unless she do him by the forelock take. *Id.*

Obedience of creatures unto the law of nature is the *stay* of the whole world. *Hooker.*

All that may *stay* their minds from thinking that true which they heartily wish were false, but cannot think it so without some scruple. *Id.*

On this determination we might *stay* ourselves without further proceeding herein. *Id.*

If she do bid me pack, I'll give her thanks,
As though she bid me *stay* by her a week.
Shakspeare.

Put thyself
Into a 'haviour of less fear, ere wildness
Vanish my *staider* senses. *Id. Cymbeline.*

Your ships are *stayed* at Venice. *Shakspeare.*

What surety of the world, what hope, what *stay*,
When this was once a king, and now is clay? *Id.*

Determine
Or for her *stay* or going; the affair cries haste. *Id.*

I'll tell thee my whole device
When I am in my coach which *stays* for us. *Id.*

The Syrens sang to allure them into danger; but Orpheus sang so well that he *staid* them.
Raleigh's History of the World.

When substantialness combineth with delightfulness, and currantness with *stayedness*, how can the language sound other than most full of sweetness?
Camden's Remains.

He did ordain that as many might depart as would; but as many as would *stay* should have very good means to live from the state. *Bacon.*

Whatsoever is above these proceedeth of shortness of memory, or of want of a *stayed* and equal attention. *Id.*

Many just and temperate provisos well showed and foretokened the wisdom, *stay*, and moderation of the king. *Id.*

Perkin Warbeck, finding that when matters once go down the the hill they *stay* not without a new force, resolved to try some exploit upon England. *Id.*

Bones, after full growth, continue at a *stay*; teeth stand at a *stay*, except their wearing. *Id.*

Should judges make a longer *stay* in a place than they usually do, a day in a county would be a very good addition. *Id.*

Affairs of state seemed rather to stand at a *stay* than to advance or decline. *Hayward.*

They flocked in such multitudes that they not only *stayed* for their resort, but discharged divers.
Id.

Who have before, or shall write after thee,
Their works, though toughly laboured, will be
Like infancy or age to man's firm *stay*,
Or early and late twilights to mid-day. *Donne.*

His fell heart thought long that little way,
Grieved with each step, tormented with each *stay*.
Fairfax.

Our ships lay anchor'd close: nor needed we
Fear harme on any *staies*. *Chapman*

Unto the shore, with tears, with sighs, with moan,
They him conduct; cursing the bounds that *stay*
Their willing fleet, that would have further gone.
Daniel.

So long a *stay* will make
The jealous king suspect we have been plotting.
Denham.

My only strength, and *stay!* forlorn of thee,
Whither shall I betake me? where subsist? *Milton.*

I will bring thee where no shadow *stays*
Thy coming, and thy soft embraces. *Id.*

Not after resurrection shall he *stay*
Longer on earth than certain times t' appear. *Id.*

Satan
Throws his steep flight in many an airy wheel,
Nor *stayed*, till on Niphates' top he lights. *Id.*

This seems to our weaker view
O'erlaid with black, *staid* wisdom's hue. *Id.*

I should not be a persuader to them of studying much in the spring, after three years that they have well laid their grounds; but to ride out, with prudent and *staid* guides, to all the quarters of the land.
Milton on Education.

Made of sphere-metal never to decay,
Until his revolution was at *stay*. *Milton.*

Her long with ardent look his eye pursued,
Delighted! but desired more her *stay*. *Id.*

He was well *stayed*, and in his gait
Preserved a grave majestick state. *Hudibras.*

The boiling blood of youth, fiercely agitating the fluid air, hinders that serenity and fixed *staidness* which is necessary to so severe an intenseness.
Glanville's Scepsis.

The injured sea, which from her wonted place,
To gain some acres, avarice did force,
If the new banks neglected once decay,
No longer will from her old channel *stay*. *Waller*

The Thracian youth invades
Orpheus returning from the' Elysian shades,
Embrace the hero, and his *stay* implore. *Id.*

Almighty crowd! thou shorten'st all dispute;
Nor faith nor reason make thee at a *stay*,
Thou leap'st o'er all. *Dryden's Medal.*

If as a prisoner I were here, you might
Have then insisted on a conqueror's right,
And *stayed* me here. *Dryden.*

Alas! what *stay* is there in human state?
And who can shun inevitable fate? *Id.*

Nor will I *stay*
On Amphix, or what deaths he dealt that day. *Id.*

I must *stay* a little on one action which preferred the relief of others to the consideration of yourself. *Id.*

If sometimes he appears too gay, yet a secret gracefulness of youth accompanies his writings, though the *staidness* and sobriety of age be wanting. *Id. Preface to Ovid.*

What pleasure hop'st though in my *stay*,
When I'm constrained and wish myself away? *Dryden.*

When the wine sparkles,
Make haste, and leave thy business and thy care,
No mortal interest can be worth thy *stay*. *Id.*

Weavers, stretch your *stays* upon the weft. *Id.*

Stay, I command you, *stay* and hear me first. *Id.*

Sallows and reeds, for vineyards useful found,
To *stay* thy vines. *Id.*

The flames augment, and *stay*
At their full height; then languish to decay. *Id.*

We for his royal presence only *stay*
To end the rites. *Id.*

I *stay* for Turnus, whose devoted head
Is owing to the living and the dead;
My son and I expect it from his hand. *Id.*

I was willing to *stay* my reader on an argument that appears to me new. *Locke.*

He took nothing but a bit of bread to *stay* his stomach. *Id.*

Nor must he *stay* at home, because he must be back again by one-and-twenty. *Id.*

The father cannot *stay* any longer for the fortune, nor the mother for a new set of babies to play with. *Id.*

With prudent *stay* he long deferred
The rough contention. *Philips.*

To *stay* these sudden gusts of passion
That hurry you from reason, rest assured
The secret of your love lies with me only. *Rowe.*

I am the more at ease in Sir Roger's family because it consists of sober and *staid* persons. *Addison.*

Trees serve as so many *stays* for their vines, which hang like garlands from tree to tree. *Id. on Italy.*

No stubborn *stays* her yielding shape embrace. *Gay.*

Every plant has its atmosphere, which hath various effects on those who *stay* near them. *Arbuthnot on Aliments.*

Stay her stomach with these half hundred plays, till I can procure her a romance big enough to satisfy her great soul with adventures. *Pope.*

Why cease we then the wrath of heaven to *stay*?
Be humbled all. *Id.*

With *stays* and cordage last he rigged a ship,
And, rolled on leavers, launched her in the deep. *Id.*

A *stayed* man and wife are seldom so indolent as not to find consolation in each other. *Id.*

Servants sent on messages *stay* out longer than the message requires. *Swift.*

A *staylace* from England should become a topick for censure at visits. *Id.*

May Jove, the guardian of the capitol,
He, the greater *stayer* of our troops in rout,
Fulfil your hopes, and animate the cohorts. *A. Philips.*

Stay, a large strong rope employed to support the mast on the fore part, by extending from its upper end towards the fore part of the ship, as the shrouds are extended to the right and left, and behind it. See Mast, Rigging, and Shroud. The stay of the fore-mast is called the fore-stay, and reaches from the mast-head toward the bowsprit end: the main stay extends over the forecastle to the ship's stem; and the mizen-stay is stretched down to that part of the main-mast which lies immediately above the quarter-deck: the fore-top-mast stay comes also to the end of the bowsprit, a little beyond the fore-stay: the main-top-mast is attached to the head or hounds of the fore-mast: and the mizen-top-mast stay comes also to the hounds of the main mast; the fore-top-gallant stay comes to the outer end of the jib-boom; and the main-top-gallant stay is extended to the head of the fore-top mast.

Stay Sail, a sort of triangular sail extended upon a stay. See Sail.

STAYNER (sir Richard), was the gallant commander of a ship of war during the protectorate; and, in conjunction with captain Smith, took a Dutch East India ship of 800 tons burden, having on board four chests of silver. In 1656 he was appointed to the command of three frigates, and with this squadron fell in with the Spanish flotilla, consisting of eight sail, of which he captured two, burnt one, sunk another, and drove two on shore. The treasure captured on this occasion amounted to £600,000 sterling, so that Stayner returned to England crowned with glory, and laden with wealth. In the following year he sailed with the fleet, under the command of Blake, for the purpose of intercepting the Spanish West India fleet, which had taken shelter in the bay of Santa Cruz. On reconnoitering the position of the enemy, the English admiral found it impossible to bring off his ships, though he thought they might be destroyed. Stayner was immediately detached to begin the attack, and, being supported by Blake with the remainder of the fleet, the Spaniards were, in a very few hours, driven out of their ships and breast-works. The former were instantly taken possession of by the English, and, as they could not be brought off, they were all set on fire, and burnt to the water's edge. 'The whole action,' says Clarendon, 'was so miraculous, that all men, who knew the place wondered that any sober men, with whatever courage endowed, would ever have undertaken it; and they could hardly persuade themselves to believe what they had done! while the Spaniards comforted themselves with the belief that they were devils, and not men, who had destroyed them in such a manner.' Cromwell thought so highly of the conduct of captain Stayner, that he immediately conferred on him the honor of knighthood. On the restoration, sir Richard Stayner had a command under Montague, afterwards the earl of Sandwich, was again knighted, and was constituted rear-admiral of the fleet. He first hoisted his flag in the

Swiftsure, and afterwards in the Mary. After this, the nation being at peace, no opportunity was offered to this brave man of adding to those services which he had already rendered his country; and it is thought he died very soon after.—Campbell's Lives of the Admirals, vol. iv.

STEAD, *n. s.* & *v. a.* STEAD'FAST, *adj.* STEAD'FASTLY, *adv.* STEAD'FASTNESS, *n. s.* STEAD'ILY, *adv.* STEAD'INESS, *n. s.* STEAD'Y, *adj.* Sax. ȝteȝ; Goth. *stod.* Place; room; position; support; (hence the wooden frame that supports a bed;) aid: to fill the place of another; aid; help; support: steadfast is firm; fixed fast in place: hence firm of character; constant; resolute: steady is also firm; fixed; regular; constant: the respective adverbs and noun substantives corresponding.

There fell down many slain, and they dwelt *in* their *steads* until the captivity. 1 *Chron.* v. 22.

Be faithful to thy neighbour in his poverty; abide *stedfast* unto him in the time of his trouble. *Eeclus.* xxii. 23.

Him resist, *stedfast* in the faith. 1 *Peter* v. 9.

Their feet *steady*, their hands diligent, their eyes watchful, and their hearts resolute. *Sidney.*

We are neither in skill, nor ability of power, greatly to *stead* you. *Id.*

Such was this giant's fall, that seemed to shake
This *stedfast* globe of earth, as it for fear did quake. *Spenser.*

So hard these heavenly beauties be enfired,
As things divine, least passions do impress,
The more of *stedfast* minds to be admired,
The more they stayed be on *stedfastness.* *Id.*

I hope her stubborn heart to bend,
And that it then more *stedfast* would endure. *Id.*

Fly, therefore, fly this fearful *stead* anon,
Lest thy fool hardize work thee sad confusion. *Id.*

The term of life is limited,
Ne may a man prolong nor shorten it;
The soldier may not move from watchful *stead,*
Nor leave his stand until his captain bed. *Id.*

They nigh approached to the *stead*
Where as those maremaids dwelt. *Id. Faerie Queene.*

Laws ought to be like stony tables, plain, *steadfast,* and immoveable. *Id. State of Ireland.*

If we had taken them clean away, or else removed them, so as to place in their *stead* others, we had done worse. *Hooker.*

A complete man hath some parts whereof the want could not deprive him of his essence; yet to have them standeth him in singular *stead* in respect of special uses. *Id.*

It nothing *steads* us
To chide him from our eyes. *Id.*

Rich garments, linens, stuffs, and necessaries,
Which since have *steaded.* *Id. Tempest.*

Can you so *stead* me
As bring me to the sight of Isabella? *Shakspeare.*

We shall advise this wronged maid to *stead* up your appointment, and go in your place. *Id.*

He sails 'tween worlds and worlds with *steady* wing. *Milton.*

Now clear I understand
What oft my *steadiest* thoughts have searched in vain. *Id.*

Nor do the boldest attempts bring forth
Events still equal to their worth;
But sometimes fail, and in their *stead*
Fortune and cowardice succeed. *Butler.*

Jealousy then fired his soul,
And his face kindled like a burning coal;
Now cold despair succeeding in her *stead,*
To livid paleness turns the glowing red. *Dryden.*

The genial bed,
Sallow the feet, the borders, and the *sted.* *Id.*

What form of death could him affright,
Who, unconcerned, with *stedfast* sight
Could view the surges mounting steep,
And monsters rolling in the deep? *Id.*

Steady to my principles and not dispirited with my afflictions, I have, by the blessing of God, overcome all difficulties. *Id. Æneid.*

Steadiness is a point of prudence as well as of courage. *L'Estrange.*

A clear sight keeps the understanding *steady.* *Locke.*

He makes his understanding the warehouse of lumber rather than a repository of truth, which will stand him in *stead* when he has occasion for it. *Id.*

Sin has a tendency to bring men under evils, unless hindered by some accident, which no man can *steadily* build upon. *South's Sermons.*

God's omniscience *steadfastly* grasps the greatest and most slippery uncertainties. *Id.*

Your friendly aid and counsel much may *stead* me. *Rowe.*

A friend is useful to form an undertaking, and secure *steadiness* of conduct. *Collier of Friendship.*

How reverend is the face of this tall pile,
Whose massy pillars rear their aged heads
To bear aloft its arched and ponderous roof,
By its own weight made *steadfast* and immoveable,
Looking tranquillity! it strikes an awe
And terrour on my aking sight. *Congreve.*

So *steadily* does fickle fortune steer
The' obedient orb that it should never err. *Blackmore.*

The smallest act of charity shall stand us in great *stead.* *Atterbury's Sermons.*

John got the better of his choleric temper, and wrought himself up to a great *steadiness* of mind, to pursue his interest through all impediments. *Arbuthnot.*

In general, *stedfastly* believe that whatever God hath revealed is infallibly true. *Wake's Preparation for Death.*

Steer the bounding bark with *steady* toil,
When the storm thickens and the billows boil. *Pope.*

STEAK, *n. s.* Isl. and Erse. *styck,* a piece; Swed. *steka,* to boil. A slice of flesh broiled or fried; a collop.

The surgeon protested he had cured him very well, and offered to eat the first *stake* of him. *Tatler.*

Fair ladies who contrive
To feast on ale and *stakes.* *Swift.*

STEAL, *v. a.* & *v. n.* STEA'LER, *n. s.* STEA'LINGLY, *adv.* STEALTH. *Pret.* I stole; *part. pass.* stolen; Saxon ȝtelan; Belg. *stelen*; Goth. *stela.* To take by theft; take clandestinely, slily, or without right: the derivatives corresponding.

How should we *steal* silver or gold? *Gen.* xlv. 8.

Stolen waters are sweet, and bread eaten in secret is pleasant. *Prov.* ix. 17.

Fixt of mind to avoid further entreaty, and to fly all company, one night she *stole* away. *Sidney.*

They were divers motions, they did so *stealingly* slip one into another, as the latter part was ever in hand before the eye could discern the former was ended. *Id.*

On his back a heavy load he bare
Of nightly *stealths*, and pillage several.
Faerie Queene.

In the secret dark that none reproves,
Their pretty *stealths* shall work, and snares shall spread. *Spenser.*

The law of England never was properly applied to the Irish, by a purposed plot of government, but as they could insinuate and *steal* themselves under the same by their humble carriage and submission. *Id.*

The owner proveth the *stealth* to have been committed upon him by such an outlaw, and to have been found in the possession of the prisoner. *Id. State of Ireland.*

The wisdom of the same spirit borrowed from melody that pleasure, which, mingled with heavenly mysteries, causeth the smoothness and softness of that, which toucheth the ear, to convey, as it were by *stealth*, the pleasure of good things into man's mind. *Hooker.*

Young Lorenzo
Stole her soul with many vows of faith,
And ne'er a true one. *Shakspeare.*

Were it not that my fellow schoolmaster
Doth watch Bianca's steps so narrowly,
'Twere good to *steal* our marriage. *Id.*

Let's shift away; there's warrant in that theft,
Which *steals* itself when there's no mercy left. *Id.*

The transgression is in the *stealer*. *Id.*

A schoolboy, finding a bird's nest, shews it his companion, and he *steals* it. *Id.*

Now withered murder, with his *stealthy* pace,
Moves like a ghost. *Id. Macbeth.*

Thou ran'st a tilt in honour of my love,
And *stol'st* away the ladies' hearts of France. *Shakspeare.*

There are some shrewd contents in yon same paper,
That *steal* the color from Bassanio's cheek;
Some dear friend dead. *Id. Merchant of Venice.*

My lord of Amiens and myself
Did *steal* behind him as he lay along
Under an oak. *Shakspeare.*

I cannot think it,
That he would *steal* away so guilty like,
Seeing you coming. *Id. Othello.*

The most peaceable way, if you take a thief, is to let him shew what he is, and *steal* out of your company. *Shakspeare.*

At time that lovers' flights doth still conceal,
Through Athen's gate have we devised to *steal*. *Id.*

In my conduct shall your ladies come,
From whom you now must *steal* and take no leave. *Id.*

The good humour is to *steal* at a minute's rest.
—Convey, the wise it call; *steal!* a fico for the phrase! *Id.*

I feel this youth's perfections,
With an invisible and subtile *stealth*,
To creep in at mine eyes. *Id. Twelfth Night.*

The *stealth* of mutual entertainment
With character too gross is written on Juliet. *Shakspeare.*

Others, weary of the long journey, lingering behind were *stolen* away; and they which were left, moiled with dirt and mire. *Knolles.*

The vapour of charcoal hath killed many; and it is the more dangerous, because it cometh without any ill smell, and *stealeth* on by little and little. *Bacon's Natural History.*

The gods persuaded Mercury,
Their good observer, to this *stealth*. *Chapman's Iliad.*

Store of cabins are but sluttish dens, that breed sickness in peace, serving to cover *stealths*, and in fight are dangerous to tear men with splinters. *Raleigh.*

A bride
Should vanish from her clothes into her bed,
As souls from bodies *steal*, and are not spied. *Donne.*

A soft and solemn breathing sound
Rose like a stream of rich distilled perfumes
And *stole* upon the air, that even silence
Was took ere she was ware. *Milton.*

The monarch blinded with desire of wealth,
With steel invades his brother's life by *stealth*
Before the sacred altar. *Dryden.*

As wise artists mix their colours so,
That by degrees they from each other go;
Black *steals* unheeded from the neighbouring white,
So on us *stole* our blessed change. *Id.*

Stealing is the taking from another what is his, without his knowledge or allowance. *Locke.*

They hate being alone, for fear some affrighting apprehensions should *steal* or force their way in. *Calamy.*

Now his fierce eyes with sparkling fury glow;
Now sighs *steal* out, and tears begin to flow. *Pope.*

Let humble Allen, with an awkward shame,
Do good by *stealth*, and blush to find it fame. *Id.*

A factor *stole* a gem away. *Id.*

At a time when he had no steward, he *stole* away. *Swift.*

Variety of objects has a tendency to *steal* away the mind from its steady pursuit of any subject. *Watts.*

STEAM, *n. s.* Sax. ꝥeme. The smoke or vapor of any thing moist and hot. See below.

Scarcely had Phœbus in the gloomy east
Got harnessed his fiery-footed team,
Ne reared above the earth his flaming crest
When the last deadly smoke aloft did *steam*. *Spenser.*

Sweet odours are, in such company as there is *steam* and heat, things of great refreshment. *Bacon.*

His offering soon propitious fire from heaven
Consumed, with nimble glance and grateful *steam*. *Milton.*

Ye mists that rise from *steaming* lake. *Id.*

The dissolved amber plainly swam like a thin film upon the liquor, whence it *steamed* away into the air. *Boyle.*

Let the crude humours dance
In heated brass, *steaming* with fire intense. *Philips.*

While the temple smoked with hallowed *steam*,
They wash the virgin. *Dryden.*

See! see! my brother's ghost hangs hovering there
O'er his warm blood, that *steams* into the air. *Id.*

O wretched we! Why were we hurried down
This lubrick and adulterate age;
Nay, added fat pollutions of our own,
To increase the *steaming* odours of the stage? *Id.*

Such the figure of a feast,
Which, were it not for plenty and for *steam*,
Might be resembled to a sick man's dream. *King.*

Some it bears in *steams* up into the air, in such a quantity as to be manifest to the smell, especially the sulphur. *Woodward.*

These minerals not only issue out at these larger exits, but *steam* forth through the pores of the earth, occasioning sulphureous and other offensive stenches. *Id*

STEAM ENGINE.

1. Steam Engine. Steam may justly be considered as the most important prime mover that the ingenuity of man has yet devised, and its utility to a commercial country like Great Britain must be sufficiently obvious. It has enabled us to support a proud superiority both in arts and manufactures, and, from the commercial advantages that have resulted, it has enabled us to fight the battles of freedom in every quarter of the globe.

2. Prior to entering into a detailed history of the steam engine, it may be advisable to furnish our readers with a brief view of the various prime movers that have been employed prior to the invention of this stupendous machine, and we shall thus be the better enabled to form an accurate estimate of its importance. We cannot better do this than by a reference to the introductory portion of Partington's Treatise on the Steam Engine.

3. From the most accurate observations it appears that the physical powers of the human race differ very widely, not only in various individuals, but also in different climates; the value of a man therefore, as a working machine, will not be so great beneath the torrid zone as in the more temperate climate of Europe. This will serve to illustrate the great advantage which our colonists, particularly in the West Indies, would derive from the more general employment of inanimate force; the day labor of a negro in the sugar countries amounting to little more than one-third of that performed by a European mechanic.

4. A laborer, working ten hours per day, can raise in one minute a weight equivalent to 3750 pounds one foot high, or about sixty cubic feet of water in the same time; while the power of a horse, working eight hours per day, may be correctly averaged at 20,000 lbs. Smeaton states that this animal, by means of pumps, can raise 250 hogsheads of water ten feet high in an hour. It is a well known fact also that men, when trained to running, are able on the average of several days being taken, to outstrip the fleetest horse; and yet it will be seen from the above statement that his force, if properly applied, is at least six times that of the most powerful man.

5. The use of water as an impelling power, both for the turning of machinery and other purposes connected with the useful arts, appears to have been known at a very early period. Vitruvius describes a variety of machines for this purpose, the earliest of which were employed merely to raise a portion of the fluid by which they were impelled. The most simple method of applying this element as a mechanical agent evidently consisted in the construction of a wheel, the periphery of which was composed of a number of float-boards. This, on being exposed to the action of a running stream, was afterwards employed to give motion to a variety of mills, and is at the present time employed in almost every species of machinery.

6. Among the most celebrated hydraulic machines we may enumerate the machine of Marly. This, when first constructed, appears to have produced one-eighth of the power expended, so that seven-eighths of its power were usually lost. This misapplied power has been injurious to the engine; and the wear it has occasioned has reduced the mechanical effect very materially. But this may be considered as an extreme case, and we select it merely as an instance of that total ignorance of the first principles of mechanics which characterised some foreign engineers of the last century.

7. It may, however, be advisable to examine the ratio of power expended in comparison with that of the effect produced in some of the most simple hydraulic machines; and, by this calculation, the amount of friction, &c., may be accurately ascertained.

	Power.		Effect.
Undershot water wheel . .	9	=	3
Overshot do.	10	=	8
Hydraulic ram. (This machine will make from twenty to 100 strokes per minute).	10	=	6
Large machine at Chremnitz (each stroke occupying about three minutes).	9	=	3

8. But the water-mill, which is the usual machine employed, even in its most improved form, is far from being beneficial either to the agriculturist or the manufacturer. The former is injured by the laws which prohibit the draining of mill-streams for the purposes of irrigation, by which much improvement is kept back that would otherwise take place; while the health of the latter, in the immediate neighbourhood of manufacturing districts, is much injured by the stagnant condition of the water which is thus unnecessarily dammed up.

9. Wind, which we may consider as the next substitute for animal power, appears to have been first employed to give motion to machinery in the beginning of the sixth century. The use of this species of mechanical force is, however, principally limited to the grinding of corn, the pressing of seed, and other simple manipulations; the great irregularity of this element precluding its application to those processes which require a continued motion.

10. A windmill with four sails, measuring seventy feet from the extremity of one sail to that of the opposite one, each being six feet and a half in width, is capable of raising 926 pounds 232 feet in a minute; and of working on an average eight hours per day. This is equivalent to the work of thirty-four men; twenty-five square feet of canvas performing the average work of a day laborer. A mill of this magnitude seldom requires the attention of more than two men; and it will thus be seen that, making allowance for its irregularity, wind possesses a decided superiority over every species of animal labor.

11. To show, however, the great advantage which the steam engine, even in its rudest state, possesses over mere pneumatic or hydraulic ma-

chinery, we will now examine its effective force when employed in the working of pumps. It has been already stated that the machine of Marly, formerly considered the most powerful engine in the world, when first erected lost seven-eighths of its power from friction, and other causes; while the over-shot water-wheel, which can act only in favorable situations, produces nearly eight-tenths of the force employed. Now it is stated by Dr. Desaguliers that the atmospheric engine working at Griff-mine, nearly a century back, produced full two-thirds of effective force for the power employed; and this too at a comparatively moderate expense. We find, farther, that a hundred weight of coals burned in an engine on the old construction would raise at least 20,000 cubic feet of water twenty-four feet high; an engine with a twenty-four inch cylinder doing the work of seventy-four horses. From this it will be seen that a bushel of coals is equal to two horses, and that every inch of the cylinder performs nearly the work of a man.

12. An engine upon captain Savery's plan, constructed by Mr. Keir, has been found to raise nearly 3,000,000 lbs. of water one foot high with a single bushel of coals; while the best engine on Newcomen's principle will raise 10,000,000, and Mr. Watt's engine upwards of 30,000,000 lbs., the same height. If we add to the advantage gained by the employment of so cheap a prime mover, the vast concentration of force thus brought into immediate action, its value may easily be appreciated.

13. One of the largest engines yet constructed is now in action at the united mine in Cornwall; it raises 80,000 lbs. 100 feet high per minute; and to effect this enormous labor it only requires about thirty pounds of coal for the same period of time.

14. To the mining interests this valuable present of science to the arts has been peculiarly acceptable; as a large portion of our now most productive mineral districts must long ere this have been abandoned had not the steam engine been employed as an active auxiliary in those stupendous works. In the draining of fens and marsh lands this machine is in the highest degree valuable; and, in England particularly, it might be rendered still more generally useful. In practice it has been ascertained that an engine of six horse power will drain more than 8000 acres, raising the water six feet in height; while the cost of erection for an engine for this species of work, including the pumps, will not exceed £700. This is more than ten windmills can perform, at an annual expenditure of several hundred pounds; while, in the former case, the outgoings will not exceed £150 per annum.

15. To the mariner, also, the steam engine offers advantages of a no less important and novel nature than those we have already described. By its use he is enabled to traverse the waters, both against wind and tide, with nearly as much certainty, and, as the machinery is now constructed, with much less danger, than by the most eligible road conveyance.

16. The generation of steam forms a most important part of the subject under consideration. Indeed the whole power of the steam engine depends on the formation of elastic vapor produced from water varying in temperature from 212° of Fahrenheit's thermometer to about 300° of the same scale. This matter has been admirably discussed in the unfinished work by Dr. Birkbeck and Mr. Adcock, to whose pages we must now direct our readers' attention, as it contains a most masterly dissertation on the formation of steam.

17. Aqueous vapor, in its perfect state, is transparent and colorless, consequently invisible. We are chiefly accustomed to attend to it, when having partially mingled with the air, or having touched substances cooler than itself, it has become vesicular, and consequently visible. The moist white vapor, therefore, composed of an infinite number of vesicles or small globules, is not, as generally supposed, perfect steam, but steam which has been robbed of a portion of caloric. The consequence of this abstraction of caloric is the loss of the gaseous or elastic form, and is quickly followed by a complete restitution of the state of inelastic fluidity. The facility and suddenness, indeed, with which condensation, as this change is denominated, may be effected by different refrigerating means, is a property not less remarkable or important than elasticity, the energetic property which we have already mentioned.

18. Water exposed in an open vessel to the action of fire cannot, however great the heat applied, be made to indicate a higher temperature than that which first produces ebullition. Steam will be evolved in greater or less abundance, according to the heat applied, but throughout the process its temperature will continue the same as that of the water. Dr. Hooke directed public attention to this fact; but to Dr. Black is due the honor of having first minutely investigated the whole phenomenon. He discovered that, during the conversion of ice into water, a greater quantity of caloric disappeared than was indicated by the thermometer; therefore, reasoning from analogy, he was led to conclude that, as the difference between a liquid and a solid is ascribable to the fixation of caloric, so, most probably, an elastic fluid, such as steam, differs from a liquid, such as water, in consequence of the operation of the same cause. In endeavouring to ascertain this point, he compared the time of raising the temperature of a liquid a certain number of degrees with the time of evaporating it by the same influx of external heat, and found that the caloric existing in a latent state in steam which balances the pressure of the atmosphere was not less than 800°. Subsequent experiments performed by other philosophers seem to prove that the heat which disappears is here stated too low: but it must be confessed that the results of the experiments on this interesting subject exhibit great discrepancies.

Latent Heat of Aqueous Vapor.

	Fahrenheit.
Black	800°
Ure	888
Southern	945
Watt	950
Clement	990
Lavoisier	1000
Thompson	1016
Rumford	1021

19. Considering that the caloric producing these important changes was not immediately discoverable by the thermometer or the senses, Dr. Black gave it the name of latent heat. Subsequently it has been termed by Professor Pictet, with more propriety, caloric of fluidity, and caloric of vaporisation.

20. From the well-known ability and long experience of the late James Watt, we ought to conclude that the result of his experiments approaches very near the truth; more especially as it coincides with that of Southern, who in practical dexterity was very little, if at all, inferior to his highly ingenious and scientific friend.

21. It was in the course of the year 1781 that Mr. Watt tried experimentally to ascertain this point. He obtained a pipe of copper, one-fiftieth of an inch thick, five feet long, and five-eighths of an inch diameter in the bore, and, having bent the extremities in contrary directions, fixed one end steam-tight on the spout of a tea-kettle, from which the pipe inclined upwards, so that the other end was about two feet higher than the spout. In the upper end was fitted a piece of cork, having a hole about two-tenths of an inch diameter, and a small piece of quill introduced to keep the perforation open. The kettle was filled with water half way up the spout, and the lid, being made tight with a proper lute, was securely held down by a piece of wood, reaching from the top of the centre of the lid to the under side of the handle. It was placed over a fire and made to boil, and care was taken to allow the steam to escape, until such portion of it as condensed, no longer dropped from the end of the tube but returned by the inclined part into the kettle. A tin pan, four inches deep and six inches in diameter, was supplied with two pounds and a half avoirdupois of water, then weighed with great accuracy, and placed on several folds of flannel on a stand. This stand was made of sufficient height to allow the extremity of the cork in the upper end of the tube to be immersed in the water in the pan. The water was nearly two inches and a half deep. A disk of strong paper, coated with linseed oil and dried, was fitted to the inside of the pan; and it was again accurately weighed.

22. When the end of the tube was immersed in the cold water of the pan, the steam issuing from it was condensed with a crackling noise, and the water became heated. The water was constantly stirred, that the heat might be equally distributed, and the experiment was continued until the water had acquired from 70° to 90° of heat, which was generally in from four to six minutes. Afterwards the pan was covered with a disk of oiled paper, to prevent evaporation, which would have lessened the weight during the operation of weighing. The heat of the room, during the experiments, was generally about 56°.

23. Having so far completed the preparation, it became necessary, in order to obtain the greatest possible accuracy, to learn what quantity of heat had been absorbed by the pan. It was therefore made quite dry, and placed in a room of the temperature 40°; and in about half an hour, when it was supposed to have acquired the heat of the place, two pounds of water, of the temperature 76°, were poured into it. The result was 75° 30′. Then for every 35° 30′ with two pounds of water, or every 44° with two pounds and a half of water, half a degree must be allowed for the heat absorbed by the pan.

24. Eleven experiments were made by Mr. Watt, from which the latent heat of steam has been calculated according to the following example. The heat of the water in the pan at the beginning of the experiment was 43·5, at the conclusion 89·5; so that, by the condensation of the steam, the water in the pan gained 46° of heat. The quantity of water in the pan at the beginning of the experiment was 17,500 grains, at the end 18,260; therefore the effect was produced by the condensation of a quantity of vapor equal to 760 grains. By multiplying the quantity of water in the pan, at the beginning of the experiment, by the increase of temperature from the condensed steam, and by the heat absorbed by the pan, we have $17500 \times 46° \times 0{\cdot}5 = 81375$; and by dividing this product by the weight of condensed steam, and adding to the quotient the heat of the mixture, we have $81375 \div 760 + 89{\cdot}5 = 1159{\cdot}5$, the sum of the sensible and latent heats. The sensible heat 212° being deducted, leaves 947·5 as the latent heat of steam.

25. In a similar manner, Mr. Watt determined the particulars of the other experiments, the results of which are exhibited in the following table:—

Number of the experiment.	Quantity of cold Water in Pan in Grains.	Temperature of the cold Water.	Weight of condensed Steam in Grains.	Temperature of the heated Water.	Increase of Heat.	Total sensible and latent Heat.	Latent Heat.
1	2	3	4	5	6	7	8
1	17500	43°·5	760·	89°·5	46°·5	1159°·5	947°·5
2	17500	44·5	708·	86·5	42·5	1136·9	924·9
3	17500	44·5	899·	98·	54·	1149·1	937·1
4	17500	44·5	467·5	73·5	29·5	1175·6	963·6
5	17500	44·5	369·	67·25	23·	1158·	946·
6	17500	47·5	642·	87·	40·	1177·3	965·3
7	17500	49·	588·5	84·5	36·	1155·	943·
8	17500	47·	675·	87·5	41·	1150·5	938·5
9	17500	45·	680·5	86·5	42·	1166·5	954·5
10	17500	45·	664·25	85·5	41·	1165·66	953·66
11	17500	45·	975·	102·	57·5	1134·	922·

26. The sum of the quantities in the eighth column divided by the number of experiments gives 945·03° as the average; but if the second and eleventh experiments, which yield results much smaller than the others, and which Mr. Watt therefore considered objectionable, be omitted, the average will be 949·9°. As several circumstances however affect these experiments, tending for the most part to make the latent heat appear rather less than it actually is, Mr. Watt considers that we shall not err in excess by calling it 960°.

27. One of the circumstances productive of the error above alluded to is the progressive increase or diminution of caloric by radiation, and by the contact of the surrounding atmosphere. This interference with his conclusions, neglected by Mr. Watt, was avoided in a very ingenious and satisfactory manner by count Rumford. At the commencement of his experiment, he rendered the temperature of his apparatus 10° or 12° lower than that of the surrounding air; and the vapor was then allowed to pass into the tube of the refrigeratory. Whilst the temperature of the water around the tube continued below that of the air and adjacent bodies, caloric flowed into it, and it was consequently warmed by them. But the contrary effect occurred, of course, when the circumstances as to temperature were reversed; the surrounding bodies being warmed by the apparatus. Conducting his experiment therefore in such manner that the same time was occupied in each case, a compensation was obtained, the same quantity of caloric being retained by the whole apparatus as if no portion had been either absorbed or emitted. It is to this ingenious precaution, chiefly, that Biot is disposed to ascribe the superior accuracy of Rumford's experiments; and the agreement of their results with those of the profound investigator, Gay Lussac.

28. We have already intimated that the experimental results of Watt and Southern very nearly coincide. Mr. Southern's experiments were performed in 1803 with the intention of ascertaining the latent heat of steam under 3° of elasticity, viz. equal to the support of forty, eighty, and 120 inches of mercury. The following are the results brought into a tabular form:—

No. of Experiment.	Duration of the Experiment.	Weight of cold water in pounds.	Temperature of cold water.	Temperature at the end of Experiment.	Temperature gained.	Weight of water gained.	Temperature of Steam.	Elasticity of Steam in inches.
1	2	3	4	5	6	7	8	9
	′ ″	lbs.	°	°	°	lb.		Inches.
1	12 45	28½	48	80	32	·878	229	40
2	5 50	28½	48	81⅓	33⅓	·857	270	80
3	4 00	28½	47¾	81	33¼	·826	295	120

29. From the above experiments may be calculated the latent heat of the steam formed in each. For, if the weight of the water which received the heat be multiplied by the number of degrees of temperature communicated to it, and the product be divided by the accession of weight to the water, the quotient will give the caloric which the steam lost. By adding to this the temperature of the water in the vessel at the conclusion of the experiment, a number will be obtained showing the whole heat, or the sum of the sensible and latent heat of the steam. Hence, by subtracting the sensible heat of the steam from this sum, the latent heat will be found. Thus

$$\frac{\text{col. 3} \times \text{col. 6}}{\text{col. 7}} + \text{col. 5} = \text{the sum of the sensible and latent heat;}$$

or if

$W =$ weight of cold water, $T =$ its temperature,

$w =$ accession of water by the condensed steam,

$t =$ temperature of warm water, and

$x =$ sum of the sensible and latent heat of the steam condensed.

$$\frac{\overline{W + w} \cdot t - WT}{w} = x.$$

30. If in either of the above equations the quantities found in the preceding table be properly employed, the sums of the sensible and latent heat will be 1119°, 1190°, and 1228° and the latent heat 890°, 920°, and 933°. It was distinctly observed, however, that the tin vessel in which the steam was generated imparted heat to the surrounding air: and an experiment was made to determine the amount of this loss. It was found that, when the contained water was at 80°, 1° was lost in five minutes; and, when at 60°, 1° was lost in ten minutes and a-half; it would therefore, probably, lose 1° in eight minutes during the time of performing an experiment—the mean temperature being about 65°. As the excesss of temperature at the beginning and end of each experiment above that of the air was nearly the same in all, the loss would be nearly proportional to the duration of each: hence, to the acquired heat should be added, in the first experiment, 1⅛°; in the second ¾°, and in the third ½°; being severally proportional to the said duration. These being respectively added to the temperatures, in cols. 5 and 6, give in the former 81⅝°, 82°, and 81½°; and in the latter 33⅝°, 34°, and 33¾°; and if either of these sets of numbers be used in the calculation, according as one or the other of the equations is adopted to develope the results, they will be found to be 1171°, 1212°, and 1245°, for the sums of the sensible and latent heat; and consequently the latent heat in each experiment will be 942°, 942°, and 950°.

31. From all the experiments to determine the quantity of heat latent in steam, notwithstanding their partial disagreement, it is evident that though steam produced under the ordinary pressure of the atmosphere does not indicate a nigher temperature than boiling water, or about 212°, it does actually contain nearly 1200 thermometric degrees of heat. Steam, therefore, when mixed with six times its weight of water at 32°, will raise its temperature to 212°; and it is on this account employed in several brew-houses, dyeing works, and manufactories where large quantities of hot water are required. Many large buildings are also warmed by steam; and it is very advantageously employed in several drying processes where great heat is required, and where the substances to be heated are liable to combustion.

32. To the latent heat thus existing in water when converted into steam, or to the caloric of vaporization, its elasticity is ascribable. Speculation has been active in endeavouring to show how this property is conferred by caloric, but hitherto without effect. Experiment has been more successful in ascertaining the extent of this elasticity; a subject of great practical importance. Many scientific individuals, as before stated, have directed their attention to this enquiry, and the results of their investigations will be found in the following copious synopsis, commencing at 212°

33. Synopsis of experimental and calculated results on the elasticity of vapor.

Temperature.			Force in inches of mercury.								
Fahrenheit.	Reaumur.	Centigrade.	Robison, by experiment.	Dalton, by calculation.	Ure. By experiment.	Ure. By calculation.	Creighton, by calculation.	Watt, by experiment.	Southern. By experiment.	Southern. By calculation	Taylor, by experiment.
212°	80°·00	100°·00	. .	30·00	30·00	30 00	30·00	. .	30·00	30·00	. .
213	80·44	100·55	. .	30·60	. .	. .	. .	30·00	. .	. .	. .
214	80·88	101·11	. .	31·21	. .	. .	. .	. .	. .	. .	31·00
215	81·33	101·66	. .	31·83	. .	. .	. .	31·00	. .	. .	. .
216	81·77	102·22	. .	32·46	. .	. .	. .	. .	. .	. .	32·30
217	82·22	102·77	. .	33·09	. .	. .	. .	32·00	. .	. .	33·00
218	82·66	103·33	. .	33·72	. .	. .	. .	. .	. .	. .	33·70
219	83·11	103·88	. .	34·35	. .	. .	. .	33·00	. .	. .	34·20
220	83·55	104·44	35·80	34·99	35·54	35·54	35·17	. .	. .	. .	35·00
221	84·00	105·00	. .	35·63	. .	. .	. .	. .	. .	. .	35·50
222	84·44	105·55	. .	36·25	. .	. .	. .	35·00	. .	. .	36·20
223	84·88	106·11	. .	36·88	. .	. .	. .	. .	. .	. .	37·00
224	85·33	106·66	. .	37·53	. .	. .	. .	. .	. .	. .	37·50
225	85·77	107·22	. .	38·20	39·11	. .	. .	37·00	. .	. .	38·00
226	86·22	107·77	. .	38·89	. .	. .	. .	. .	. .	. .	38·80
227	86·66	108·33	. .	39·59	. .	. .	. .	. .	. .	. .	39·50
228	87·11	108·88	. .	40·30	. .	. .	. .	39·00	. .	. .	40·20
229	87·55	109·44	. .	41·02	. .	. .	. .	. .	. .	. .	40·85
230	88·00	110·00	44·50	41·75	43·10	43·36	42·66	. .	. .	. .	41·55
231	88·44	110·55	. .	42·49	. .	. .	. .	41·00	. .	. .	42·25
232	88·88	111·11	. .	43·24	. .	. .	. .	. .	. .	. .	43·00
233	89·33	111·66	. .	44·00	. .	. .	. .	. .	. .	. .	43·75
234	89·77	112·22	. .	44·78	. .	. .	. .	43·00	. .	. .	44·60
235	90·22	112·77	. .	45·58	47·22	. .	. .	44·00	. .	. .	45·50
236	90·66	113·33	. .	46·39	. .	. .	. .	. .	. .	. .	46·40
237	91·11	113;88	. .	47·20	. .	. .	. .	. .	. .	. .	47·30
238	91·55	114·44	. .	48·02	. .	. .	. .	. .	. .	. .	48·20
239	92·00	115·00	. .	48·84	. .	. .	. .	. .	. .	. .	49·10
240	92·44	115·55	54·90	49·67	51·70	52·46	51·44	49·00	. .	. .	50·00
241	92·88	116·11	. .	50·50	. .	. .	. .	. .	. .	. .	50·90
242	93·33	116·66	.	51·34	53·60	. .	. .	. .	. .	. .	51·75
243	93·77	117·22	. .	52·18	. .	. .	. .	. .	. .	. .	52·62
244	94·22	117·77	. .	53·03	. .	. .	. .	. .	. .	. .	53·50
245	94·66	118·33	. .	53·88	56·34	. .	. .	. .	. .	. .	54·40
246	95·11	118·88	. .	54·68	. .	. .	. .	. .	. .	. .	55·30
247	95·55	119·44	. .	55·64	. .	. .	. .	54·00	. .	. .	56·25
248	96·00	120·00	. .	56·42	.	. .	. .	. .	. .	. .	57·20
249	96·44	120·55	. .	57·31	. .	. .	. .	. .	. .	. .	58·20
250	96·88	121·11	66·80	58·21	61·90	62·95	61·68	. .	60·00	60·11	59·12
251	97·33	121·66	. .	59·12	. .	. .	. .	. .	. .	. .	60·10

Synopsis, &c.—Continued.

Temperature.			Forces in inches of mercury.								
Fahrenheit.	Reaumur.	Centigrade.	Robison, by experiment.	Dalton, by calculation.	Ure. By experiment.	Ure. By calculation.	Creighton, by calculation.	Watt, by experiment.	Southern. By experiment.	Southern. By calculation.	Taylor, by experiment.
252°	97°·77	122°·22	. .	60·05	. .	. .	. .	. .	. .	. .	61·12
253	98·22	122·77	. .	61·00	. .	. .	. .	. .	. .	. .	62·15
254	98·66	123·33	. .	61·92	. .	. .	. .	. .	. .	. .	63·20
255	99·11	123·88	. .	62·85	67·25	. .	. .	62·00	. .	. .	64·40
256	99·55	124·44	. .	63·76	. .	. .	. .	. .	. .	. .	65·50
257	100·00	125·00	. .	64·82	. .	. .	. .	64·00	. .	. .	66·60
258	100·44	125·55	. .	65·78	. .	. .	. .	. .	. .	. .	67·75
259	100·88	126·11	. .	66·75	. .	. .	. .	66·00	. .	. .	69·00
260	101·33	126·66	80·30	67·73	72·30	74·91	73·57	. .	. .	. .	70·12
261	101·77	127·22	. .	68·72	. .	. .	. .	68·00	. .	. .	71·25
262	102·22	127·77	. .	69·72	. .	. .	. .	. .	. .	. .	72·45
263	102·66	128·33	. .	70·73	. .	. .	. .	. .	. .	. .	73·52
264	103·11	128·88	. .	71·74	. .	. .	. .	. .	. .	. .	74·80
265	103·55	129·44	. .	72·76	78·04	. .	. .	. .	. .	. .	76·00
266	104 00	130·00	. .	73·77	. .	. .	. .	. .	. .	. .	77·25
267	104·44	130·55	. .	74·79	81·90	. .	. .	. .	. .	. .	78·50
268	104·88	131·11	. .	75·80	. .	. .	. .	76·00	. .	. .	79·80
269	105·33	131·66	. .	76·82	84·90	. .	. .	. .	. .	. .	81·14
270	105·77	132·22	94·10	77·85	86·30	88·39	87·31	. .	. .	. .	82·50
271	106·22	132·77	. .	78·89	. .	. .	. .	80·00	. .	. .	83·90
272	106·66	133·33	. .	79·94	. .	. .	. .	. .	. .	. .	85·45
273	107·11	133·88	. .	80·98	. .	. .	. .	. .	. .	. .	86·95
274	107·55	134·44	. .	82·10	. .	. .	. .	. .	. .	. .	88·50
275	108·00	135·00	. .	83·13	93·48	. .	. .	. .	. .	. .	90·00
276	108·44	135·55	. .	84·35	. .	. .	. .	. .	. .	. .	91·55
277	108·88	136·11	. .	85·47	. .	. .	. .	. .	. .	. .	93·15
278	109·33	136·66	. .	86·50	. .	. .	. .	. .	. .	. .	94·70
279	109·77	137·22	. .	87·63	. .	. .	. .	. .	. .	. .	96·26
280	110·22	137·77	105·9	88·75	101·90	103·41	103·13	. .	. .	. .	97·75
281	110·66	138·33	. .	89·87	. .	. .	. .	. .	. .	. .	99·25
282	111·11	138·88	. .	90·99	. .	. .	. .	. .	. .	. .	100·70
283	111·55	139·44	. .	92·11	. .	. .	. .	. .	. .	. .	102·20
284	112·00	140·00	. .	93·23	. .	. .	. .	. .	. .	. .	103·80
285	112·44	140·55	. .	94·35	112·00	. .	. .	. .	. .	. .	105·60
286	112·88	141·11	. .	95·48	. .	. .	. .	. .	. .	. .	107·30
287	113·33	141·66	. .	96·64	. .	. .	. .	. .	. .	. .	109·00
288	113·77	142·22	. .	97·80	. .	. .	. .	. .	. .	. .	110·80
289	114·22	142·77	. .	98·96	118·20	. .	. .	. .	. .	. .	112·65
290	114·66	143·33	. .	100·12	120·15	119·95	121·27	. .	. .	. .	114·50
291	115·11	143·88	. .	101·28	. .	. .	. .	. .	. .	. .	116·40
292	115·55	144·44	. .	102·45	. .	. .	. .	. .	. .	. .	118·30
293	116·00	145·00	. .	103·03	. .	. .	. .	. .	120·00	119·17	120·25
294	116.44	145·55	. .	104·80	126·70	. .	. .	. .	. .	. .	122·20
295	116·88	146·11	. .	105·97	129·00	. .	. .	. .	. .	. .	124·15
296	117·33	146·66	. .	107·14	. .	. .	. .	. .	. .	. .	126·05
297	117·77	147·22	. .	108·31	. .	. .	. .	. .	. .	. .	128·00
298	118·22	147·77	. .	109·48	. .	. .	. .	. .	. .	. .	129·80
299	118·66	148·33	. .	110·64	. .	. .	. .	. .	. .	. .	131·62
300	119·11	148·88	. .	111·81	139·70	137·94	142·01	. .	. .	. .	133·75
301	119·55	149·44	. .	112·98	. .	. .	. .	. .	. .	. .	135·60
302	120·00	150·00	. .	114·15	144·30	. .	. .	. .	. .	. .	137·55
303	120·44	150·55	. .	115·32	. .	. .	. .	. .	. .	. .	139·75
304	120·88	151·11	. .	116·50	. .	. .	. .	. .	. .	. .	141·90
305	121·33	151·66	. .	117·68	150·56	. .	. .	. .	. .	. .	144·05
306	121 77	152·22	. .	114·86	. .	. .	. .	. .	. .	. .	146·15
307	122·22	152·77	. .	120·03	. .	. .	. .	. .	. .	. .	148·30

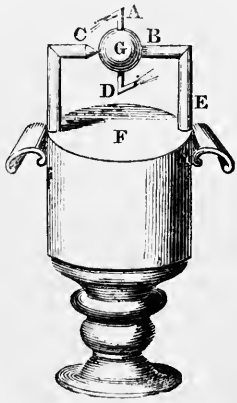
Synopsis, &c.—Continued.

Temperature.			Force in inches of mercury.								
Fahrenheit.	Reaumur.	Centigrade.	Robison, by experiment.	Dalton, by calculation.	Ure. By experiment.	Ure. By calculation.	Creighton, by calculation.	Watt, by experiment.	Southern. By experiment.	Southern. By calculation.	Taylor, by experiment.
308°	122°·66	152°·33	. .	121·20	157·70	. .	. .	. .	. .	. .	150·65
309	123·11	153·88	. .	122·37	. .	. .	. .	. .	. .	. .	157·70
310	123·55	154·44	. .	123·53	161·30	157·25	165·61	. .	. .	. .	155·00
311	124·00	155·00	. .	124·69	. .	. .	. .	. .	. .	. .	157·20
312	124·44	155·55	. .	125·85	166·00	. .	. .	. .	. .	. .	159·45
313	124·88	156·11	. .	127·00	. .	. .	. .	. .	. .	. .	161·75
314	125·33	156·66	. .	128·15	. .	. .	. .	. .	. .	. .	164·20
315	125·77	157·22	. .	129·29	. .	. .	. .	. .	. .	. .	166·70
316	126·22	157·77	. .	130·43	. .	. .	. .	. .	. .	. .	169·15
317	126·66	158·33	. .	131·57	. .	. .	. .	. .	. .	. .	171·70
318	127·11	158·88	. .	132·72	. .	. .	. .	. .	. .	. .	174·30
319	127·55	159·44	. .	133·86	. .	. .	. .	. .	. .	. .	176·80
320	128·00	160·00	. .	135·00	. .	177·70	. .	. .	. .	. .	179·40
321	128·44	160·55	. .	136·14	. .	. .	. .	. .	. .	. .	. .
322	128·88	161·11	. .	137·28	. .	. .	. .	. .	. .	. .	. .
323	129·33	161·66	. .	138·42	. .	. .	. .	. .	. .	. .	. .
324	129·77	162·22	. .	139·56	. .	. .	. .	. .	. .	. .	. .
325	130·22	162·77	. .	140·70	. .	. .	. .	. .	. .	. .	. .
343·6	138·49	173·11	. .	. .	. .	. .	. .	.	240·00	239·28	. .

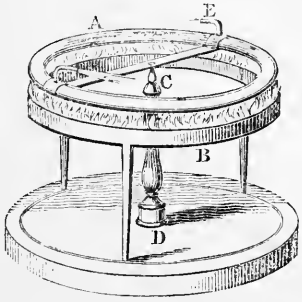
34. Having, in the preceding paragraphs, furnished our readers with a series of practical illustrations relative to the formation of elastic vapor, it may now be advisable to proceed with a detailed history of the progress of the steam engine.

35. Among the numerous competitors for the honor of having first suggested steam, as a moving power in mechanics, we must certainly place Hero of Alexandria, Brancas, and the marquis of Worcester in the foremost rank.

36. The simple apparatus suggested by Hero about 2000 years ago may be readily understood by reference to the annexed figure. F represents a caldron in which steam is generated by the application of a concealed furnace beneath. The tube E and bent arm B are intended to convey the elastic vapor, thus produced, to a revolving ball G, which is connected by a steam-tight joint at B. Two tubes bent to a right angle at A and D are the only parts open to the air; and as the steam rushes out from these minute apertures the re-action produces a rotatory motion.



37. A more simple apparatus, acting on the same principles, and employed by Mr. Partington in his lectures at the London Institution, may here be adverted to. A circular base D, and



upright pillar furnished with a point at C, support a moveable hollow ring. This is in the first instance filled with water, and the flame of burning alcohol beneath converts it into steam. The bent tube E performs the same office as that at A in the previous diagram, and the steam entering the air in the direction E A leaves an excess of force tending to make the ring revolve in the opposite direction.

38. The second of these candidates was an Italian philosopher of considerable eminence, and who, in 1629, published a treatise entitled Le Machine, &c., which contained a description of an apparatus for the same purpose.

39. Brancas's revolving apparatus, as will be seen by reference to the following diagram, was still more simple than that contrived by Hero.

SAVERY'S STEAM ENGINE.

Fig. 1.

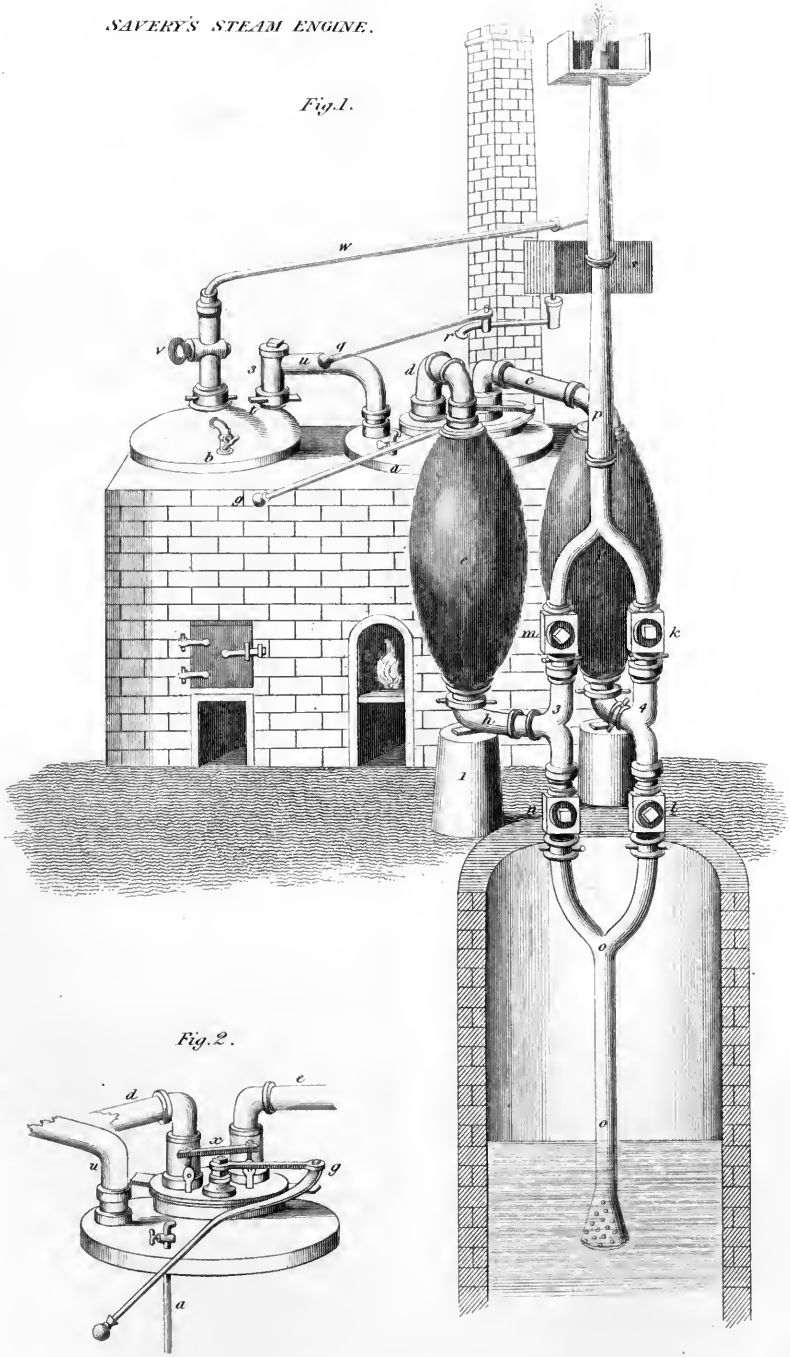


Fig. 2.

London, Published by Thomas Tegg, 73, Cheapside.

J. Shury sculp.

lation of that part which relates to the steam engine. It occurs in the Transactions of the Royal Society for 1697. After alluding to the inconvenience of forming a vacuum by means of gunpowder, which was one of his early propositions, he recommends 'the alternately turning a small surface of water into vapor, by fire applied to the bottom of the cylinder that contains it, which vapor forces up the plug in the cylinder to a considerable height, and which (as the vapor condenses, as the water cools when taken from the fire) descends again by the air's pressure, and is applied to raise the water out of the mine.'

49. In 1698 Captain Savery obtained a patent for a new mode of raising water, and communicating motion to a variety of machines by the force of steam; and in the following year a working model of the above engine was submitted to the Royal Society, who then held their sittings in Arundel House. Savery's engine was employed to raise water to a given height by the pressure of the atmosphere, and then to force the fluid up the remaining elevation, by the power of steam acting on the surface.

50. The steam apparatus of captain Savery was usefully employed in the mines for many years, and as it forms the ground-work of both Kier's and Pontifex's vacuum engines of the present day, it may be advisable to furnish a detailed account of its construction :—

51. Plate I., fig. 1, STEAM ENGINE, represents a general view of the apparatus as employed for raising water. Two copper boilers are employed; they are set in furnaces of brick-work, so constructed that the flame and heated air can circulate around them to the greatest advantage.

52. In the upper part of each boiler is a small cock, *a* and *b*, called gauge-cocks. These, by means of screws, may be removed, in order that two-thirds of the quantity of water which it can contain may be introduced into the large boiler, and that the small boiler may be quite filled. The cocks are then replaced, and a fire is made beneath the great boiler, as represented in the engraving.

53. Two steam-pipes, *c* and *d*, proceed from the top of the boiler to the receivers *e* and *f*. These communications may be effectually closed, or opened and shut alternately, by an ingenious contrivance, represented on an enlarged scale, in fig. 2.

54. At the extremity of the lever connected with the bent handle *g* there is a square hole to which a pin is adapted. The upper part of this pin forms a pivot, and works in a cross bar *x*, which is supported by two screws, *y* and *z*, and the lower part passes through the lid of the boiler, having fixed to its extremity a brass plate, called the double slide valve, or regulator. This plate, being ground and fitted with great accuracy to the under surface of the lid of the boiler, prevents the escape of steam through either of the steam orifices, which it may cover; and the attendant, by moving the handle *g*, is enabled to open and shut alternately the steam passages; or, by stopping the regulator between the utmost limits of its movement, the orifices of both pipes may at the same time be effectually closed.

55. From the lower part of the receivers, *e* and *f*, proceed two pipes, *h*, *i*, resting on the standards 1 and 2; and to these are screwed two other pipes, 3 and 4, branching off to the chambers *k*, *l*, *m*, *n*, in which are valves, as exhibited in the engraving. Two other pipes 5 and 6, connect the chambers *k*, *l*, *m*, *n*, with the pipes *o* and *p*. The pipe *o*, which is called the suction-pipe, has its lower end immersed in a well or reservoir of water; and the pipe *p* is denominated the force-pipe.

56. The action of this engine is very simple. The steam generated in the large boiler is allowed to accumulate in the upper part, until the attendant conceives that a sufficient quantity is collected to supply the engine. He then, by means of the handle *g*, removes the regulator from beneath the orifice of the steam-pipe *d*; this allows the steam to rush from the boiler into the receiver *e*, whence, driving before it the whole of the air contained in the pipes and the receiver, it passes along the pipe *h* 3, through the valve *k*, into the force pipe *p*, where it communicates with the atmosphere.

57. The air being thus expelled from the receiver, and its place occupied by steam, the attendant closes the communication with the boiler, and places the orifice of the cock *r*, in such position, that a stream of cold water can be discharged from the cistern *s* upon the external surface of the receiver. This abstracts from the steam that portion of caloric which is necessary to maintain its elastic state; and as water, on its conversion into steam, is found to occupy a space about 1800 times greater than its former bulk, the condensation of the vapor must necessarily produce within the receiver a vacuum. Nothing, therefore, is left to counterbalance the atmospheric pressure on the surface of the water in which the bulb of the suction-pipe *o* is immersed; and as this pressure, when the vacuum is perfect, can raise a column of water to the height of thirty-three feet, the water ascends into the receiver, and fills it.

58. The receiver being thus filled, the lower clack-valve *l* closes. If the double slide valve be now removed from the orifice of the steam-pipe *d*, the steam will rush from the boiler, and drive the water from the receiver into the force-pipe *p*, from which it cannot escape on account of the clack-valve *k*.

59. That steam should press upon a liquid in the same manner as upon a solid piston may to many appear surprising; but it should be recollected that the specific gravity of steam, air, or any of the gases, is less than the specific gravity of liquids, otherwise they could not be maintained in a vaporous or gaseous state; and further, that, as no fluid can descend through one which is much heavier than itself, steam cannot descend through water; the steam, entering into the receiver, must continue on the surface of the water, pressing upon every portion of it until the water is removed, and the receiver again filled with steam. Therefore, the attendant has only occasion to allow cold water to flow from the cock *r* upon its outer surface, to produce, as before, a vacuum, and to fill again the vacant space with water from the well.

60. Having thus exhibited the action of the engine, as far as regards one receiver, it is very easy to conceive that, by means of the two steam-pipes and two receivers, an alternate effect may be maintained, and a constant discharge of water kept up at the top of the force-pipe *p*.

61. The quantity of steam consumed in maintaining the alternate actions of the engine quickly reduces the water in the boiler; and, as danger might occur from allowing the water to descend too low, the gauge-cocks, *a* and *b*, have been judiciously introduced. The gauge-cock *a* descends within the great boiler to about one-half of its depth; and the cock *b*, in the small boiler, to within eight inches of the bottom. When the attendant conceives that the great boiler requires to be replenished, he turns the handle of the cock *a*: if steam issues, the water is below that level, and the boiler must be supplied; but, if otherwise, water alone is discharged.

62. When this trial indicates that a supply is required for the great boiler, the attendant kindles a fire beneath the small, or, as it is called, the subsidiary boiler. By placing this at the side of the large boiler the water within is raised by the waste heat nearly to ebullition; consequently it requires but a small addition of caloric to convert a sufficient quantity into steam to expel the water into the large boiler. The steam which is thus generated, having no opportunity to escape, depresses the water and causes it to ascend up the pipe *t*, through the clack-valve 3, and along the bent pipe *u*, into the large boiler; and this discharge continues so long as the surface of the water is above the lower orifice of the pipe *t*, which is within eight inches of the bottom of the boiler. When it is below that point, the steam, in passing through the clack-valve 3, makes a rattling noise, and indicates that the small boiler requires to be replenished. To effect this the attendant turns the cock *v*, which, being connected with the inclined pipe *w*, admits water from the force-pipe.

63. The comparative simplicity of this engine affords a strong inducement for its adoption; but its application is, unfortunately, attended by a great waste of steam, and consequent useless expenditure of fuel. In order to drive the water from the receivers, *e* and *f*, into the force-pipe *p*, we have stated that steam must be admitted upon its surface. This steam possesses a sensible temperature, from 150° to 200°, higher than that of the water; consequently, by contact with it, a considerable portion is condensed, and thereby raises the surface of the water nearly to the temperature of ebullition. The extreme slowness with which caloric descends in fluids allows the water to form a heated stratum between the steam and body of cold water. Then, rapidly accumulating in quantity, the steam, by compression, acquires sufficient force to expel the water into the force-pipe *p*, and, overcoming the weight of the column contained in the pipe, discharges an equal portion at the top. As the water descends in the receivers a new source of condensation occurs; the steam comes in contact with successive portions of the cold surface of the metal, and, according to professor Robison, not less than eleven-twelfths of that which is generated in the boiler are thus uselessly expended.

64. Another imperfection, which operated against the introduction of this engine into mines, is the limited height to which, by suction, as it is improperly termed, and by the pressure of the steam, water can be raised. By suction, or, in other words, by the pressure of the atmosphere, water can be raised from twenty-three to thirty feet; and, from the nature and strength of the materials of which it is composed, steam should not be applied to force the fluid to a greater height than sixty or seventy,—an elevation amounting to about sixteen fathoms. How inadequate this engine must be for the purposes of mining is easily perceived. In Savery's time some of the mines were, perhaps, not less than 100 fathoms deep; and, at the present time, several exceed 200 fathoms, or 400 yards.

65. To render the engine effectual for these depths captain Savery proposed that one should be erected at every fourteen or fifteen fathoms: but the expense of attendants, and the consumption of fuel, added to the annual expenditure for wear and tear, would, in this arrangement, exceed the expense incurred by the employment of horses. Besides, there is a liability that one engine should become deranged; in which case the works must cease, as all the other engines would be rendered ineffectual.

66. In the engines constructed under the authority of Savery's patent it was necessary for a laborer to be in constant attendance for the purpose of turning the cocks, which alternately admitted the steam and condensing water. M. de Moura however effected a considerable improvement in this part of the engine, by constructing a self-acting apparatus for this purpose.

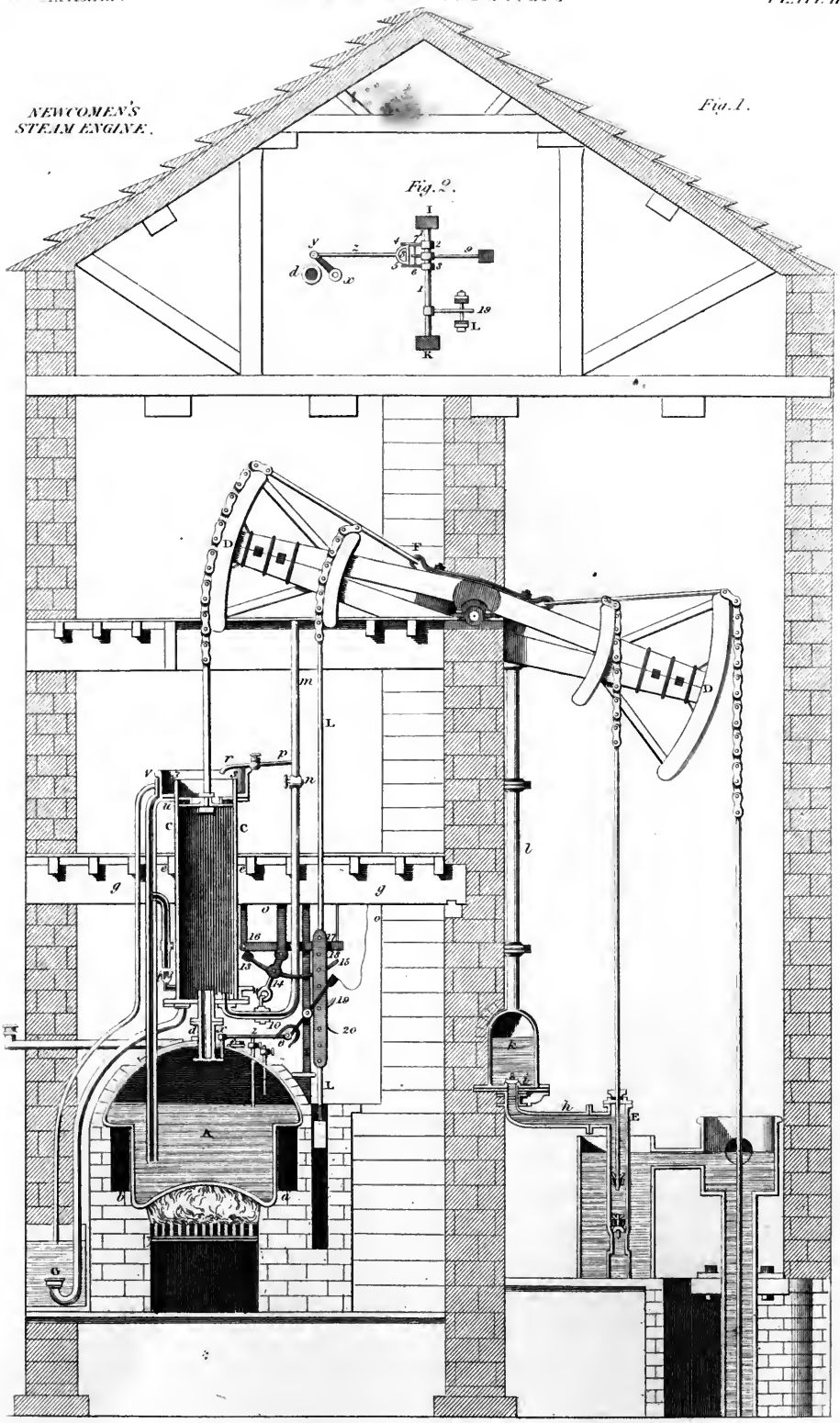
67. M. De Moura's apparatus was made self-acting by a very simple contrivance. It consisted of a float within the receiver, composed of a light ball of copper, which is not loose therein, but fastened to the end of an arm or lever, which is made to rise and fall by the float, while the other end of the arm is fixed to an axis; and consequently, as the float moves up and down, the axis is turned round one way or the other. This axis is made conical, and passes through a conical socket, which is soldered to the side of the receiver, and upon that end of the axis which projects beyond the socket; and therefore, at the outside of the receiver, is fitted a second arm, which is also moved backwards and forwards by the axis as the float rises and falls. By these means the rising and falling of the surface of the water within the receiver communicates a correspondent motion to the outside, in order to actuate the rest of the gear, which regulates the opening and shutting of the steam and injection-cocks.

68. A small cistern is soldered to the outside receiver; and, being kept full of water, surrounds the joint, or conical socket through which the axis of the float passes: this keeps the axis and socket air-tight. The cistern is constantly kept full of water by means of a small leakage from the force-pipe, through a wooden peg, and the drops are conducted by a packthread down to the cistern. A small weight is applied to the

STEAM ENGINE.

NEWCOMEN'S STEAM ENGINE.

Fig. 1.



London, Published by Thomas Tegg, 73, Cheapside.

J. Shury sculp.

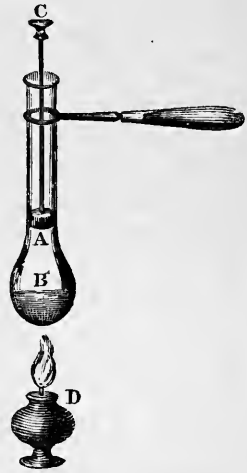
arm on the outside of the receiver, to counterpoise the float within; also upon the same arm is a slider, which, being set nearer to, or farther from the axis, will rise or fall a greater or less space, as may be required; when the float within rises or falls and the slider can be fastened by a screw at any part. A chain is attached to the slider, and gives motion by means of a shorter chain to a balance, or tumbler, which moves on an axis, and opens and shuts the cocks. The first-mentioned chain passes over two pulleys, supported by two arms, that are fastened to the side of the receiver, which give a chain a proper horizontal direction: in order to move the balance to the end of the chain a weight is fastened sufficient to raise the balance to a perpendicular position, and also to overcome the friction of the float and its axis with the pullies and chain.

69. The balance moves upon an axis, which is supported in pieces projecting from the receiver; and it has three arms, one of which applies with a roller to the handle of the steam-cock, a second acts upon the lever of the injection-cock, and a third short arm has a piece of chain, to link it to the chain before-mentioned, at the part where the same extended horizontally between the two pulleys. The arms, which act upon the cocks, are so placed as to shut the steam cock the moment before the injection is opened, and vice versâ.

70. To put the engine in motion press down the arm of the axis, which raises the float within the receiver, and the counter-weight of the chain will bring the balance over to the right side, and in its motion will open the steam-cock, and shut the injection-cock: also open a small gauge-cock in the top of the receiver, that the air may be discharged by the entrance of the steam into the receiver. This being done, shut the air-cock and let go the arm of the balance: the weight at the end of the chain will bring over the balance to the left, and in its motion will shut the steam cock and open the injection-cock, to admit a small jet of cold water into the receiver, which, presently condensing the steam into water, in a great measure leaves a vacuum in the receiver. In this situation the pressure of the atmosphere will cause the water to mount through the suction-pipe into the receiver, where, as its surface rises, it makes the float ascend, and, depressing the arm on the outside of the receiver, draws the chain and raises the balance, till it has passed the perpendicular, when it will fall over suddenly by its own gravity: in falling, the roller of one of its arms takes hold of the handle of the steam-cock, and opens it, whilst the other one shuts the injection-cock. This fall of the balance takes place when the receiver is almost filled with water, and the balance cannot return till the surface of the water therein subsides and suffers the float to descend. This takes place as soon as the steam ceases to be condensed by the cold receiver, and acquires sufficient elastic force from its heat to fill the receiver and drive out the water from the forcing pipe. When the surface of the water descends the float sinks, and suffers the counter-weight to draw up the chain. By the short chain it draws the balance beyond the perpendicular towards the left, when it falls of its own accord, and, in falling, the one arm takes hold of the handle and shuts the steam-cock, whilst the other opens the injection-cock as before.

71. The *atmospheric piston engine* will come next in order, and its claim to practical utility is much greater than either of those already described.

72. A very simple and at the same time ingenious mode of illustrating the operations of an atmospheric steam engine, will be found in the annexed apparatus, suggested by professor Brande, and employed in his lectures at the London Institution.



73. The glass tube and bulb B is shown with its piston A; the rod being hollow and closed by a screw C. If steam be generated by the spirit lamp D, the air will speedily be expelled; and after this is effected the screw C may be closed, and a working stroke produced by artificial condensation.

74. Having thus furnished our readers with a practical illustration of the principle of Newcomen's engine, we may now proceed with a detailed account of its various parts. In Plate II., Steam Engine, the boiler A is set in a furnace of brick-work, so contrived that the flame and heated air can pass beneath it, and circulate through the side-flues, *a*, *b*, into the chimney.

75. Between this boiler and the cylinder C there is a pipe, or communication, *d*, which can be opened and closed at pleasure by the regulator *f*.

76. The cylinder C has a piston accurately fitted to it, so that when moving it is steam-tight. On the external surface of the cylinder are projections or lugs, *e*, *e*, which support the cylinder on the beams *g*, *g*, only one of which is shown, the other being removed to exhibit the parts in section.

77. The piston H, which is adapted to the cylinder, is formed of different materials to make it steam-tight. The lowest piece represents a strong circular plate of iron, the diameter of which is very nearly equal to the internal diameter of the cylinder. Above this, and projecting from it, there is a circular ring, and between it and the cylinder a stuffing of oakum or gaskett, lubricated with tallow, to lessen the friction.

78. D a lever or beam, strongly framed and braced, and having concentric arcs, similar to those already described, to maintain the rods which are suspended from them in a vertical direction.

79. The pump E is called the jaquette or jack-head, and is employed to force water along the pipe *h*, through the valve *i*, into the air-vessel

k, whence it is conveyed by the pipe *l* into the injection cistern F. From this cistern proceeds a pipe, *m*, and, at about half its length, is placed the stop-cock *n*, and a little above, a branch-pipe, *p*, the orifice of which projects over the side of the cylinder. The water from *p* falls upon the piston, and is intended to assist in keeping it air-tight.

80. A circular chamber, 3, surrounds the upper part of the cylinder, to receive the water which may flow over during the ascent of the piston. It is furnished with two pipes, *u* and *v*: the former is called the feed-pipe, supplying the boiler with a portion of the water which has been heated by being in contact with the piston and sides of the cylinder; and the latter allowing the surplus water to flow into the hot-well G.

81. From the lower part of the cylinder proceeds a small-pipe *t*, furnished with a cup and valve, called the snifting valve; and from the feed-pipe a small branch descends nearly to the cup, for the purpose of supplying it with water. From the top of the boiler proceeds a horizontal pipe, having a loaded valve 21, connected with a small cord passing over a pulley. By means of this cord, the attendant raises the valve, to allow the steam to escape when the engine ceases working.

82. The movement of the regulator, instead of being effected by the hand, as in the original engine of Newcomen, is, in the improved apparatus by Beighton, produced by a series of ingenious contrivances. The valve is connected with a vertical spindle *x*, and a horizontal lever *y*, and the rod *z*, instead of being moved by the hand of the attendant, is impelled so as alternately to cover and uncover the extremity of the steam pipe. To effect this, the upright post, I, supports one end of a horizontal iron axis, marked 1; the other end of it, being supported by another post, can only be seen at K, fig. 2. From this axis is freely suspended, by two rings, 2 and 3, a kind of stirrup, formed of two parallel bars of iron, 4 and 5, and a cross-bar, 6, together somewhat resembling the letter H. Above this is another cross piece or spindle, 7, which, passing through the eyes of the fork 8, connects the rod *z*, of the lever *y z*, with the stirrup. As this stirrup is freely suspended, the horizontal axis, 1, may be made to revolve in either direction, without communicating its motion to the stirrup, which will remain suspended vertically beneath it, unless force be applied to remove it either to the right or left.

83. On the same horizontal axis, 1, is fixed a piece of iron 9, having at one end a fork 10, and at the other a lump of iron or lead. This piece is called the Y, from its resemblance to that letter inverted; and is so placed on the axis 1 that one of the prongs is situate on each side of the stirrup. The space or distance between the prongs is rather more than sufficient to allow the tail of the Y to be placed upright, without removing the stirrup 6, fig. 1, when it inclines either to the right or left. In the present position of the engine, the stirrup 6 is represented to the left of the upright post I, and the regulator covers the orifice of the steam-pipe *d*. Let, therefore, the Y be raised from its inclined position, and placed on the opposite side of the post with a sufficient inclination for the weight, or, as it is termed, the logger-head or tumbling bob, at the end of the Y, to descend by its gravity; then, releasing it from the hand, it will descend with considerable force, and, with a smart jerk, place the stirrup 6 to the right of the post. This jerk is very efficacious, as it instantly overcomes the cohesion and friction of the regulator with the orifice of the steam-pipe *d*. The Y is prevented falling too far by a cord or strap *o o*, which is fastened to the logger-head and to the cylinder-beam *g*. By lengthening or shortening this strap, the fall of the logger-head can be regulated to any required distance.

84. Having thus exhibited the manner in which the Y influences the regulator, it only remains for us to observe that by the reciprocation of the beam D an alternating motion is given to the plug-tree L. This plug-tree is formed of two parallel pieces to admit two bent handles, called spanners, which are fastened on the same horizontal axis as the Y, to move between them. In the alternating motion of the plug-tree, the spanners 19 and 20 are struck by pins, which are placed horizontally, as may be seen by reference to the plan. By means, therefore, of these contrivances, the logger-head is jerked alternately to the right and left of the upright post, and the steam-valve is opened and closed at the proper intervals.

85. In a similar manner the movement of the cock which regulates the injection is effected. To the beam *g g* is fastened a bar *o*, from which is suspended the piece 13, 14, 15, called the hammer, or more commonly the F, from its resemblance to that letter. It consists of a lump of metal 13, a fork 14, and a long tail or spanner 15. By the movement of the plug-tree, a pin raises the horizontal bar 16, 17, and releases the head of the F from the catch by which it is supported; it therefore descends with considerable force, and causes the fork 14, between the prongs of which is the arm *w*, to open the injection-cock. On the descent of the plug-tree, another pin depresses the tail 15 of the F, and replaces the head in the catch 16. By this movement the injection-cock is gradually closed, which is necessary, as otherwise the warmth of the cylinder would be apt to impair the vacuum by reconverting a portion of the water into steam.

86. In order to determine the best proportions of the parts of Newcomen's engine, Mr. Smeaton made numerous experiments, and the results furnished him with data for the construction of engines of any required power. This important information is contained in the following table:—

TABLE by Mr. SMEATON, for proportioning the parts of Newcomen's Engine.

Cylinder.		Boiler.		Steam-pipe.	Injection.	Stroke.	
Diameter in inches.	Area in inches.	No.	Centre Diameter in feet and inches.	Diameter in inches.	Sq. hole in inches.	Length in feet and inches.	Number per minute.
20	314	1	8	$3\frac{3}{4}$	$\frac{1}{2}$	4 8	$15\frac{1}{2}$
22	380	1	8 6	4	$\frac{9}{16}$	4 10	$15\frac{1}{4}$
24	452	1	9	$4\frac{1}{4}$	$\frac{3}{5}$	5	15
26	531	1	9 6	$4\frac{1}{2}$	$\frac{2}{3}$	5 2	$14\frac{3}{4}$
28	616	1	10	5	$\frac{11}{16}$	5 4	$14\frac{1}{2}$
30	706	1	10 6	$5\frac{1}{4}$	$\frac{3}{4}$	5 6	$14\frac{1}{4}$
32	804	1	11	$5\frac{1}{2}$	$\frac{3}{4}$	5 8	14
34	908	1	11 6	$5\frac{3}{4}$	$\frac{13}{16}$	5 10	$13\frac{3}{4}$
36	1018	1	12	$6\frac{1}{4}$	$\frac{7}{8}$	6	$13\frac{1}{2}$
38	1134	1	12 6	$6\frac{1}{2}$	$\frac{15}{16}$	6 2	$13\frac{1}{4}$
40	1256	1	13	$6\frac{3}{4}$	$\frac{15}{16}$	6 4	13
42	1385	1	13 6	7	1	6 6	$12\frac{3}{4}$
44	1520	1	14	$7\frac{1}{2}$	1	6 8	$12\frac{1}{2}$
46	1662	1	14 6	$7\frac{3}{4}$	$1\frac{1}{16}$	6 10	$12\frac{1}{4}$
48	1809	1	15	8	$1\frac{1}{8}$	7	12
50	1963	2	11	$8\frac{1}{2}$	$1\frac{3}{16}$	7 2	$11\frac{3}{4}$
52	2124	2	11 6	$8\frac{3}{4}$	$1\frac{1}{3}$	7 4	$11\frac{1}{2}$
54	2290	2	12	9	$1\frac{1}{4}$	7 6	$11\frac{1}{4}$
56	2463	2	12 6	$9\frac{1}{2}$	$1\frac{1}{4}$	7 8	11
58	2642	2	13	$9\frac{3}{4}$	$1\frac{5}{16}$	7 10	$10\frac{3}{4}$
60	2827	2	13 6	10	$1\frac{1}{2}$	8	$10\frac{1}{2}$
62	3019	2	14	$10\frac{1}{2}$	$1\frac{6}{16}$	8 2	$10\frac{1}{4}$
64	3216	2	14 6	$10\frac{3}{4}$	1 -	8 4	10
66	3421	2	15	11	$1\frac{7}{16}$	8 6	$9\frac{3}{4}$
68	3632	2	15 6	$11\frac{1}{2}$	$1\frac{7}{16}$	8 8	$9\frac{1}{2}$
70	3848	2	16	$11\frac{3}{4}$	$\frac{1}{2}$	8 10	$9\frac{1}{4}$
72	4071	2	17	12	$\frac{1}{2}$	9	9

87. The following tabular view of the engine is important to those who still employ this simple prime mover.

Cylinders.			Strokes.		Journey per minute.	Boilers.			Diameter of Steam-pipe.	Square hole for jet of injection.	Injection, water per stroke.		Boilers feed per stroke.	Coals per hour.	Pumpage.	Great product per minute.	Effect per minute of one bushel per hour.
Diameter.	Square of diameter	Area in square inches.	No.	Length.		Centre-diameter		Fire surface.			In ale gallons.	Cyl. inch feet.					
Inches.	Cir. Ins.	Sq. In.		Ft. In.	Feet.	Ft.	In.	Sq. Ft.	Inches.	Inches.			Cub. In.	Bushels.	Cyl. In. Ft.		M.
12	144	113	16½	4 0	66·	6	0	37½	2·50	·33	·6	18	12·7	·74	2·592	·171·072	231
14	196	153	16¼	4 2	67·71	6	6	44	2·78	·375	·76	23	15·9	·91	3·528	·238·881	263
16	256	201	16	4 4	69·3	7	0	51½	3·06	·42	·93	28	19·7	1·11	4·608	·319·488	288
18	324	254	15¾	4 6	70·88	7	6	58½	3·35	·47	1·13	34	23·9	1·33	5·832	·413·372	311
20	400	314	15½	4 8	72·3	8	0	66½	3·64	·51	1·36	41	28·5	1·56	7·200	·520·800	334
22	484	380	15¼	4 10	73·71	8	6	75½	3·93	·56	1·6	48	33·6	1·81	8·712	·642·162	355
24	576	452	15	5 0	75·	9	0	84	4·22	·60	1·86	56	39·3	2·08	10·368	·777·600	374
26	676	531	14¾	5 2	76·21	9	6	94	4·52	·645	2·16	65	45·3	2·36	12·168	·927·323	393
28	784	615	14½	5 4	77·3	10	0	104	4·82	·69	2·48	74½	52·	2·66	14·112	1·091·328	410
30	900	706	14¼	5 6	78·36	10	6	115	5·12	·735	2·82	84½	59·1	2·97	16·200	1·269·432	427
32	1024	814	14	5 8	79·8	11	0	126	5·43	·78	3·18	95½	66·8	3·30	18·432	1·462·272	443
34	1156	907	13¾	5 10	80·21	11	6	138	5·74	·825	3·56	107	75·	3·64	20·808	1·669·010	459
36	1296	1018	13½	6 0	81·	12	0	150	6·05	·87	4·	120	84·	4·00	23·328	1·889·568	472
38	1444	1134	13¼	6 2	81·71	12	6	163	6·37	·91	4·46	134	93·4	4·37	25·992	2·123·806	486
40	1600	1256	13	6 4	82·3	13	0	176	6·69	·95	4·95	148½	103·7	4·76	28·800	2·371·200	498
42	1764	1385	12¾	6 6	82·88	13	6	190	7·01	·99	5·46	164	114·6	5·16	31·752	2·631·606	510
44	1936	1520	12½	6 8	83·3	14	0	204	7·34	1.03	6·03	181	126·5	5·58	34·848	2·904·000	520
46	2116	1662	12¼	6 10	83·71	14	6	219	7·67	1·07	6·63	199	139·	6·01	38·088	3·188·346	531
48	2304	1809	12	7 0	84·3	15	0	234	8·	1·11	7·26	218	152·5	6·46	41·472	3·483·648	539
50	2500	1963	11¾	7 2	84·21	11	0	252	8·33	1·15	7·96	239	166·9	6·92	45·000	3·789·450	548
52	2704	2123	11½	7 4	84·3	11	6	276	8·66	1·19	8·7	261	182·3	7·40	48·672	4·104·672	555
54	2916	2290	11¼	7 6	84·36	12	0	300	9·	1.225	9·48	284½	198·7	7·89	52·488	4·427·888	561
56	3136	2463	11	7 8	84·	12	0	326	9·33	1·26	10·3	310	216·4	8·40	56·448	4·760·448	567
58	3364	2642	10¾	7 10	84·21	12	0	354	9.66	1·295	11·22	336½	235·1	8·92	60·552	5·099·084	572
60	3600	2827	10½	8 0	84·	12	0	384	10·	1·33	12·18	365½	255·3	9·46	64·800	5·443·200	575
62	3844	3019	10¼	8 2	83·71	12	0	402	10·33	1·36	13·2	396	276·7	10·01	69·192	5·792·062	579
64	4096	3216	10	8 4	83·3	12	0	426	10·66	1·39	14·3	429	299·8	10·58	73·728	6·144·000	581
66	4356	3421	9¾	8 6	82·88	12	0	450	11·	1·425	15·46	464	324·3	11·16	78·408	6·498·455	581
68	4624	3631	9½	8 8	82·3	12	0	476	11·33	1·45	16·73	502	350·7	11·76	83·232	6·852·768	583
70	4900	3848	9¼	8 10	81·71	12	0	502	11·66	1·475	18·08	542½	378·9	12·37	88·200	7·206·822	583
72	5184	4071	9	9 0	81·	12	0	530	12·	1·50	19·53	586	409·3	13·00	93·312	7·558·272	581

These have two boilers.

The surface in the flues is taken at half.

88. The different columns of this table explain themselves, except the great product per minute. This is the effect of the engine expressed in a convenient manner, to separate it from all considerations of the diameter or lift of the pumps, or of the number of strokes which the engine makes in a minute, being the multiple of all these, and is thus obtained:—Multiply the square of the diameter of the cylinder in inches, by the pressure on each square inch of the piston, not expressed in pounds weight, but in the height of a column of water in feet; and this again is multiplied by the velocity of the motion of the piston per minute. For example, a twenty-six inch cylinder square of diameter (676) × 18 feet, the pressure per square inch in feet of water, = 12168 × 76·21 feet, the journey per minute, = 927323, the great product per minute, as per table. The table is calculated upon the supposition that the pressure upon each square inch of the piston is eight pounds avoirdupois, or eighteen feet column of water.

89. The last column, or effect per minute of one bushel of coals per hour, is a comparative view of the effect of different sized engines, showing the advantages of large engines in respect to small, in the quantity of work they will effect in proportion to the coals they consume.

90. To find the number of bushels of coals which any of the engines will consume per hour, calculate the internal surface of the cylinder in square inches, and add to it three times the square of the diameter to allow for the piston bottom, cylinder bottom, and the surface of the pipes which are within the cylinder. Next calculate the solid content of the cylinder in cubic inches, and find the proportion between the superficial and the solid measure of the cylinder: according to the number of this proportion, find a number in the following table for a division.

Proportion of the surface of the cylinder to its capacity in square and cubic inches.	Effect of one bushel per hour.
1	98 = 90
2	188 = 85
3	273 = 76
4	349 = 65
5	414 = 54
6	468 = 44
7	512 = 33
8	545 = 22
9	567 = 11
10	578 = 0
11	578 = 8
12	572

91. Lastly, cut off three places of figures from the great product per minute, and, dividing by the divisor, the quotient will be the effect of one bushel per minute.

92. For example, a seventy-two inch cylinder: its circumference will be 226·3, which, multiplied by 135 inches, the length, gives 30,550 square inches; and adding thereto 15,552, which is three times the square of the diameter, we have 46,102 superficial inches; and the content of the cylinder is 549,652 cubic inches. By seeking in the last table for 11, 9, or 12, we find the number 572 for the divisor of the great product, after cutting off its three last figures, viz. 7558 ÷ 572 = thirteen bushels per hour.

93. By this way of finding the proportion between the surface and the content of the cylinder, an allowance is made for the loss of steam which takes place from condensation, when it enters into the cylinder at every stroke, after it has been cooled by the injection thrown into it.

94. We now come to a most important period in the history of this gigantic machine: a period indeed when the towering genius of a self-educated mechanic converted the irregular and almost unmanageable drudge we have hitherto been considering into an engine, second only to the vital frame in the perfection and accuracy of its movements. The history of Mr. Watt's first connexion with the steam engine is thus detailed:—In 1763 he was employed to repair a working model of the atmospheric engine belonging to the university of Glasgow, and during this employment observed the great loss of steam from the condensation of the cold surface of the cylinder. He found that a great quantity of heat is contained in a very minute quantity of water, in the form of elastic steam; for, when a quantity of water is heated several degrees above the boiling point in a close digester, if a hole be opened the steam rushes out with great violence, and in three or four seconds the heat of the remaining water is reduced to boiling heat. If the steam be condensed the whole of it will afford only a few drops of water, yet this small quantity in the state of steam carried off with it all the excess of heat from the water of the digester. Mr. Watt reasoned thus: that, if so great a quantity of heat is contained in a certain quantity of steam, the economical use of the steam was a matter of great importance in the improvement of the engine, more than the construction of the furnace, which had been the chief object of former efforts to improve the engine. The cylinder of the little model was heated when the steam was in it, so that it could not be touched by the hand; but, before a vacuum could be made, it required to be cooled by the injection and was then to be heated.

95. All Mr. Watt's early improvements were secured to him by right of patent; and, as they form a new era in the steam engine, they well deserve particular notice.

96. Patent, 25th of October, 1781. 'For certain new methods of applying the vibratory or reciprocatory motion of steam or fire-engines, to produce a continued rotative or circular motion round an axis or centre, and thereby to give motion to the wheels of mills, or other machines.'

97. The specification, dated 13th of February, 1782, contains a description of five different contrivances of rotative motion.

98. Patent, 12th of March, 1782.—'For certain new improvements upon steam or fire-engines for raising water, and other mechanical

purposes, and certain new pieces of mechanism applicable to the same.'

99. The specification, dated 3rd of July, 1782, contains, first the expansive steam engine, with six different contrivances for equalising the power; second, the double power steam engine, in which the steam is alternately applied to press on each side of the piston, while a vacuum is formed on the other; third, a new compound engine, or method of connecting together the cylinders and condensers of two or more distinct engines, so as to make the steam which has been employed to press on the piston of the first, act expansively upon the piston of the second, &c., and thus derive an additional power to act either alternately or conjointly with that of the first cylinder; fourth, the application of toothed racks and sectors to the ends of the piston or pump-rods, and to the arches of the working-beams, instead of chains; fifth, a new reciprocating semi-rotative engine, and a new rotative engine or steam-wheel.

100. Patent, 28th of April, 1784.—'For certain new improvements upon fire and steam-engines, and upon machines worked or moved by the same.'

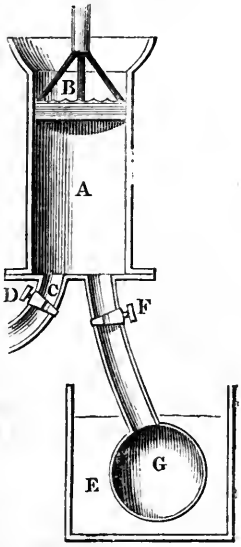
101. The specification, dated 24th of August, 1784, describes, first, a new rotative engine, in which the steam vessel turns upon a pivot, and is placed in a dense fluid, the resistance of which to the action of the steam causes the rotative motion; second, methods of causing the piston-rods, pump-rods, and other parts of engines, to move in perpendicular or other straight lines, and to enable the engine to act upon the working-beams both in pushing and pulling; this is now called the parallel motion, and three varieties are described; third, improved methods of applying the steam engine to work pumps, or other alternating machinery, by making the rods balance each other; fourth, a new method of applying the power of steam engines to move mills which have many wheels required to move round in concert; fifth, a simplified method of applying the power of steam engines to the working of heavy hammers or stampers; sixth, a new construction and mode of opening the valves, and an improved working gear; seventh, a portable steam engine and machinery for moving wheel-carriages.

102. Patent, in 1785.—'For certain newly improved methods of constructing furnaces or fire-places for heating, boiling, or evaporating of water and other liquids which are applicable to steam engines and other purposes; and also for heating, melting, and smelting of metals and their ores, whereby greater effects are produced from the fuel, and the smoke is in a great measure prevented or consumed.'

103. The specification is dated 14th of June, 1785.

104. The act of parliament, extending Mr. Watt's exclusive privilege for the improvements secured to him by his first patent, expired in 1800, at which period he retired from business, having, for some years before, ceased to take an active part.

105. Mr. Watt's first great improvement in the engine of Newcomen may be best understood by reference to the annexed diagram, in which A represents the cylinder, and B its plug or piston, made to fit air-tight. The pipe C is furnished with a stop-cock D, by means of which the elastic vapor is occasionally admitted; a similar pipe, furnished with a stop-cock at F, passes from the other side of the cylinder, and enters the vessel G; E is a reservoir to contain water. If we now suppose the piston at the bottom of the cylinder, and steam admitted by the pipe C, its expansive force will elevate the piston, and the whole interna



l cavity of the tube will be filled with condensable vapor. On closing the steam-cock, and opening that connected with the vessel G, a portion of the vapor will immediately expand itself, and, coming in contact with the cold sides of the vessel, a portion of its heat must be absorbed by the water at E. A new supply of steam then descends, and is also condensed; and indeed the same process continues till the whole of the steam is drawn from the tube. A vacuum being thus formed, the pressure of the atmosphere will preponderate, and the piston-rod be depressed to the bottom of the tube. On closing the stop-cock F a new portion of steam may be admitted by the other pipe, and, after raising the piston, the process of condensation may be readily repeated.

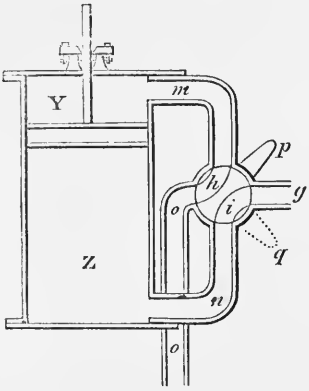
106. The advantages that arise from this mode of forming a vacuum are very considerable, not the least important of which is a saving of nearly half the fuel. In the old engine the condensing water must reduce the temperature of the internal surface of the cylinder to that of the atmosphere, before a vacuum could be produced; and, when the condensing-water was applied more sparingly, the elastic vapor remaining in the cylinder was found to materially reduce the pressure of the air operating above. The great advantage, then, of Mr. Watt's apparatus consists in performing the condensation in a separate vessel, so that the cylinder is always preserved at the temperature of boiling water.

107. Having thus produced a vacuum, without the intervention of condensing-water beneath the piston, Mr. Watt's next improvement consisted in closing the top of the cylinder, so that the piston-rod worked through an air-tight hole in the centre of the cap; and, to ensure the necessary pressure within the cylinder, steam with an elastic force greater than that of the atmosphere was admitted above the piston. The atmospheric engine of Newcomen was thus

converted into a steam engine, and its power was easily regulated.

108. The double acting engine requires nearly twice the quantity of steam that would be necessary for a single engine of the same size; but this is compensated for by its doing twice the quantity of work. And, after what has been said upon the principle of the single engine, little need be added in explanation of the double one; for, its principles being the same, a mere change of mechanism is all that is required to produce the machine.

109. In order to a due comprehension of the action of the double engine, some of the contrivances that have been adopted to produce a proper distribution of the steam, and an alternate vacuum, must next be noticed, and although the four-way cock, and sliding regulator are not considered as the most perfect of these, yet they are very frequently applied to small steam engines, and their simplicity gives them a preference. Let Y Z represent a section of a steam engine cylin-



der with its piston, and the piston rod moving through a stuffing-box, so as to be quite air-tight; *g* is the steam-pipe for bringing steam from a boiler, and this terminates in a four-way cock *h i*, which together with the pipes *m*, *n*, and *o*, are drawn much too large for the cylinder Y Z, in order that their parts may be distinctly seen: *p* is the end of a lever or handle for the purpose of turning the cock when required. This cock is constructed precisely in the same manner as other cocks for fluids, and consists of a conical plug or pin ground very truly into the body of the cock itself; but instead of having a single straight passage through the plug, as is commonly the case, there are two curved ones *h* and *i*, which give the plug the appearance of having four openings, each appearing in the same plane, and at one quarter of the circumference apart, so that, as the cock stands in the figure, steam coming from *g* would pass through the opening *i* in the plug, and would be delivered into the pipe *n* at right angles to its first direction, instead of passing directly onwards to *o*, as would be the case in a common cock. From the pipe *n* the steam would pass immediately into the lower part Z of the cylinder, and consequently would drive the piston upwards. At the same time it will be seen that there is an immediate connexion between the upper part Y of the cylinder through the pipe *m*, and opening *h* of the cock to the pipe *o o*, leading down to the condenser; consequently, so long as the steam is acting against the under side of the piston, there will be a vacuum at Y to permit it to rise. So soon as the piston has arrived near the top of the cylinder, the cock must be turned one quarter round by depressing its handle *p* from its present position to that shown by the dotted lines at *q*, by which all the openings in the plug of the cock will be changed: steam, therefore, which now enters at *g*, will be turned upwards by the passage *h*, and by entering the pipe *m* will be conveyed above instead of below the piston, while the passage *i* forms a connexion between the pipe *n*, leading to the lower part of the cylinder, and the pipe *o* leading to the condenser; consequently, in this position, a vacuum will be formed below the piston, while the steam is operating above it. The piston will therefore descend, and, on coming near the bottom, the cock must be again turned into its first position, when the piston will ascend, and so on; thus producing an equality of force, both in the up and down strokes, by simply turning a small cock.

110. Having in the preceding pages strictly adhered to a chronological arrangement of the improvements in the steam engine, it may now be advisable to furnish our readers with a sketch of its earliest application to the purposes of navigation:—

111. The possibility of employing steam as a moving power in the navigation of vessels was known early in the last century; its practical application, however, on a large scale, has not been fully established above twenty years.

112. In 1698 Savery recommended the use of paddle-wheels, similar to those now so generally employed in steam vessels, though without in the remotest degree alluding to his engine as a prime mover; and it is probable that he intended to employ the force of men or animals working at a winch for that purpose. About forty years after the publication of this mode of propelling vessels, Mr. Jonathan Hulls obtained a patent for a vessel in which the paddle wheels were to be driven by an atmospheric engine of considerable power.

113. In describing his mode of producing a force sufficient for towing of vessels, and other purposes, the ingenious patentee says, 'In some convenient part of the tow-boat there is placed a vessel about two-thirds full of water, with the top close shut; this vessel, being kept boiling, rarefies the water into steam; this steam being conveyed through a large pipe into a cylindrical vessel, and there condensed, makes a vacuum, which causes the weight of the atmosphere to press on this vessel, and so presses down a piston that is fitted into this cylindrical vessel, in the same manner as in Mr. Newcomen's engine, with which he raises water by fire.

114. 'It has been already demonstrated that when the air is driven out of a vessel of thirty inches diameter (which is but two feet and a half) the atmosphere will press on it to the weight of four tons 16 cwt. and upwards: when

proper instruments for this work are applied to it, it must drive a vessel with great force.'

115. Mr. Hulls's patent is dated 1736, and he suggested the use of a crank to produce the rotatory motion of his paddle-wheels; this ingenious mode of converting a reciprocating into a rotatory motion was afterwards recommended by the abbé Arnal, canon of Alais in Languedoc, who, in 1781, proposed the crank for the purpose of turning paddle-wheels in the navigation of lighters.

116. It is probable that Mr. Hulls anticipated some objection to his new mode of propelling vessels; and it appears from captain Savery's statement, to which we have already alluded, that a strong prejudice had been raised against the use of propelling wheels in vessels. Mr. Secretary Trenchard, who was at that time at the head of the admiralty, had also given a decided negative to the proposition. In answer therefore to the objections which might have been anticipated, Mr. Hulls proposed the following queries, which he afterwards solved in the most satisfactory way.

117. '*Query* 1.—Is it possible to fix instruments of sufficient strength to move so prodigious a weight as may be contained in a very large vessel?

118. '*Answer.*—All mechanics will allow it is possible to make a machine to move an immense weight, if there is force enough to drive the same; for every member must be made in a proportionable strength to the intended work, and properly braced with laces of iron, so that no part can give way, or break.

119. '*Query* 2.—Will not the force of the waves break any instrument to pieces that is placed to move in the water?

120. '*Answer.*—First, It cannot be supposed that this machine will be used in a storm or tempest at sea, when the waves are very raging; for if a merchant lieth in a harbour, &c., he would not choose to put out to sea in a storm, if it were possible to get out, but rather stay until it were abated. Secondly, when the wind comes a-head of the tow-boat, the fans will be protected by it from the violence of the waves, and, when the wind comes side-ways, the waves will come edge-ways of the fans, and therefore strike them with the less force. Thirdly, there may be pieces of timber laid to swim on the surface of the water on each side of the fans, and so contrived as they shall not touch them, which will protect them from the force of the waves.

121. 'Up inland rivers, where the bottom can possibly be reached, the fans may be taken out, and cranks placed at the hindmost axis to strike a shaft to the bottom of the river, which will drive the vessel forward with the greater force.

122. '*Query* 3.—It being a continual expense to keep this machine at work, will the expense be answered?

123. '*Answer.*—The work to be done by this machine will be upon particular occasions, when all other means yet found out are wholly insufficient. How often does a merchant wish that his ship were on the ocean, when, if he were there, the wind would serve tolerably well to carry him on his intended voyage; but does not serve at the same time to carry him out of the river, &c., he happens to be in, which a few hours' work at this machine would do. Besides, I know engines that are driven by the same power as this is, where materials for the purpose are dearer than in any navigable river in England. Experience, therefore, demonstrates that the expense will be but a trifle to the value of the work performed by those sort of machines which any person who knows the nature of those things may easily calculate.'

124. M. Duquet appears to have tried revolving oars as early as the year 1699, and experiments were made with them on a large scale both at Marseilles and at Havre: this mode, however, of impelling vessels was soon given up as impracticable; and after our countryman, Hulls, the marquis de Jouffroy unquestionably holds the most distinguished rank in the list of practical engineers, who have added to the value of this invention.

125. It is evident, from an article published in the Journal des Debats, that in 1781 the marquis constructed a steam boat at Lyons, of 140 feet in length. With this he made several successful experiments on the Saone, near that city. The events of the revolution, which broke out a few years afterwards, prevented M. de Jouffroy from prosecuting this undertaking, or reaping any advantage from it. On his return to France after a long exile, in 1796, he learned from the newspapers that M. de Blanc, an artist of Trevoux, had obtained a patent for the construction of a steam boat, built probably from such information as he could procure relative to the experiments of the marquis. The latter appealed to the government, which was then too much occupied with public affairs to attend to those of individuals. Meanwhile Fulton, who had gained the same information, and was making similar experiments near the Isle des Cygnes, alarmed M. de Blanc, who knew that he had much more to fear from the influence and mechanical skill of an Anglo-American than from that of an emigrant. He accordingly alleged his patent right, and requested the stoppage of Mr. Fulton's works, who returned for answer that his essays could not affect France, as he had no intention to set up a practical competition upon the rivers of that country, but should soon return to America, which he actually did, and commenced the erection of those engines to which he has since laid claim as exclusive inventor.

126. Shortly after the first experiments were made, by the marquis de Jouffroy, a gentleman of the name of Miller, who resided at Dalswinton, published a work, in which he described the application of wheels to the working of triple vessels on canals; and in 1794 he completed a model of a boat on this construction, impelled by a steam engine.

127. From this period till 1801, but little progress appears to have been made in this species of navigation: in that year Mr. Symington, who had been employed in the construction of Miller's vessel, tried a boat propelled by steam on the Forth-and-Clyde inland navigation; this, however, was shortly laid aside, on account of the injury with which it threatened the banks of

STEAM ENGINE.

Mr. WATT'S ENGINE.

Fig. 1

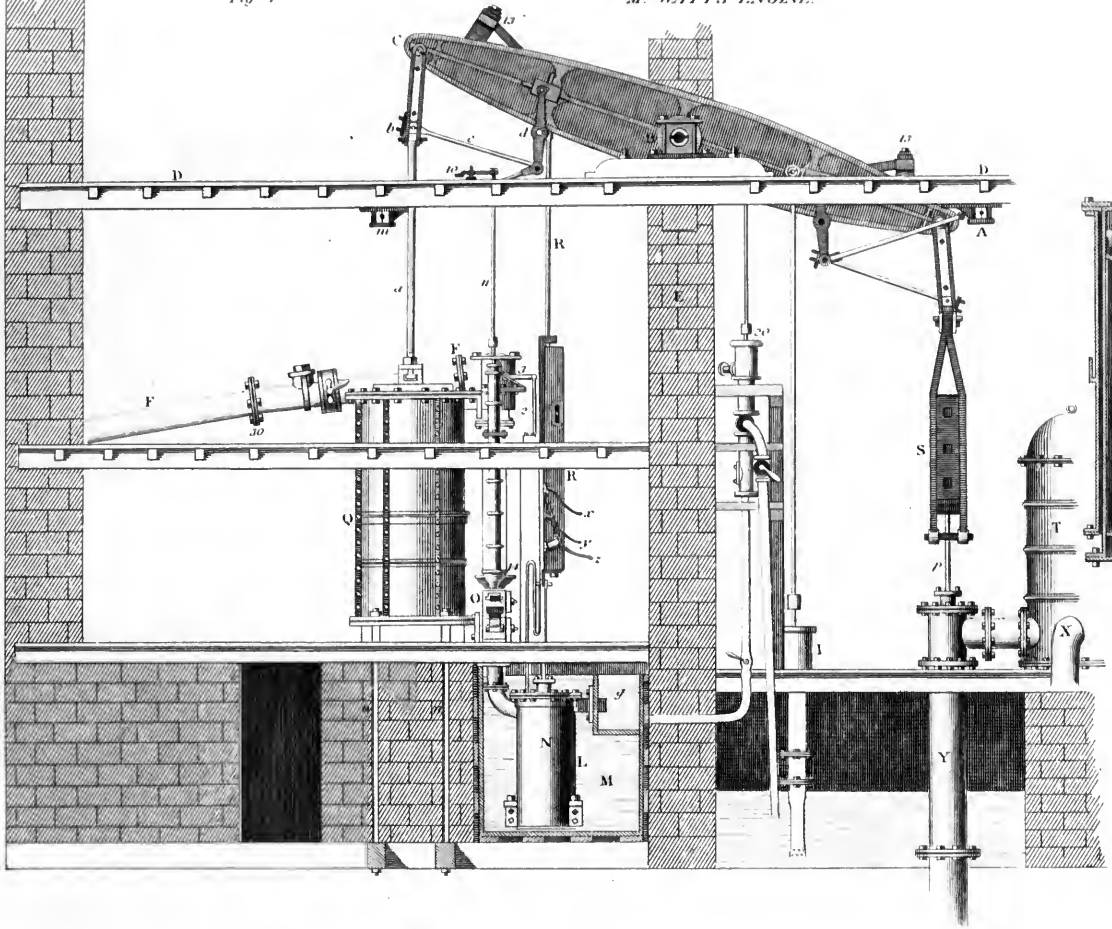
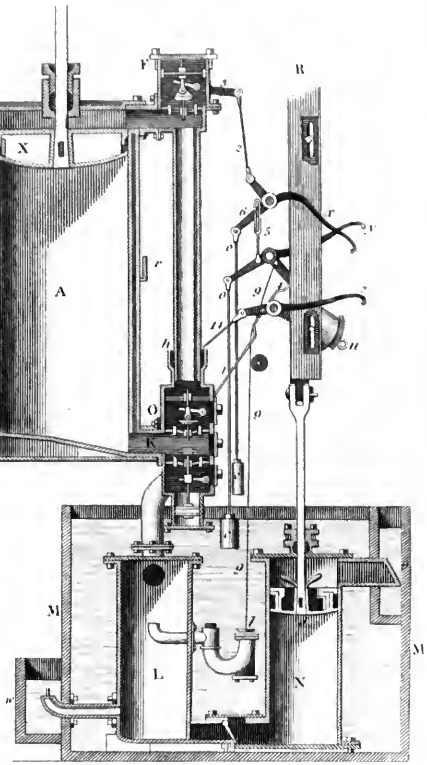


Fig. 2



London. Published by Thomas Tegg. 73 Cheapside

J. Shury sculp.

the canal, from the violent agitation produced by the paddle-wheels.

128. Mr. Symington's mode of connecting the piston and paddle-wheel was by placing the cylinder nearly in a horizontal position, so that by this means the necessity of employing a working beam was avoided. The piston was also supported in its position by friction-wheels, and communicated, by means of a rod, with a crank connected with the wheel, which imparts a motion to a paddle somewhat slower than its own. The paddle wheel was placed in the middle of the boat towards the stern, and on this account it became necessary to have a double rudder, connected by rods, which were moved by a winch placed at the head of the boat.

129. Mr. Symington also employed stampers placed at the head of the boat, for the purpose of breaking the ice on canals; and this plan, we believe, was also adopted in the original construction of the vessels intended for the Arctic expedition.

130. In 1795 a very ingenious apparatus was invented by lord Stanhope, and tried by that nobleman in Greenland Dock. In this experiment the paddles were made to resemble the feet of a duck, and were placed under the quarters of the vessel. This plan was also tried in America, but it does not appear in either case to have answered the expectations of its projector.

131. A plan has also been tried which in some measure resembles the endless chain of a pump. This was, we believe, first employed in the duke of Bridgewater's canal, and consists in the use of a chain, with a number of paddles attached to it, going over two wheels placed level with the water line. A steam engine, acting on the foremost roller, gave motion to the chain, and a continuous parallel motion was thus effected.

132. Having already described the general arrangement of a steam engine, as improved by Mr. Watt, it may now be advisable more particularly to point out the arrangement of its mechanism in detail. For this purpose we may select the single acting engine as employed for pumping.

133. Plate VIII. A B C represents the beam, which is made of cast-iron instead of wood, and is composed of two large plates, of the shape represented in the figure, put together at twelve inches distance from each other, leaving a space between them, the centre or axis B passing through the middle of both plates. The axis lies on the floor D, which is sustained by the wall E, built beneath the centre. Q is the cylinder, contained within a steam jacket, composed of segments screwed together. F F is the steam-pipe coming from the boiler G. *a b* is the piston-rod, connected with the end C of the beam, by links C, *b*; and whilst the upper ends of these links move in the arc of a circle, with the end of the beam, the lower ends, *b*, are made to accommodate themselves to the vertical motion of the piston-rod *a*, by means of the rods *c*, extending to the smaller links, *d*, which form a parallelogram. The motion of the parallelogram is governed by the bridle-rods, which move about a fixed centre *m*; the lower ends *b*, of the links *b*, C, will ascend and descend in a perpendicular right line. A similar motion, but of half the quantity, is given to the rod R, which works the air-pump, N, of the engine at the lower end, and the middle part of the rod has the plug-beam, R, attached to it, which has pins, or chocks, screwed on it to actuate the handles, *x*, *y*, and *z*, of the mechanism for the valves, which mechanism is very different from that employed in the old engines, and even from that of the first engines of Mr. Watt.

134. The pump-rod *p* is suspended at the end A of the beam by another parallel motion, and the upper part S of the rod is made of cast-iron, and very massive, to have a sufficient weight in itself to draw up the piston, and make the returning stroke. The real pump-rod *p* is jointed to the heavy counter-weight S, and is polished, like the piston-rod *a*, that it may slide through a collar of leathers in the head of the pump Y, because the pump is of that kind called lifting force-pumps; its bucket raises the water in ascending, but it forces it through the air-vessel T, and pipe X, which leads to a reservoir two miles distant, in Hyde Park, and elevated 150 feet above the level of the water in the well where the pump draws from. This well has a communication with the river.

135. The cylinder Q is kept down by the weight of a pier of masonry, on which it is placed, and large iron bolts, *n*, descend from the lower stanch to the groundsills, upon which the masonry is built. Immediately before the pier is the condensing cistern M, which contains the air-pump N, the condenser L, partly concealed, and hot-well *g*, and is kept supplied with cold water by the cold-water pump I, worked by the beam at the outer end, and the waste runs off again into the well, so as to keep the water in the cistern always cold.

136. The valves, which must be opened and shut to produce the action of the engine, are four in number; viz. the upper steam-valve at F, the lower steam-valve O, and the exhaustion-valve K, fig. 2, and a small valve *l*, beneath the water in the cistern M, to admit the injection into the condenser: but these parts are better explained in fig. 2, which is a section of the cylinder, air-pump, and condenser on a double scale.

137. A, the section of the cylinder, in which the piston X moves; F, the steam-pipe coming from the boiler; L, the condenser; N, the air or discharging-pump; *m*, a passage or pipe from the pump L to the condenser N, in which passage is an occasional communication by a hanging-valve at *m*, which shuts towards the condenser; *l* is the injection-valve, to be lifted by the engine at every stroke, for the purpose of condensing the steam in the condenser L; *w* is the snifting or blowing-valve, placed outside the condensing cistern (of which M M is a section, on purpose to show the contents); the snifting-valve *w* communicates with the condenser by a pipe passing through the side of the cistern M, and is inserted at the side of the condenser; K is the exhaustion-valve, to be lifted by the engine, and open a communication between the cylinder A and the condenser L; O is the steam-valve, to be lifted by the engine, and open a communication between the lower part of the

cylinder, and upper part thereof, through the steam-pipe *r*; and F is the upper steam valve of the same kind, opening a passage from the boiler to the top of the cylinder; and thence by the pipe *r*, and valves O, K, to all parts of the engine.

138. We must now attend to the mechanism by which the engine is made to feed itself, and perform its reciprocations. The valves are lifted by means of a lever applied to each, within the iron box in which it is contained, entering into an opening in the stem of the valve; and a second lever is fixed on the axis of the lever, on the outside of the box, to be connected with the levers and handles *x*, *y*, *z*, which open and shut the valves. There are three separate axles, or spindles, placed parallel and above one another, and each has a handle or spanner *x*, *y*, *z*, by which it is moved, either by the hand, to start the engine, or by the chocks on the plug-beam R, when the engine is in action. The two upper spindles, *x* and *y*, have short levers projecting from them towards the cylinder; and from each of these levers a rod is suspended, with a sufficient weight, *o*, at the lower end to turn round the spindle, each upon its axis, in that direction which will cause the handles, *x* and *y*, to fly upwards. Also the lower spindle has a lever projecting from it, away from the cylinder, with a heavy weight, *n*, fixed at the end; but this being applied, on the opposite side, to the weights of the two upper handles *x*, *y*, the weight, *n*, causes the handle, *z*, to descend. Both the axles of the lower handles, *y*, *z*, have small levers, or catches, 1 and 2, which act in the hooks of a double latch, or detent, *t v*, which is moveable upon a centre-pin situated between the two axles. The hooks of this detent are to detain the catches of the spindles, and prevent the handles *y z* from moving by the action of their respective weights, until the detent is moved on its centre, so as to relieve the catches of the levers from its hooks *t*, *v*. But it is evident, from fig. A, that when only one catch, as 2, is hooked by the lower hook *v* of the detent, and consequently the weight of its spindle is held up, if the other catch, 1, is moved by depressing its handle *y*, so as to raise its weight in the act of entering the hook *t* of the detent, it will press the end *t* of the detent forwards upon its centre, and this at the same time pressing back the hook *v*, at the opposite end of the detent, releases the catch, *z*, of the lower handle, *z*, therefrom, and the weight *n* on that spindle immediately falls.

139. The spindle of the upper handle, *x*, is devoted to opening and shutting the upper steam-valve F, having a lever which communicates by a rod, 2, with the lever, 3, of that valve; so that by pressing down the handle *x*, it will shut the valve F. The weight *o*, which is applied to the upper spindle, tends to lift up the handle *x*, and open the valve F; and, when the upper handle *x* is depressed, the valve will be shut; or, when the handle is suffered to fly up by the action of its weight, it will open the valve.

140. The second spindle, *y*, has a lever communicating with the lever of the exhausting-valve K, by a rod 4. The weight *o*, applied to this like the former, tends to lift up the handle *y*, and draw open the valve; but, when the handle *y* is depressed, the valve is shut, and in this position the catch 1 is held down by the hook *t* of the detent, before explained, and retains the valve shut.

141. Lastly, the lower spindle, *z*, is for the lower steam-valve O, which is opened by the rod 14, when the handle *z* is suffered to fall down, and shut when the same is up, being held by the catch 2, and hook *v*. In all these the weight tends to open the valve; but, when the valve is to be kept shut, the detent holds the weight up. Now, by removing the detent, the weight falls and opens the valve in an instant.

142. The upper spindle has no detent to detain it; but what is equivalent is a rod, 5, jointed to that lever of the middle axis which has its weight and rod, *o*, suspended from it. The upper end of the rod, 5, is made with a loop, or long slit, in which works a pin at the end of a lever, 6, projecting from the upper axis towards the cylinder. The consequence of this is, that while the middle axis is detained by its catch, and detent *t*, to keep the exhausting-valve K shut, the lever 6 of the upper spindle will be borne up by its pin resting in the bottom of the loop of the rod 5, so as to keep the weight from opening the upper steam-valve F, as long as the exhausting-valve is kept shut; but when the catch, 1 *t*, of the middle axis is discharged, and its weight has opened the exhausting-valve, the looped rod, 5, will no longer support the lever, 6, of the upper axis, but allows its weight to descend and open the upper steam-valve; but at the same time the upper steam-valve, F, is not confined to be always open when the exhausting-valve, K, is open; for the upper steam-valve may be shut by depressing the upper handle *x*, without affecting the exhausting-valve at all, because the slit, or loop, in the top of the rod 5, allows that motion. This property must be attended to, because the action of the engine, by expansion, depends upon it. We have not before noticed the injection-valve, from which a long wire ascends, and is attached to a strap, 9, which winds upon the middle axis; therefore, when the middle handle, *y*, flies up by its weight, it winds the strap, and opens the injection-valve at the same instant that the exhausting-valve is opened.

143. The injection-valve, *l*, is placed to close the orifice at the end of a short curved pipe, which enters into the condenser and turns up; and the pipe has a cock in it, between the valve and the condenser, to cut off the communication, or to regulate the supply of injection when the valve is opened. This cock must be always shut when the engine is not at work, to prevent the condenser filling with water.

144. Suppose the fire lighted beneath the boiler G; all the valves are kept shut by pressing down the two upper handles *x* and *y*, and lifting up the lower one, their respective catches detaining them in those positions, until the steam is sufficiently heated, and the engine is ready to work. In the quiescent position of the engine, when it is at rest, the counter-weight always draws the piston fully at the top of its cylinder, as in the figure; the air-pump bucket will also be at the top of its barrel.

145. In order to prepare for setting the engine to work, all the three valves must be opened at once. This is done by relieving the spindles from their several catches, when the weights immediately open the valves. The steam enters through the valve F into the top of the cylinder, and by the pipe *r* through the lower steam-valve O, into the bottom of the cylinder; also through the exhausting valve K into the condenser L, driving before it some air which passes out at the snifting-valve *w*. At first the coldness of the parts condenses all the steam which enters; and it is not until all the iron with which the steam comes in contact is heated to the temperature of boiling water, that the steam ceases to flow from the boiler in a stream, and be condensed as it arrives at the cylinder and condenser; but after this the steam acquires the same force in the cylinder and pipes that it has in the boiler; it then occupies every cavity and crevice of the engine, and in a little while displaces all the air in the cylinder, condenser, and pipes, which passes out, and is discharged at the snifting-valve *w*. This valve is always covered with water in a small cistern attached to the side of the large one to ensure its tightness. Through this valve the air is discharged by the steam, not at every stroke, as in Newcomen's engine, but only at first setting the engine to work, and this operation is called the blowing through. It is well known when the cylinder and other vessels are properly heated, and the air discharged, by a very smart crackling noise at that valve like a violent decrepitation of salt in the fire; this noise being occasioned by the water in the small cistern producing a sudden and rapid condensation of the issuing steam when the air is all gone.

146. It being known by this sign that all parts of the engine are cleared of air, all the three valves are to be shut by pressing and holding down the two upper handles *x*, *y*, and lifting up the lower handle *z*, in which situation its catch, 2, will retain it. This cuts off the farther supply of steam from the boiler, and also intercepts the passage of the steam from the cylinder to the condenser; and, as the cold surface of the condenser still continues to condense a considerable portion of steam, there will soon be none left, and a vacuum will be formed in the condenser, while the cylinder both above and below the piston is full of steam. The vacuum in the condenser will soon become perfect from the external cold alone, though more slowly than when an injection is made.

147. In this state the engine is prepared for starting at a moment's notice, by the engine-man letting the two upper handles, *x* and *y*, rise up, by their respective weights: this opens the upper steam-valve, and the exhausting and injection-valves; the former admits the steam into the top of the cylinder to press upon the piston; while the latter allows the steam, already in the lower part of the cylinder, to flow into the vacuous condenser; and at the same instant that he opens the injection-cock the valve is lifted at the same time with the exhausting-valve: this admits a jet of cold water into the condenser, and condenses the steam as fast as it arrives from the cylinder, so that in an instant all the steam in the lower part of the cylinder will be drawn off and condensed. The pressure of the steam on the piston, being now unbalanced by any thing beneath the piston, it descends and draws up the pump-buckets and columns of water in the pumps, with a velocity proportioned to the pressure of the steam and the diameter of the piston, compared with the height of the column of water in the pumps, and the diameter of the bucket: but, the piston having descended about one-third of its stroke, a chock of the plug-frame R meets the upper handle *x*, and, pressing it down, shuts off the steam from the boiler. That part of the handle on which the chock acts becomes perpendicular when the valve is shut, the handle being bent for that purpose; and the chock can therefore descend farther, and slide against the perpendicular part of the handle, which is straight, without producing any farther depression of the handle, at the same time that it keeps it down to the same point, so as to hold the valve shut. The piston, therefore, continues its descent by the farther expansion of the quantity of steam at first let into the cylinder; but, having arrived at the bottom of its stroke, a chock on the opposite side of the plug-beam R seizes the middle handle *y*, and presses it down, which pushes the rod 4, until it shuts the exhausting-valve K, and also the injection-valve by the strap and rod 9. When the catch 1, of this handle *y*, presses on the upper hook *t*, of the detent *t v*, it relieves the catch 2, of the lower axle *z*, and then the weight *n* causes the handle *z* to fall, and, pulling the rod 14, opens the lower steam-valve O. Let us now consider the position of the engine; the middle handle *y* will be held down, by its catch 1 holding in the upper hook *t* of the detent so as to keep the exhausting-valve K shut; and the upper steam-valve F is also kept shut, by the same means which kept it shut during the latter two-thirds of the descent of the piston.

148. Under these circumstances the piston is at liberty to rise by the action of the counter-weight S, because the opening of the lower steam-valve O has established a free communication between the top and bottom of the cylinder, and the steam in the top of the cylinder can flow through the pipe *r*, and enter the bottom of the cylinder, as fast as the piston rises, by the action of the counter-weight.

149. When the piston has returned to within one-third of the top of the cylinder, the chock of the plug-frame quits the upper handle *x*; but this handle cannot yet be thrown up by its weight to open the upper valve, because the rod 5 from the lever of the middle axis bears up the short lever 6 of the upper axis *x*; and thus the motion continues till the piston arrives very nearly at the top of the cylinder: a chock on the plug-frame then seizes the lower handle *z*, and, lifting it up, shuts the lower steam-valve; and the catch 2 of the lower axis, passing the lower hook *v* of the detent, moves it on its centre so as to release the catch 1 of the middle axis from the upper hook *t* of the detent. This being the case, the weight of the middle axis causes its handle *y* to fly up, and by the rod 4 it opens the exhausting-valve; and, by drawing the strap and rod 9, it opens the injection-valve; at the same time the

upper axis x, losing the support of the rod 5 which kept it up, its weight carries up the upper handle x, and, by pulling the rod 2, it opens the upper steam-valve F.

150. The steam from the boiler is now admitted to press upon the upper surface of the piston, while the steam from the lower part of the cylinder beneath the piston rushes into the condenser, where, being met by the cold injection, it is condensed, and makes a vacuum in the lower part of the cylinder, which brings down the piston to make another stroke.

151. At one-third of the descent the plug-frame, as before, presses and holds down the upper handle x to keep the upper steam-valve shut; and, when the piston has arrived at the bottom, the plug-frame presses down the middle handle y to shut the injection and the exhausting-valves; and in catching, this discharges the lower axis, and the weight thereof opens the lower steam-valve. The piston then rises by the counter weight, and when at the top of its stroke the plug-frame lifts the lower handle z, and shuts the lower steam-valve; and, in catching, discharges the two other handles, which open the upper steam-valve, the exhausting-valve, and the injection-valve, and this produces the descent of the piston as before.

152. If the air has been fully discharged from all parts of the engine by blowing through, the action of the air-pump does not begin until the injection-water and the air, which are extricated from the water in the boiling, have accumulated in some quantity in the condenser; then at every descent of the bucket d of the air-pump it dips into the water contained in the bottom of the barrel N, and the water passes through the valves in the bucket: these valves shut when the bucket is drawn up, lifting all that water which is above them up to the top of the barrel, and there it is forced out through the hanging-valve g into the hot-well g. The drawing up of the bucket at the same time makes a vacuum in the pump-barrel beneath it; and if this vacuum is more perfect than that in the condenser, which it will be if the condenser contains either air or steam, it will press by its elasticity upon the surface of the water in the lower part of the condenser, and force it through the hanging-valve at m into the lower part of the barrel N of the air-pump; and, when all the water is gone from the condenser, the air or elastic vapor which is in the condenser will follow and enter into the pump until the space of the barrel beneath the bucket is filled equally with the condenser.

153. This takes place while the pump-bucket is at the top of its barrel; and on the descent of the bucket the space beneath it is diminished until it compresses this rarefied vapor so much, that its elasticity will be sufficient to close the hanging-valve m, and to lift the valves in the bucket d, and pass through them into the space of the barrel above the bucket: and, when the bucket has descended to the very lowest, the water contained in the bottom of the barrel, not being able to escape through m, must pass up through the valves, and rest upon the bucket d. When the bucket ascends it carries before it this water and air, and as it rises the space of the barrel above the bucket diminishes, and the rare vapor or air in it condenses by being crowded into less space, until at last it becomes equally dense with the atmospheric air, and then the water following it drives it through the valve g into the open air.

154. The ascent of the bucket d left a vacuum beneath it as before, and this drew a portion of the air or vapor from the condenser into it ready to be extracted by the next stroke. As soon as the bucket begins to return the discharge-valve g shuts, and prevents the atmospheric air from entering into the pump. By this we see that, if the vapor in the condenser is so rare that the whole contents of the barrel of the pump will only make a few cubic inches, when reduced to become equal to the pressure of the atmosphere, this small quantity will be effectually evacuated through the discharge-valve g, because the water resting upon the bucket follows the air, and will chase every particle of it from the top of the pump, and then follow itself.

155. An effective and economical steam engine, imparting a primary rotatory motion, has long been a grand desideratum in the arts. The importance of such an invention will be apparent, when it is considered that, although the reciprocating steam engine (whether we look to the admirable expedients for adapting it to the end proposed, or to the skill displayed in the workmanship) appears to have reached its utmost degree of perfection, yet it absorbs half the power of the steam.

156. This fact may be proved by calculating what pressure on the pistons of reciprocating condensing engines is required to produce the declared powers. The results will prove generally to be only from six pounds to six pounds and a half per square inch, on the pistons of small power engines; seven pounds as to engines of from ten to thirty horse powers; and from seven pounds and a half to eight pounds as to engines of larger powers; when the actual pressure of the steam is at least seventeen pounds per square inch above a vacuum. When the engine is in the best possible working state, these results will be a little more; but this state is seldom long maintained; therefore they may be taken as a fair average. This serious loss of power is occasioned principally by friction, and in alternating the movements of the parts. Now to obviate these defects, a variety of rotatory steam engines have been suggested. These may be examined nearly in the order of their invention, commencing with that invented by Mr. Masterman :—

157. Plate XII., fig. 1, represents a vertical and central section of the troke (being that part of the engine which revolves). Fig. 2 is a transverse section of it, and of the two masks after mentioned. The troke is composed of the axis, of the nucleus (being the central part, and through which the axis passes); of the annulus (being a hollow ring, in which are placed valves), and of the radii (being the steam passages between the nucleus and the annulus). Fig. 3 is a plan of the nucleus. That part of it which is included between the two concentric circles is called the face. The surface of the face is a

STEAM ENGINE.

'MASTERMANS' ROTATORY STEAM ENGINE.

Fig. 3.

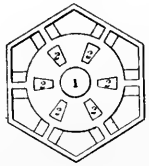


Fig. 1.

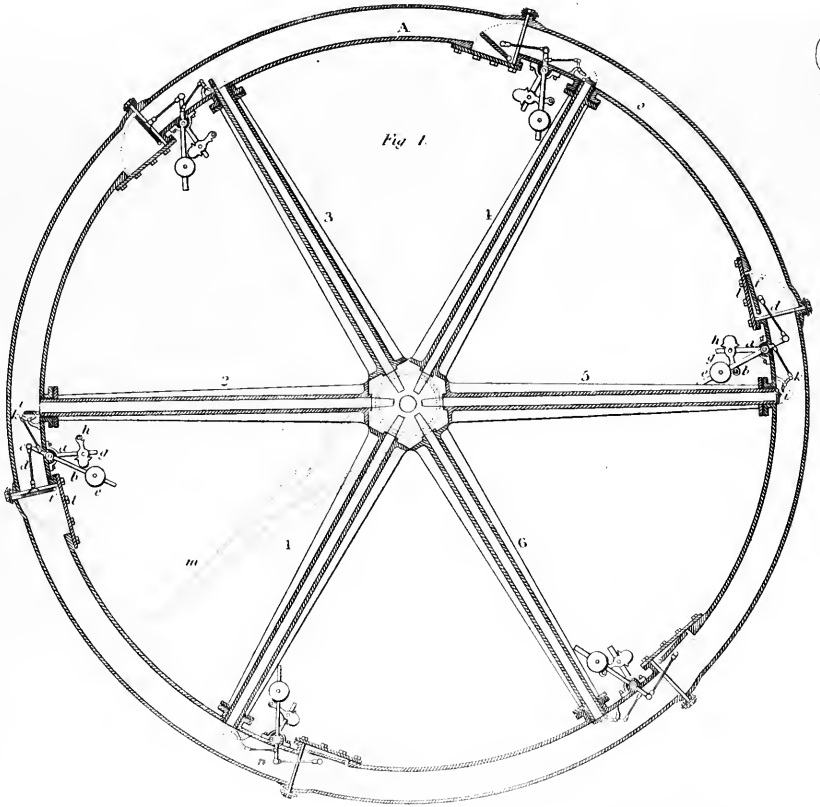


Fig. 6.

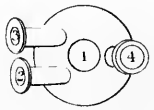


Fig. 2.

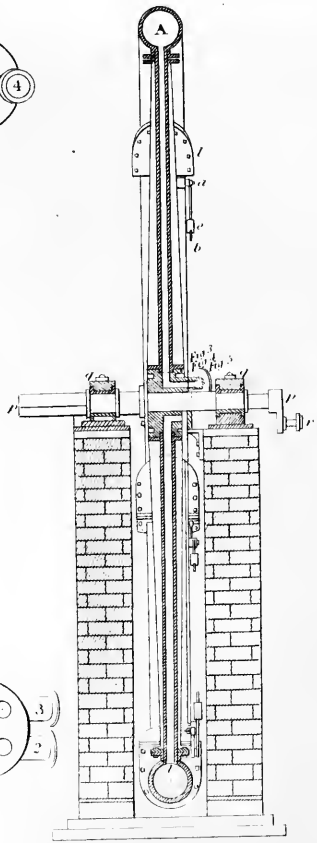


Fig. 4.

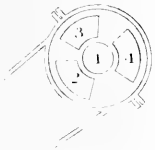
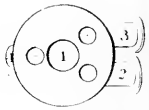


Fig. 5.



perfect plane. The axis passes through the hole 1 at right angles with the plane of the face. Six holes 2, of similar figure and dimensions with each other, are sunk in the face at equal distances, in a direction parallel to the axis, for three or four inches; then, curving into a direction at right angles with the axis, they open in the periphery of the nucleus.

158. The annulus A consists of six equal segments. At each of their joints is fixed a valve, which, by being ground on its seat, is rendered steam-tight when closed.

159. The radii 1, 2, 3, 4, 5, 6, are connected with the nucleus and annulus, so as to form steam-tight communications between each hole in the face, and the inside of the annulus.

160. Fig. 4 is a plan of the inner mask, being a circular plate of metal, of equal diameter with the face, about two inches thick, and having each side perfect planes, parallel to each other.

161. There are four holes 1, 2, 3, 4, through ; 1 is of sufficient size to admit the axis; 2, 3, 4, are each one-sixth of the space that would be included by completing the two concentric circles, segments of which form the sides of those holes; and those circles are described with the same radii as the segments of those which bound the holes in the face. Thus, each of those holes would extend over one of the holes in the face, and one of the adjoining spaces. The space between 2 and 3 is of such dimensions as just to cover completely one of the holes in the face; 4 is situated so as to leave equal spaces between it and 2 and 3.

162. The periphery of this mask is clasped by an iron hoop, from which projects a lever, extending nearly to the annulus, and having a small inclined bar placed across its end. The two projections from fig. 4 represent the beginning of the lever; and the whole of it, with the hoop, is represented by the dotted lines *m* in fig. 1.

163. Fig. 5 is a plan of the inner side of the outer mask. Fig. 6 is a plan of its outer side. This mask is a circular piece of metal of the same diameter, and about the same thickness, as the inner mask. The inner side, fig. 5, is a perfect plane; 1 is a hole sufficiently large to admit the axis; 2, 3, 4 (see fig. 6), are pipes which enter the outer side of this mask, and open in its inner side. The apertures are represented by the three smaller circles in fig. 5. 2 is the pipe through which the steam passes from the boiler to the engine. 3 is the eduction pipe, through which the steam is discharged from the engine into the condenser, or (where one is not used) into the air. 4 is a pipe through which any waste or excess of water in the annulus may be supplied or withdrawn; it is kept closed by a stop-cock while the engine is at work. The axis passes through 1 in both masks; the inner mask is placed next the face, the other next the inner mask, and both are kept closely pressed towards the face (by means of screws acting on the back of the outer mask) so as to be steam-tight with each other, and with the face; a trifling pressure suffices to make them so, the opposed surfaces having been ground on each other. The outer mask is placed in such a position, with respect to fig. 1, as that the pipes 2 and 3 may be horizontal, and point towards radius 2 (it appears in this relative position in fig. 6), and it always remains stationary. The inner mask is placed in such a position, with respect to the outer mask, as that pipes 2, 3, 4, in the latter may communicate with the holes of corresponding numbers in the former, and thus form a communication between the pipes in the outer mask and the face. It appears in this relative position in fig. 4.

164. Thus the holes in the inner mask are for the same relative purposes as the pipes in the outer mask marked with corresponding numbers.

165. The inner mask is moveable by means of *m*, but so far only as not to interrupt the communication between 2 and 3 in the outer mask and the face.

166. The transverse sections of both masks, placed in their relative positions, are represented in fig. 2.

167. The corresponding letters in figs. 1 and 2 refer to the corresponding parts in each figure; *p p* is the axis; *q*, *q*, are its bearings; *r* is a crank attached to the end of the axis, for working the feeding pump, and (where a condenser is used) the air-pump. As the valves, and the gear for regulating them, are precisely the same in each segment of the annulus, only two of them (one showing their position closed, the other open) are lettered for reference.

168. Each valve *f* is similar to the other, and opens in the same direction; its gudgeons moving freely in sockets fixed to the sides of the annulus nearest the axis.

169. Their working gear is as follows:—*a* is a small hollow protuberance, or bonnet, screwed on the annulus and communicating with the inside of it; on one of its inner sides is a socket, on the opposide side a stuffing box; one end of a spindle works in the socket, the other passes through the stuffing box to the outside of the bonnet; to this end is attached the lever *b*, and to the centre is attached the lever *c*, both levers being at right angles with the spindle and in the opposite direction to each other. To the extremity of *c* is attached, by a moveable joint, the rod *d*, and to the extremity of *b* is fixed the weight *e*, being more than sufficient to counterpoise *f*, which is connected with it by means of a moveable joint at the other end of *d* and attached to the centre of *f*. The levers are so placed as to cause *f* to be half open when they point to the axis. Thus it is evident that during the revolutions of the stroke, two of the valves *f* on its ascending side, denoted by the arrow, will by the mere preponderance of *e* be shut, and the whole of the others will be open, as represented in fig. 1.

170. For more easily comprehending the action of these valves, let it be considered that their movements are regulated by the mere gravity of *e*. It will be afterwards shown that they are regulated with more precision by means of the catch *h* and lever *m*. Let it also for the present be considered that there are no valves *i*, nor lever *k*, their use will afterwards be detailed. The machinery to which motion is to be imparted is attached to that end of the axis next fig. 1.

171. The steam is generated and condensed in the usual manner.

172. The principle on which the engine acts is by a liquid body, water or mercury for instance, placed in the annulus being pressed on one side of the troke by the steam, until that side gain such a preponderance over the other as to overcome the resistance of the machinery attached to the axis; and by being then sustained there, so as to maintain the preponderance during the revolutions of the troke.

173. The engine represented by the plate is one in which water is the liquid made use of in the annulus.

174. The manner in which it is worked is as follows:—The annulus is nearly half filled with water, which need never be withdrawn. The troke is placed so as to have two of its radii in a vertical position: *m* is then depressed so as to cause 2 in the inner mask to communicate with the lowest hole in the face. The steam cock is now turned, consequently the steam rushes through the pipe and hole 2 in the outer and inner masks, and through the lowest hole in the face, into the lowest radius; and, after imparting to the surface of the water in that radius its own temperature, it presses such water downwards, and flows into the annulus, condensing in the water therein, until it has imparted to it also its own temperature, which will be rapidly accomplished. On the temperatures becoming alike, the steam will rise through the water on both sides of the troke; and meeting with a closed valve on one side will press the water, which is beneath it, downwards, and consequently cause the water on the other side to rise proportionably, until the preponderance thus given to that side be sufficient to overcome the resistance of the machinery attached to the axis. Immediately whereupon the troke will begin to revolve,—*m* must now be returned to its working position; that is, such a position as will elevate the hole 2 so high as to cause the steam to flow into the annulus, just above the depressed surface of the water (ascertained by the pressure of steam).

175. The load or resistance of the machinery remaining the same, and the supply of steam being equable, the water will remain nearly stationary during the revolutions of the troke: its surfaces are denoted by the dotted lines at *n* and *o*.

176. As the troke revolves, each of the holes in the face communicates in succession with 2 in the inner mask. It should be borne in mind that, as has before been observed, the position of the inner mask is never so far changed as to prevent 2 and 3 therein communicating with the corresponding pipes in the outer mask, when the engine is at work.

177. By the construction one entire hole in the face, or parts of two equal to one, is or are always in communication with 2 in the inner and outer masks; so that there is always an equable flow of steam into the annulus, preventing the depressed surface of the water rising with the ascending closed valve.

178. The holes in the face, as they pass in succession from 2 to 3 in the inner mask, are entirely closed by the space between them; and, immediately on communicating with 3, the steam confined between the two closed valves rushes from the annulus, through 3, into the air; or into the condenser, if one be used. And, until the same hole in the face has passed 3, a communication with the air, or the condenser, remains for the discharge of the steam.

179. The pressure of the steam being thus removed from each valve *f*, as it arrives at this point, it will, by the gravity of *e*, open as it begins to descend (see the valve *f* partly open in fig. 1), and thus allow the column of water to remain on that side of the troke.

180. The water will fill the radii as their ends descend beneath the elevated surface *o*, and will remain there until the steam presses it out at about *n*; but cannot escape if before it enters them the hole in the face has passed the hole 3: otherwise, however, the water would escape through that hole into the air or condenser.

181. A uniform rotatory motion is thus produced and maintained, as long as the steam flows equably into the annulus, acting with a force proportionate to the preponderance of the water on one side of the troke over the other. This force is easily estimated; being equal to the weight of a perpendicular column of water, having the difference of the two levels for its altitude, and the area of a transverse section of the annulus for its base, pressing against the closed valve.

182. Having thus described the action of the engine without the catches *h*, or the valves *i*, it is now necessary to describe them. The projection *g* is cast with *a*; *h* is attached to one side of this projection by a pin, which is the fulcrum on which it moves: it is prevented swinging to an angle of more than about 20° by the shoulders on it, near its round end; this end is much thicker than the other end, and more than sufficiently heavy to counterpoise it. Near the extremity of its thin end is fixed a pin of about four inches long. Another pin of about the same length is fixed on *b* within *e*; those two pins project from *h* and *b* at right angles, as seen in the figure, and point, the first towards the eye, the second in the opposite direction. The pin on *b* rests in the notch at the thin end of *h* when just below *m*, and thus prevents *e* acting on *f*; but as the catch passes *m* the pin on *h* comes in contact with the bottom of the inclined bar on *m*, and before it has passed the top of it, is pressed so far towards the annulus as to release the pin on *b* from the notch, when *e* immediately falls and *f* closes. The superior gravity of the round end of *h* keeps the notch back, or towards the annulus, while that part of the troke is descending, and brings it forward so as to support the pin on *b*, when it begins to ascend.

183. When the engine is working with its heaviest load, the depressed surface of the water will be as near the bottom of the annulus as it can be, without affording a passage for the steam to the other side of the troke; and the lighter the load the farther from the bottom will it be. Now it is most beneficial, both for *f* to close and the steam to enter into the annulus, above such depressed surface; as otherwise the speed

of the engine would be impeded, and the surface of the water agitated; but were the valves *f* to close, and the steam to enter the annulus always at one spot, either this disadvantage would occur when the engine should be working with a light load, or the column of water must be limited, or part of the water must be withdrawn from the annulus.

184. It is evident that any alteration in the position of *m* changes the closing point of *f*, by varying the point of contact of the pin on *h* with the inclined bar on *m*. It is also evident that any alteration in the position of the inner mask, in like manner, varies the point at which the steam is admitted into the annulus.

185. Before the clasp round the inner mask is screwed up, the following adjustment must be made:—Let a hole in the face (that communicating with radius 2 for instance) be covered by the space between 2 and 3 in the inner mask. The situation of *f* immediately below that radius will be the most beneficial point relatively to the then position of this mask, where the valves *f* ought to be closed. Because the covered hole immediately afterwards communicates with the eduction hole 3, and consequently, were they not then closed, the steam entering radius 1 would, until they closed, be lost by passing out through radius 2, without having exerted its force; and, were they closed lower than at the arrow, that is, when any considerable portion of steam should be entering through radius 2, they would be pressed open again; *m* ought therefore to be placed in such a direction as to cause *f* to close at this point. And this direction will be nearly that in which *m* appears in the plate. The clasp is then screwed so tight, by means of the screws and nuts represented in fig. 4, as to cause the position of the inner mask to be altered by any movement of *m*.

186. After this adjustment, one simple movement of *m* will not only cause the steam to enter the annulus above the depressed surface of the water, but will also cause the valves *f* to close at the most beneficial point relatively to such entrance of the steam. There could be no difficulty in causing the steam to regulate this movement by its pressure on a small piston connected with lever *m*.

187. Where the load is constant, the inner mask, the lever *m*, and the catch apparatus, might be dispensed with, by making the apertures in the outer mask of the same form and size as those represented in the inner mask, and by leaving the action of the valves *f* to be regulated by the gravity of *e*; and, where fuel is cheap, the valves *i* might also be dispensed with; thus diminishing the expense of the construction and repairs of the engine, and simplifying it.

188. The only use of valves *i* is to prevent the water entering the radii at *o*. Their construction and action are as follows:—That end of each radius which enters the annulus has a flanch of about an inch broad; against this *i* closes. The gudgeons of *i* work freely in sockets screwed to the flanch.

189. Lever *k* is attached to lever *c* by the rod appearing to connect them in the plate, which has a moveable joint at each end. A pin passes through the centre of *k*, and through the notched end of the small projection appearing fixed to the annulus, which consequently forms a fulcrum for it. As the valve *f* (represented partly open) begins to open, the extremity of *k* presses against the back of *i* until its gravity causes it to shut. Its gravity keeps it shut until it has descended below the horizontal line; when the pressure of the water prevents its opening, until the steam, entering through its radius, presses it open.

190. *l* is a bonnet screwed to the annulus, by which access is procured to the valves for repairing them. The troke is constructed of cast metal, except the valves and inner mask (which are of brass, where mercury is not used), and the valve gear inside the annulus, which is of wrought iron.

191. The troke is enclosed in a case of stone, or brick, for the purpose of preventing condensation when at work, and the cooling of the water when at rest, by confining the heated air next its surface. And, further to delay the latter, evaporation is prevented by closing valves in the steam and eduction pipes. With these precautions the water would remain until the next day at a very few degrees below the boiling point, and consequently the engine in an immediate working state. Where a condenser is not used, fuel is saved, by causing the steam from the eduction pipe to impart its heat to the water from which the boiler is supplied.

193. The diameter of the troke ought never to be less than twenty-eight feet, as the engine could not be worked economically with steam of a less pressure than about ten pounds per square inch; but this diameter need never be increased, as the power required may be gained by enlarging the annulus. In large powers, however, it would be found advantageous to increase the diameter of the troke.

194. In the plate the annulus is circular, but in larger powers it would assume the form of a square, and in still larger powers that of an oblong; so that the breadth of the valves from their gudgeons should never exceed about eighteen inches, on account of the advantage of limiting their action.

195. Where mercury is used, instead of water, the engine differs not in construction or principle; but the diameter of the troke need not exceed six feet for any power; the great specific gravity of the mercury giving the requisite pressure to the steam by a column of about thirty inches: and the transverse section of the annulus ought always to be an oblong, that form requiring less mercury. Several parts may, however, be omitted; for instance the valves *i*; because, with a column of thirty inches, the radii descend to the horizontal line before their ends reach the surface of the mercury, and its temperature would be throughout alike. Also the inner mask (the outer mask being made to assume its form as before mentioned), because, the closing point of the valves need never be altered, so short a column (comparatively with the diameter of the troke) allowing the steam to enter the annulus nearly as high as the horizontal line of the radii, without causing a radius

to descend into the mercury before its communication be cut off from hole 3. And for the same reason the radii may be reduced in number to five or even four. The pipe 4 may also be omitted, there being no waste of the mercury.

196. Instead of the case before mentioned, the troke, with its mask, may be enclosed in a steam-tight cast iron case, and the steam being admitted into it in the first instance, all condensation of steam within the annulus is prevented. This it is advisable to effect, on account of the difficulty of getting rid of the water, which would accumulate on the depressed surface of the mercury. This water, however, may, when necessary, be blown out by the steam into the air through a pipe of about a foot long, inserted into that side of the annulus next the axis, and having a stopcock in it; and a common case may then be made use of.

197. It will be perceived that where mercury is used, the engine is exceedingly compact; but, where space is very limited, the troke may be made to revolve in the boiler itself, by having a projection on its top; and this is the more economical mode.

198. A patent has been taken out for another rotatory engine that possesses considerable merit. It may be thus described:—A piston is made to revolve in an annular channel, or hollow ring, formed between two concentric horizontal cylinders; into which channel two sliders pass from opposite sides of its diameter alternately, so as to form in it steam-tight partitions that constitute abutments, to resist the steam at the end of the portion of the channel, in which it is forcing round the piston, and which are by the external machinery drawn out of the track of the piston, whenever it approaches them.

199. To communicate the motion of the piston to the mill work on which the engine is intended to act, the internal cylinder is divided transversely in the centre into two equal parts, between which a circular vertical disk is placed, to the edge of which the middle of the side of the piston next to it is united; and an axle passing through the centre of this disk, and through the entire of the internal cylinder in the line of its axis, being made fast to it, the circular motion of the piston is by it communicated to this axle, which in its turn acts on the mill work. The end plates of the outer cylinder form each one piece with one of the halves of the internal cylinder, and, by being ground into rebates in the ends of the cylinder, make with it steam-tight junctures, which are closely pressed together by means of flanches formed in the end plates, and in the cylinder, connected by screws and nuts.

200. The circular disk to which the piston is attached is made steam-tight at its sides, by rings that lie in grooves formed in them, which are pressed against the adjoining divisions of the internal cylinder by hemp packing placed between them and the disk; and the piston itself, which is of a rectangular form, is made steam-tight at its edges by a metallic packing, behind which hemp packing is also placed, which metallic packing consists of four pieces in the form of the letter L, the longer portions of which lie along the two principal edges of the piston, while the shorter portions meet in the middle of its ends; the longer pieces at the outer edge of the piston meet in the middle, but those at its inner edge, next the centre, are separated by the disk with which they are made to form secure junctures, by portions of them being bent round into its direction, and entering into cavities made for them in its substance. Where the ends of these pieces of metallic packing meet, part of their external surface is cut away, to admit plates to be placed across their lines of juncture to prevent the steam from passing between them; and spiral springs being fixed in several places between these pieces and a piece in the centre of the piston force them out against the sides and ends of the two concentric cylinders; while flat plates at each side of them, that are nearly equal in size to the transverse diameter of the channel, and which are united by screws to the central piece of the piston, keep them in their places, and along with them and the central piece constitute the piston.

201. The packing pieces and the side plates being ground, where they come in contact, the former easily slide between the latter on being pressed by the springs, and at the same time maintain their joinings steam-tight; and the screws which unite the plates to the central piece, being made of the same metal with them, expand or contract equally with them on alterations of temperature, which prevents any of that contraction that might be occasioned from difference of expansion, were the parts made of different metals.

202. The sliders move vertically in grooves made for them in the end plates, and enter into other grooves cut lengthways for them on the face of the internal cylinder; they of course pass through the sides of the external cylinder, and are there received into steam-tight cases; through the ends of which that are farthest from the centre, rods, like piston rods, pass from their middles through stuffing boxes; the outer ends of these rods are fastened to the centre of horizontal bars that extend a little beyond the ends of the main cylinder, and are there jointed to vertical pieces that terminate in forks; between which are placed vertical rollers, against which the edges of cam wheels act that are attached to the main axle, by which they are moved up and down so as to close or open the channel in which the piston moves, as required; while two other rollers, placed at the sides of the forks externally, serve to guide them between upright bars, placed for that purpose, and keep them from being made to deviate to either side by the pressure of the cam. The upper slide is moved upwards by the cam wheel, and descends by its own weight; but the lower one, which lies directly under it at the other side of the main cylinder, is pressed downwards by the cam, and rises up again by the action of a balance lever placed beneath it, to the farther end of which a weight is appended. The rod by which each slider is worked is fastened to it by the intervention of a narrow bar that is dove-tailed to the outer edge of the slider, to the centre of which bar the rod

is rivetted or screwed. The longest radius of the cam wheel by which the sliders are worked is nearly equal in length to the radius of the outer cylinder, and its shortest radius is, by the depth of the annular channel in which the piston moves, so much less in length than this. The sliders themselves are made steam-tight in the grooves by grinding; and in the part of the edge of the central disk, against which they press when closed, sloped notches are made, which, as the disk revolves, gently elevate them to its edge, and thus, in the opinion of the patentee, prevent sudden percussion.

203. For the admission of the steam into the annular channel an aperture is made through each of the end plates near the entrance of the sliders; and diametrically opposite to them two other apertures are made in the same plates, for the eduction of the steam from the portion of the annular channel which is being emptied, either into a condenser or into the open air. These apertures are covered with circular valves, ground on their beds to make them steam-tight, and which turn round on their centres; in these circular valves perforations are made of the same size of the other apertures mentioned, which, when turned round over them, permit the steam to pass; but, when turned in the opposite position, totally close the passages, by the solid parts of their plates being then brought round over the apertures so as to cover them completely. These circular valves are placed in bonnets, or boxes, which are screwed to the end plates over the apertures; and axles pass from their centres through stuffing boxes, in the covers of these boxes, by which they are turned round by arms that project from them at right angles, and which are jointed to a frame that connects the two of them together, which are on each end plate at opposite sides of its diameter; through the middle of which frame the axle passes, carrying on it a pointed cam wheel, which acts against friction rollers, attached to the joints that connect the arms with the frame; by which arrangement the circular valves are made to turn in opposite directions; so that when one is opened to let the steam enter at the upper part of the annular channel, that which lets it pass to the lower part of this channel is closed; and, in like manner, when the circular valve is closed, through which the steam passes out at the other end plate of the cylinder, that at the opposite extremity of this plate is opened, to afford a free passage to the steam from the other side of the channel, either to the condenser or to the open air.

204. Supposing then the piston to be near the upper aperture for the admission of steam, the slider behind it being then let down by the cam which moves it, the steam will press forward, while that which remained at the other side of the piston in the channel, passes out at the aperture at the lower part of the other end plate, until the piston approaches near to it; when it is immediately closed by the action of the cam on its valve, and at the same time the lower slider is pressed downwards, out of the way of the piston by its cam; the piston directly after passes by this lower aperture, and the lower slider, and also by the second lower aperture, close to the other side of the lower slider, by which the steam is admitted to the lower portion of the channel; immediately after which the lower slider is closed, and the lower steam valve and the upper eduction valve are opened; when the steam presses the piston round upwards, until it comes nearly to the upper slider, and to the steam valve, and eduction valves at its opposite sides, which are managed in the same manner as the lower valves and lower slider just described; by which means the piston passes them in a similar manner, and is again urged forwards by the steam as at first.

205. In front of the engine, on a level with the axle, a box is fixed to the frame-work, by which the whole engine is supported, into which box the steam enters by a pipe from the boiler, and passes from it horizontally through tubes concealed in the frame-work, round into passages made in one of the end plates which convey it to the valves; while similar passages in the other end plate convey the steam off from before the piston through the eduction valves, and round through similar tubes into another division of the same box, whence a pipe passes either to the condenser or to the open air; and a common sliding valve is so placed in the box that by shifting its position, by an external handle, the steam will pass into those tubes which before served for the eduction; and, on the contrary, those tubes through which the steam before passed will then convey it away to the division of the box whence the pipe proceeds to the condenser or to the open air. The precise mode of arranging the sliding valve, and the divisions in this box is not detailed in the specification, but may be easily conceived by those conversant with the subject; by the means however mentioned, the direction of the progress of the piston will be reversed, and the engine be made to turn in a course contrary to its former movement: which contrivance would be particularly useful in working gins for raising coals from the pits, and other similar purposes; and would also be occasionally of use when the rotary engine was employed in steam vessels.

206. The patentee explains the term, 'improved rotary steam engine,' in the title, to mean *improvements* in rotary steam engines, and enumerates the following particulars in the engine described as coming under that head, and accordingly claims them as his sole property by authority of his patent. 1st, the annular grooves in the faces of the divisions of the internal cylinder next the central revolving disk, which receive the packing rings that make that juncture steam-tight: 2d, the notches in the edge of the disk, which receive the ends of the sliders, and cause them to be gently elevated to its circumference: 3d, the combined packing of metallic pieces and hemp used with the piston and the central disk, which the patentee calls 'compensating packing:' 4th, the circular valves for closing the apertures through which the steam passes into and from the annular channel in which the piston moves: and, 5th, the friction rollers at the ends of the rods of the apparatus

for moving the sliders, against which rollers the cam wheels act.

207. The next rotary engine which it may be necessary to describe was invented by Mr. Eve. It formed the subject of a patent, and the specification will scarcely admit of abbreviation. The patentee says, 'I, the said Joseph Eve, do hereby declare that the nature of my said improved steam-engine consists of five particulars. 1st, In the application of revolving cones to rotary engines, in the manner hereinafter described, for the purpose of compensating any loss by friction; and in the general arrangement of the various parts of the rotary engine hereinafter described. 2d, In a steam-generator, so constructed of tubes that the heat of the furnace shall cause the water to circulate constantly through the tubes, thereby preventing the steam from driving the water out of them, by which means the said tubes are less liable to burn out or become oxidated. 3d, In an arrangement of one or more revolving cock or cocks, for the purpose of supplying the generator with water in lieu of the ordinary forcing pump. 4th, In a new safety apparatus, by which the elasticity of steam in boilers is ascertained by weight directly applied instead of indirectly, as in the ordinary steelyard valve. And, 5th, In such an arrangement of cog wheels with a compound engine, in such manner that the steam, after having acted as high pressure, may be used as low pressure with greater effect than in any engine now in use. And, in further compliance with the said proviso, I, the said Joseph Eve, do hereby describe the manner in which my said invention is to be performed by the following mechanical description of the various improvements constituting the same, reference being had to the drawings annexed, and to the figures and letters marked thereon (that is to say):—Sheet first contains three modes of constructing my rotary steam-engine. Fig. 1, plate V., STEAM-ENGINE, presents an end section. Fig. 2, a longitudinal section of the same engine, on the simplest manner of construction. The same letters refer to similar parts in all the figures. In sheet the first, *a*, *a*, are the cylinder and cone revolving in contact in opposite directions, the cone having one groove, and being one-third of the diameter of the cylinder, which latter has three wings or pistons, *c*, *c*, *c*, the ends of which, as they revolve, touch the outer case E, and do not admit any steam to pass. The steam is admitted through the pipe F, and, acting on the wing *c*, causes the cylinder to revolve until the said wing passes the pipe G, where the stratum of steam lodged between each two wings is allowed to escape; the wing which has thus passed falls into the groove *d* of the cone, the bottom of which groove it touches in passing, thus allowing no steam to escape between. The said wing *c* then passes again by the steam-pipe F, and is acted upon as before described, and so on in rotation. The cylinder *a*, which is firmly fixed to its axis *b*, rests on one side, on the outer case E, through which the axis projects; but as there is some friction produced by the revolution of the said cylinder at its two ends, touching the outer case, I have placed a false end, *h h*, under the opposite end of the cylinder, which false end slides on the axis *b* freely, and has a thread out at the end; by means of which, and the adjusting nut *i*, the cylinder, if worn at the two ends, can be easily tightened and adjusted. The adjusting nut is confined by the collar K, which collar is screwed to the outer case. The conical shape of the small runner, which can likewise be moved upwards or downwards in the outer case, serves to keep the two convex surfaces of the cylinder and cone in contact, so that no steam can escape between them. It is obvious, from the conical shape of the runner, that the longer the engine will be in use the better it will work, and the more steam-tight it will become. By referring to fig. 3, which presents a longitudinal view of the conical runner, it will be seen that the groove *d* is cut into a separate piece of metal, which slides by an adjusting screw up and down in the empty space X, so that when the engine is adjusted, the groove, or the piece of metal into which the said groove is cut, can be moved up and down so as to fit the wings of the cylinder by means of the adjusting screw O, as exhibited in this and in fig. 4, which latter figure presents an end view of the before described cone. The dotted lines in the said fig. 4 show the appearance of the sliding piece containing the groove. Letters *n*, *n*, in fig. 11, present two cog wheels, running into each other, attached on the outside of the engine to the axis of the cylinder and cone, placed there for the purpose of producing a corresponding revolution of the said cylinder and cone, causing the groove of the cone to present itself regularly to the wings of the cylinder. *o* is a pinion, fixed to the other end of the axis, by means of which any machinery can be put into motion. Another variety of constituting a steam-engine on my principle is shown by an end section view in fig. 5, and an external view in fig. 6. This engine has a cylinder with three rings and two small conical runners on each side; said conical runners being of the same construction as in fig. 3, represented with one groove cut into each, and of one-third of the diameter of the cylinder. There are two induction and two eduction steam-pipes; and although the engine may be, with the exception of the addition of one of the conical runners, exactly of the same size as the one first described, a double quantity of steam is requisite, and twice the power of the former engine is gained. The steam enters through pipe F *a*, and acts on the wing *c*, which, after having passed pipe G *a*, where the steam escapes, falls into the groove *d* of the lower cone, and appearing at the induction steam-pipe F, *b*, is loaded again with steam pressure, which it discharges at the second eduction pipe G *b*, and then enters the groove of the upper cone; after having passed which it is loaded again at the first mentioned induction pipe. Letters *m*, *m*, *m*, in fig. 6, are bridges by which the spindles, *b*, *b*, *b*, of the cylinders and cones are supported. I have represented six bridges in the drawing, but two bridges on each end, and supporting the three spindles or axes, will answer as well, or any other contrivance to support them properly. This engine has three cog wheels, *n*, *n*, *n*, attached to the three spindles so as to cause the

Fig. 13.

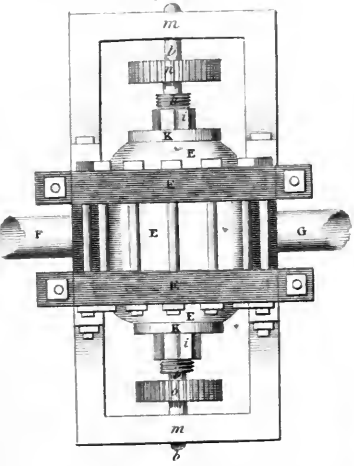


Fig. 12.

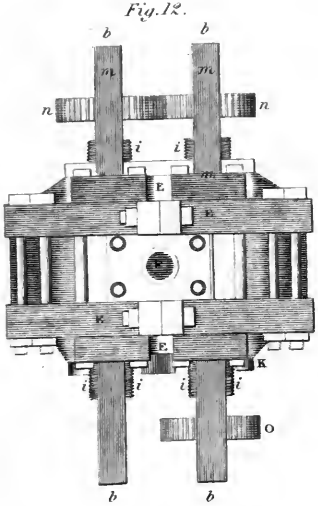


Fig. 6.

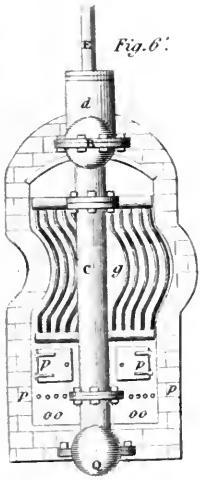


Fig. 7.

Fig. 8.

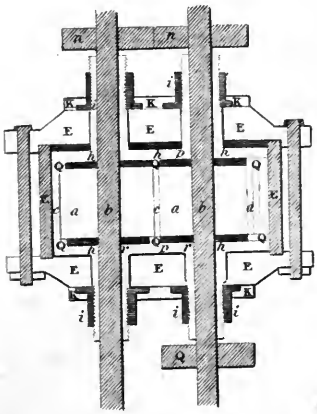


Fig. 1.

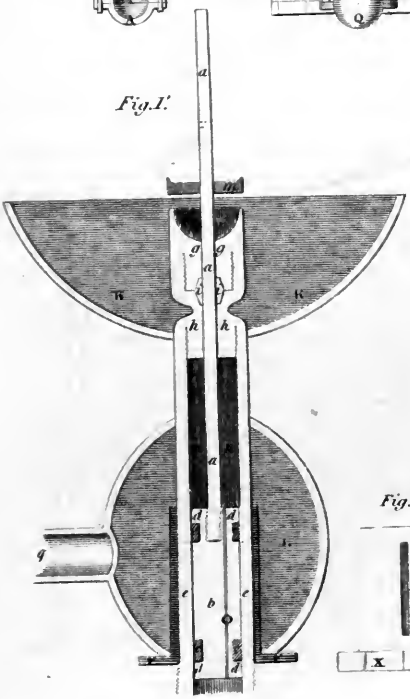


Fig. 3.

Fig. 9.

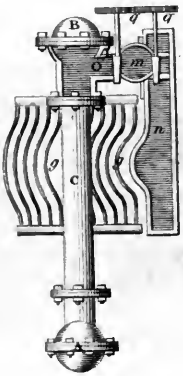


Fig. 2.

Fig. 4.

Fig. 7.

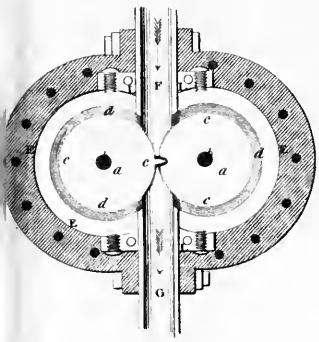


Fig. 3

Fig. 2.

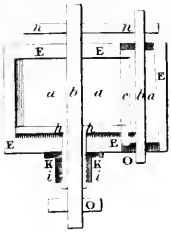


Fig. 9

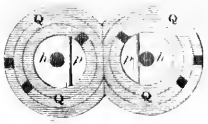


Fig. 4.

Fig. 10.

Fig. 6.

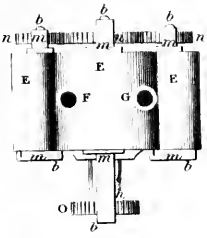


Fig. 5.

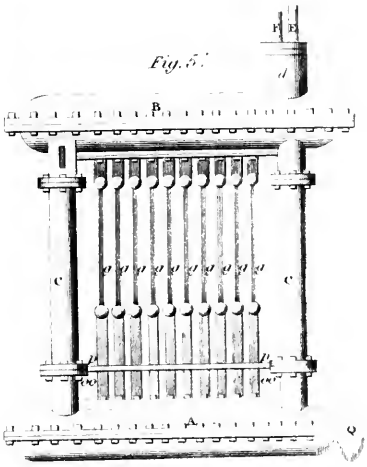


Fig. 1.

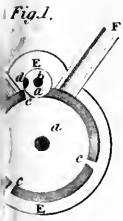


Fig. 5.

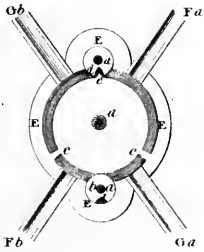
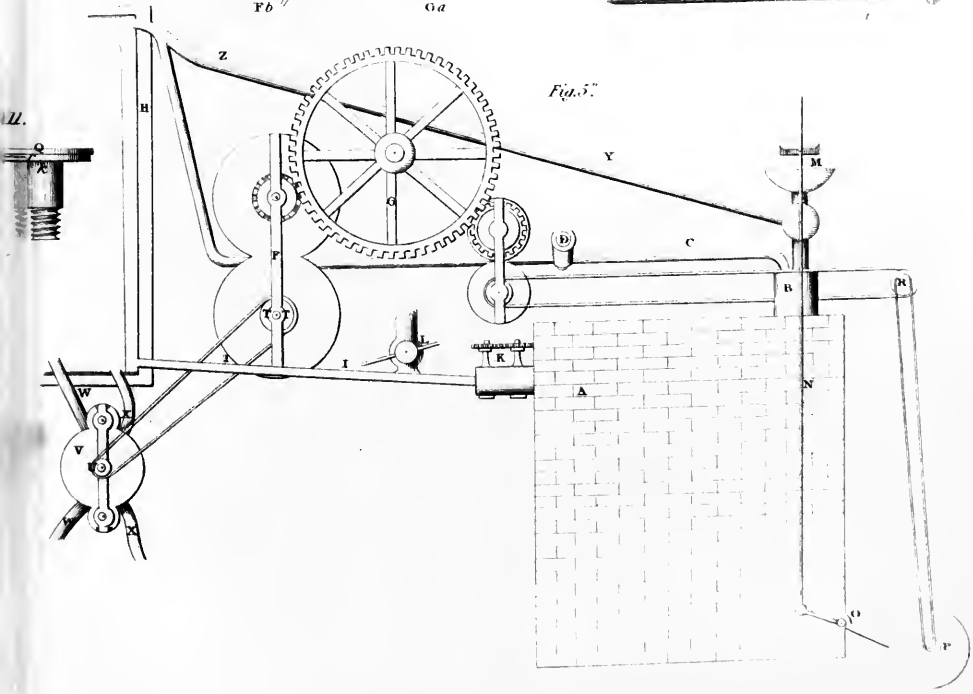


Fig. 5.



cylinder and cones to revolve in unison, and, like the first described engine, a pinion *o*, on the opposite end of the axis of the cylinder. Fig. 7 shows an end section view, and fig. 8 a longitudinal section. Figs. 12 and 13 two external views of an engine which I have constructed upon a different plan, without altering any of the leading principles of the two engines heretofore described. The same letters already explained apply likewise to the last mentioned figures. The two conical runners in this engine are of an equal length and diameter; each has two wings or pistons attached, and two grooves cut into it, and in revolving in opposite directions, the wing of one runner falls alternately into the groove of the other. The steam enters by pipe F, and as the cylinders are running in contact, it cannot escape between them, but acts upon the two wings in an opposite direction, and escapes at the eduction pipe G, after the said wings have passed the same. By reference to fig. 8, which represents the longitudinal section, it will be seen that the two cones have each two false ends, *h*, *h*, *h*, *h*, sliding freely on their spindles; the two outer cases, E, E, fit over the runners and their wings exactly. Each of the four false ends has an adjusting nut, by which the engine is tightened if steam escape, or slackened if it run too tight. Each pair of the false ends, where they join, have a plate that connects them and breaks their joint so as to prevent escape of steam. This plate *p* slides into the groove *r*, cut out of the false ends, as exhibited by figs. 10 and 11, the former showing an end view of the false ends, with the connecting plate in the middle; the latter figure, 11, exhibiting a longitudinal view of the said false ends or bottoms. On these false ends packing rings, Q, Q, Q, which are confined to the sliding plate, as exhibited in fig. 9, are placed; these rings press against the hollow outer case, and prevent any steam escaping by them. These packing rings are shown in section, in fig. 8. It will be evident that the false ends need not be made true if the connecting plates and packing rings, as above-described, are adopted; and that the engine, if provided with moveable false ends, conical runners, and the afore-described connecting plates and packing rings attached, as shown in fig. 8, can always be kept steam-tight; and by use the various parts on which there is any friction will fit better. Sheet second, figs. 5′, 6′, 7′, and 8′, exhibit various views of my said second particular, and which I call my circulatory tubular steam-generator; as also of my said third particular, being an arrangement of two revolving cocks to supply the waste of water in lieu of the forcing pump. Fig. 5′ is a side view, fig. 6′ a front view, fig. 8′ a back view of the said generator. The same letters apply to all the figures. A is the lower conduit pipe: B the steam receiver: C, C, are two pipes in which the water descends from the steam receiver to the lower or conduit pipe: *d* is the dome connected with the steam receiver, from which dome the steam enters into the steam-pipe F, and into pipe E, which latter leads to the safety apparatus: *g*, *g*, *g*, *g*, *g*, *g*, *g*, *g*, *g*, *g*, are ten pipes which communicate with the lower conduit pipe and the upper pipe or steam receiver. Fig. 7′ presents one of these ten sections in front, and the manner in which they are formed, and bent, and connected, with the two horizontal pipes, which latter are shown in section in this figure: *h* and *i* are two valves, the former kept open by its own weight, and the latter floating; with these two valves every section of pipes is provided at its two orifices, where they communicate, with the lower conduit and steam receiving pipe: *p* is the grate and fire-place, over the middle of which the smaller combination of pipes are placed: *o*, *o*, is the ash-pit: Q is an end which screws into the lower conduit pipe, by means of which the same may be cleaned out when necessary; the number of sections, number of pipes composing each section, and the manner in which the pipes are bent, is arbitrary. The generator or boiler is fed with water through the orifice O. In fig. 5′ each of the two horizontal tubes or pipes is shown as composed of two pieces in my drawings, and united by means of their flanges and bolts and screws; they may, however, be cast in one piece of metal. The heat of the furnace will cause the water to circulate constantly through the tubes, thereby preventing the steam from driving the water out of them, and by which means they are in a great degree prevented from burning out or oxidating. My tubes, in the sections, are from one-eighth to one-fourth of an inch thick, and one and two inches diameter; they may be of copper, iron, or any other metal which is sufficiently strong to bear the pressure. This pressure will be comparatively small on account of the small size of the pipes, although steam of the highest pressure be used. My horizontal pipes are an inch and a quarter thick, and nine inches and a half diameter; the vertical pipes three-fourths of an inch thick, and four inches and a half diameter. The valves *h* and *i*, attached to the orifices of each of the section pipes where they enter into the horizontal tubes, are placed there in case of a rupture in one of the sections to which they belong, in which case the unbalanced pressure of steam would force the water so rapidly into the particular section that was ruptured, as to cause the valves to close, thereby preventing any waste of steam, and detaching the ruptured section from the rest of the generator, whereby the engine need not be stopped, but would only lose so much of its power as the proportion of one section to the remaining sound ones would be. The two large vertical, as well as the two large horizontal tubes, are imbedded in brick-work, and the sections only are exposed to the heat of the fire; therefore no steam will be found or generated in the former, while the action of the fire will cause the steam and water to ascend rapidly through the small pipes into the steam receiver, while the water in the steam receiver, being heavier than the water combined with steam in the smaller pipes, will descend through the vertical tubes into the lower conduit tube, thereby causing a continual circulation through all the tubes, great and small. The steam will of course accumulate at the top, and through the dome find its way to the steam-pipe and safety-apparatus. In case the circulation should be too rapid, and to prevent the possibility of the water

being forced into the steam-pipe before it descends again through the vertical pipes, I have placed a piece of sheet iron, perforated with small holes, similar to a strainer, in the middle of the steam receiver, all across from end to end, shown by a line across in the drawing, in fig. 7′. I have given to the small pipes in the sections the peculiar serpentine form, in order to enable the steam to rise to the top more rapidly than the water. My generators or boilers are supplied with water by means of one or more revolving cocks, to serve in lieu of the forcing pump, as shown in sheet second, fig. 8′, where two cocks are represented, and which number I prefer: *n* is a vessel, filled with water, of any convenient shape, one side of which vessel is near the furnace, so as to keep the water warm. This vessel is connected with the generator through a tube entering at O, which is shown in section in the drawing. This tube has two revolving cocks, K and L, with a chamber between them as is shown by letter *m*. The cocks are made to revolve equally by cog wheels gearing into each other; so if cock K is open towards the water reservoir, cock L will be closed towards the tube leading to the generator, the chamber between the cocks will therefore be filled with water through cock K. By that time cock K closes and L opens towards the generator; the water in the chamber will then descend through O into the generator, by its own gravity, and its place be occupied in the chamber by steam from the generator. Cock K opens again towards the chamber, and L is closed towards the generator; the steam in the chamber will be condensed by the water now entering, or escapes into the water reservoir *n*. This revolution goes on continually. If water be presented by cock L to the generator, and the said generator should be sufficiently full, the water being up to the dotted lines, in such a case the water will not be received, but remains in the chamber until part or the whole is wanted, the cocks constantly revolving. By this arrangement the water can be kept constantly at the desired height. Figs. 1′, 2′, 3′, and 4′, elucidate my improvements in the safety apparatus, as applicable to my tubular circulatory steam-generator, or to any other boiler where high or low pressure steam is generated. Fig. 1′ shows a longitudinal section of the compound tube: *a* is the piston rod screwed into the piston *b*, which piston fits into the cylindrical tube *e*, screwed or otherwise fixed at its base into the pipe that connects it with the steam receiver or boiler. O is a hole perforated through *b* to allow the steam to ascend into the hollow space *n*, above the piston, so that the pressure is equal on both sides with the exception of the piston rod, the diameter of which alone is unbalanced. The piece *h*, screwed into the upper part of tube *e*, prevents the steam from ascending higher; another piece, *g g*, having a hollow space on the top, is screwed into *h*. Both these pieces have a hole bored in their centre, lengthways, of a diameter equal to the piston rod *a*, and to allow it to work up and down. The hollow space *i i*, in the middle of the two pieces *g* and *h*, is filled with packing so as to prevent any escape of steam along the piston. The hollow space *p*, at top, is filled with oil: K is a basin, with water up to the dotted line to keep the upper part cool; the weights with which the safety apparatus are intended to be loaded are placed on the collar *m*. The hollow tube *e* has longitudinal openings, as will be perceived by fig. 3′, which presents an outside front view of the apparatus, and through these openings the steam escapes whenever the piston *b* rises. These holes may be of an indefinite length and breadth; a jacket F, represented by fig. 2′, which fits over the tube *e*, and has likewise the same number of longitudinal holes cut through it, slides over the said tube, and, by adjusting this jacket at X, the channel for the escape steam can be made narrower accordingly, as it may be desirable to have the piston rod raised more or less. The hollow vessel L, or a vessel of any other form, slides or is otherwise fixed over the lower part of the apparatus, so as to intercept the steam from incommoding the upper part of it where the rod is loaded. The pipe *q* leads from this hollow vessel L to the steam condenser, or serves for the escape of steam. Fig. 4′ presents an outside view of the piston: *a* is the rod already described: *c*, *c*, are packing rings, two on the upper side and two on the lower side. These rings press against the tube *e*, in order to keep it steam-tight, so that no steam can escape through the longitudinal openings: *d*, *d*, are two pieces of metal screwed on at the top and base of the piston to confine the packing rings. Sheet third, fig. 5″, exhibits an elevation of my said compound steam-engine, with the aforesaid arrangement of cog-wheels, constituting my said fifth particular. A is the furnace containing the steam generator or boiler: B is the dome on the top of the steam receiver, with the steam-pipe C, and safety apparatus M. D is a cock upon pipe C, through which steam is admitted to the high-pressure engine E. After having acted upon it the said steam passes into the low-pressure engine F, constructed on my principle on a larger scale, so as to allow the steam to expand, and then act upon it as low-pressure: E and F have pinion wheels, of an equal pitch, gearing into a spur wheel G: these wheels determine the power given to each engine by regulating their motion with reference to the power required from each. The steam finds its escape at Z into the condenser H: the condensed steam or water runs through pipe I by its own gravity towards the two revolving cocks, K, whence it is conveyed back to the feeding pipe in the steam generator. V is an engine constructed upon the plan elucidated by figs. 5 and 6 on sheet first, having two induction and two eduction pipes, which engine serves as a pump in this particular situation. Pipe W sucks the water from the well or river, and carries it into the refrigerator: X receives the water in the refrigerator and carries it downwards: P is the bellows, fanning the fire by means of a band round the axle Q, connected with two pulleys, R and S, or by any other contrivance: O is the valve and lever of the bellows, connected by rod N with the safety apparatus: T and U are pulleys connected by a band to give rotary motion to pump V; but many other contrivances may be used: L is a cock which is only opened before the

engine is set to work, in order that the air may be driven out of the pipes and condenser by the steam; the cock may then be shut and the engine set to work: Y is a pipe leading from the safety apparatus to the condenser.'

208. The principle of the high-pressure steam engine, which must next be examined, depends on the power of steam to expand itself very considerably beyond its original bulk, by the addition of a given portion of caloric, thus acquiring a considerable elastic force, which, in this case, is employed to give motion to a piston. One of the greatest advantages attendant on employing the repellent force of steam, as in this form of the engine, consists in an evident saving of the water usually employed in condensation; and this, in locomotive engines, for propelling carriages, is an object of considerable importance.

209. Leupold has furnished a description of a high-pressure engine, in a very valuable work on machines, published in 1724. He ascribes the invention to Papin, and his apparatus consists of two single cylinders placed at some distance from each other, each of which is provided with a piston made to fit air-tight, and connected with a forcing pump.

210. When high-pressure steam is admitted at the bottom of the first cylinder, it is forced upwards, carrying with it the lever of the pump; at the same time that the steam or air is expelled from the other. On this operation being repeated, or rather reversed, the steam is allowed to enter the second cylinder, which is also connected with the boiler, while the steam in the first cylinder is allowed to escape into the air. From this it will be evident that the process of condensation forms no part of the principle of the high-pressure engine; and that the expansion of gunpowder might be made to produce a precisely similar effect.

211. The amazing force to be produced by the expansion of highly elastic vapor did not escape the penetrating notice of that towering genius, which was now directing all its energies towards its improvement. Accordingly, we find, in Mr. Watt's first patent, the following clause, which expressly describes this engine: 'I intend, in many cases, to employ the expansive force of steam to press on the pistons, or whatever may be used instead of them, in the same manner as the pressure of the atmosphere is now employed in common fire engines. In cases where cold water cannot be had in plenty, the engines may be wrought by the force of steam only, by discharging the steam into the open air after it has done its office.'

212. Messrs. Trevithick and Vivian were the first to employ the high-pressure engine to advantage, as they found it admirably adapted for the purpose of propelling carriages. In this case the steam, after having performed its office, was thrown off into the air; and the condenser, together with the necessary supply of cold water which must have accompanied it, was by this means dispensed with. For the purpose of motion, the high-pressure engine certainly possesses considerable advantages, not the least of which are its cheapness and portability; the danger, however, attendant on the use of steam acting with a force equal to from forty to eighty pounds on the square inch, must inevitably form an insuperable bar to its general introduction to our manufactures.

213. Mr. Woolf's improvements, which we shall presently more fully examine, are of considerable importance, and are founded on the same principle as those of Mr. Watt, namely the power of steam to expand itself, or increase its volume in a very considerable degree, after its passage from the boiler. From a variety of experiments made on this subject, he ascertained that a quantity of steam having the force of five, six, seven, or more pounds on every square inch of the boiler, may be allowed to expand itself to an equal number of times of its own volume, when it would still be equal to the weight of the atmosphere, provided that the cylinder in which the expansion takes place have the same temperature as the steam possessed before it began to increase.

214. The most economical mode of employing this principle consists in the application of two steam cylinders and pistons of unequal size to a high-pressure boiler; the smaller of which should have a communication, both at its top and bottom, with the steam vessel. A communication being also formed between the top of the smaller cylinder and the bottom of the larger cylinder, and vice versâ. When the engine is set to work, steam of a high temperature is admitted from the boiler to act by its elastic force on one side of the smaller piston, while the steam which had last moved it has a communication with the larger or condensing cylinder. If both pistons be placed at the top of their respective cylinders, and steam of a pressure equal to forty pounds on the square inch be admitted, the smaller piston will be pressed down; while the steam below it, instead of being allowed to escape into the atmosphere, or pass into the condensing vessel, as in the common engine, is made to enter the larger cylinder above its piston, which will make its downward stroke at the same time as that in the smaller cylinder; and, during this process, the steam which last filled the larger cylinder, will be passing into the condenser to form a vacuum during the downward stroke.

215. To perform the upward stroke it is merely necessary to reverse the action of the respective cylinders; and it will be effected by the pressure of the steam in the top of the small cylinder acting beneath the piston in the great cylinder; thus alternately admitting the steam to the different sides of the smaller piston, while the steam last admitted into the smaller cylinder passes regularly to the different sides of the larger piston, the communication between the condenser and steam boiler being reversed at each stroke.

216. The economical application of this engine may however be best understood by an examination of its effective force when applied to the raising of water. It appears that a double cylinder expansion engine was constructed for Wheal Vor mine in 1815. This has a great cylinder of fifty-three inches in diameter, and

nine feet stroke, the small cylinder being about one-fifth of the contents of the great one. The engine works six pumps, which at every stroke raise a load of water of 37,982 pounds weight, seven feet and a half high. This produces a pressure of 14·1 pounds per square inch on the surface of the great piston, while its average performance may be estimated at 46,000,000 pounds, raised one foot high with each bushel of fuel.

217. The steam or vapor, which is produced by the expansion or ignition of any inflammable body, has frequently been suggested for producing a vacuum, and even furnishing motive force to impel mechanism. Several contrivances of this kind might be noticed, but in the present case our limits will only permit of one exemplification. It is shown in the accompanying figures.

218. The above apparatus was suggested by an ingenious American, and the first part of the machine consists of a metallic or other vessel, or tubes, so constructed that a stream or current of atmospheric air may pass, together with the inflammable vapor, through a considerable space, interrupted by short turns or other impediments, the object of which is to mix and blend the air and the vapor thoroughly with each other, by which union they are rendered highly explosive.

219. Fig. 1, plate VI., consists of an oblong box of tin or other metallic plates, divided horizontally into four compartments, by the partitions *a*, *a*, *a*, which extend alternately from one end of the box to within a short distance of the other end, so that air, entering the lower compartment at *b*, would be compelled by the partitions to travel the whole length of the box through each compartment, in its ascent to the top. These compartments are divided by the vertical partitions *c*, *c*, running the whole length of the box, into half inch spaces, which produces the two-fold advantage of increasing the friction of the particles of vapor and air with each other, and also of preventing violence in the event of any explosion, should such an accident take place within the box. There is a tube *d*, for the admission of air and the other materials into the lower compartment at *b*, and another tube *e*, for the outlet of the explosive mixture from the upper compartment, each covered with a wire-gauze to prevent explosion, which completes the preparing vessel.

220. Fig. 2 is a front view of the apparatus; fig. 3, a section taken transversely; A is a cylinder of brass, copper, or other material, fitted with a plunger or piston B, connected with a crank shaft C, as in a steam-engine. The lower end of the cylinder has a valve D, of at least half its diameter, opening outwards. This valve D may be made very simply by a rim of leather, or other flexible substance, of the same diameter as the opening into the cylinder. This rim of leather is to be tied round the lower end of the cylinder, so as to form a continuation of it. The bottom part of the leather is to be flattened so as to bring its sides together, for four or five inches of its length, and to be kept in that position by slight springs, attached to the edges of the flat part, something like a bow and bow-string. This valve is supported or prevented from being pushed into the cylinder by a plate of metal, of sufficient thickness to bear the pressure of the atmosphere, arched or curved outward, and perforated with as many holes, of one-eighth or one-quarter of an inch diameter, as can conveniently be made in it. The end of the cylinder forms the abutment to the arched plate.

221. A valve E, opening outwards, is fixed in the side of the cylinder at the bottom, for the purpose of admitting air to the interior. The inflammable vapor is passed from the preparing box F (shown detached at fig. 1), through a pipe *e e*, which extends entirely round the cylinder, at the depth of about one-sixth of the stroke of the piston from the top. The cylinder is perforated with small holes, in that part embraced by the pipe *e*, for the passage of the inflammable vapor to the interior. The neck of this pipe *e* should be as short as possible, to prevent the vapor condensing before it reaches the cylinder, and should be furnished with a valve *f*, next the preparing vessel, to cut off the communication between it and the cylinder, while the explosion takes place. A small valve *g*, next the cylinder, opening outwards, permits the inflammable vapor to be ignited by the flame of a lamp *h*; these valves being worked by cams *i*, *k*, on the revolving crank-shaft, or by any other convenient method.

222. A perforated plate of thin metal *l* is introduced into the cylinder below the piston B, supported and guided by small rods *m*, *m*, working sufficiently tight in a stuffing-box in the piston B. This plate *l* ascends and descends with the piston, and is prevented from rising higher than the vapor pipe *e*, by the upper ends of its rods *m*, *m*, striking a stationary part above. In this situation it forms a partition between the explosive mixture and the air in the lower part of the cylinder. A wire gauze should also be placed between the vapor valve *f*, and inflaming valve *g*, to prevent explosion, should the former not close in time. It will be seen at fig. 2 that there are two cylinders fitted up in this way. and communicating with the same preparing vessel and crank-shaft.

223. To prepare the explosive mixture, there must be a small quantity of alcohol, either alone or mixed with spirit of turpentine, or any other inflammable material, capable of evaporation, introduced into the lower compartment of the vessel F. A lamp *n*, or other heat if necessary, is now to be placed under the preparing vessel, for the purpose of raising the temperature, and keeping the materials about blood heat. The flame of a lamp *h* is also to be stationed at the inflaming valve *g*. If too much vapor is raised in proportion to the quantity of air, the mixture ceases to be explosive.

224. The piston B, in its ascent, would cause a partial vacuum in the cylinder, but this is prevented by raising the valve E, which supplies the cylinder with air till B reaches the pipe *e* here the perforated plate *l*, stops, while the piston B continues its motion to the top of the cylinder; the air-valve E is now closed, and the remainder of the cylinder above *l* is supplied

STEAM ENGINE.

Fig. 2.

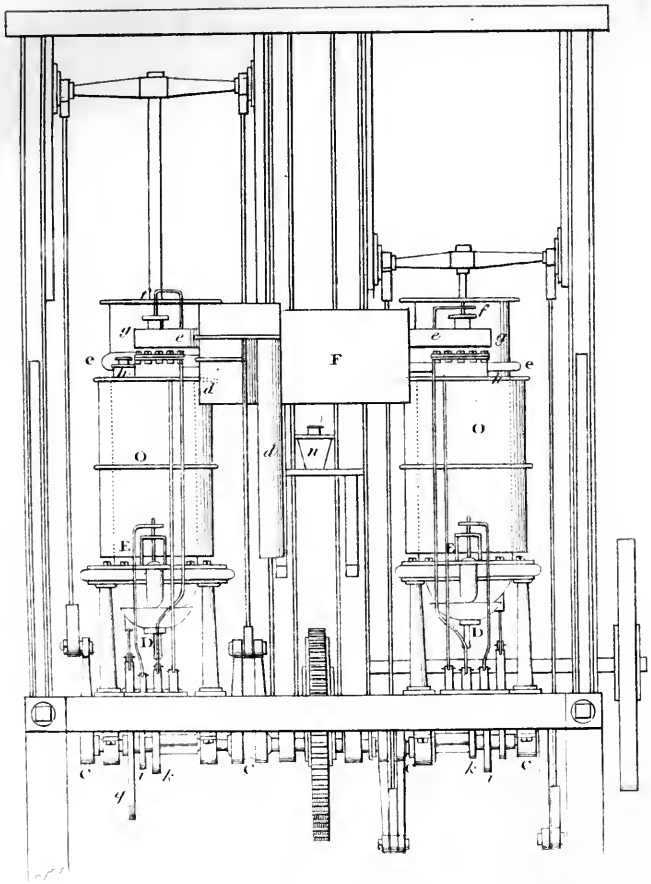


Fig. 1.

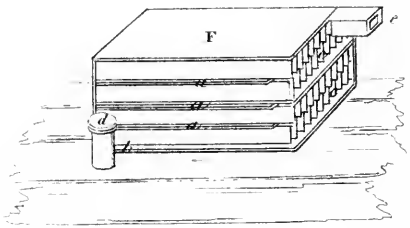
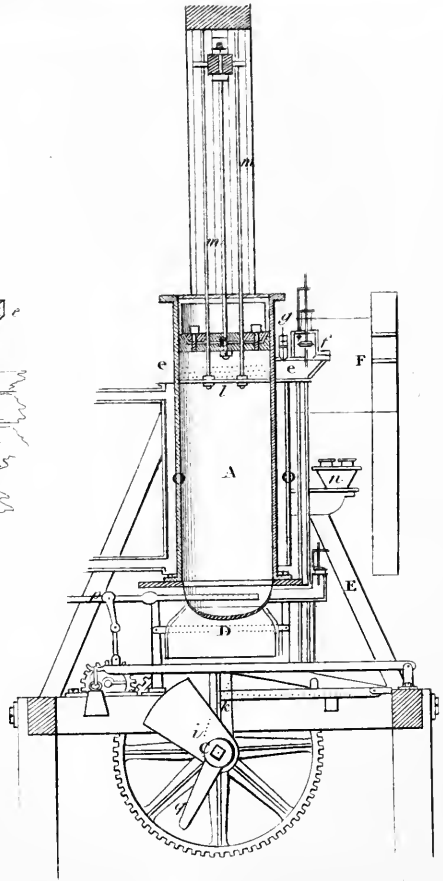


Fig. 3.



with explosive mixture through the pipe *e*, from the preparing box. Just before the piston B reaches the end of its stroke, the inflaming valve *g* opens, and the flame of the lamp communicating to the vapor causes an explosion which instantly drives out the contents of the cylinder through the perforated arched plate *l*, and flexible leathern valve D, which leather valve immediately collapses again to prevent the return of the air.

225. The steam formed by the explosion is condensed by keeping the cylinder below the pipe E cool, by surrounding it with water in the jacket O O, and by injecting a jet of water through the cock *p*, (which is also worked by a cam *q*, on the crank-shaft).

226. The vacuum being formed under the piston B, it descends by the pressure of the atmosphere, and its connecting rods communicate motion to the crank-shaft, in the same way as in ordinary steam engines; and, a similar operation being carried on in the second cylinder, the power is taken from the crank-shaft, and employed as a moving power.

227. The patent apparatus for generating steam, suggested by Mr. Gurney, promises to be of considerable importance as an adjunct to the high-pressure engine. The specification of his patent contains a description of two sorts of boilers. The first is a tubular vessel consisting of a series of portions, each formed like the figure 8, and these being arranged together, one behind the other successively, will form two cylindrical compartments, in the lower one of which the fire is made, on bars placed across the lower portion of the curved tubes, while the upper one serves as a funnel to convey the smoke to the chimney. Besides the curved tubes, which thus constitute the boiler, two straight tubes, of considerably larger size, are used to connect the others together and form the communication between them, one of which runs across beneath them at bottom and conveys the water to them, and the other passes across them at top, and carries off the steam from them to the working cylinder, apertures being made through them and the bent tubes at their points of contact to form passages for the water and the steam. To make the fire act more powerfully on the upper part of the lower cylindrical compartment, and also to prevent it from passing up between the tubes into the upper compartment, a plate of iron is laid along over the whole of the bottom of this latter, which compels the flame and heated vapor to pass on to its end before it can enter the upper compartment, along which latter they afterwards pass on their way to the chimney, heating in their passage the upper portions of the bent tubes. To confine the heat a double case of iron encloses the whole apparatus, between the two constituent parts of which a space is left, which being filled up with pumice-stone, or some other bad conductor of heat, makes the heat act more powerfully in the direction required. This sort of boiler may be varied by having a greater number of cylindrical compartments formed by additional flexures of the bent tubes on the principle above-mentioned.

228. The second species of boiler is composed of two horizontal cylinders, one of which being somewhat smaller than the other is placed within it, and united to it at the edges, leaving sufficient space between the two for the reception of water. Above this double cylinder two double semi-cylinders, formed in a similar manner, are placed one over the other with the hollow part downwards, and the communication between them is effected by bent tubes, which pass from the upper part of the double cylinder to the lower parts of the double semi-cylinder next it at each side, and also from the upper part of this latter to the lower edges at each side of the upper double semi-cylinder. The fire is made within the double cylinder on bars placed on bearers about a third of the height from the bottom, and the flame and smoke pass from its farther end into the space between it and the first semi-cylinder, beneath which they return towards the front and pass round beneath the upper double semi-cylinder, whence they enter the chimney at its further end. The double cylinder, and the double semi-cylinders, are divided into a number of small vertical parallel compartments by bent bars of iron placed within them at regular distances, and fastened by rivets which pass through them and the parts of the cylinders and semi-cylinders with which the bars are in contact. These bent bars are somewhat shorter than the parts within which they lie, so as to leave a free space beneath them for the passage of water, or of water and steam, according to their positions; and a similar space may be left by the same means along the upper ridges of the cylinder and semi-cylinders for the passage of the steam, which may be also conveyed by separate tubes from each of the small compartments A large straight tube runs beneath the bottom of the cylinder to convey water to it, and another proceeds along the top of the upper semi-cylinder to carry off the steam from it to the working cylinder. The whole of this boiler is to be also enclosed in a case similar to that of the first described boiler.

229. An account is next given of an apparatus for separating the steam from the water when they are forced out intermixed from tubular boilers, which consists of an upright cylinder, into the upper part of which a tube enters from the top of the boiler, and then bends round and descends to near its bottom, whence another tube returns again to the boiler at its lowest projection. Near the bottom of the cylinder a wooden valve is placed, which permits the water separated from the steam to return into the boiler; but, in case of any sudden expansion of the steam in the boiler, it rises up and prevents water from the boiler being forced by this expansion into the cylinder. From the top of this cylinder the steam proceeds to the engine through another tube, after having left behind the water with which it was first intermixed.

230. Another apparatus is after this described, whose office is to convey water to the boiler. This is also an upright cylindrical vessel, from the top of which a pipe goes to the reservoir, and from its bottom another pipe descends to near the bottom of the vessel last described, while a third tube passes down from its upper

part to about the middle of the former vessel. In the pipe that goes to the reservoir is a stopcock near the top of the vessel, and two more in the two descending pipes, which latter may be placed so as to be closed by one plug traversing the two; to these cocks are fixed cranks connected together by a bar worked by the steam engine, and the passages of the cocks are so arranged that when the two lower ones in the descending pipes are closed, that in the upper one leading to the reservoir will be open, and vice versâ. By this arrangement of the pipes the end of the one that passes from the top of the upper vessel to the middle of the lower one will be sometimes above the water and sometimes beneath it, according as its level varies in this vessel; when the first happens the patentee states that the steam will rise up through it into the upper vessel, and will force the water which this contains through the other descending pipe into the lower vessel; and when the latter case occurs, and its lower end is immersed, then the passage of the water will be interrupted. It is mentioned that this latter apparatus may be used with any other sort of steam-boiler as well as those described.

231. Finally, a method is recited for freeing the tubes of the boilers from the sediment and incrustations that are more or less formed in all boilers, which method consists in filling them, if formed of iron, with a mixture of one part of muriatic acid to 100 parts of water, or with a mixture of vinegar and water, in the proportion of a pint of the former to three gallons of the latter; and if the tubes are made of copper, then sulphuric acid is directed to be added to marine salt, in the proportion of half an ounce to a pound, and with a proper quantity of water to be put into them. These mixtures are to be used cold, and a little while after one of them is poured in, a small fire of chips is to be made under the boiler, to make the fluid circulate and bring fresh portions of it in contact with the concretions; and, when these are observed to be sufficiently dissolved, the liquor is to be run off through a cock in the bottom of the boiler along with the undissolved siliceous matter.

232. Mr. M'Curdy's apparatus has excited too much attention to be passed without particular notice. It consists of eleven cylinders, twelve feet long and twelve inches in diameter, placed horizontally in two rows, like gas retorts, in a furnace, six being in the lowest row and five in the upper one over the intervals of these, and a fire-place being made under each three of the cylinders in the lower row. Each cylinder contains another cylinder within it, so much smaller as to leave a space between them of about an inch in extent, which space is to be maintained by bands, or pins, reaching so much beyond the inner cylinders, and placed on them at regular distances asunder.

233. Above the eleven double cylinders, or steam-generators, in the same furnace, a twelfth cylinder of the same length, but somewhat more than thirty inches in diameter, is placed, which Mr. M'Curdy calls a *steamometer*, and which will hold ten times the contents of all the spaces between the inner and outer cylinders; the eleven outer cylinders are connected by tubes, which run from one to the other sideways near their tops in each row, and from the lower to the upper row; a tube also passes from the upper row of cylinders to the steamometer, and another goes from the latter to the working cylinder of a steam engine. The supply of water is given by a forcing pump, which draws it from the reservoir and impels it into the space between the inner and outer cylinders, which are placed at the outside of the lowest row, and thence through the tubes and the spaces between all the other inner and outer cylinders up to the steamometer; at the bottom of which latter a cock is placed, by which the ascent of the water to that point may be known; while by another cock, fixed between the forcing pump and the reservoir, the degree of the supply of water is regulated. A safety valve on the steam tube, close to where it passes from the steamometer on its way to the steam engine, completes the apparatus.

234. In pursuing the history of the steam engine, we have already examined the most perfect form of the single-acting apparatus; but an engine of double powers was soon produced by the comprehensive mind of Mr. Watt. He had introduced steam acting against a piston to press it downwards; he now formed a communication between both sides of the piston and the boiler, and also with the condenser, and made the steam act to press the piston upwards as well as downwards.

235. The mechanism was now, as far as the principle went, perfect; and it was freed, for the first time, from the enormous dead weight of counterpoises, which had hung on it from the first attempts of Newcomen; and the equally enormous load which was used in the construction of the various parts, for the purpose of equalising the motion.

236. The cylinder *a*, plate VII., is enclosed in a jacket or casing like the single engine, having a similar interval, which may be filled with steam or air. The piston *b* is attached to the lever-beam by the rod *x*. 1, 2, 3, 4, are the valves which admit steam to the cylinder, or open a communication between the upper and under sides of the piston and the condenser. *g* is the pipe leading from the valves to the condenser. *m*, *m*, the levers or spanners, which are elevated or depressed by the tappets or pins *n*, *z*, in the plug-frame, and open or shut the valves to which they may be connected. *h* is the condenser; L, a pipe connecting it with air-pump *i*, and a second air-pump E. *c*, the piston-rod of this second pump, attached like the other, *l*. to the lever-beam. F, a pipe from the cold water-pump *q*, to supply the reservoir in which the condenser and its pumps are placed. *k*, a trough or reservoir into which the water heated by the condensation of steam in the condenser, which is raised by the air-pump is pumped back by M into the boiler. G, a pulley; and H, an endless chain moving over it, also going round a pulley fixed on the upright axis of the conical pendulum or governor Z. R, the handle of the lever which regulates the quantity of injection water admitted. P, P, the masonry or wall on which the cylinder, and other parts of

the machine are placed. *d*, a pipe conveying steam from the boiler to the cylinder. B, a cock or valve, called the throttle-valve or regulator, placed on the pipe conveying the steam from the boiler, and which is moved by the levers shown as supported at D, and connected with the conical pendulum. T, Q, Q, Q, W, are a system of levers, called the parallel motion. *z* is the axis of the lever-beam *y*.

237. The motion at first is produced in this machine in the same manner as in the single engine,—by filling the condenser and cylinder with steam, and then opening the injection-cock.

238. This process may be considered to have been gone through, and that the piston has arrived at the top of the cylinder. At this moment the tappets *n*, *n*, and levers *m*, *m*, open the valves 1 and 4, and shut 3 and 2. The steam from the boiler now acts on the upper side of the piston, while a vacuum is formed under it by valve 4 opening a communication between that part of the cylinder beneath it and the condenser. The piston is therefore pressed by the elasticity of the steam to the bottom; when it has arrived at the lowest point, the tappets on the plug frame, which also descend with the piston-rod, shut the valves 1 and 4, and open 3 and 2. The steam from the boiler, instead of flowing in at the top of the cylinder, is admitted at the bottom, and a communication is opened between the upper end of the cylinder and the condenser: a vacuum is then produced above the piston, and the elasticity of the steam (instead of the counterpoise in our last figure) forces it upwards. When it is elevated to the required height, the tappets again act on the spanners, and prevent the further flow of steam beneath the piston, and admits it at its upper end, opening at the same moment a communication between the lower end and condensing apparatus. The motion of the piston is then reversed, and this alternation may be continued indefinitely.

239. The mode of pumping out the water from the condenser, being the same as that in the single engine, will be easily understood from an inspection of our figure. In order to show the four valves in section, a pipe placed in the same direction, and opposite to o, has been omitted in the engraving; it connects the top of the cylinder and the condenser together.

240. The power of the condensing engine is easily known by ascertaining the temperature of the steam, which moves the piston, the area of the piston, and the temperature of the vapor which remains in the condenser. We know from experiment that steam of the temperature of 212° will balance the pressure of the atmosphere, or, what is the same thing, will force a piston into a vacuum with a force equal to about fourteen pounds and three quarters weight for every square inch of the area of the piston. The difference between the elasticity of the steam in the condenser, and that issuing from the boiler, will be the measure of the power of the engine. It is however found most expedient to raise the steam to a somewhat higher temperature than 212°, so as to produce a pressure between seventeen and eighteen pounds on each square inch of the piston; yet, in practice, from the imperfect vacuum which is made in the condenser, and after making allowance for the friction of the piston on the sides of the cylinder, and for the friction of the various parts of the intermediate machinery, this pressure of eighteen pounds on each square inch of the piston, cannot raise more water per inch than would weigh about eight pounds and a half, so that somewhat more than a half of the whole power of the steam is absorbed to give motion to the intermediate mechanism. The height to which this weight can be elevated depends on the length of the cylinder, and to raise the same weight to twice the height by the same piston requires double the quantity of steam. The double condensing engine will also perform double the work of a single engine in about half the time, but it requires double the quantity of steam. So that in all cases, under the same circumstances, the work performed will be as the quantity of steam used.

241. When the impulse of the steam impelled the piston only in one direction (downwards) its motion could be imparted to the beam by means of chains; but, when the impulse was to be communicated upwards as well as downwards, some other contrivance for connecting the beam and piston became necessary; and one of the conditions of this contrivance must be, to convert the motion in a curved path of the end of the lever-beam, into a rectilineal motion of the cylinder piston-rod. Mr. Watt, in his earlier engines, used to form the end of the beam as a sector with teeth, which worked into a rack fixed on the end of the piston-rod; this allowed the rod to move perpendicularly upwards or downwards, but it was very inelegant in appearance, worked with a great noise, and was easily deranged, especially at the instant when the direction of the motion was changed.

242. Even after the motion of the piston was equalised, by shutting off the steam sooner or later from the cylinder, another source of irregularity was found to arise from the varying quantity of steam which in different states of the fire under the boiler, was admitted into the cylinder. Several modes of adjustment occurred to Mr. Watt. The one most generally employed, and probably as accurate as any, was, by placing a valve in the pipe connecting the boiler and the cylinder, which could be made to increase or diminish the steam-way. The next improvement was to make this valve, called a throttle-valve, a self-acting one, and to admit of its being so adjusted that, when the piston was moving with too great a velocity, it would admit less steam into the cylinder, aud so diminish its speed, and on the contrary admit a greater quantity when it was moving too slow.

243. A similar irregularity in the motion of corn-mills, from the varying quantity of water or resistance, had early exercised the ingenuity of millers, to obtain some means by which its injurious effects could be obviated. One of the most usual modes was by means of a couple of heavy balls, attached by a jointed rod, which were made to revolve by being connected with the spindle or axis of the mill-stones. When the stones were moving at a great speed, the meal, by the rise of the stones, was too coarse;

and, on the contrary, when the motion was too slow, the meal produced was small in quantity, and too fine. The attached balls, which were called a lift-tenter, by their centrifugal force either raised or lowered a stage in which the arbor of the spindle revolved, and brought the mill-stones nearer, or removed them farther from each other, as they might be adjusted. This most ingenious regulator was adopted by Mr. Watt, and was applied to regulate the opening and shutting of the throttle-valve of his improved engine.

244. Mr. Hornblower's engine combined the high pressure principle, and the condensing apparatus, in one engine. We are not to consider this engine as being on a different principle from Mr. Watt's, but as applying his principles of condensation and expansion in a different manner from what Mr. Watt does. Mr. Hornblower obtained a patent in 1781 for a machine or engine for raising water by means of fire, and the specification of the patent was as follows:—First: 'I use two vessels, in which the steam is to act, and which in other engines are called cylinders. Secondly: I employ the steam after it has acted in the first vessel to operate a second time in the other, by permitting it to expand itself, which I do by connecting the vessels together, and forming proper channels and apertures, whereby the steam shall occasionally go in and out of the said vessels. Thirdly: I condense the steam, by causing it to pass in contact with metalline surfaces, while water is applied to the opposite side. Fourthly: To discharge the engine of the water used to condense the steam, I suspend a column of water in a tube or vessel constructed for that purpose, on the principles of the barometer, the upper end having open communication with the steam vessels, and the lower end being immersed in a vessel of water. Fifthly: To discharge the air which enters the steam-vessels with the condensing water, or otherwise, I introduce it into a separate vessel, whence it is protruded by the admission of steam. Sixthly: That the condensed vapor shall not remain in the steam-vessel in which the steam is condensed, I collect it into another vessel, which has open communication with the steam-vessels, and the water in the mine, reservoir, or river. Lastly, in cases where the atmosphere is to be employed to act on the piston, I use a piston so constructed as to admit steam round its periphery, and in contact with the sides of the steam-vessel, thereby to prevent the external air from passing in between the piston and the sides of the steam-vessel.'

245. The following is a description of this engine by the inventor, as it was published in the Encyclopædia Britannica. Let A and B (plate III. fig. 1) represent two cylinders, of which A is the largest; a piston moves in each, having their rods, C and D, moving through collars at E and F. These cylinders may be supplied with steam from the boiler by means of the square pipe G, which has a flanch to connect it with the rest of the steam-pipe. This square part is represented as branching off to both cylinders: *c* and *d* are two cocks, which have handles and tumblers as usual, worked by the plug-beam W. On the fore-side of the cylinders, that is, the side next the eye, is represented another communicating pipe, whose section is also square, or rectangular, having also two cocks *a*, *b*. The pipe Y, immediately under the cock *b*, establishes a communication between the upper and lower parts of the small cylinder B, by opening the cock *b*. There is a similar pipe on the other side of the cylinder A, immediately under the cock *d*.

246. When the cocks *c* and *a* are open, and the cocks *b* and *d* are shut, the steam from the boiler has free admission into the upper part of the small cylinder B, and the steam from the lower part of B has free admission into the upper part of the great cylinder A; but the upper part of each cylinder has no communication with its lower part.

247. From the bottom of the great cylinder proceeds the eduction-pipe K, having a valve at its opening into the cylinder; it then bends downward, and is connected with the conical condenser L. The condenser is fixed on a hollow box M, on which stand the pumps N and O, for extracting the air and water, which last runs along the trough T, into a cistern U, from which it is raised by the pump V, for recruiting the boiler, being already nearly boiling hot. Immediately under the condenser there is a spigot-valve, at S, over which is a small jet-pipe, reaching to the bend of the eduction-pipe K. The whole of the condensing apparatus is contained in a cistern, R, of cold water; a small pipe, P, comes from the side of the condenser, and terminates on the bottom of the trough T, and is there covered with a valve, Q, which is kept tight by the water that is always running over it.

248. Lastly, the pump-rods, X, cause the outer end of the beam to preponderate, so that the quiescent position of the beam is that represented in the figure, the pistons being at the top of the cylinders.

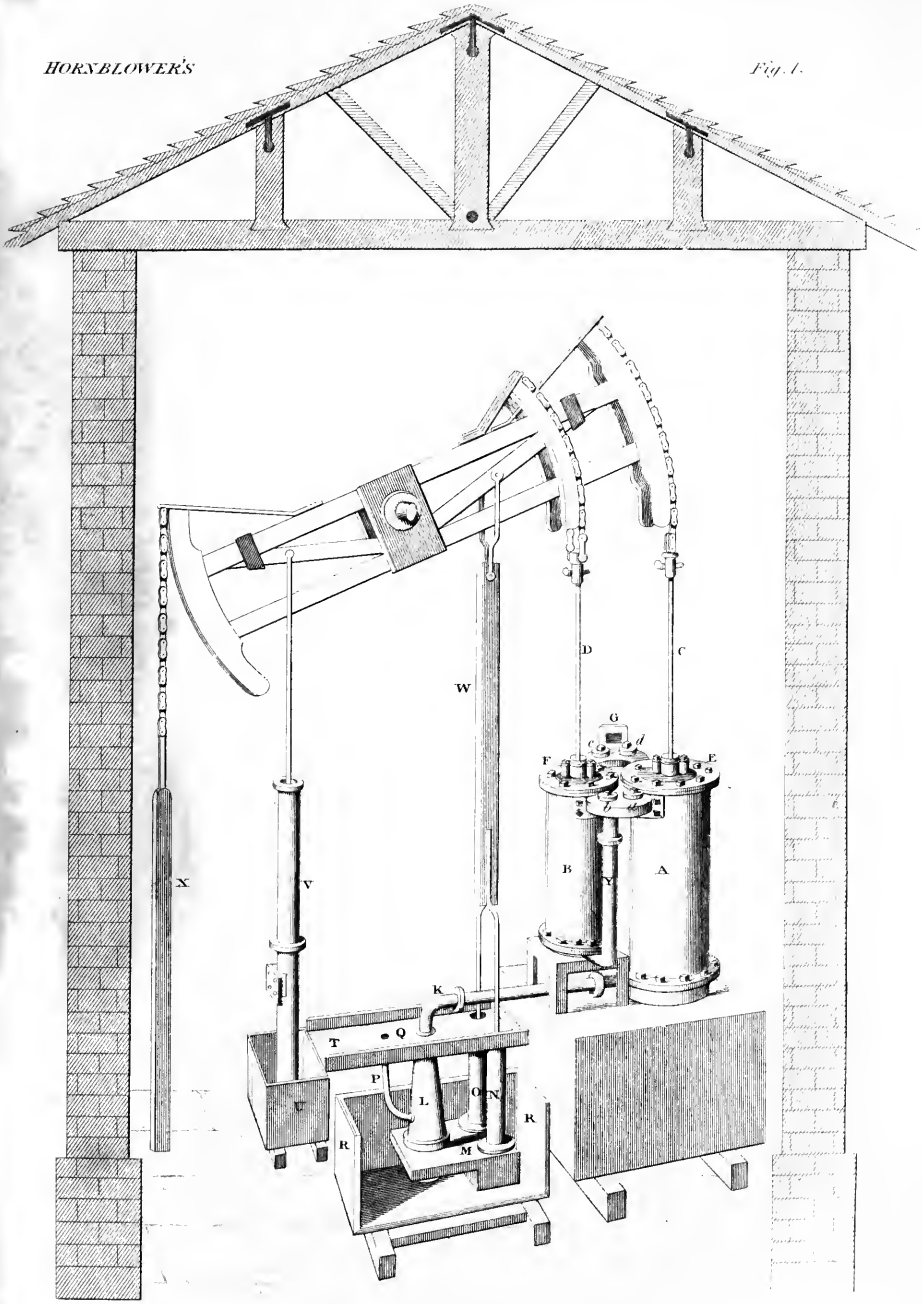
249. Suppose all the cocks open, and steam coming in copiously from the boiler, and no condensation going on in L, the steam must drive out all the air, and at last follow it through the valve Q. Now shut the cocks *b* and *d*, and open the valve S of the condenser; the condensation will immediately commence, and draw off the steam from the lower part of the great cylinder. There is now no pressure on the under side of the piston of the great cylinder A, and it immediately descends. The communication Y, between the lower part of the small cylinder B and the upper part of the great cylinder A, being open, the steam will go from the lower part of B, into the space left by the descent of the piston of A. It must therefore expand, and its elasticity must diminish, and will no longer balance the pressure of the steam coming from the boiler, and pressing above the piston of B.

250. This piston, therefore, if not withheld by the beam, would descend till it came in equilibrio, from having steam of equal density above and below it. But it cannot descend so fast for the cylinder A is larger than B, and the arch of the beam, at which the great piston is suspended, is no longer than the arm which supports the piston of B; therefore, when the piston of B has descended as far as the beam will permit it, the steam between the two pistons occupies a larger space than it did when both pistons were at the top of their cylinders, and its density diminishes as its bulk increases. The steam beneath

STEAM ENGINE.

HORNBLOWER'S

Fig. 1.



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the small piston is, therefore, not a balance for the steam on the upper side of the same, and the piston B will act to depress the beam with all the difference of these pressures.

251. The slightest view of the subject must show the reader that, as the pistons descend, the steam that is between them will grow continually rarer and less elastic, and that both pistons will draw the beam downwards. Suppose, now, that each one had reached the bottom of its cylinder, shut the cock *a*, and the eduction-valve at the bottom of A, and open the cocks *b* and *d*. The communication being now established between the upper and lower part of each cylinder, their pistons will be pressed equally on the upper and lower surfaces; in this situation nothing, therefore, hinders the counter-weight from raising the pistons to the top.

252. Suppose them arrived at the top: the cylinder B is at this time filled with steam of the ordinary density; and the cylinder A with an equal absolute quantity of steam, but expanded into a larger space. Shut the cocks *b* and *d*, and open the cock *a*, and the eduction-valve at the bottom of A; the condensation will again operate, and cause the pistons to descend; and thus the operation may be repeated as long as steam is supplied; and once full of the cylinder B, of ordinary steam, is expended during each working stroke.

253. The cocks of this engine are composed of two flat circular plates, ground very true to each other, and one of them turns round on a pin through their centres: each is pierced with three sectorial apertures, exactly corresponding with each other, and occupying a little less than one-half of their surfaces. By turning the moveable plate so that the apertures coincide, a large passage is opened for the steam; and, by turning it so that the solid part of the one covers the aperture of the other, the cock is shut. Such regulators are now very common in the cast-iron stoves for warming rooms. Mr. Hornblower's contrivance for making the collars for the piston-rods air-tight is thus: the collar is in fact two, placed at a small distance from each other; and a small pipe, branching off from the steam-pipe, communicates with the space between the collars. This steam, being a little stronger than the pressure of the atmosphere, effectually prevents the air from penetrating through the upper collar; and, though a little steam should get through the lower collar into the cylinder A, it can do no harm. The manner of making this stuffing-box is as follows: on the top of the cylinder is a box to contain something soft, yet pretty close, to embrace the piston-rod in its motion up and down; and this is usually a sort of plaited rope of white yarn, nicely laid in, and rammed down gently, occupying about a third of its depth; upon that is placed a sort of tripod, having a flat ring of brass for its upper, and another for its lower part; and these rings are in breadth equal to the space between the piston-rod and the side of the box. This compound ring being put on over the end of the piston-rod, another quantity of this rope is to be put upon it, and gently rammed as before; then there is a hollow space left between these two packings, and that space is to be supplied with strong steam from the boiler. Thus is the packing about the piston-rod kept in such a state as to prevent the air from entering the cylinder when at any time there may be a partial vacuum above the piston.

254. Mr. Hornblower's description of this engine was followed by a mathematical investigation of the principles of its action, by the ingenious professor Robison, which demonstrates that it is the same thing in effect as Mr. Watt's expansion-engine; but, though this is true, there is a considerable difference in the steps by which the effect is attained, which gives an important advantage when it is reduced to practice. We shall give an investigation in a more popular form, using only common arithmetic. Mr. Hornblower assumed that the power or pressure of steam is inversely as the space into which the steam is expanded: this is the case with air, and, for the present, we will grant it to be so with steam, and reason from the same data as the ingenious inventor gives us.

255. To explain clearly what passes in the two cylinders, we must deviate from the precise form of the engine, and divest ourselves of one complication of ideas, by reducing both cylinders to the same stroke; therefore, suppose the engine to be made like fig. 2, which represents the two cylinders placed one upon the other, the lower one being double the capacity of the upper one, and both pistons being attached to the same rod, which may be applied to the end of the beam, so that the descent of the pistons must draw up the load at the opposite end of the beam.

256. Then, if we suppose the small piston to be ten inches in diameter, the great piston must be 14·14 inches; and to avoid all difficulties of the ratio of the expansion, and the pressure of steam, we will suppose the engine to be worked by the pressure of atmospheric air instead of steam; and, for the convenience of round numbers in our calculation, we will consider the pressure at only ten pounds per circular inch on the surface of the piston.

257. The area of the small piston will be 100 circular inches, and, being assumed to move without friction, the pressure upon it will be $10 \times 100 = 1000$ lbs. The area of the great piston is twice as much, or 200 circular inches, and the pressure 2000 lbs.

258. Suppose both pistons to be at the top of their respective cylinders; let the atmospheric air be admitted to press freely upon the upper surface of the small piston; and suppose the space between the two pistons filled with air of the same density, while there is a perfect vacuum made in the lower part of the great cylinder, beneath its piston.

259. Under these circumstances, the two pistons will begin to descend with something less than 2000 lbs. of load upon the outer end of the beam, because there are 2000 lbs. of pressure on the great piston by the air contained in the space between the two pistons, bearing on the 200 inches of surface with a weight of ten pounds per inch; and beneath this piston there is nothing to counteract the pressure. At the same time the small piston, having air of equal density above and below it, is in equilibrio.

Descending Power of the Great Piston.		Descending Power of the Small Piston.		Combined Power of both Pistons.	
	lbs.		lbs.		lbs.
At first the power will be . In consequence of the pressure of 10 lbs. per circular inch upon its upper surface, and no pressure beneath.	2000	At first the power will be Because the piston is in equilibrio, having 1000 lbs. pressing upwards, and 1000 lbs. downwards.	0	At first . .	2000
At one-fourth of the descent the power will have diminished, by regular decrements, to Because the air between the two pistons must occupy three-fourths of the small cylinder, and one-fourth of the great cylinder, which is a space equal to one and one-fourth of the original space which it filled; therefore the spaces will be as five to four; and, if the density of air is as the inverse proportion of the space which it occupies, the pressure on the great piston must be as four to five, or four-fifths of 2000 = 1600.	1600	At one-fourth the power will be Because the equilibrium does not continue, and at one-fourth of the descent the pressure beneath the small piston is reduced by the expansion of the air between the two pistons to four-fifths of 1000 = 800 lbs., while the pressure above the piston continues to be 1000. The power is, therefore, 1000 — 800 = 200.	200	At one-fourth	1800
At one-half of the descent the power will have diminished to Because at this position the air between the pistons occupies one-half of the small cylinder and one-half of the great one, which is a space equal to one and one-half of the space it filled originally. The spaces will therefore be as six to four, and the pressure on the great piston as four to six, or two-thirds of 2000 = $1333\frac{1}{3}$.	$1333\frac{1}{3}$	At one-half of the descent the power will have increased to Because the pressure beneath is diminished by the increased rarity of the air to two-thirds of 1000 = $666\frac{2}{3}$, while the downward pressure continues to be 1000. The power is therefore 1000 — $666\frac{2}{3}$ = $331\frac{1}{3}$.	$333\frac{1}{3}$	At one-half .	$1666\frac{2}{3}$
At three-fourths of the descent the power will be only Because the air must now occupy one-fourth of the small cylinder, and three-fourths of the large cylinder, which is a space equal to one and three-fourths of the original space. Thus the spaces will be as seven to four, and the pressure on the great piston four-sevenths of 2000 = $1142\frac{6}{7}$.	$1142\frac{6}{7}$	At three-fourths of the descent the power will be Because the pressure beneath is reduced by the rarity of the air to four-sevenths of 1000 = $571\frac{3}{7}$; therefore the power is 1000 — $571\frac{3}{7}$ = $428\frac{4}{7}$.	$428\frac{4}{7}$	At three-fourths	$1571\frac{3}{7}$
At the bottom of the cylinder the power will be Because the air must occupy the whole of the large cylinder, a space equal to twice the small cylinder which it at first filled. The pressure will therefore be one-half of 2000.	1000	At the bottom the power will be Because the air beneath the piston is reduced to one-half of its pressure, or 500, which, deducted from 1000, leaves 500.	500	At the bottom	1500
Sum of the powers exerted by the great piston in its descent	7076	Sum of the powers of the small piston	1461	Sum of the combined powers	8538

261. Now let us consider how Mr. Watt's principle of expansion would operate in the same circumstances; that is, in a cylinder of 14·14 inches diameter; which is to be supplied with air of ten pounds pressure per circular inch, until it has completed one-half of its descent, and leaving the remainder of the descent to be accomplished by the expansion of the air already contained in the upper half of the cylinder.

	lbs.
At the beginning the power of descent will be	2000
At one-fourth the power will still be .	2000
At one-half the power will be . . .	2000
At three-fourths of the descent the power will be diminished to . . .	1333⅓
Because the air must occupy one-fourth of the length of the cylinder, in addition to that half of the cylinder which it occupied before the expansion began; therefore the space is one and a half times the former, or as three to two, and the pressure will be two-thirds of 2000.	
At the bottom the pressure will be .	1000
Because the air is expanded to occupy twice the space it filled before.	
	8333⅓

262. The sum total is very nearly the same as the former, but both are greater than they should be, from the imperfect manner in which we have been obliged to make our calculation, so as to express it in common arithmetic, without having recourse to fluxions, which is the only method of treating quantities that are constantly increasing or decreasing by any given law.

263. The source of the inaccuracy is easily explained: at first we set out with the pressure at 2000 lbs. in Mr. Hornblower's engine, and did not take into the account that it decreases at all, until the piston has descended to one-fourth, but reasoned as though it diminished all at once at that place; whereas it began to diminish from the very first starting. Here then we have taken a small quantity too much. In the same manner, our process takes no notice of the diminution which happens between one-fourth and one-half of the descent, or between the other points at which we have chosen to examine it; the result is, as if the diminution took place suddenly at each of those points. The remedy for this would have been to have taken the account at a greater number of places, as it is by fluxions alone that we can take an infinite number, so as to obtain a true result. Now in the second calculation of Mr. Watt's expansion-engine we have taken a still less number of steps for the consideration of the expansion, because, although there are four steps in the process, two of them are before the expansion begins.

264. This is the reason of the apparent difference; for in reality there is none in the sum total of the varying powers exerted through the whole stroke, as will appear to any person who will take the trouble to read professor Robison's investigation. But, if we consider the difference of the manner in which the whole power is expended during the stroke, we shall see great reason to prefer Mr. Hornblower's method, from the much greater uniformity of the action; it begins at 2000, and ends at 1500; whilst Mr. Watt's begins at 2000, and ends at 1000: hence the necessity of those ingenious contrivances for equalising the action in Mr. Watt's patent of 1782. Mr. Hornblower's is not uniform, but approaches uniformity more nearly, so that he could have carried the effect of the expansive principle much farther, in employing stronger steam, than we believe he ever proposed to do.

265. We have been thus full upon this subject, because the gaining more power by the expansion of air or steam acting in double cylinders, has been a favorite idea with many, and there are no less than five different patents for it, but several of these have been upon mistaken notions; neither Mr. Watt's nor Mr. Hornblower's can have any advantage from shutting off the air, or from a double cylinder, when air is used to press the piston; nor could they derive any advantage from the expansion of steam in their engines, if the pressure of it was inversely as the space it occupies.

266. The advantage of the expansive principle arises wholly from a peculiar property of steam, by which, when suffered to expand itself to fill a greater space, it decreases in pressure or elastic force by a certain law, which is not fully laid down; that is, the relation between its expansive force and the space which it occupies is not clearly decided: but Mr. Woolf has found that, by applying these properties in their fullest extent to the double cylinder engine, he can make most important improvements in the effects which can be obtained from any given quantity of fuel. Steam is a fluid so different from air as to have no one property in common with it, except elasticity. This elasticity is wholly derived from the quantity of heat which it contains, and its force increases and diminishes with the quantity of heat; but by what law it increases or diminishes we are uncertain, because we have no measure of the actual quantity of heat which is contained in steam of any given elastic force. All we know with certainty is what is stated in our table of expansion, viz. that water, being converted into steam, and confined in a close vessel, when heated until the thermometer indicates a certain temperature, will have a certain pressure or elastic force. But here we must observe that the thermometer indicates only the intensity of the heat, without affording a direct measure of its quantity. When steam is suffered to expand itself into any given space, the quantity of rarefied water which will be found to be contained in any given bulk or steam, in its expanded state, must be undoubtedly proportioned to the quantity of water contained in the same bulk of the steam, before the expansion took place, in the inverse ratio of the space which it originally occupied, and that space which it fills when expanded; but we cannot say that this is the case with heat; and it is the quantity of heat alone which determines the elastic force.

267. We believe that in practice Mr. Hornblower was not able to obtain any greater effect from the application of the expansive action in

two cylinders, than Mr. Watt did in one cylinder. In 1791-2 he erected an engine in Cornwall, at Tin Croft mine, of which the large cylinder was twenty-seven inches diameter, and worked with a stroke of eight feet long, and the small cylinder twenty-one inches diameter, working with a six-feet stroke. The only account we have been able to obtain of the performance of this engine is from a pamphlet published by Thomas Wilson, an agent of Messrs. Boulton and Watt, professedly with a view to prevent the introduction of Mr. Hornblower's engines into that country, in which he makes it appear that it raised only 14,222,120 lbs. of water one foot high with each bushel of coals.

268. In Mr. Hornblower's own account of his engine, in Gregory's Mechanics, he informs us that 'an engine was erected in the vicinity of Bath, some years since, on this principle, and under very disadvantageous circumstances. The engine had its cylinders nineteen inches and twenty-four inches diameter, with lengths of stroke in each suitable to the occasion, viz. six feet and eight feet respectively. The condensing apparatus was very bad, through a fear of infringement on Mr. Watt's patent; and the greatest degree of vacuum which could be obtained was no more than twenty-seven inches of mercury The engine worked four lifts of pumps to the depth of 576 feet, 4500 lbs. fourteen strokes in a minute, six feet each, with a cylinder six feet long, and nineteen inches diameter, with a great deal of inertia and friction in the rods and buckets; some of the latter of which were not more than three inches and a half diameter: and this it did, under all these disadvantageous circumstances, with seventy pounds of coal (light coal) per hour.'

269. To reduce this to the standard of one foot high we must put the load 4500 lbs. × 6-feet stroke = 27,000 lbs. which the engine raised one foot high at every stroke; 27,000 lbs. × 14 strokes per minute = 378,000 lbs. raised one foot high each minute; 378,000 × 60 = 22,680,000 lbs. raised one foot high per hour, or with 70 lbs. of coals. As the coals are stated to be light, we will take them at only 84 lbs. per bushel, instead of 88 lbs., as Mr. Smeaton did, and say as 70 lbs. : 22,680,000 lbs. :: 84 lbs. : 27,216,000 lbs. of water raised one foot high with a bushel of coals, which is a very good performance, but not greater than Mr. Watt's.

270. In this engine Mr. Hornblower says that two remarkable circumstances presented themselves to show the advantages of this application of the principle: the one was, that the man who attended the engine would sometimes detach the smaller cylinder from the beam, and work only with the large one, and then the boiler would scarcely raise steam enough to keep the engine going; but no sooner was the small cylinder-rod attached to the beam, than the engine resumed its wonted activity, and the steam would blow up the safety-valve.

271. The next circumstance is, that when the detent, which kept the exhausting-valve shut, happened to miss its action, the piston would be checked, as it were, not being permitted to rise through the whole of the returning stroke; and it would, as by an instinctive nature, come down again and again, until the detent performed its office, which is a practical argument for the power of the engine at the termination of its stroke.

272. In 1792 Mr. Hornblower made application to parliament for an extension of the term of his patent, but it was not granted: and he was prosecuted by Messrs. Boulton and Watt for infringement on their patent in using the condenser and air pump. We believe none of these engines have been erected since the expiration of Mr. Watt's patent in 1800, until Mr. Woolf took up the subject of double-cylinder engines.

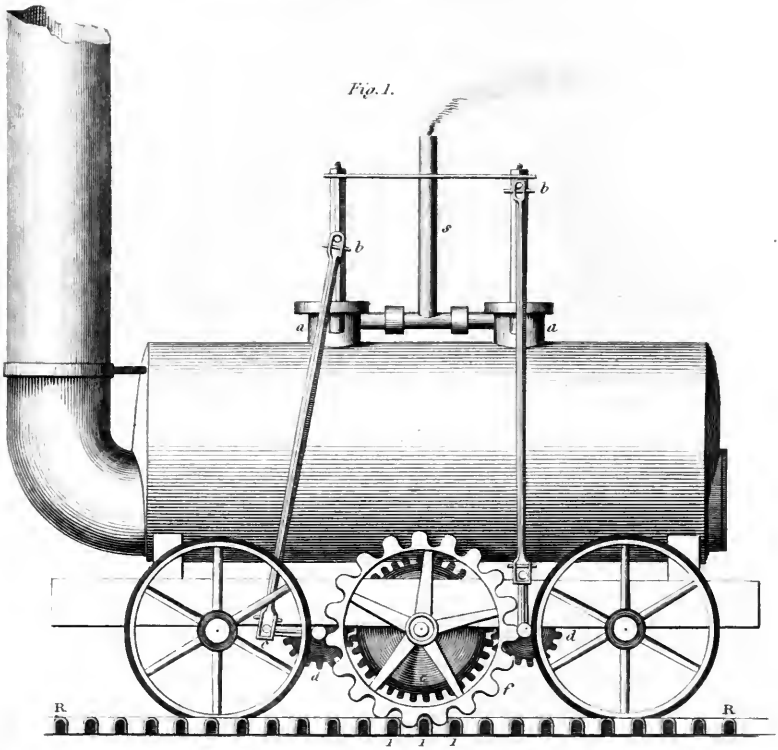
273. So early as the year 1759 steam appears to have been thought of as *a motive power to wheel-carriages*. In a note to the last edition of Robison's Mechanical Philosophy, Mr. Watt states, 'My attention was first directed, in the year 1759, to the subject of steam engines, by the late Dr. Robison, then a student in the university of Glasgow, and nearly of my own age. He, at that time, threw out an idea of applying the power of the steam engine to the moving of wheel-carriages, and to other purposes; but the scheme was soon abandoned, on his going abroad.' Mr. Watt, it appears, soon after made an experiment with steam acting by its expansive force, but relinquished the idea of constructing an engine upon this principle: 'I, however,' says he, 'described this engine, in the fourth article of my patent, in 1769; and, again, in the specification of another patent, in the year 1784, together with a mode of applying it to the moving of wheel-carriages.'

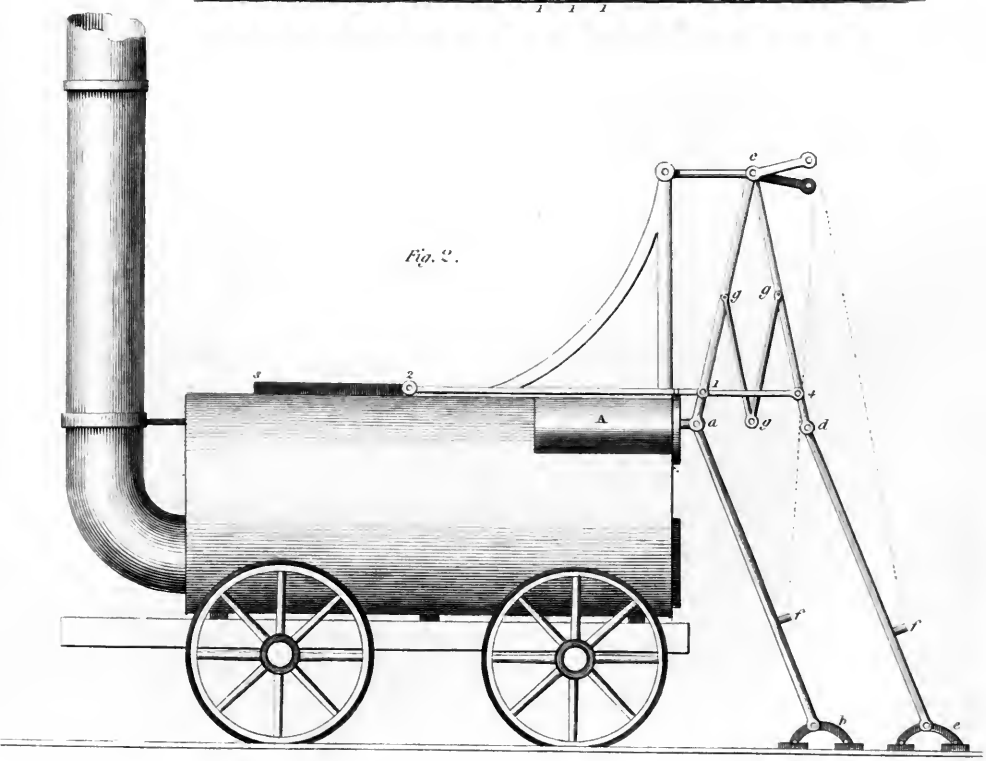
274. For many years subsequent to this, the improvement of the steam engine, acting by condensation, seems to have wholly occupied the scientific world; and the use of steam, acting by its elastic force, entirely abandoned or neglected. Mr. Hornblower had a patent, for the application of steam, acting both by its expansive force, and by condensation; but it is to Messrs. Trevithick and Vivian that we owe the introduction of the steam engine, acting solely by the expansive force of the steam. In March, 1802, they obtained a patent for the application of that species of power to propel carriages upon rail-roads.

275. Mr. Woolf, a short time after, made a series of experiments, to develope the law of action of steam, at different degrees of elasticity, which he explained, in his patent of June 7th, 1804, and, since that time, high-pressure steam engines have been much used, in many parts, to economise the fuel.

276. Messrs. Trevithick and Vivian, in the specification of their patent, give a drawing of their engine, applied to move a carriage upon the common roads. The carriage there delineated resembles in form the common stage coaches, used for the conveyance of passengers; a square iron case, containing the boiler and cylinder, is placed behind the large, or hinder, wheels of the carriage, and is attached to a frame, supported from the axles of those wheels. The cylinder was in a horizontal position; and the piston-rod was projected backwards and forwards, in the

STEAM ENGINE.





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line of the road towards the front of the carriage. Across the square frame, supported by the wheel of the carriage, an axle was extended, reaching a little beyond the frame on each side: this axle was cranked in the middle, in a line with the centre of the cylinder, and a connecting rod, passing from the end of the piston, turned this axle round, and produced a continued rotatory motion of it when the piston was moved backwards and forwards in the cylinder. Upon both ends of this axle cog-wheels were fixed, which worked into similar cog-wheels upon the axle of the wheels of the carriages, so that, when a rotatory motion was produced in the cranked axle by the piston-rod, the rotatory motion was communicated to the axle of the larger or hinder wheels of the carriage; and these wheels being fixed upon, and turning round with the axle, gave a progressive motion to the carriage. Upon one end of this axle was fixed a fly-wheel, to secure a rotatory motion in the axle at the termination of each stroke.

277. The four wheels of the carriage were of the usual form, which, turning to different angles with the body of the carriage, directed its motion upon the road; and, in cases where abrupt turns of the road required sudden changes in the direction of the carriage, the toothed or cog-wheels, on either side, could be thrown out of geer, and the opposite wheel made to drive the carriage into the proper obliquity of the road.

278. Upon the periphery of the fly-wheel, a brake was attached, to regulate the descent of the carriage down steep hills. The contrivances, to effect the requisite motions of the various parts of this machine, are extremely ingenious and, considering it as the first which directed public attention to the subject, is entitled to great commendation.

279. The many objections to its application, upon public turnpike roads, may, I presume, have operated in preventing the patentees from carrying it into practice in the manner described in their specification; they, therefore, very properly directed their attention to its use upon rail-roads.

280. Two years after the date of this patent, we find that Mr. Trevithick made an engine in South Wales, which was tried upon the Merthyn Tydvil rail-road. The engine is stated to have had an eight-inch cylinder, with a four feet six-inches stroke, and 'drew after it upon the rail-road as many carriages as carried ten tons of bar-iron, from a distance of nine miles, which it performed without any supply of water to that contained in the boiler at the time of setting out; travelling at the rate of five miles an hour.'

281. As there is no account given of the inclination of the road, we cannot judge of the real performance of the engine. It had, it appears, only one cylinder, and, from what I can learn, did not materially differ, in construction, from that previously described, except in the form of the carriage.

282. The great obstacle to their introduction, at that time, was the supposed want of hold or adhesion of the wheels upon the rails to effect the loco-motion of the engine. Messrs. Trevithick and Vivian, in their patent, recommended making the external periphery of the wheels rough or uneven, by using projecting heads of nails, bolts, or cross-grooves; or, in case of a hard pull, to cause a lever, bolt, or claw to project through the rim of one or both of the said wheels, to take hold of the ground. But it will appear obvious to any one that this mode of remedying one defect would be the means of producing another; for any projections would not only cause considerable resistance to the progressive motion of the engine, but would also tend to injure the rails of the road.

283. To obviate these defects, Mr. Blenkinsop, of Middleton colliery, near Leeds, in 1811, obtained a patent for the application of a rack, or toothed rail, stretched along the whole distance to be travelled, into which wheels, turned by the engine, worked, and thus produced a progressive motion in the carriage.

284. Fig. 1, plate IX., will convey a pretty correct idea of the mode of action of this kind of engine. R R is a piece of iron of the rails constituting the rail-road, on the side of which are cast the semicircular protuberances or projections 1, 11, &c.: these semicircular teeth project from the side of the rail two or three inches, thus forming a longitudinal toothed rack, which is extended the whole length of the road. *a*, *a*, are the cylinders, placed within the boiler. The action is communicated by the pistons to the connecting rods *b*, *b*, which transfer the motion to the cranks *c*, *c*, turning upon axles attached to the frame of the carriage. Upon the axles on which these cranks are fixed are also fixed the pinion-wheels *d*, *d*, which are turned round by the cranks; these two pinion-wheels communicate with a larger cog-wheel *e*, in such a manner that both contribute in producing a rotatory motion in it. The axle of this cog-wheel *e* extends to the outside of the frame of the engine, and upon the end of it is affixed the larger toothed wheel *f*, which is thus turned round by the large cog-wheel, and consequently by the action of the engine; and the teeth of this cog-wheel, being made to correspond, will lay hold of the toothed projections on the side of the rail, and a progressive motion of the carriage is thereby effected. The steam, after performing its office in the cylinder, is allowed to escape into the atmosphere, through the pipe *e*. The boiler is cylindrical, and is heated by a circular tube passing through it, terminated at one end by the chimney. The toothed or rack-rail is only laid on one side of the road, the other being common rails. The cog-wheels can be varied in size according to the different velocity with which it is required to travel.

285. By the use of this rack-rail the engine is enabled to ascend acclivities which Mr. Trevithick's engine, from the want of adhesion, could not surmount; accordingly its use is extended.

286. Mr. Blenkinsop, soon after the date of his patent, erected some of his engines, and employed them upon the Middleton colliery rail-road, in sending coals to Leeds, where they have ever since been used.

287. The engine erected by Mr. Trevithick had one cylinder only, and a fly-wheel, to secure a rotatory motion in the crank at the end of each

stroke. An engine of this kind was sent to the north, for Mr. Blackett, of Wylam, but was, for some cause or other, never used upon his rail-road, but applied to blow a cupola at an iron-foundry in Newcastle. Mr. Blackett however had, in 1813, an engine of this kind made, and set upon his rail-road, which worked by the adhesion of its wheels upon the rails. Still the supposed want of adhesion formed the great obstacle to their introduction, and the attention of engineers was directed to obtain a substitute for this supposed defect.

288. In December, 1812, Messrs. William and Edward Chapman obtained a patent for a mode of effecting the loco-motion of the engine, by means of a chain stretched along the middle of the rail-road, the whole length, properly secured at each end, and at proper intervals. This chain was made to wind partly round, or to pass over a grooved wheel, turned by the engine, of such a form that the wheel could not turn round without causing the chain to pass along with it. When this wheel was turned round by the engine, as the chain was fastened firmly at the end, it could not be drawn forwards by the wheel, the carriage was therefore moved forwards in the line of the chain. The carriages containing the goods were attached to the engine carriage, and thus conveyed along the rail-road.

289. At intervals of every eight or ten yards, the chain was secured by means of upright forks, into which it fell when left at liberty; this was for the purpose of taking off the strain from part of the chain, when more than one engine was travelling by it. The chain was prevented slipping, when the grooved wheel was turned round, by friction-rollers pressing it into the groove.

290. Mr. Chapman had one of his engines tried upon the Hetton rail-road, near Newcastle, but it was soon abandoned; the great friction, by the use of the chain, would operate considerably against it, and also its liability to get out of order.

291. In 1813 Mr. Brunton, of Butterley iron-works, also obtained a patent for a mode of accomplishing the loco-motion of the engine without the aid of the adhesion of the wheels upon the rail.

292. Plate IX. fig. 2, is a side view of the engine. The boiler was nearly similar to that of Mr. Blenkinsop—semicircular; there was a tube passing through it, to contain the fuel. The cylinder A was placed on one side of the boiler; the piston-rod is projected out behind horizontally, and is attached to the leg *a b* at *a*, and to the reciprocating lever *a c*, which is fixed at *c*; at the lower extremity of the leg *a b* feet are attached, by a joint at *b*; these feet lay a firmer hold upon the ground, being furnished with short prongs, which prevent them from slipping, and are sufficiently broad to prevent their injuring the road.

293. On inspecting the engraving it will be seen that, when the piston-rod is projected out from the cylinder, it will tend to push the end of the lever, or leg *a*, from it in a direction parallel to the line of the cylinder; but as the leg *a b* is prevented from moving backwards, by the end *b* being firmly fixed upon the ground, the re-action is thrown upon the carriage, and a progressive motion given to it, and this will be continued to the end of the stroke. Upon the reciprocating line *a c* is fixed at 1 a rod, 1, 2, 3, sliding horizontally backwards and forwards upon the top of the boiler; from 2 to 3 it is furnished with teeth, which work into a cog-wheel, lying horizontally: on the opposite side of this cog-wheel a sliding-rack is fixed, similar to 1, 2, 3, which, as the cog-wheel is turned round by the sliding rack 2, 3, is also moved backwards and forwards. The end of this sliding rod is fixed upon the reciprocating lever *d c* of the leg *d e*, at 4. When, therefore, the sliding rack is moved forwards in the direction 3, 2, 1, by the progressive motion of the engine, the opposite rod 4 is moved in the contrary direction, and the leg *d e* is thereby drawn towards the engine; and, when the piston-rod is at the farthest extremity of the stroke, the leg *d e* will be brought close to the engine; the piston is then made to return in the opposite direction, moving with it the leg *a b*, and also the sliding rack 1, 2, 3; the sliding rack, acting on the toothed wheel, causes the other sliding rod to move in the contrary direction, and with it the leg *d e*. Whenever, therefore, the piston is at the extremity of the stroke, and one of the legs is no longer of use to propel the engine forward, the other, immediately on the motion of the piston being changed, is ready, in its turn, to act as a fulcrum or abutment for the action of the moving power, to secure the continual progressive motion of the engine.

294. The feet are raised from the ground during the return of the legs toward the engine, by straps of leather or rope fastened to the legs at *ff*, and passing over friction sheeves, moveable in one direction only, by a ratchet and catch worked by the motion of the engine. The feet are described of various forms in the specification, the great object being to prevent them from injuring the road, and to obtain a firm footing, that no jerks should take place at the return of the stroke, when the action of the engine came upon them; for this purpose they were made broad, with short spikes to lay hold of the ground.

295. In a communication to the editor of the Repertory of Arts, vol. 24, the patentee gives an account of an experiment made with one of those engines, which he termed his mechanical traveller; the boiler was of wrought-iron, five feet six inches long, three feet diameter; the step was twenty-six inches long, the piston-rod having a stroke of twenty-four inches; the weight of the whole 45 cwt. 'The machine being placed on a rail-way, I first ascertained the power necessary to move it at the rate of two miles and a half in an hour, which I found to be eighty-four pounds. I then applied a chain to the hinder part of the machine, by which, as the machine moved forward, a weight was raised at the same time and rate, and found that, with steam equal to forty or forty-five pounds pressure on the square inch, the machine was propelled at the rate of two miles and a half per hour, and raised perpendicularly 812 lbs. at the same speed, thus making the whole power equal to 896 lbs. at two

STEAM ENGINE.

Fig. 1.

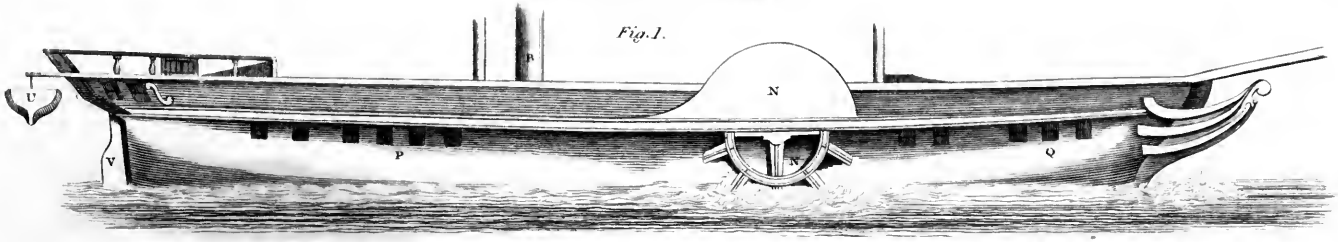


Fig. 2.

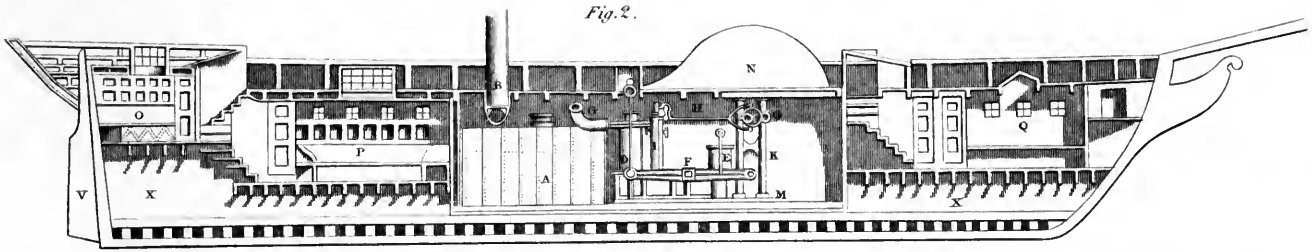
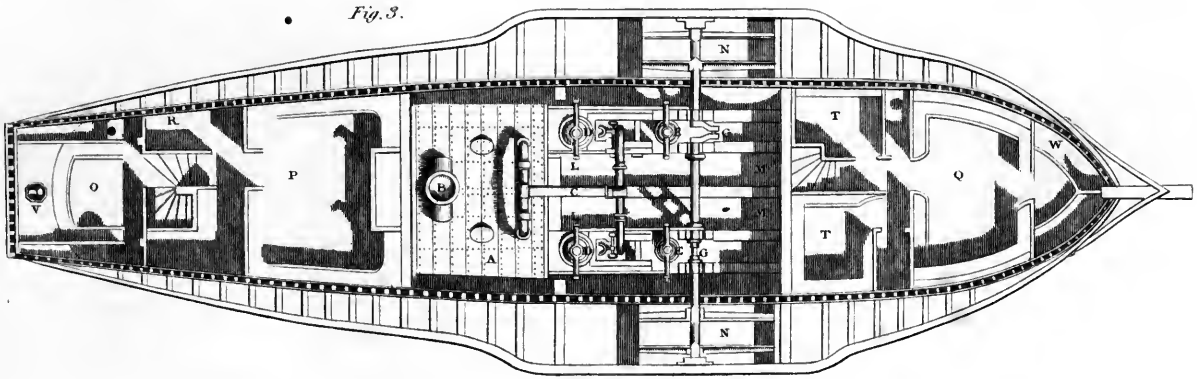


Fig. 3.



London, Published by Thomas Tegg 73, Cheapside

J. Shury sculp.

miles and a half per hour, equal to six horses nearly.'

296. About this time Mr. Blackett had considerably improved his engines, and by experiments had ascertained the quantity of adhesion of the wheels upon the rails, and proved that it was sufficient to effect the loco-motion of the engine upon rail-roads approaching nearly to a level, or with a moderate inclination. His rail-road was a plate rail, and would consequently present more friction or resistance to the wheels than an edge-rail; and, on that account, the amount of adhesion would be greater than upon the latter rail; still the credit is due to Mr. Blackett, for proving that the loco-motion could be applied by that means alone.

297. The first attempt of Messrs. Trevithick and Vivian failed; and, though this was no doubt owing to the imperfect construction of the engine, yet it appears that the cause was partly, if not wholly, attributed to the want of adhesion to obtain loco-motion; and hence we find the engineers attempting to produce other means of loco-motion. Mr. Blenkinsop, by means of a cog-rail; Mr. Chapman, by the chain; and Mr. Brunton, by means of moveable legs.

298. It was, however, a question of the utmost importance to ascertain if the adhesion of the wheels of the engine upon the rails were sufficient to produce a progressive motion in the engine, when loaded with a train of carriages, without the aid of any other contrivance; and it was, by the introduction and continued use of them upon the Wylam rail-road, that this question was decided: and it was proved that upon rail-roads nearly level, or with very moderate inclination, the adhesion of the wheels alone was sufficient, in all the different kinds of weather, when the surface of the rails was not covered with snow.

299. Mr. Hedley states that they first tried, by manual labor, how much weight the wheels of a common carriage would overcome without sloping, or slipping ground, upon the rail; and, having found the proportion it bore to the weight, they thence ascertained that the weight of the engine would produce sufficient adhesion to drag after it, upon their rail-road, a requisite number of waggons.

300. The first engine applied upon the Wylam rail-road had only one cylinder, with a fly-wheel to regulate the action of the crank; but they were found to be very troublesome, and their action very uncertain. When the engine was stopped, and the crank and connecting rod in the same line, the power of the cylinder had then no effect in turning the crank round, and the engine had to be moved by levers applied to the spokes of the fly-wheel, until the crank formed such an angle with the connecting rod that the engine got sufficient power to produce a rotatory motion and urge itself forward. This occasioned frequent delays, and the irregular action of the single cylinder produced jerks in the machinery, and had a tendency to shake the machine in pieces; for some time, however, the whole of the coals was taken down the rail-road by the use of this kind of engine.

301. In a preceding page we took occasion to furnish our readers with the earliest attempts at steam-navigation in this country; the construction of a modern steam-boat, as well as the attempts at improvement from the commencement of the present century, properly find a place after our description of the perfect steam engine.

302. The first American steam-boat which completely succeeded was launched at New York on the 3d of October, 1807 (five years before the construction of the Comet at Port-Glasgow), and soon after plyed between that city and Albany, a distance of 160 miles.

303. In Britain steam-vessels were first brought into use in 1812 upon the Clyde. They were built at Port-Glasgow, Greenock, and Dumbarton, where the art of ship-building had for many years been conducted by carpenters eminent in their profession. When launched they were towed at a very trifling expense up the Clyde to Glasgow, situated in the midst of inexhaustible mines of coal and iron, and where the number of skilful practical engineers and artificers rendered the construction of the engines and machinery easy and the prices moderate.

304. The early experiments were, of course, made upon a small scale. The first steam-boat actually put to use there was the Comet (forty feet keel, ten feet and a-half beam, four wheels, four shovel-shaped paddles on each, with a cistern of fresh water to feed the boiler), built, as already mentioned, by Mr. Henry Bell. She had an engine of only three horses' power, being intended merely for passengers, who, till then, had no other means of conveyance on the river than small row-boats, either quite open or supplied with only an awning to secure them from the weather. Small as this engine was, it rendered the passage certain in one tide; the vessel being able to make head-way even against the wind and in rough weather.

305. The success of the first experiment soon excited competition; and a larger vessel, the Elizabeth (fifty-eight feet on deck, eleven feet beam, with an engine of eight horses' power), was completed in March 1813, and for a time proved very profitable to the proprietors. The third boat, the Clyde, which began plying in July of the same year, was still larger in her dimensions; being seventy feet keel, seventy-five feet on deck, thirteen feet beam, with an engine of fourteen horses' power.

306. At present there are about forty steam-vessels on the Frith of Clyde, some of which sail from Glasgow almost every hour, or half hour, during day-light, to the various ports on the river and the lochs communicating with it; as Dumbarton, Helensburgh, Loch-Long, Rothsay, Loch-Fine, and Campbellton, on the right bank; and Port-Glasgow, Greenock, Gourock, Innerkip, Largs, Milport, Ardrossan, Ayr, Irvine, Girvan, Stranraer, &c., on the left bank. Many of them occasionally visit Islay, Mull, Staffa, Icolmkill, and adjacent islands, during the summer months; and also Londonderry, Coleraine, and other ports of Ireland. Several vessels of larger dimensions are employed as regular packets to Belfast, the Isle of Man, Liverpool, &c., and thus a constant communication between the united kingdoms is maintained. Since 1821 two steam-vessels have regularly sailed from Leith to Aberdeen, calling at several

of the intermediate ports. Five or six steam luggage-boats are constantly employed as lighters and draggers of other boats for the speedy conveyance of goods from Glasgow to the ports of exportation, and occasionally towing large vessels in or out of harbour. The annual voyages of each of these thirty-five vessels may be averaged at 10,000 English miles; consequently the whole sail 350,000 miles yearly, or nearly fourteen times the circumference of our globe.

307. The success of steam-vessels at Glasgow soon excited attention in other quarters, and several of the Clyde vessels were purchased as models. It is worthy of mention that shortly after the time of their appearance on the Clyde, Mr. Lawrence of Bristol established a steam-boat on the Severn, and having carried her to ply on the Thames, the Company of Watermen made such opposition to this innovation that he was obliged to take her back. Now, however, not only are all the chief navigable rivers in Britain thus navigated, but steam-vessels ply regularly from London to Aberdeen, sometimes passing the Pentland Frith.

308. On the Holyhead station, to carry mails between England and Ireland, there are three steam-vessels employed; viz. the Royal Sovereign, 210 tons, two forty-horse engines; the Meteor, 190 tons, two thirty-horse engines; and the Ivanhoe, 165 tons, one fifty-six-horse engine. They have answered the purpose much better than sailing vessels; as a proof of which, during the last year the latter were employed, exactly 100 Irish mails arrived in London late; while, during the nine months after the steam-boats were first established, only twenty-two arrived late; and that winter happened to be extremely boisterous. These boats use sails occasionally, and go to sea when sailing vessels dare not leave port. The average passage of the Royal Sovereign from Houth to Holyhead is six hours fifty-seven minutes; from Holyhead to Houth seven hours thirty-six minutes. Of the Meteor, from Houth to Holyhead, seven hours four minutes, and back, eight hours thirteen minutes. The average passage is half the time in which the average passage of sailing vessels used to perform the voyage. The shortest passage was, from Houth to Holyhead, five hours thirty minutes; which, the distance being about seventy-three miles, is nearly twelve miles an hour.

309. It is difficult to say what is the maximum speed of steam-vessels. Several of those between London and Margate make the voyage in seven hours and a half, a distance of eighty-four miles. The Hero made the voyage, wind and tide in her favor, in six hours sixteen minutes. The Eclipse, from Belfast to Greenock, 120 or 130 miles, has been known to come in nine hours; and, on one occasion, having about 3000 square feet of canvas set, besides the engine at work, she came from Ailsa to Greenock at the rate of nine miles. The Henry Bell, a new steam-trader between Glasgow and Liverpool, has delivered goods at various warehouses in Glasgow several hours before the invoices, or advice of the shipment, had arrived in course of post. The New York steam-vessels run up to Albany, 160 miles, in twenty-one hours, and down in nineteen; never in less than nineteen. They go from Newhaven to New York, ninety miles, in six hours and a half without sail; being nearly fourteen miles per hour.

310. At present steam-boats frequently ply between London and Dieppe, Rouen, Havre de Grace, Cadiz, Corunna, Alicant, Vigo, Lisbon, and other ports of France, Spain, and Portugal. One was lately established between Naples and Leghorn and Genoa, but soon abandoned, owing to the oppression of the quarantine laws and the rapacity of the government of the Two Sicilies. Another steam-vessel was launched by an American gentleman on the Lake of Geneva, but, being a very bad sailer, it is about to be replaced by another. Every season they are becoming more numerous, and adventurous in sailing to greater distances and through heavier seas; such as the Bay of Biscay, the Mediterranean, the Baltic, the Gulfs of Finland, Bothnia, &c. A steam-packet, carrying the mail, now sails between Kiel, in Holstein, and Copenhagen. In the Adriatic, the Carolina goes every second day from Venice to Trieste, and the Eridano to Pavia; the latter voyage being usually accomplished in thirty-seven hours. The Royal George steam-packet makes her passage from Portsmouth to Corunna in from sixty to sixty-four hours; a distance of between 400 and 500 miles.

311. Having thus endeavoured to give a sketch of the origin and progress of steam-navigation, we shall now proceed to describe the form and parts of a steam-boat (suppose of 100 tons), and to some other details calculated to furnish a more particular view of the present state of steam-navigation in Britain and other countries.

312. Fig. 1, plate X., is an elevation; fig. 2, a longitudinal section; fig. 3, a ground plan. The same letters refer alike to the respective parts of each figure: A the two boilers with their two manhole doors, one to each; B the chimney; C the steam pipes; D,D, the cylinders of the two engines; E, E, the two air pumps; F the side lever; one on each side of each engine; G,G, the crank of the paddle-wheel shaft; H the rod that works the steam valves or hand gear, moved backward and forward by an eccentric wheel on the shaft; I the nozzles; K pillars of the framing; L L the area where the fireman stands to put coals into the furnace; M M place where the coals are stowed away; N,N, the paddle-wheels and covers; O ladies' parlour; P principal cabin; Q second cabin, having each a raised lantern or sky-light besides the lateral windows of P and Q; R steward's room; S breakfasting room; T,T, refreshment rooms for the second cabin passengers; U small boat ready to be let down on an emergency; V rudder; W,W, seamen's beds; X X space for lumber or spare fuel. The fireman stands in the space L L; an iron trap-ladder leads down to it from the deck, flush with which are two horizontal gratings for the admission of fresh air to himself and the fire; his coals are built up behind him, and he brings down only a few lumps at a time, which he breaks into small pieces as required. The chimney B is a series of sheet-iron cylinders riveted at the joints and slipped the one over the other. Each boiler has a flue within making various convolutions under

the surface of the water; through which the smoke and flame pass until they enter the chimney.

313. These wheels being ponderous, acquire sufficient momentum to turn the crank and supersede the necessity of a fly. The air-pump, feed-pump, and occasional cold water pump, are wrought by rods from F, F, the side horizontal levers. To prevent the waste steam of the boilers from annoying the passengers a pipe conveys it into the chimney. Besides this a waste steam valve is within reach of the engine-man, who loads and unloads it as he finds necessary. It is a curious fact that a great flow of steam into the chimney prevents black smoke from issuing from it, which otherwise would. The paddle-wheels are firmly wedged on their shaft, and whatever pressure they exert against the water causes an equal re-action on the vessel, which is thus impelled either forwards or backwards according to the direction of circumvolution.

314. The principal cabin is painted and otherwise tastefully fitted up, and furnished with a stove, the chimney of which rises up through the deck. The second cabin occupies the fore-end of the vessel, and is also completely furnished, less elegantly. Small steam-boats from thirty tons upwards are generally laid out much in the same way, only varying according to the nature of their employment. When intended for sea voyages a great part of the internal space is allotted for sleeping births.

315. The following is an alphabetical list of steam-vessels built in Britain from 1813 to 1823:—

When built.	Names of Vessels.	Tonnage.	Engines.	Horse Powr.
1822	Aaron Manby	140	1	28
1821	Abbey . . .			
1819	Active . . .	83	1	10
1816	Ætna (double vessel) . .	75	1	20
1820	Aire and Calder	110	1	35
1816	Albion . . .	92	1	22
1818	Albion . . .	75	1	24
1822	Albion . . .	160	2	60
1815	Argyle . . .	88	2	32
1821	Arrow . . .	130	2	40
1820	Belfast . . .	190	2	70
1821	Brilliant . . .	160	2	40
1822	Bristol Cambria	100	1	30
1818	British Queen	75	1	20
1817	Britannia . .	70	1	15
1820	Britannia . .	100	2	40
1821	Britannia . .	80	1	20
1815	Caledonia . .	102	2	32
1816	Caledonia . .	80	1	12
1820	Caledonia . .	80	2	30
1821	Caledonia . .	84	1	30
1821	Cambria . .	130	2	50
1813	Clyde . . .	69	1	14
1821	City of Edinburgh . . .	400	2	80
1822	City of Glasgow	300	2	100
1818	Cobourg . .	75	1	24
1812	Comet . . .	25	1	3
1821	Comet lengthened . . .	70	1	30
1816	Congo . . .	100	1	20
1819	Countess of Scarborough	50	1	10
1821	Dasher . . .	130	2	40
1817	Defiance . . .	50	1	14
1820	Diana . . .	60	2	20
1818	Dispatch . .	83	1	10
1820	Duchess of Northumberland	40	1	10
1822	Duke of Lancaster . . .	141	2	50
1818	Dunbarton . .	100	1	16
1814	Eagle (double vessel) . .	40	1	6
1816	Eagle . . .	70	1	20
1821	Eagle . . .	170	2	40
1819	Eclipse . . .	190	2	60
1821	Eclipse . . .	140	2	60
1821	Edinburgh Castle	148	2	40
1813	Elizabeth . .	40	1	10
1823	Emerald Isle .	450	2	65
1818	Engineer . .	315	2	70
1817	Enterprise . .	30	1	5
1820	Earl of Egremont . . .	50	2	24
1818	Favorite . . .	160	2	40
1819	Favorite . . .	117	1	26
1817	Fingal . . .	67	1	16
1813	Glasgow, now the Thames .	74	1	16
1820	Glasgow . . .	90	1	24
1819	Gourock . . .	65	1	14
1817	Greenock . .	52	1	10
1823	Henry Bell . .	200	2	60
1822	Hercules . . .	130	2	60
1821	Hero	233	2	90
1823	Hibernia . . .	280	2	40
1821	Highlander . .	67	1	24
1822	Highland Chieftain . . .	65	1	16
1820	Highland Lad .	51	1	12
1815	Hope	45	2	6
1819	Hope	30	1	6
1817	Humber . . .	80	1	12
1820	Indefatigable .	30	1	8
1818	Industry . . .	79	1	10
1820	Inverary Castle	114	2	40
1820	Ivanhoe . . .	165	2	56
1821	James Watt .	448	2	100
1817	John Bull . .	75	1	15
1822	King of the Netherlands . .	140	2	80
1814	Lady of the Lake	76	1	20
1818	Lady of the Shannon . .	90	1	20
1821	Lady Stanley .	87	1	20
1819	Largs	96	1	35
1820	Leeds . . .	125	1	30
1822	Lemington Packet . .	30	1	7
1817	London . . .	70	1	14
1822	Lord Melville .	220	2	80
	Lord Nelson, see Sir William Wallace			

When built.	Names of Vessels.	Tonnage.	Engines.	Horse Powr.
1816	Majestic . . .	90	1	24
1821	Majestic . . .	350	2	100
1819	Maria Tug . .	80	1	24
1817	Marion . . .	70	1	14
1813	Margery . . .	70	1	14
1818	Marquis of Bute	60	1	14
1822	Medina . . .	100	1	36
1822	Medusa . . .	90	2	20
1819	Mersey . . .	80	1	24
1819	Mersey . . .	60	1	20
1821	Meteor . . .	190	2	60
1814	Morning Star .	100	1	26
1814	Morning Star .	20	High pres.	3
1821	Mountaineer .	190	2	70
1821	Navigator . .	40	1	18
1816	Neptune . . .	88	2	40
1813	Orwell . . .	60	2 Horiz.	12
1813	Orwell . . .	20	High pres.	3
1815	Oscar	70	1	12
1814	Perseverance .	60	1	14
1814	Phœnix . . .	25	High pres.	4
1821	Postboy . .	80	1	20
1819	Port Glasgow .	70	1	16
1821	Portuguese . .	80	2	20
1813	Prince of Orange	40	2	8
1822	PrinceLlewellyn	170	2	70
1821	Queen Margaret	60	1	20
1823	Quentin Durward . . .	96	2	40
1821	Rapid . . .	140	2	56
1822	Rapid . . .	140	2	60
1816	Regent . . .	112	2	24
1814	Richmond . .	60	1	10
1818	Rising Star . .	400	2	70
1819	Robert Bruce .	155	2	60
1819	Robert Burns .	73	1	24
1818	Rob Roy . .	100	1	30
1820	Rothesay Castle	90	1	24
1823	Royal George Ship . . .		2	
1821	Royal Sovereign George IV. .	210	2	80
1822	Royal Sovereign	220	2	80
1821	Safety . . .	36	1	14
1821	Sampson . .	100	2	40
1818	Selby	80	1	24
1822	Sir Joseph Yorke	100	1	30
1816	Sir William Wallace, formerly Lord Nelson .	95	2	32
1823	Soho	510	2	120
1818	Speedwell . .	40	1	10
1814	Stirling Castle .	60	1	12
1817	Sons of Commerce . . .	80	1	20
1822	Sovereign . .	95	2	32
1822	Sovereign . .	95	2	32
1822	St. George . .	312	2	110
1822	St. Patrick . .	298	2	110
1821	Star	90		
1820	Superb . . .	246	2	70
1821	Surprise . . .	120	2	30
1815	Swift	12	1	3
1819	Swift	9	1	3
1821	Swift	250	2	80
1821	Swiftsure .	104	2	30
1819	Talbot . . .	156	2	60
1821	Tartar . . .	180	2 Horiz.	80
1821	Thames, see the Glasgow		1 Vertical.	10
1821	Thane of Fife .	148	2	40
1822	Tourist, now Royal George	200	2	80
1822	Towart Castle .	120	2	50
1818	Trusty . . .	88	1	10
1817	Tug	95	2	32
1820	Two Brothers .	35	1	9
1820	Tyne	40	1	10
1821	Union . . .	20	1	4
1822	Union . . .	53	2	16
1822	Union, double ferry-boat . .	100	2	30
1821	Venus . . .	265	2	60
1821	Velocity . . .	150	2	40
1818	Victory . . .	160	2	40
1820	Waterloo . .	90	1	20
1819	Waterloo . .	210	2	60
1822	Yorkshireman .	200	2	80

316. The Atlas is the largest vessel ever built, and is impelled by three engines of 100 horse power each. This gigantic steam vessel was built at Rotterdam, and launched in the summer of 1828. Her decks are about thirty-five feet longer than a first-rate man of war, and is furnished with four masts. Her engines were constructed at Leige.

317. The vessel Soho is of somewhat smaller dimensions than the American steamboat, the Chancellor Livingston, plying on the Hudson River between New York and Albany, constructed by Mr. Fulton. The following are some particulars respecting this vessel:—Her keel is 154 feet long; deck 165; thirty-two broad; burden 520 tons; draft of water about seven feet three inches; principal cabin fifty-four feet long, seven high; ladies' cabin, above the other, thirty-six feet long, with closets; forward cabin thirty long, seven high. Permanent sleeping births, in principal cabin, thirty-eight; in ladies' cabin, twenty-four; in fore cabin, fifty-six; in captain's cabin on deck, two; engineers' and pilots', three; forecastle, six; firemen, cooks, &c., six; total 135. Her engine is of seventy-five-horse power; diameter of cylinder forty inches, length five feet; piston rod eight feet and a half; stroke five feet; boiler twenty-eight feet long, twelve broad, with two funnels; paddle-wheels seventeen feet diameter; paddle-boards, five feet ten inches long, with two fly-wheels, each fourteen feet diameter, connected by pinions to the crank wheel. The machinery rises four feet and a half above the deck. Average rate of sailing, eight miles and one-half to eight and three-fourths an hour. With a strong wind and tide in her favor she has made twelve; but with a strong wind and tide against her not more than six miles per hour. The hands employed on board are—thirteen mariners, eleven cooks, waiters, stewards, &c.; in all twenty-four.

318. This vessel, however, is still much surpassed in size by the Lady Sherbrooke, of 787 tons,

and sixty horse power; being the largest of eight which ply on the river St. Lawrence. This gives thirteen tons for each horse power, whereas in the Soho the same burden has three times as much action applied to it. The American steam-vessels, though fast sailers, are thus impelled by comparatively smaller engines than those built in this country.

319. It appears from the Report of the Select Committee of the House of Representatives, for session 1817, that there were then seventeen large steam-boats in constant employment on the American rivers, besides ferry-boats. But since that time they have increased so rapidly that there was in 1823 about 300.

320. The following are the names of thirty-five vessels, and their tonnage, plying on the Mississipi and its tributary rivers alone; viz. Alabama, 200 tons; Buffalo, 300; Cedar Branch, 250; Cincinnati, 120; Constitution, seventy-five; Eagle, seventy; Etna, 390; Exchange, 200; Experiment, forty; Frankfort, 320; General Jackson, 200; General Pike, 250; Governor Shelby, 120; Harnot, forty; Hecla, seventy; Henderson, eighty-five; Independence, 300; James Monroe, ninety; James Ross, 320; Johnston, eighty; Kentucky, eighty; Louisiana, fifty-four; Madison, 200; Maysville, 150; Napoleon, 332; Ohio, 443; Paragon, 400; Rifleman, 250; Rising States, 150; St. Louis, 220; Tamerlane, 320; Vesta, 100; Vesuvius, 390; Volcano, 250; Washington, 400; in all 7259 tons.

321. Belonging to some of the States there are steam frigates and ships of war carrying guns, some of them 100 pounders. These vessels are thirteen feet thick in the sides, of alternate layers of oak and cork; are so constructed that they can eject boiling water on their enemies; and there are cases of cutlasses and pikes which project from their sides and draw back again every fifteen seconds.

322. The Savannah, of 350 tons, was the first steam-vessel that crossed the Atlantic. She arrived at Liverpool on the 20th of June, 1819, in twenty-one days from land to land, eighteen of which her engine was going; her daily consumption of coal was about ten tons, so that she must have had at least 200 on board, leaving 150 for the weight of engine and cargo. Her paddles were occasionally taken off when she sailed by wind; and the whole of the paddle-wheels were capable of being taken to pieces and shipped in case of bad weather. As the distance is not much short of 4000 miles, she must have averaged nearly 200 per day.

323. By far the greatest number of steam-vessels use low pressure engines. A larger proportion of American vessels have high pressure engines than in this country. High pressure engines are wrought with steam of a great variety of strengths, from thirty to 160 lbs. per square inch. Some engineers assert that it is capable of being used at 1000 lbs. The steam is not condensed, but, after having acted on the piston, is allowed to blow off into the air. The diameter of their steam cylinders may be made of any size proportioned to the strength of the steam used. Thus, when it is 160 lbs., the area of the cylinder may be only a sixteenth part of the area of one using steam of ten pounds; consequently, a five-inch cylinder wrought with such strong steam will be equal in power to a twenty inch cylinder wrought with such weak steam. High pressure engines require neither air-pump, conductor, nor the parts therewith connected; and, as the volume of steam used is in proportion, their boilers may consequently be much smaller. Hence these engines occupy less room and tonnage, and require somewhat less fuel; but the risk of explosion is considerable. Were it otherwise they would be very valuable at sea, because their power can be increased on emergencies by merely increasing the fire, whereas the power of condensing engines is much more circumscribed and confined to their original construction. The free effective power of large low pressure engines is about eight or nine pounds per square inch of their steam pistons, and of small ones, under thirty horses, only seven or eight.

324. It is remarkable that, after the first successful trial, very little improvement has been made in the construction of steam-vessels. Experience has only fixed the suitable proportions of the several parts. Much, however, still remains to be done. The great objects wanted are to increase the power of the engine; to avoid the waste of force in the play of the paddles; and to render their action more equable. Notwithstanding the number and variety of steam engines which have been erected in this island, it is truly surprising that some of the most important points of theory should be left uncertain and subject to dispute. We have neither ascertained exactly the density of steam formed under different pressures, nor the quantity of heat absorbed in its formation. Most of the conclusions of engineers are drawn rather from analogy than from facts; and a new set of experiments on steam, conducted with scrupulous attention, and on a comprehensive plan, are much wanted at present to guide all our practical operations. It seems probable that the most economical engines, on the whole, are those which work under a high steam pressure, though the statements given by different authors cannot be easily reconciled. The vapor of other fluids has sometimes been proposed instead of the steam from water. It would be an important object gained if the same elastic force could be created with less expense of heat. The prodigious consumption of coals by the boilers proves a great hindrance to the extension of steam-navigation. The store of this ponderous species of fuel required for the supply of the engine in a distant voyage, would occupy the whole tonnage even of a large vessel. The Rapid, of 130 tons burden, and sixty-horse power, required nearly a ton of coals every two hours, and could not therefore continue at sea above eleven days; and we have seen that the Savannah, which crossed the Atlantic, consumed ten tons of coals every day, or 210 tons during the passage of twenty-one days, leaving only 140 of surplus tonnage. Unless some great discovery, indeed, be made on the concentration of heat, we shall never despatch steam-packets directly to the East or West Indies.

325. The first objection which occurs to the use of wheels for propelling the vessel, is, that there is a great waste of power. The wheel, at every point of its circumference but one, is either ascending or descending. Each of the arms has to be immersed at a considerable expense of power, and the effect of its application to the water, in this direction, would be, to lift the vessel out of the water, as much as to push it forward upon the surface, were it not that the force necessary to lift another of the arms out of the water is equal to that which is required to immerse the former. In other words, the tendency which the descending arm has to elevate the vessel is counteracted by the operation of the ascending arm, which tends to depress it. In short, the space in which the revolution of the wheel is of any use in forwarding the vessel, is very small. One-fourth of the power, steadily applied in a horizontal direction, would produce greater effects.

326. The next disadvantage attending the use of wheels is, that the whole force is applied to the water too close to the sides of the vessel. It is true that this is an objection common to all the different methods yet put in practice; but in the case of wheels, especially as they are generally placed nearly as forward as the bow of the vessel, the effect is to bring a current against the head of the vessel, which impedes its progress, and occasions great waste of power.

327. The form and number of paddles attached to each wheel, as well as their velocity, has been so fully discussed by Mr. Tredgold, as to put the whole matter in the clearest light.

328. In still water, it may be assumed that the resistance of the same vessel is sensibly proportional to the square of the velocity; the difference from this law being too small to produce a sensible effect within the range to which the velocity is limited in practice. Therefore, if a be the force that will keep the boat in a uniform motion at the velocity u, the force that will keep it in motion at the velocity v will be found by this analogy.

$u^2 : v^2 :: a : \frac{a v^2}{u^2}$ = the resistance at the velocity v.

Now this force acts with the velocity v; hence the mechanical power required to keep the boat in motion, at the velocity v, will be $\frac{a v^3}{u^2}$.

329. Whence it appears that the mechanical power, or the power of a steam engine to impel a boat in still water, must be as the cube of its velocity. Therefore, if an engine of twelve horses' power will impel a boat at the rate of seven miles an hour in still water, and it be required to know what power will move the same boat at ten miles per hour, it will be $7^3 : 10^3 :: 12 : \frac{10^3 \times 12}{7^3} = 35$; or an engine of thirty-five horses' power.

330. This immense increase of power, to obtain so small an increase of velocity, ought to have its influence in fixing upon the speed of a boat for a long voyage, and its proportions ought to be adapted for that speed, with a proper excess of power for emergencies. A low velocity should be chosen, where goods as well as passengers are to be conveyed. Our example places this in a striking point of view; for, to increase the velocity of the same boat from seven to ten miles per hour, requires very nearly three times the power, and, of course, three times the quantity of fuel, and three times the space for stowing it, besides the additional space occupied by a larger engine; consequently, if seven miles per hour will answer the purposes of the trade the vessel is to conduct, the advantages of the lesser speed must be evident.

331. According to the principles we have calculated upon, the power required to give a boat different velocities in still water will be as follows:—

Miles per hour.	Horses' power.
3	5½
4	13
5	25
6	43
7	69
8	102
9	146
10	200

332. In short voyages the extra quantity of engine room, and tonnage for fuel, is not so objectionable; but, in a long voyage, it reduces the useful tonnage to so small a proportion as to render it doubtful whether such vessels will answer or not. The consumption of fuel to produce a given effect is much greater than in engines on land; and, perhaps, much in consequence of the imperfection of the draught of the chimney, and the limited space for the boiler. The former might be easily remedied by an artificial blast, directed so as to force the flame to expend its heat on the boiler. And, while on this subject, it well deserves the attention of those who wish to improve steam-boats, to adopt some more effective methods of confining the heat to its proper object, and particularly where the engineer and firemen are exposed to it.

333. When the paddles of a steam-boat are in action there is a point in each paddle wherein, if the whole re-action of the fluid was concentrated, the effect would not be altered; this point may be called the centre of re-action. It has not been determined for the case under consideration, but may perhaps form a subsequent object of research.

334. We suppose the fluid to be at rest, and the velocity of the centre of re-action to be V, and the velocity of the boat to be v; then $V - v$ is the velocity with which the paddles strike the water. Or the difference between the velocity of the paddles and the velocity of the boat is equal to the velocity with which the paddles act on the water; hence, when these velocities are equal, the paddles have no force to impel the boat; and, if the paddles were to move at a slower rate, they would retard it. Now, as $(V - v)$ is the velocity, the force of the re-action will be as $(V - v^2)$; for this quantity is proportional to the pressure which would produce the velocity $V - v$. But, during the action of the paddle, the water yields with a velo-

city $V - v$; and since the velocity of the boat is v, the effective power is as $V - v : v :: (V - v)^2 : v (V - v)$. And the effect of this power in a given time is a maximum when $v^2 (V - v)$ is a maximum, that is, when $2 V = 3 v$, or when the velocity of the centre of re-action of the paddles is one and a half times the velocity of the boat.

335. It is desirable that the action of the paddles should be as equable and continuous as possible, unless they be arranged so that the variation of the power of the engine may coincide with the variation in the action of the paddles. But, in attempting to render the action of the paddles equable, their number ought not to be increased more than can be avoided, because there is not then time for the water to flow between them, so as to afford a proper quantity of re-action, neither do they clear themselves so well in quitting the water. If we suppose W L, plate VI. fig. 4, to be the line the water would assume when at rest, the most favorable arrangement with the smallest number of paddles appears to be to make the paddle A of the wheel A just entering, when the preceding one B is in a vertical position, and the one C quitting the water. This arrangement allows time for the water to flow between, and for it to escape from the retiring paddles. If a smaller number be employed, there will be a short interval during which none of the paddles will be in full action. The utmost variation will be between the positions of the wheels A and B, fig. 5, and an intermediate position is shown by the wheel C. I have not attempted to represent the actual state of the surface of the water during the motion of the paddles, for, unless it were done with accuracy, according to nature, it is better undone; but the form of the surface will not materially affect the conclusions.

336. To determine the radius of the wheel, or the depth of the paddles, when the number of the paddles is given, becomes an easy problem, when the preceding conditions are to be adhered to. For, put A O, fig. 6, the radius $= r$, and $x =$ the depth A a of the paddles, and n their number. Then $\frac{360^\circ}{n} =$ the angle A O B contained between two paddles, and r cos. $\frac{360}{n} =$ O a; the cosine of the angle being the depth from the centre of the wheel to the surface of the water; and

$$r \cos. \frac{360}{n} = r - x, \text{ or,}$$

$$r \left(1 - \cos. \frac{360}{n}\right) = x = \text{A } a, \text{ the depth of the paddles.}$$

$$\text{Also } \frac{x}{1 - \cos. \frac{360}{n}} = r = \text{A } o, \text{ the radius of the wheel.}$$

From these equations we have the following rules, viz. To find the radius of the wheel, when the number and depth of the paddles are given. Divide 360 by the number of paddles, which will give the degrees in the angle contained between the two paddles. From unity subtract the natural cosine of the angle, and the depth of the paddles divided by the remainder will give the radius of the wheel.

337. Thus, if the number of paddles be eight, and their depth one foot and a half, then $\frac{360}{8} = 45^\circ$, and its cosine is ·7071, therefore $\frac{1 \cdot 5}{1 - \cdot 7071} = 5 \cdot 12$ feet, the radius of the wheel. Again, if the number of paddles be seven, and their depth 1·5 feet as before, then $\frac{360}{7} = 51^\circ 26$ and its cosine is ·6234, consequently $\frac{1 \cdot 5}{1 - \cdot 6234}$ = four feet.

338. Both divisions are represented in the previous fig. and it may be remarked that, when the depth of the paddles is fixed upon, the greater number of paddles should have the preference, because the first impression on the water is then less vertical. The difference is easily seen by comparing the angles at which the paddles A and a, strike the water. It will also be observed that the larger wheel must have less tendency to throw the water up behind at C.

339. It is obvious that, by enlarging the wheel, the obliquity of the action on entering the water may be reduced; but it also may be done by lessening the depth of the paddles, as will be evident from the other figs., where the angles are the same in both wheels; hence it is useful to be able to find the depth, and, if the number of the paddles and the radius of the wheel be given, the depth may be found by the following rule:—

340. Multiply the radius of the wheel by the difference between unity and the natural cosine of the angle contained between two paddles, and the product is the depth required. Suppose the radius is to be 4·5 feet, and that there are to be eight paddles; then $4 \cdot 5 (1 - \cdot 7071) = 1 \cdot 318$ feet for the depth of the paddles.

341. Eight paddles is as small a number as ought to be adopted, and, where large wheels can be admitted, nine or ten might be used with advantage; but, where many paddles are employed, the wheels must necessarily be of large diameter, to keep them narrow. The advantages of wheels of large diameter consist in the favorable direction they strike the water, and also quit it; the paddles are also more distant from one another, and, while they have more re-action on the water, they splash it about much less; the weight of the wheel also renders it more effective as a regulator of the forces acting upon it. On the contrary, there are some strong practicable objections to very large wheels for sea-vessels; they give the force of the waves a greater hold on the machinery; they are cumbersome and unsightly; and they raise the point of action too high above the water line; so that the choice requires both experience and judgment.

342. The best position for the paddles appears to be in a plane passing through the axis, as represented in the figures; if they be in a plane which does not coincide with the axis, they must either strike more obliquely on the fluid in entering, or lift up a considerable quan-

tity in quitting it. With respect to the shape of the paddle, it is clear that it should be such that the resistance to its motion should be the greatest possible. These conditions appear to be fulfilled in a high degree by the simplest of all forms, the plane rectangle; but we might learn much from a judicious set of experiments on this subject.

343. As there is some variation in the force of re-action against the paddles, it may in some measure be compensated by making its periods coincide with the variation in the force of the engine. To effect this, the stroke of the engine should be made in the same time as is occupied by that part of the revolution of the paddle-wheel which is expressed by a fraction having the same number of paddles for its denominator, and the piston should be at the termination of its stroke, when one of the paddles is in a vertical position. For, when one of the paddles is in a vertical position, as in the wheel A, the re-action is the least; and it is greatest when two paddles are equally immersed, as in the wheel B, at which time the force would be acting at right angles to the crank.

344. Having shown the power that is necessary to keep a boat in motion in still water, it will be some advantage to resume the enquiry in the case where it moves in a stream or current; and, for that purpose, let v be the velocity of the boat, and c the velocity of the current; a being the resistance, when the boat is in motion with the velocity u.

345. When the resistance to be overcome, to give the boat the velocity v, is, when the motion is with the stream, $u^2 : (v-c)^2 :: a : \frac{a(v-c)^2}{u^2}$

And, when the boat moves against the stream as $u^2 : (v+c)^2 :: a : \frac{a(v+c)^2}{u^2}$. Hence the power in either case is expressed by $\frac{a\,v\,(\pm c)^2}{u^2}$. The upper sign to be attended to when the motion is with the current, and the lower sign when it is against it. When c, the velocity of the current, is nothing, the result is the same as before. But the resistance in still water is not the mean between the resistances in the direction of the current and against the current; consequently, the mean rate of a boat, which alternately goes with and against a current, must be less than the mean rate in still water. The mean resistance is $\frac{a\,v\,(v^2+c^2)}{u^2}$, while the resistance in still water is only $\frac{a\,v^3}{u^2}$, and the difference between these is $\frac{a\,v\,c^2}{u^2}$; a quantity depending on the velocity of the current; and, for any particular case, should be calculated from the mean motion of the current.

346. When a boat advances with a current, the velocity with which the paddles act on the water will be $V+c-v$; and when the boat moves against the current it will be $V-c-v$; consequently, in either direction, it is $V \pm c - v$; and the force of re-action $(V \pm c - v)^2$.—But the effective resistance of the boat is as $V \pm c - v : v :: (V \pm c - v)^2 :: v\,(V \pm c - v)$; and its effect in a given time is a maximum when $v^2\,(V+c-v)$ is as a maximum; that is when $V = \frac{3v+2c}{2}$, or when $V = 1{\cdot}5\,v + c$

Also, $\frac{2\,(V+c)}{3} = v$.

347. When $c = o$, or the boat moves in still water, $\frac{2\,V}{3} = v$, the same as before, and the mean between moving against and with the current is $\frac{2\,V}{3} = v$ also; therefore, where the velocity cannot be changed to suit the circumstances, this will be the best proportion for all cases. Where the force of a current is considerable, it would be extremely desirable to have the power of altering the velocity of the wheels; and it is not proper that it should be done by any change in the velocity of the steam-piston; because, whatever change is made in its velocity, must affect the power of the engine. There is no difficulty in adopting such a train of mechanism as would produce the alteration of velocity required, and yet be as strong and durable as the ordinary combination, and not at all expensive, compared with the object to be gained by introducing it. It will only be necessary to provide for an increase of velocity; for, when the boat goes with the stream, the rate of the paddles is already too great; whereas, when a boat moves against the current, both an increase of velocity of the wheel and an increase of surface of paddle is necessary, to maintain the mean rate.

348. We will close this part of our subject with a view of the velocity a boat may be expected to acquire, when the power is the same:—Let P be the power of the engine, then $\frac{a\,v\,(v \pm c)^2}{u^2} = P$

349. Put the ratio of the velocity of the current to the velocity of boat as $1 : n$; that is, $1 : n :: v : c = n\,v$; whence we have

$$\frac{a\,v^3(1 \pm n)^2}{u^2} = P, \text{ or } v = \left(\frac{P\,u^2}{a\,(1 \pm n)^2}\right)^{\frac{1}{3}}$$

350. If the boat moves in a current of which the velocity is n times the velocity of the boat, then we shall have

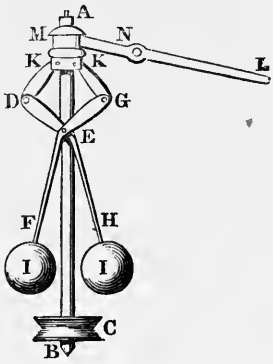
	Miles per hour.	Miles per hour.
With the stream	4	8
	2·2	6·6
	1·53	6·12
Still water . .	0·00	5·00
Against the stream	1·08	4·34
	1·38	4·16
	1·92	3·85
	2·38	3·58
	3·17	3·17

This table shows that a power capable of moving a boat at the rate of five miles per hour in still water, will only move it at the rate of a little more than three miles per hour against a current of the same velocity as the boat; and that the speed of the same boat would be eight miles per hour when moving with a current of which the velocity is four miles per hour. It should be remarked that these calculations suppose the

area of the paddles and their velocity to be adjusted to the maximum proportions in each case; were it otherwise, the velocity with the current would be increased, and the velocity against the current diminished.

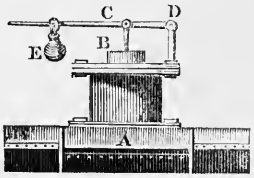
351. There are two or three detached parts of the engine that require a more particular notice than we have yet given. The *governor*, as it is called, furnishes a beautiful illustration of the application of the centrifugal force as a means of regulating the velocity of the engine. Indeed the same law that governs the motions of the planetary bodies is here made subservient to producing the most perfect equilibrium between the various parts of the machine.

352. It is represented in the accompanying diagram, and a rotatory motion is communicated by a gut band passing round a rigger, or pulley fixed upon the fly-wheel shaft, or some other revolving part of the engine, and also round the pulley C; and the relative velocities of the governor and the engine must be adjusted by such wheel-work, or the respective diameters of the two pulleys. Towards the upper part of the rod or spindle A B two bent levers D E F and G E H are fixed, so that they can both turn or open on the common centre E which is fixed to the spindle; a heavy iron ball I, I, is fixed to the end of each bent lever, and the upper ends D and G of these levers are attached by connecting links K, K, with joints to the sliding piece M, which slides freely on the square spindle. It follows therefore that while the two balls I, I, lie in contact with the spindle A B, the slider M will be pushed to its greatest possible height upon the rod; but whenever the balls I, I, are opened out the slider M must be depressed. The weight of the balls keeps them in contact with the spindle, so long as it remains stationary or moves slowly; but whenever their revolving motion increases, their centrifugal force will drive them to a greater or less distance from the centre: L N is an iron lever turning on the fixed pivot N, while its opposite end enters a groove formed in the sliding piece M; this is merely for multiplying or increasing the motion produced in M, when necessary; for, by prolonging the distance between N and L, the end L may be made to move in any required degree. To apply the governor to the regulation of the velocity of the engine, it therefore only becomes necessary to connect the end L of the lever by means of strong wires with the lever of the throttle valve, taking care that that valve shall be quite open when the two balls of the governor are lying close to their spindle; for then the engine will move at its full speed. By so doing, the balls will instantly separate and raise the end L of the governor-lever, which, by drawing upon the lever or the throttle valve will partly close it and diminish the speed.

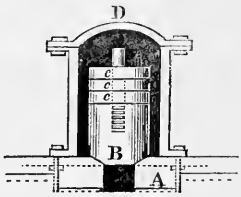


353. The safety-valve being an object of considerable importance, both as regards the utility of the engine, and the preservation of those connected with its management, much attention has been given to its construction; and to this highly useful appendage we would particularly call the reader's attention.

354. The first engine that was made by Savery was furnished with a steel-yard safety-valve The accompanying figure will furnish an idea of its arrangement. A the top of the boiler; B, the safety-valve or plug, made to fit air-tight in the tube or valve-seat beneath. C, the lever working on an axis D, and furnished with a moveable weight E, adjusted to balance the weight of the steam in the boiler.



355. The lever and balance-ball safety-valve employed in all the early boilers appear but little calculated for those engines in which high pressure steam is employed, as the engine-man, in an over anxious zeal for the full performance of the machinery confided to his care, has been frequently known to increase the internal pressure of a large boiler many thousand pounds beyond the resistance to which it was originally proved. To prevent a recurrence of those accidents which first drew the attention of the legislature to this important part of the engine, it appears advisable to enclose the safety-valve in an iron case, of which a section is annexed. The valve B in this case rests upon a conical seat in the boiler A, and is furnished with a series of small moveable plates lettered *c*, which are employed to increase or diminish the entire weight of the safety-valve, the whole being covered by the box D; and, as this is pierced with a number of small holes, the steam readily escapes when the expansive force exceeds the resistance offered by the loaded valve.



356. The cylinders of steam engines are frequently surrounded with cases containing steam of the same elasticity as that in the boiler. The water proceeding from the condensation which takes place in the case was for a considerable time allowed to pass off without further use; but it has subsequently been the practice to return it to the boiler.

357. The object of the case was to prevent condensation taking place within the cylinder. But we shall see that the application of heat in this manner is by no means advantageous. As far as experiments hitherto published afford us a clue we will endeavour, says an ingenious author, to investigate it in the case of the engine at Huel Towan.

357*. M. W. De la Roche and Berard found that the capacities of equal volumes of air under the pressures of 29·2 and 41·7 inches of mercury were nearly as 1 : 1·2396 differing from the ratio of the pressures of densities which is 1 : 1·358.

358. If we suppose the densities and capacities to be in this ratio to each other; then under a pressure of 24·9 inches of mercury 8·983.

29·2 . . .	1·000
39·6 . . .	1·215
71·15 . . .	1·91

359. As air and steam, out of contact with its generating water, follow the same ratio of expansion; in the absence of experiments on the subject, it seems reasonable to suppose that their capacities vary as one another, and consequently that the capacity of the steam in the case—1·910 whilst that of the steam contained in the cylinder at the termination of the working stroke —·8983 for equal volumes; and for equal weights that of the former —·02684 whilst that of the latter —·03607. It consequently requires that 3607 parts by weight of steam, of a pressure equal to that of 71·15 inches of mercury, be cooled, in order to heat 2684 parts of the pressure of 24·9 inches, the same interval of temperature. From the law of Mariotte it follows that the elastic force of a given weight of any elastic fluid, × the sphere of its action, will give the same quantity, whatever may be the temperature, pressure, or density; provided the whole quantity of heat in the mass suffer no increase or diminution; and hence, friction and capacity disregarded, we obtain the same result, whether a given quantity of water and caloric, in the form of a vapor, act on a surface of eight or eighty inches in diameter.

360. In the use of a steam case it appears that a portion of steam is destroyed in order to communicate to another portion a force so considerably less than what would have been obtained by adding volumes together as the difference between 2684 and 3607. The former representing the effect produced on the steam in the cylinder by the abstraction of heat from the case; and the latter what would have been the effect of the steam condensed in the case had it been employed in the cylinder.

361. But the quantity of injection water will be augmented by the steam within the cylinder acquiring an increased quantity of heat after its admission there; the load of the air-pump being of course proportionally greater; the surface exposed to the cooling influence being enlarged by the application of a case. Mr. Woolf and Mr. Grose usually employ steam cases, which with the upper parts of the boilers, the steam pipes, cylinder, cover, nozzles, &c., are surrounded and covered with from ten to fourteen inches in thickness of ashes, saw-dust, or powdered charcoal.

362. Before the application of this contrivance Mr. Hocking, engineer at the Consolidated mines, states, that the quantity of steam condensed in the case of a ninety inch cylinder, and working with steam of a pressure of about seventy inches of mercury, gave 81·6 cubic feet of water in twenty-four hours.

363. Mr. Sims has recently adopted a plan, which, if it can be so carefully managed by the engine-men as to avoid charring the packing of the piston, seems preferable to a steam case. It is making the flue, from the boiler to the chimney, around the cylinder. But it is doubtful whether the advantage obtained in the cylinder be not counterbalanced by the increased burden of the air pump.

364. The sudden descent of a weight sufficiently heavy to open the valves of a powerful engine, would be attended with serious inconvenience, was not some expedient resorted to for diminishing its force. To do this, each plunger weight moves in a strong box or case which very nearly fits it; and as this, together with the weight itself, is placed in the cold water cistern, of course this box is always filled with water, which is admitted by a valve opening inwards; when the plunger weight descends, it is therefore resisted by the water, which only permits it to move slowly; but, in its ascent, the valve opens and admits of the most rapid motion, and at the same time prevents any unnecessary load being thrown upon the plug tree. In engines of great power, the weight of the plunger would necessarily be so great as to be very inconvenient, and Messrs Watt and Boulton have therefore most ingeniously applied a small separate steam cylinder and piston for the express purpose of removing the pressure from the valves. The piston rod of this small cylinder, which is usually fixed immediately below the side pipes, is a continuation of the rod by which the valves are connected, and is made steam tight by working through stuffing-boxes. The piston is of the same diameter as the valves to which it is connected, and the steam passages are so continued from the slide-pipes that, when steam is made to press on the upper side of any valve, it is at the same time admitted below the piston, and thus tends to raise that valve upwards with a force exactly equal to that which presses it downwards, consequently the valve moves with the same facility as if it were in the open air. The plunger weights do not therefore require to be of greater weight than what is necessary to overcome the friction of the piston, and the stuffing-boxes of the valve-spindles. In those engines that work with a four-way cock, or sliding regulator, plungers are unnecessary, and indeed cannot well be applied, though the motion they produce is always desirable, because the steam cannot be cut off too suddenly, but should be admitted gradually; for, if its power is too suddenly thrown upon the piston, it may do mischief by its exertions before the vis inertia of the piston and beam are overcome.

365. In 1805 Mr. Job Rider obtained a patent for improvements in the steam engine. These improvements consist, first, in lining the steam cylinder with soft metal, of a sufficient thickness to admit of finishing the inside of the cylinder of such metal, by drawing or boring; secondly, in applying a hollow piston-rod, answering the purpose of an eduction pipe; thirdly, in the order of opening and shutting the valves; and, fourthly, in regulating the speed of the engine by a pendulum. The nature of this latter contrivance is very ingenious, and may be understood from the following description. Upon an horizontal arbor, which we may denominate the

main arbor, are placed three wheels, a drum or barrel, and a pinion: one of these wheels, that is to say, the main wheel, is fitted by means of a socket upon the main arbor, so as to turn round upon it, and has teeth both upon the exterior and interior periphery of its rim. Within the circle of the interior cogs of this wheel, a pinion is fixed to the arbor, its diameter being one-third of the interior diameter of the main wheel; and this pinion has teeth surrounding its convex surface. The moveable barrel turns freely upon the main arbor; its diameter is rather less than the exterior diameter of the main wheel, and it carries a cord, with a weight hanging at its end, acting like a clock-weight. Besides this, the ends of the barrel are pierced with two orifices, each at about half the exterior radius of the main wheel from the arbor, these holes serving as bushes or pivot-holes, wherein an arbor turns, carrying a wheel of which the diameter and number of teeth are equal to those of the pinion: the latter wheel may be called the barrel pinion; its teeth work in the teeth of the pinion, and also in the interior teeth of the main wheel. By these means the barrel may be turned round upon the main arbor, while the arbor itself is turned by the pinion, which is acted upon by the barrel-pinion, at the same time that this pinion acts upon the interior teeth of the main wheel. The external teeth of the main wheel turn the pinion of a scapement wheel and pallets, nearly similar to those in Graham's dead-beat. Near one end of the main arbor there is a ratchet-wheel, and wheel and click; and near the other end a wheel, which is acted upon by an endless screw upon a horizontal shaft, worked by the general operation of the steam engine.

366. This arrangement serves to regulate the rate of the engine's motion; for the turning of the worm wheel, by the general motion of the engine, causes the weight to be raised which hangs to the cord that winds upon the barrel; and this weight is connected to one end of a lever, the other end of which is attached to the steam-valve in such a manner that the degree of opening of that valve depends upon the altitude to which the weight is raised. The aperture of this valve is formed like an inverted cone; and, while this valve shuts and opens twice at every stroke, the lever does not prevent such opening and shutting, but merely limits the extent of the opening by the springing up of a rod connected with it. By this contrivance it happens that when the weight is highest the valve is least opened; and when the weight is lowest the valve is most opened. Hence it is evident that should the engine wind up the weight, by turning the worm faster than the pendulum permits it to descend by the turning of the barrel, the aperture of the valve will be contracted; and vice versâ. Little power is lost by these means, and the speed of the engine can be accurately regulated by properly adjusting the length of the pendulum, and the numbers of teeth in the wheels and pinions. As to the ratchet-wheel and click, their sole use is to prevent the weight from drawing the line off the barrel, when the worm-wheel is thrown out of gear.

367. The *air-pump* and *condenser* of the common engine are usually of the same size; if of one-eighth, the capacity of the working cylinder, it will be found sufficient to keep the condenser empty in Mr. Watt's single engine. The best proportion for a double action engine is about two-thirds the diameter of the cylinder and half the length of stroke, the condenser, as in the single engine, being of similar capacity.

368. In Mr. Maudslay's portable engine the condenser is a hollow cylinder, and the air-pump is placed within it, so that there is no necessity for a pipe of communication from the air-pump to the condenser; and in this case a small cistern is fixed over the pump to contain the hot water, the discharge valves being placed in the lid, which thus forms the bottom of the cistern or hot well.

369. In the early engines, on Messrs. Boulton and Watt's construction, the air-pump and condensing-cistern were placed at the outer end of the beam; in which case, the pump-bucket being drawn up by the descent of the piston, the engine required less counter-weight than in the present form, in which the air-pump must be wholly worked by the counter-weight. It was necessary, also, that the parts appropriated to the condensation of steam should be kept as cold as possible; on which account the air-pump and condenser were placed in a cistern of cold water, which, being continually on the overflow, carried off the excess of heat.

370. The mode of condensing by outward cold was not however found sufficient; and Mr. Watt afterwards introduced a small jet of water, the dimensions of the air-pump being so far increased as to extract the injection-water as well as the air.

371. To show the degree of vacuum in the condenser, and consequently the amount of pressure on the piston, a barometer-gauge has been employed. This is justly considered as a most important instrument, though unfortunately for the profit of steam engine proprietors, but little attended to. This gauge is in fact a common barometer tube, of thirty inches in length, with a graduated scale, and connected with the condenser by a small tube furnished with a stop-cock. When the air is expelled from the cylinder this must be closed, otherwise the steam entering the tube would blow the mercury from the cup. On the cock being turned, and the communication opened with the condenser, the exact degree of vacuum will be shown by the height of the mercurial column, which, if the condensation be not complete, or air be admitted, will descend, and on the contrary, if perfect, it will ascend, as in the Torricellian tube.

372. The steam-gauge employed by Mr. Watt consists of an inverted syphon or bent tube of glass or iron, one leg of which is jointed to the steam-pipe, while the other is open to the atmosphere. A quantity of mercury being poured into the tube, it will occupy the lower or bent part, and the surface of the fluid metal in one leg being exposed to the pressure of the steam, while the external air acts upon the other, it is evident that the difference of level of the two surfaces will express the pressure of the steam in

the height of the mercurial column passing up the graduated tube.

373. This gauge is just the reverse of the preceding; the barometer showing the pressure of the atmosphere on a given space of the piston, while the steam-gauge indicates the force of elastic vapor entering from the boiler. It is the duty of the fire-man frequently to look at his gauge, that he may know when to increase the fire in the furnace, and thus a sufficient supply of steam will always be secured to the engine.

374. In the early atmospheric engines, the *working-beam* was composed of a large and almost unhewn tree; but Mr. Smeaton employed a framing of wood for this purpose, which was afterwards much simplified and improved by Mr. Hornblower.

375 In double-acting engines it is usual to have the beam cast in one piece, the extremities being turned in a lathe to form cylindrical pins, upon which are fitted sockets or pieces, having other pins projecting from them to form the points of the parallel-motion and connecting-rod. Thus, there is one pin on each side of the socket, the two links of the parallel-motion being fitted to the two projecting pins at one end, while the double joint of the connecting-rod is fitted on the two pins at the other end of the beam. The advantage of this construction is, that the joints at the ends of the beam become universal joints, having liberty of motion in all directions; and, in some of Mr. Murray's best engines, the same contrivance is applied to the crank-pin and connecting-rod.

376. The following table exhibits the proportions of the parallel-motion and as such is important.

	Length of Stroke.	Beam A B.	Coupling Rod D E C B.	Link C E B D.	Bridle-Lever E F.
No. 1	96	147	69	42	78
2	72	120	50	28	96
3	72	110	55	31½	55
4	48	60	41	20	60
5	48	84	38	19	60
6	48	84	36	20	54
7	48	72	41	18	25
8	45·6	76	40	23	36
9	36	60	37	12	15·66
10	24	37	16	9	26
11	23	36	16	12	26

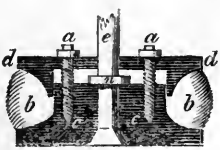
377. The two great links of the parallel motion are each composed of a strap or loop of iron, bent so as to form a double link, in the upper bend of which are two sockets for the pivots at the end of the beam, and at the lower end are two others, for the pivots which project on each side of the piston-rod socket. The brasses of this joint are held in by wedges, put through the two links at the lower end, which, on being driven inwards, tighten the fittings at pleasure.

378. The proper length of the stroke for different engines is not at all settled; Mr. Watt's first engines were made much longer than this table, but of late years they have been made shorter, and without any adequate reason which we can perceive; for it must be an advantage to a machine to make as few reciprocations as is consistent with a practicable length of cylinders. These differences in the length of stroke do not affect the calculation of powers, because, if the length of the stroke is altered, the number per minute is also changed, and the velocity of the piston is the same; at least it will be always nearly the same as the table for those engines that work a crank and fly-wheel. But it must be observed that these engines move with a greater celerity than the engines for pumping water, because it is necessary to accumulate a considerable velocity in the fly-wheel, or it must be immensely heavy if the piston was to move so slowly as the pumping-engine generally does.

379. The *cylinder* and *piston* being those parts of the engine in which the effective force is more immediately produced, may now claim attention:—

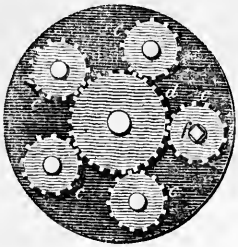
380. The piston of the atmospheric engine is generally made of cast iron nearly fitting the inside of the cylinder, a circular ledge or rim being formed round it to receive the packing, without which the steam would find a passage through the interstices in the cylinder. Mr. Smeaton, who greatly improved the atmospheric engine, coated the under side of the piston with elm or beech planks about two inches and a quarter thick; the wooden bottom being screwed to the iron with a double thickness of flannel and tar, to exclude the air between the iron and the wood. By the adoption of this improvement its property of conducting heat was diminished, and the wood, having been previously jointed with the grain radiating in all directions from the centre, was not liable to expand very materially by the heated steam. This piston was kept air-tight by a small stream of water continually falling on its upper surface; but in Mr. Watt's engine he was compelled to effect this by improving the fitting of the piston, the old mode being inadmissible.

381. It is now cast with a projecting rim at bottom, which is fitted as accurately to the cylinder as it can be, to leave it at full liberty to rise and fall through the whole length. The part of the piston above the rim is a little less all round than the cylinder, to leave a circular groove for the hemp which forms the packing. To keep this in its place, a lid or cover is put over the top of the piston, with a ring or projecting part which enters into the circular groove for the packing *b b*, and pressing upon it the plate is forced down by screws *a*, *a*, which work into the body of the piston at *c c*. By this means the packing is made to fill the diameter of the cylinder with tolerable accuracy, and to prevent for a time any steam passing between the piston and the cylinder. The connexion with the piston-rod is seen at *n e*. When, however, by continued working the piston became too easy, and so occasioned a waste of steam, it was found



necessary to take off the top of the cylinder to get at the screws, even when fresh hemp or packing was not wanted, and this operation being attended with considerable labor was seldom resorted to by the engine-man till a great waste of steam had taken place. By an improvement on this piston, introduced by Mr. Woolf, this is now effected without taking off the cylinder-cover, except, indeed, when new packing is required.

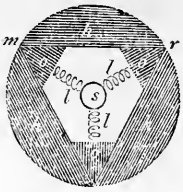
382. To accomplish this, Mr. Woolf fastens on the head of each of the screws a small cog-wheel or nut, *c, c, c, c, c*, and these are all connected together by means of a central wheel *d*, working loose upon the piston-rod in such a manner, that if any one of the screws be turned, a similar motion is given to the remainder, a cap being provided in the upper end of the cylinder screwed down by bolts to make it steam-tight. In a piston thus constructed, there is little difficulty in drawing down the packing, by applying a key to the square head of the projecting screw employed to communicate with the rest. Another method contrived by Mr. Woolf for the smaller pistons differs but little from the preceding in construction. Instead of having several screws, all worked down by one motion, there is in this but one screw, and that one cut upon the piston-rod itself; on this is placed a wheel, the centre of which is furnished with a female screw, which is forced down by means of a pinion furnished with a square projecting head turned in a similar manner to the preceding.



383. For high-pressure engines, however, the metallic piston invented by Mr. Cartwright has the most decided preference. This not only saves the trouble and expense of packing, which must be frequently renewed in all other engines, but also a great deal of steam, on account of the more accurate manner in which it is made to fit the cylinder. This is effected in the following manner:—Two metal rings are accurately ground into the cylinder, so that no steam can pass between their exterior surface and the inside of the cylinder, their upper and under sides are also ground perfectly flat, and applied one upon the other. On the upper ring is placed a plate of metal, rather smaller in diameter than the cylinder, while a similar flat plate is placed below the under ring, both of which, with the rings between, are attached firmly to each other by means of the piston-rod passing through them.

384. A shell being thus formed, the rings are each of them cut into three pieces, and in cutting them such a portion of the metal is taken away as to leave room to introduce between two of the pieces, a spring in form of the letter V, the open end of which is placed outwards, almost close to the circumference; by which means the two pieces, against which the two sides of the spring act, are pressed in the direction of the circumference, against the ends of the third piece, so that the three pieces are thus kept so uniformly in contact with the cylinder, that the longer the machine is worked the better the rings must fit. To prevent steam passing through the cuts in the lower rings, the solid parts in those upon the upper side are made to fall upon the divisions and springs of the under ones, thus interrupting the communication that would otherwise remain open, and forming a perfect break-joint.

385. A diagram of an improved piston is annexed: and it will be seen that the flexible springs *l, l, l*, rest on the rod S, and operate on the wedges *o, o, o*, and as such must expand the remaining portions *h, h, h*, so as to ensure the accurate fitting of the piston *r m*. The interior surface of the cylinder in which the piston works requires to be bored with the greatest exactness, though this was but little attended to in the early atmospheric engines, some of them being composed of timber hooped together in the same manner as barrels are constructed. Mr. Watt, in his first attempts at improving the steam engine, employed this material in the construction of his cylinders, though he afterwards abandoned it for those of bored metal; the operation of boring being performed with the greatest precision, by an apparatus invented by Mr. Wilkinson.



386. Mr. Murray has also effected considerable improvements in this part of the engine, and the boring machines employed in his manufactory are of considerable value. They are worked by a separate steam engine, which is never stopped during the operation, as in that case a shoulder or ring would be formed, running completely round the cylinder.

387. In small engines, it is common to place the cylinder within the boiler, in which case no artificial mode of retaining the heat is required; but to this arrangement in those of larger dimensions there are several objections, not the least of which is the frequent repairs that are necessary in the boiler; and a similar effect has been produced by the use of a double cylinder. This was first adopted by Messrs. Boulton and Watt, the outer cylinder or steam-jacket keeping the inner cylinder at the temperature of boiling water, by the action of a partition of steam made to pass between the jacket and the working cylinder, as we have already stated.

388. Before the boiler of a high-pressure engine is set to work, it should be proved effectually, first, by drilling small holes through it at different places, to actually measure the thickness of the metal, and ascertain that it is equal throughout, and then it should be proved by injecting water into it, until the pressure lifts the safety-valve, when loaded considerably more than is intended to be when the engine is set to work, but this proof should not be too severe, because the metal may be weakened, although it is not burst, by the proof; and in consequence may afterwards burst with a much less pressure of steam. At

the same time the engineer, who undertakes to make these engines, should fully inform himself of the real strength of metal boilers of determinate thicknesses, which could be easily done without danger by injecting water into the boilers until they actually burst. We do not know that such experiments have ever been made; and, in those boilers which have been burst by the explosion of steam, the pressure at the moment of the accident has not been known.

389. Mr. Bramah has made several steam engines, in which he employed a four-passaged cock, on a construction somewhat different from the one usually resorted to; the steam from the boiler is made to enter into a hollow at the large end of the cone of the cock, and to pass away to the condenser by a passage at the small end of the cone of the cock, which by this means is always pressed into its seat by the force of the steam acting upon a surface equal to the small end of the cock, from which the pressure is relieved. This keeps the cock always tight; and, to prevent the moveable part from being fixed fast by the pressure, the cone is made much more obtuse than usual.

390. In joining the *flanches* of iron cylinders, and other parts of hydraulic and steam engines, a strong and durable cement is required. The following are receipts for cements proper for such purposes:—Mix boiled linseed oil, litharge, red and white lead together, to a proper consistence; this cement is to be applied on each side of a piece of flannel, previously shaped to fit the joint. The quantities of the ingredients may be varied without inconvenience, only taking care not to make the mass too thin with the oil. It is difficult, in some cases, to make a good fitting of large pieces of iron-work at once, and this renders it necessary sometimes to join and separate the pieces repeatedly before a proper adjustment is obtained. When this is expected, the white lead ought to predominate in the mixture, as it dries much slower than the red. A workman, knowing this fact, can exercise his own discretion in regulating the quantities; but it is safest to have too much rather than too little white lead, as the durability of the cement is no way injured thereby, only a longer time is required for it to dry and harden. When the fitting will not admit of so thick a substance as flannel being interposed, linen may be substituted, or even paper, or thin pasteboard, the only reason for employing any thing of the kind being the convenience of handling. This cement answers well also for joining broken stones, however large. Cisterns built of square stones put together with this cement will never leak or want any repairs; in this case the stones need not be entirely bedded in it; for an inch or even less of the edges that are to lie next the water need only be so treated, and the rest of the joints may be filled with good lime.

391. Another cement, which is preferable to the former for withstanding the action of the steam, is compounded as follows:—Take two ounces of sal ammoniac, one ounce of flour of sulphur, and sixteen ounces of cast iron filings or borings; mix all well together by rubbing them in a mortar, and keep the powder dry. When the cement is wanted for use, take one part of the above powder, and twenty parts of clean iron borings or filings, and blend them intimately by grinding them in a mortar; wet the compound with water, and, when brought to a convenient consistence, apply it to the joints with a wooden or blunt iron spatula. By considering the affinities of these ingredients, those who are at all acquainted with chemistry, will be at no loss to comprehend that a degree of action and re-action takes place among the ingredients, and between them and the iron surfaces, which at last causes the whole to unite as one mass; in fact, after a time, the mixture and the surfaces of flanches become a species of pyrites, holding a very large portion of iron, all the parts of which strongly cohere together.

392. Another cement of the same kind is made by mixing together two parts of flour of sulphur and one part of sal ammoniac, and making them into a stiff paste with a little water. When the cement is wanted for use, dissolve a portion of the above paste in urine, or in water rendered slightly acidulous; and to this solution add a quantity of turnings or borings sifted, to get rid of the grosser particles. This mixture spread upon or between the flanches of iron pipes, or put into the interstices of other parts of iron work, will in a little time become as hard as stone.

393. Mr. Malam has proposed some important improvements in the construction of rotatory steam engines. Tho first of these consists in the use of a hollow cylinder or drum, in which the pressure of steam is contrived to drive a leaden piston (as the patentee terms it) round the cylinder; but which piston, by its gravity, always remaining near the lowest part, the steam is impelled upwards against the partition of the cylinder, and consequently forces it round upon its axis.

394. Two standards support the arms or axles of the revolving cylinder or drum, one of which arms is hollow, having two passages, the one communicating through the leg of the standard to the steam boiler, the other through the other leg to the condenser.

395. There are three valves in the hollow cylinder or drum, for the purpose of shutting off the steam and forming three distinct compartments; there are also three hollow arms, each leading from the hollow axle into one of these compartments. There is a heavy block of lead formed exactly to fit the curvature of the drum or hollow cylinder, which block or piston slides completely round the cylinder, the valves falling back into recesses as it passes by them. This block is so well fitted as to prevent the passage of steam between it and the cylinder.

396. The steam admitted through the hollow axle and through the hollow arm which leads to the lower compartment, where the block or piston lies, not being able to drive the block far from its place forces against the valve, which divides the chambers, and lifts that side of the revolving cylinder, carrying it round until the next valve has passed the block or piston, by which time the arm that supplied the steam has passed on so as to open a communication with the con

denser or vacuum channel, by which the steam of the chamber becomes condensed. At the same time, the second valve having closed the communication with the next chamber, the steam through the hollow arm pours into that chamber, and exerts its expansive force against the block as before, and pressing upward against the valve raises the revolving cylinder. By these means the cylinder is kept in action, which action, by means of the extended axle of the cylinder, may be communicated as a first mover to other machinery.

397. The second description of engine has three cylinders or drums, one within the other; the outer drum is called a jacket or case, which is fixed. Between this and the second drum is a passage or flue which passes round the second drum in order to keep it heated, this second drum is also fixed. The third or inner drum only revolves upon its axles, poles, or arms, which pass through metallic stuffings. One of these axles is hollow for the passage of steam, and the other is intended to communicate the motion as a first mover of machinery. The steam enters the chamber from a boiler, and thence passes by curved channels into compartments formed by oblique partitions in the revolving cylinder or drum, and passes out through small apertures in the periphery of the revolving cylinder into the passage between that and the second drum, which is the condensing passage.

398. The lower part of the revolving drum, and also of the condensing passage, are charged with a quantity of mercury, or of water, or of fusible metal, such as lead or bismuth, &c., which is kept in a fluid state by the heat communicated to the inner cylinder through the flue which surrounds the second drum enclosed within the jackets. The steam passing through the entrance pipe, as before expressed, in one of the axles, occupies the central circular chamber, and thence flows into one of the compartments above described, formed by curved partitions, where the steam, acting against the fluid metal in the lower part, raises that side of the drum, causing it to revolve upon its axis; this brings the entrance to a second chamber from out of the fluid metal in which it was immersed (and which acted as a valve to the passage), when the steam, acting upon the fluid metal in this chamber, raises that side of the drum still more, that is, continues the revolution. By this time the exit passage of the chamber first mentioned is raised above the level of the fluid metal in the condensing or vacuum passage (which passage communicates with a condenser), by which the steam in the chamber is condensed; by this time a third chamber begins to fill with steam, the expansion of which, acting against the partitions upwards and the fluid metal below, raises the revolving cylinder still more, while the exit passage of the second mentioned chamber, rising above the level of the fluid metal, liberates and condenses the steam which it contained; the first mentioned chamber, having descended as the drum revolved, becomes immersed in and filled with the fluid metal which flowed in as soon as the vacuum was produced. Thus the continued revolution of the inner cylinder or drum is effected, and the rotatory motion of the steam engine communicated by the extended arm or axle to the machinery for which it is designed to be a first mover. The advantages obtained by these arrangements, the patentee informs us, are in the absence of a fly wheel, by which much room and expense are saved, and also that of a heavy beam; and as the steam is always acting uniformly in this engine, which is not the case in a beam engine, where both steam and time are lost during the change of stroke, he conceives that the most economical and powerful appropriation of steam to the working of machinery may, by these improved engines, be effected.

399. Mr. Hague's patent steam engine must now be examined. The apparatus, which is called a rotatory engine, in appearance, very much resembles a chain pump, particularly that construction described in the specification of G. Tyer's patent, July, 1818; the parts are as follows: there is an endless chain, carrying buckets or pistons, which is distended over two cog-wheels, having recesses in their periphery for the buckets or pistons to fall into, and the cogs of the wheels take into the links of the chains for the purpose of carrying it round.

400. The cases of the apparatus consist of two boxes, placed one above, the other below, connected together by two pipes or cylinders standing vertically. One of the above-mentioned cog-wheels is placed in the upper box, the other in the lower, and the endless chain and buckets or pistons pass down the pipes or cylinders and over the wheels. The lower box is to be filled with a quantity of mercury, or other non-elastic fluid, up to the eduction or condensing pipe, which is at the bottom of the working cylinder, viz. one of the vertical cylinders or pipes before-mentioned.

401. The action of the engine will be seen by the following description: let steam of the low pressure be admitted at the upper part of the working cylinder from a boiler in the ordinary way, and it will entirely fill this case of the machinery, excepting that part of the working cylinder which is between the bucket or piston at that time in the upper part of the cylinder and the mercury below. The steam, by its expansive force, will then drive the bucket down the cylinder until it reaches the eduction or condensing pipe; before which time another bucket has entered the top of the working cylinder above. The columns of steam between the buckets then become condensed by the opening of the eduction passage; and a partial vacuum is produced, while the steam above presses down the second bucket or piston until a third has entered the working cylinder, and the steam, occupying the space between the second and third, becomes condensed as before, and so on; the buckets sinking through the mercury and up the other pipe, by which a continued rotatory action is obtained and communicated from the axle of the cog-wheel, and regulated by a fly-wheel. When this engine is worked by high pressure, the steam must be admitted at the lower part of the working cylinder, and the machinery will act the reverse way or upward. The steam's expansive force, assisted by the mercury below raises the

pistons or buckets, and is then condensed or discharged into the atmosphere at the top of the working cylinder.

402. Sir John Paul has a patent for a mode of generating steam. This invention is a mode of generating steam of high pressure, by passing water through a long contorted pipe enclosed within a furnace; by which contrivance a greatly extended surface is exposed to the action of heat, and steam of very high pressure produced with great rapidity. It is proposed to place a long metal pipe of small diameter round the furnace, and to force or inject water into one end of it, by means of a pump: which water is to be allowed to escape at the other end of the pipe, in the form of high pressure steam. The requisite length, capacity, and strength of the pipe, of which the boiler is to be formed, will depend upon the engine it is intended to work. For an engine of two-horse power the pipe should be 150 feet long, having its internal diameter at least three-sixteenths of an inch, and, if of copper, about one-sixteenth of an inch thick. This pipe is to be heated throughout its whole length nearly to redness, when the water injected at one end will escape at the other end in the state of steam, equal in pressure to about 150 lbs. upon the inch.

403. In constructing a boiler upon this principle, it is proposed to make a conical vessel of sheet iron, as an external casing, the broad end of the frustum downwards; round the inside of this vessel, the pipe above described is to be coiled, and supported upon flanges. A portion of the pipe, at the lower part of the vessel, is to be bent, so as to form the grate bars, upon which the fuel for heating the boiler is to be deposited, and the fuel may be introduced from the chimney at top, or otherwise, as may be found most convenient. A reservoir of water must be placed contiguous, and a forcing pump for injecting it into the pipe; and it is proposed to coat or cover the outer case with brick dust or coal ashes in order to prevent the radiation of heat.

404. The fuel being ignited, as in ordinary furnaces, the forcing pump is put in operation, which injects the water at the lower extremity of the pipe, so that as it rises through the conical worm, or contorted pipe, the water may become more and more heated, until it expands into steam, and this steam as it passes through the upper part of the coil, continuing to receive additional heat, ultimately escapes at the end of the pipe with great elastic force, in which state it proceeds to the engine.

405. For constructing the boiler of a steam carriage, where a chimney cannot be conveniently employed, another disposition of the worm pipe is proposed. In this boiler, the pipe is to be coiled in the form of two frustums of cones, of different dimensions, placed concentric; the larger or outer cone having its wider part at top, and the smaller, or inner one, its wider part at bottom. The continuous coil of pipe, thus formed into two cones, is to be fixed firmly upon suitable supports within the casing, which must be double, and the space between filled with coal ashes, or brick dust, or any other imperfect conductor of heat, as in the former instance. The fire is made at the lower part in contact with the pipes, and the bottom of the casing is to be formed into a funnel shape, for the purpose of receiving the cinders and dust which fall from the fire, and conducting them to an ash pit below. In this funnel an aperture is made, and a pipe inserted, which conducts a gentle current of air to the furnace, in order to keep up the fire, and consume the smoke; the current of air may be produced by bellows or by a wind hole, as may be found most desirable: and the fuel may be supplied from an air-tight box above, or by any other suitable means. The injecting pump is to be applied to one end of the pipe as before described, and the high pressure steam allowed to escape at the other end, for the purpose of working the engine. The carbonic acid, or other vapor, which is not destroyed by passing through the fire, is allowed to descend through the passage to the ash pit and to escape into the open air.

406. The specification concludes by saying that, for supplying engines of greater power than those above contemplated, more than one pipe boiler may be employed, and these may be heated either in the same way as above described, or in separate furnaces; they may be heated either by immediate contact with the ignited fuel, by the radiant heat from it, by the flame emitted, by the burning of gas, by heated air, or by any other fit and convenient means. The size, shape, or construction of the furnace, may also be varied considerably, according to circumstances, as may likewise be the arrangement of the coils of pipe, provided that the boiler consists of one entire or continuous pipe, or several pipes united together, so as to form one continuous passage from the end where the water is injected to that where the high pressure steam rushes out. The pipes may be made of any other suitable material besides copper, but their substance must be varied accordingly. The exterior surface of the pipe may be coated with a layer of fire clay, or any other fit material, to guard the pipe against the effects of the fire, and to prevent oxidation.

407. An apparatus for changing the water has been suggested by Messrs. Maudslay and Field, which is particularly adapted for the boilers of steam vessels, where salt water is used for the production of steam, as in the ordinary mode, the deposition of salt and other earthy matters, on the bottom and sides of the boilers, render them extremely liable to injury from the action of the fire. The second part of the invention is a mode of arresting the heat contained in the boiling water withdrawn from the boiler, and of conveying it into the water about to be introduced.

408. When sea water is employed in the boilers of steam engines, the evaporation quickly produces a supersaturation of salt in the remaining water, and this, rapidly increasing, causes a concentration of the salt, and a deposition of earthy matters on the internal surface of the boiler, which renders it necessary to change the water almost every fifty or sixty hours. It appears from the experiments of the patentees, that 'from twenty to thirty per cent. of the quantity evaporated taken out will keep the water within

a degree of saltness from which no practical evils can result, however long the boiling be continued.' The proposition, therefore, is to effect a continued changing and refreshing of the water in the boiler, by constantly drawing out a quantity of the supersaturated water or brine, and introducing other water to supply the place of that so withdrawn, as well as that which had been evaporated, by which means the water in the boiler can never exceed a certain degree of saturation, proportionate to the quantity so withdrawn.

409. The method proposed to effect this object is by the employment of meters, of any kind, that will regulate and adjust the quantity withdrawn to the quantity evaporated or driven off in the form of steam. No drawings are exhibited in the specification, it being considered that a general description of the method and kind of apparatus to be employed will be sufficient to enable any person to construct the necessary machinery. The meter recommended to be used is 'a small pump with a loaded discharge valve, worked by the engine, and so proportioned as to draw from the lowest part of the boiler the quantity determined upon.'

410. 'If, for instance, twenty-five per cent., or one quarter of the total evaporation, be the quantity withdrawn, it will be equal to one-fifth the quantity of common salt water driven into the boiler to keep up the supply. Thus, as sea water contains about 0·32 parts of salt, the water of the boiler will slowly but ultimately attain a degree of saltness equal to 5·32 or 4·32 parts more than sea water. After this every stroke of the engine will take as much salt out of the boiler by the pump as is left in the boiler by the steam used in the cylinder for that stroke.'

411. 'The engine working quick or slow, the quantity withdrawn bears the same proportion to the quantity left in; and, however long the engine may be worked, the water can never be more salt; thus avoiding the evils and inconveniences to which steam vessels have been hitherto subject on long voyages, in being obliged to stop to empty and refill the boilers every fifty or sixty hours, or incur the risk of severe injury to the boilers, from the deposition of salt within them, and a very great sacrifice of fuel the latter part of the fifty or sixty hours, when the water, from the quantity of salt it contains, is very unfit for raising steam.'

412. The second part of the invention is the means to be employed for arresting the heat contained in the rejected water, and returning that heat into the boilers. This is to be effected by running the hot brine into a vessel, and passing the supply water through a system of pipes or tubes of extended surfaces, immersed in the vessel containing the hot brine, and surrounded by it, in the same way as refrigerators are made to act upon worts. By these means the heat contained in the water or brine, expelled from the boiler, will be principally absorbed by the supply water, as it proceeds into the boiler, thus compensating in a great degree for the loss of heat which would otherwise be sustained, by removing a portion of the hot water, and introducing other which is cold.

413. Mr. Taylor's improvements have for their object the prevention of unequal friction in the working of pistons that move in steam cylinders, either in horizontal or inclined positions. This object is proposed to be effected by passing the piston-rod through both ends of the cylinder, and by keeping the rod in a state of tension, by means of weights acting at each end of the rod.

414. In order to render this more evident, let it be supposed that the working cylinder of a steam engine is fixed in a horizontal position upon brick work, and that the rod of the piston is extended in a straight line, and passed through both ends of the cylinder, the apertures being properly packed, and the rods running upon anti-friction rollers in frames, for the purpose of keeping its action parallel; and that at the extremities of the piston-rod, bridles or sweep rods are attached, which are connected to double or right angled levers, these levers being for the purpose of giving the up and down motion to pump rods below the base of the engine.

415. It will now be perceived that in an engine so constructed, if the piston be made to reciprocate in the cylinder by the alternate expansion and exhaustion of the steam, that the long rod will move to and from, and work both the right angle double levers, raising the pump-rod at one end and depressing it at the other, and vice versâ. It will also be seen that under these circumstances the piston-rod will be supported in all parts of its movement, and prevented from rubbing unequally; and this will be further aided, and the rod prevented from binding, by the tension produced by the weight of the levers and pump rods at the extremities.

416. In this way several cylinders may be connected together, and their powers made to act simultaneously upon one point, their rods being in the manner above described connected by bridles or sweep rods to the right angle levers below. This contrivance is applicable to engines that are worked either by expansive steam alone, or by exhaustion, or by the principles of expansion and exhaustion combined. The force of the engine, or combined engines, constructed as above, may be directed to one end of the piston-rod, by placing a weight upon one of the levers, 'equal to half the power of the engine and weight of the pump rod; this weight will be raised by half the power of the engine in one direction, and its gravity, added to the power of the engine in the other direction, will concentrate the total power on the rod.'

417. The patentee states his claim for novelty of invention to consist in 'the mode above described, of preventing the unequal friction of pistons working in cylinders either in a horizontal or inclined position, by passing the piston-rods through both ends of the cylinders, and by keeping such rods in a state of tension by means of weights or loads acting on each end of such piston-rod; and the modes, above described, of combining engines with cylinders placed in a horizontal or inclined position, so that they will work simultaneously, by which means the power of several such engines may be concentrated upon one point.'

418. Sir William Congreve obtained two patents for improvements in the rotatory engine

The first of these consisted principally in the employment of bucket wheels, or endless chains with inverted buckets, against which the expansive force of the steam exerted itself, in an upward direction; and, by raising the buckets, in a manner exactly the reverse of their descent in a water-wheel, the motive force was given to the engine and other machinery.

419. The second specification states, 'I work all the various constructions of rotary steam engines, as well as those on the reciprocating principle embraced in my patent of 19th October, 1818, in a medium of fluid (or melted) metal, or alloy, in lieu of water.' By this substitution of fluid metal instead of water, an additional power is said to be obtained in engines of any given dimension, and that in proportion to the increased density of the medium so employed; hence the magnitude of an engine of any required power will be reduced, which will render it more compact, and less expensive in constructing.

420. It is further proposed to increase the power of any engine of given dimensions, by causing the temperature of the surrounding medium, of melted metal or alloy, to be kept at a higher temperature than that of boiling water; 'by which means the energy of the steam may be made equal to that of a high pressure engine, though the surface of the medium be open to the air: while, on the other hand, by working with the medium in a close vessel, and applying a condenser to exhaust the steam as it rises to the surface of the medium, a still further expansion of the steam, and consequent increase of power, may be obtained with a given temperature and given means, by thus removing the incumbent pressure of the atmosphere.'

421. 'The importance of these new principles will at once be understood by those who are versed in these matters, as they will perceive (taking one instance only, by way of example) that, by working the simple rotatory engine of my invention, formed by the immersion of a common hydraulic wheel (as described in the first case in the specification of my above-mentioned patent) in a medium, the specific gravity of which to water shall be as ten to one, a small wheel of two feet in diameter in such a medium will be impelled by steam of the same pressure as a wheel of twenty feet in diameter working in boiling water: and, consequently, that whereas, to obtain the same pressure as that of the steam of a common condensing engine, from steam working on this principle, in a medium of boiling water, would require a machine of very large dimensions, this same effect may be produced in a heavier medium by a machine of very moderate dimensions indeed.'

422. By working the steam in a medium of high temperature, the size of the boiler may be reduced, and a considerable saving of fuel effected; for the volume of steam from a small boiler will be very rapidly increased by these means to the extent of three or four-fold, without the medium being raised to any very high temperature; and a still more rapid evolution of steam would take place by raising the temperature of the metallic medium to such a height as it is readily susceptible of; nor would there be found any difficulty in keeping the temperature of the fluid metal so raised to perform its operations.

423. 'Indeed, by carrying these principles to a greater extent, the necessity of a boiler may altogether be obviated; and the steam produced at once, by the injection of small quantities of boiling water, from time to time, into a small inverted receiver, in the heated medium; whence it would be carried to the proper part of the revolving wheel, or bucket, or other receiver in which it is to act, according to the particular construction of the engine: and in which inverted receiver the steam, from the rapidity of its generation, must be created at a much less expense of fuel than in any of the ordinary processes of the boiler; wherein, as the generation is comparatively so much slower, there is consequently so much more time even for the loss of heat by radiation. In fact, whether this heated medium operates by increasing the volume of steam ready formed in a separate boiler, or in the immediate generation of it without a separate boiler, the increased volume in one case, and the entire generation in the other, are effected in the very same moment that the steam produced is brought into action; and consequently without allowing any interval of time for the loss of heat.'

424. 'In the present state of this novel and rapid mode of producing and applying the force of steam, it is indeed impossible to say to what extent of power the effect may be carried, in proportion to the fuel consumed. It is evident, however, that so far from any possible condensation taking place in the steam, from the time of its generation to that of its action, the tendency of this mode of applying it is that of a continued accession of temperature.'

425. It is further stated that these modes of generating steam, or of increasing its volume when generated in a common boiler, is applicable to every description of steam engine. In the first case, the substitute of the boiler should be a moderately sized strong vessel, partly filled with the melted metal, into which small quantities of boiling water are to be injected at certain intervals of time; and, in the last case, the steam is merely passed through such a vessel, surrounded by the melted metal, in its way from the boiler to the engine.

426. In order to regulate the temperature of the fluid metal employed, the iron vessel in which it is heated should be surrounded by another iron vessel or jacket, filled, (when a very high temperature is desired), with oil or other such substance; by which arrangement the maximum temperature of the metallic medium will be limited to the boiling point of the surrounding fluid; and, in this case, an alloy of tin and lead, in equal parts, is proposed as a convenient medium for the above purposes; as it is not expensive, and becomes fluid at about 300° of Fahrenheit. When only a low temperature may be required, the medium should be formed by that alloy of lead and bismuth commonly called fusible metal, which becomes fluid at about 200° of Fahrenheit, the vessel in which it is contained

being immersed in boiling water. 'All the provisions of this patent apply also to the hydraulic wheel engines, whether the steam be made to enter into the buckets at their circumference, or through the hollow axis, and whether these buckets be open or closed ones.'

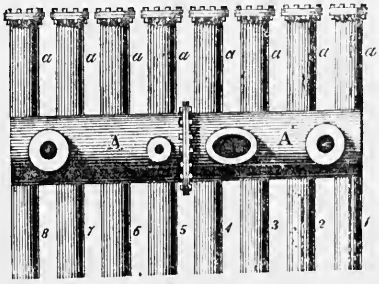
427. In Messrs. Boulton and Watt's bell-crank engine, the cylinder is supported by brackets proceeding from a cast-iron condensing cistern, and is placed over one end of it. The beam, which is formed like a right-angled triangle, has its centre of motion at the right angle, and the axis of it is supported by bearings screwed to the cistern; and, at the opposite end to that upon which the cylinder is placed, the horizontal arm of the triangle forms the working arm of the beam, to the extremity of which the power of the cylinder is applied. The connecting rod is jointed at the upper end of the perpendicular arm, and extends to the crank, which is supported in bearings screwed to the cistern at the same end at which the cylinder is placed, the centre of motion being at the same level with the top of the cistern; and, beneath the cylinder, the hypothenuse of the triangle of the beam forms a brace to strengthen it. Two of these beams are used, and are applied on opposite sides of the cistern, upon the same axis of motion, and are united together by cross rods, thus forming two connecting rods and cranks upon one axis of motion, the fly-wheel being placed at one extremity of the axis. To connect the piston-rod with the ends of the arms of the beam, or the base of the triangle, a rod is fixed across the top of the piston-rod; and, to the two ends of this, two other rods are linked, which descend to the beam, and are pointed to it at the ends. By this means the ascent and descent of the piston-rod produce a corresponding action of the beam upon its centre of motion; the upper end of the perpendicular arm moving backwards and forwards, thus by means of the connecting rods turning the cranks. The rods which descend from the bar, which is fixed across the top of the piston-rod to the ends of the beams, are so constructed as to preclude the necessity of employing the parallel motion. This engine is very compact; it requires no fixing, and the air-pump, which is placed in the middle of the cistern, is worked by two rods jointed to the horizontal arms of the beams.

428. Mr. Woolf's double cylinder-engine nearly resembles that by Mr. Hornblower, but in another apparatus, by the same ingenious individual, he proposes to apply fire to the cylinder itself, to heat the steam after it is thrown into the working cylinder; and this was to be done by a fire being placed beneath the case containing the cylinder: the space between the case and the cylinder was to be filled with oil, wax, fusible metal, or mercury. He also proposes a method of preventing the passage of any of the steam from that side of the piston which is acted upon by the steam, to the other side, which is open to the condenser. In those steam engines which act as double engines, he effects this by employing upon, or about the piston, a column of mercury, of an altitude equal to the pressure of the steam. The efficacy of this arrangement will, he says, appear obvious, from attending to what takes place in the working of such a piston. When the piston is ascending, that is, when the steam is admitted below it, the space on its upper side being open to the condenser, the steam, endeavouring to pass up by the side of the piston, is met, and effectually prevented by the column of metal, equal or superior to it in pressure; and during the down stroke no steam can possibly pass without first forcing all the metal through.

429. In working what is called a single engine, a less considerable altitude of metal is required, because the steam always acts on the upper side of the piston; and, in this case, oil or wax will answer the purpose. But care must be taken, either in the double or single engine, when working with this piston, that the outlet which conveys the steam to the condenser shall be so situated, and of such a size, that the steam may pass freely, without forcing before it, or carrying with it, any of the metal or other substance employed, that may have passed by the piston: and at the same time providing another exit for the metal, or other substance collected at the bottom of the cylinder, to convey the same into a reservoir kept at a proper heat, whence it is to be returned to the upper side of the piston by a small pump, worked by the engine, or by some other contrivance. In order that the fluid metal used with the piston may not be oxydated, some oil or other fluid substance is always to be kept on its surface, to prevent its coming in contact with the steam: and to prevent the necessity of employing a large quantity of fluid metal, although the piston must be as thick as the depth of the column required, the diameter need be only a little less than the steam-vessel, or working cylinder, so that, in fact, the column of fluid metal forms only a thin body round the piston.

430. Having described the nature of Mr. Woolf's engine, it may now be advisable to examine the boiler by which he proposed to generate steam of sufficient elasticity for the use of the small cylinder, which requires vapor of great expansive force.

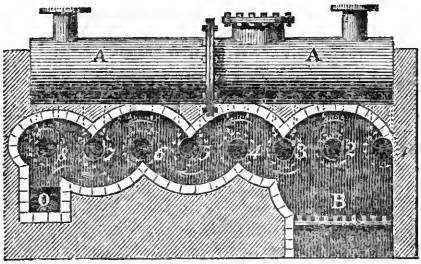
431. The boiler represented by the diagram beneath consists of a series of tubes of cast iron,



a, *a*, *a*, connected by screw bolts with the under side of a larger vessel A, or magazine of the same material. This is furnished with four, and in some cases with five apertures; the first of which is intended for the admission of water to supply the waste which continually arises from evaporation, which is effected by means of a

small forcing-pump, as it will be evident that the column must be carried to a considerable height before its weight can so far overcome the resistance of the steam within the tube to allow of its entering by the ordinary method.

432. The plan of the boiler will better be understood by a section of the tubes represented from 1 to 8. This is furnished in the engraving beneath, and the direction of the smoke proceeding from the grate B to the flue O is shown oy the bent arrows.



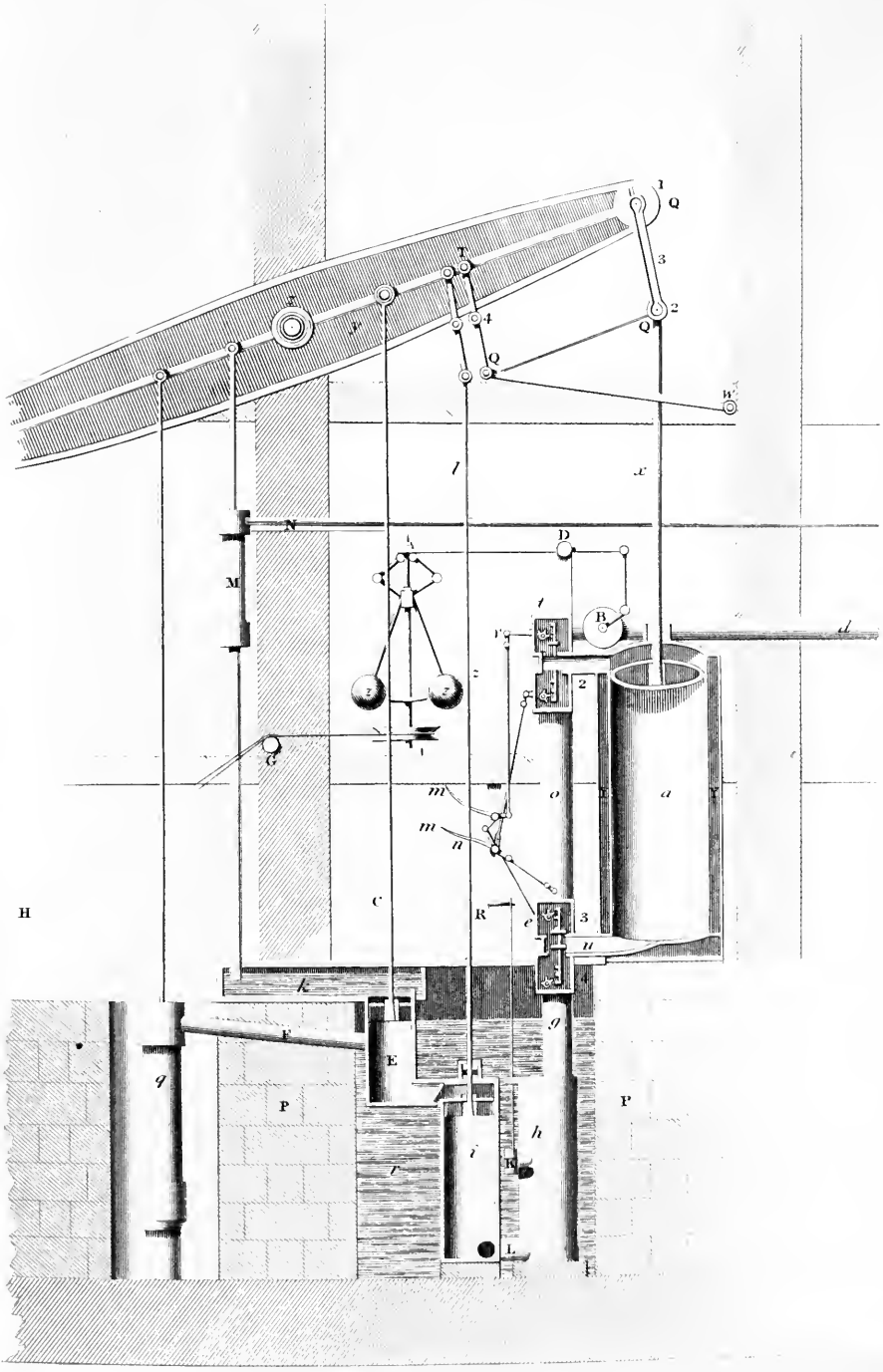
433. Passing from the boiler we arrive at the steam pipes, which should be sufficiently capacious, and as short as possible, to prevent too much exposure of surface to the atmosphere. They should pass from the upper part of the boiler to the steam cylinder, in a direction greatly inclining upwards, so that any condensed water that forms in them may run back to the boiler instead of getting into the cylinder: consequently every boiler should, if possible, be set or fixed lower than its steam cylinder; and, in order the more effectually to prevent condensation, the steam pipes should be coated with hay-bands, or sawdust and sacking, or some bad conductor of heat, particularly if they are long and much exposed to the air.

434. In collieries, where the common steam-engine is applied for drawing water from the mines, it frequently happens that, after a continuance of wet weather, the water accumulates so much as to require the engine to be worked night and day. If the boiler is supplied with water from the mines, it contains in this case a great quantity of earthy matter brought immediately from the surface, which renders the water within the boiler very muddy; and there being little time for cleaning the boiler, owing to the accumulated water in the mines, six or eight weeks elapse before this can be done. Towards the end of this period the water in the boiler is mixed with sediment to such a degree that the ordinary supply of steam cannot be raised, although the fire is increased in the furnace; the consequence of which is that the common working speed of the engine is greatly reduced. In this case it has been the constant practice of the engine-keepers in Scotland to apply a very simple remedy for increasing the quantity of steam. The substance employed is known by the name of comings, being the radicles of barley produced in the process of malting, which are separated before the malt is sent to market. About a bushel of these is thrown into the boiler; and, when the steam is again raised, an immediate effect is visible; for there is not only a plentiful supply of steam to produce the full working speed of the engine, but an excess of it going waste at the safety-valve.

435. Mr. William Deverell has two working cylinders placed near to one another, each having a pipe of communication, with a large vessel, in which the steam, after passing from the small cylinder, is suffered to expand itself before entering the large cylinder. The pistons in the two cylinders work alternately up and down by means of valves or cocks, opening and shutting as in the common engine. Suppose the small piston has just made a stroke, and a passage is opened to the steam vessel at the end of the stroke; at first beginning to work the engine, the vessel will be full of steam of about eighteen pounds pressure, admitted from the boiler, but afterwards will only be supplied by the steam thrown into it from the small cylinder. The vessel should be about twenty times larger in capacity than the smallest working cylinder; and the larger it is the more regular will be the pressure on the great piston, which is worked by the steam coming from the steam vessel. If the steam in the boiler be of fifty-four pounds pressure per square inch, the ratio of the two working cylinders may be as 1 to 3; for then the smaller one will supply the larger with steam of about eighteen pounds pressure; the proportion, however, may be varied, though these are thought best by the patentee. The improvements here are represented to consist in the steam going from the smaller working cylinder to the steam-vessel, and then from the steam-vessel to the larger working cylinder, from which it is afterwards drawn off and condensed. By these means, the engine will be very regular in its operations. Suppose the steam in the boiler is at fifty-four pounds, the small cylinder will, at the end of the stroke, be full of steam of the same or nearly the same force; and the steam-vessel being full of the steam delivered to it by the former stroke of the small cylinder, at about eighteen pounds pressure, the communication is opened between this vessel and the smaller cylinder, and the steam in each of these will be brought to nearly twenty pounds pressure, which steam will be used in the great cylinder at the next stroke. But at the end of each stroke of the pistons, before the opening is made between the smaller cylinder and the steam-vessel, the steam in the smaller cylinder will be, as before stated, at about fifty-four pounds; in the steam-vessel it will be at about eighteen pounds, and in the larger working cylinder at about eighteen pounds also. Hence the medium pressure on the piston of the smaller cylinder will be about thirty-five pounds on the inch, while the medium pressure of the steam on the piston of the great cylinder will be about nineteen pounds on the inch; for it will be about twenty pounds at the beginning and about eighteen pounds at the end of the stroke. If the steam-vessel be made larger, the difference at each end of the stroke will not be so great. If the steam was let out at fifty-four pounds from the smaller cylinder to the open air, there would be but thirty-nine pounds upon each inch of the piston in consequence of the re-action of the atmosphere, equivalent to about fifteen pounds per inch:

STEAM ENGINE.

WATT'S DOUBLE ENGINE.



London, Published by Thomas Tegg, 73 Cheapside.

J. Shury sculp.

thus, by letting the steam pass from the smaller cylinder to the steam-vessel, instead of letting it out to the open air, it loses about four pounds on the inch of the small piston, but it gains about twelve pounds on the inch of a piston three times as large; and, there being but half the steam required in the common way to condense, there must of necessity be a considerable gain. If the friction and loss of force be equal to nine pounds on the inch, on the piston of the smaller cylinder, there will be but about thirty pounds on the inch neat power, when the larger one will work about twelve pounds on the inch. Here, too, if the large cylinder, or piston, or air-pump, or condenser, should be out of order, the small piston may still be worked, by disengaging the large piston from the beam: on the other hand, if the smaller piston be out of order, the large one may still be worked, while the other is disengaged. The steam-vessel is to be made of wood, that it may transmit the heat slowly, and the cylinders may be placed within it if found convenient.

436. Mr. James has taken out a patent for a boiler, which, with some modifications, promises to be of great importance. It is formed by a number of annular tubes, arranged close together sideways, so as to exhibit a cylindrical shape externally; these tubes have apertures communicating into each other at opposite extremities of their diameters, arranged in two lines, one of which is at the bottom, when the boiler is fixed horizontally in its place, and the other line at its upper part. It is stated, at the end of the specification, that the shape of these rings may be elliptical or circular, and that round or other shaped tubes may be used for them, if preferred to those represented in the drawings, which are square, and such as might be produced by annular partitions soldered in between two hollow concentric cylindrical vessels.

437. The fire-place or furnace for this boiler is placed within it, and consists principally of a grate, arched upwards in the middle, supported by a bearing bar at each side, which passes through the boiler, and is sustained by the iron frames which support the doors of the furnace, and are put in front and the termination of the fire-place.

438. This compound boiler is moreover enclosed by a double cylindrical case, so as to leave some space between it and the case, in which the flame or hot vapors from the fire may circulate; while the internal part of this double case, being filled with charcoal dust, confines the heat more effectually. A flue rises from the top of the farther end of the case to convey away the smoke, which, however, is made to descend near the bottom of the boiler before it enters the case, by a partition at the farther extremity of this latter, whose only aperture is at its bottom.

439. A tube enters into the boiler in front, a little above its horizontal diameter, for the conveyance of water, and a pipe passes out from it at top, also in front, through which the steam is to pass to the engine; the water pipe is furnished with a peculiar cock at the level mentioned, which revolves by the motion of the engine, and is intended to prevent the water from rising any higher in the boiler, when it ascends to that line, though it admits its entrance whenever this is lower; but the mode in which the cock is to produce this effect is not fully explained.

440. The boiler being thus prepared is to be filled with water a little above its horizontal diameter, as above mentioned; and, the fire being then kindled, the patentee states that the flame or hot vapor from it will descend between the case and the boiler, and make the water in the latter boil; the steam from which, in passing through the upper parts of the tubes above the fire, will be farther heated, so as to produce an increased effect.

441. To facilitate the cleansing of this boiler from the sediment of the water, it is to be supported in front by four rollers, placed at equal intervals about it, in the iron frame which sustains the case and furnace, and at the back by a pivot in the centre of the partition at its end, which pivot passes through the case, and rests on the frame just mentioned; a winch is to be fixed on this pivot, and a handle at the same time is to be attached to the boiler in front, at a similar distance from its centre, by which two gripes it can be turned round, or made to vibrate backwards and forwards when required. When this operation is to be performed, the patentee directs that the furnace is to be taken out from the boiler, and all impediments to its circular motion to be removed; it is then to be nearly filled with water, and, shot or 'marbles' being previously put into each of its annular tubes, the whole is to be turned or made to vibrate as mentioned, which he states will be sufficient to detach the sediment from the parts to which it may adhere, and cause the whole to run off along with the water when this is discharged.

442. The gas-fire or water-burner is the name given to a new method of producing light and heat, invented by Mr. Morey, by which he conceives that all carbonaceous fluids may be conveniently burnt, and derive great force from their combination with the oxygen and hydrogen or water or steam at the moment of ignition. In the first form of this experiment a tight cylindrical vessel, containing resin, was connected with a small boiler by a pipe, which entered near the bottom and extended nearly its length, having small apertures over which were two inverted gutters, inclining or sloping upwards over each other; the upper one, which was longer than the other, being intended to detain the steam in the resin in its way to the surface. When the resin was heated, carburetted hydrogen gas issued from the outlet or pipe, inserted near the top of the vessel, and, being ignited, afforded a small blaze about as large as that of a candle; but, when the steam was allowed to flow, this blaze instantly shot out many hundred times its former bulk, to the distance of two or three feet. Tar succeeds better than resin, and has therefore been used in the steam-boilers.

443. We have, on several occasions, been obliged to refer to the 'horse-power' as it is called, of various engines, and it will be necessary in a future page to examine this mode of estimating force somewhat more in detail; at present a few facts connected with the single and double acting engine may not be misplaced.

Nominal horse-power		Dimensions of the piston.			Effective pressure or load on the piston.		Velocity of the motion with which the load is raised.				Mechanical effect expressed by the weight which can be raised in a minute to a height of one foot.		Consumption of coals in an hour in pounds weight.		
									Velocity of the piston per minute in feet.				Double engines.		
Double engine.	Single engine.	Diameter in inches.	Area in square inches.	Number of square inches for each horse-power.	Pressure on each square inch in pounds.	Load on the piston in pounds.	Length of the stroke in feet.	Number of strokes per minute.	Double engine.	Single engine.	Cubic feet of water.	Pounds avoirdupois.	By each horse-power.	Total.	Single engines
1	½	6·0	28	28·0	7·	199	1⅔	50	166⅔	83⅓	528	33,000	20·7	20	10
2	1	8·3	54	27·4	7·2	392	2	42	168	84	1,056	66,000	15·6	27	13½
4	2	11·6	106	26·5	7·3	777	2½	34	170	85	2,112	132,000	13·8	55	27½
6	3	13·9	152	25·4	7·0	1,070	3	31	185	92½	3,168	198,000	12·2	73	36½
8	4	15·9	199	24·9	6·9	1,389	3½	27	190	95	4,224	264,000	10·5	84	42
10	5	17·7	245	24·5	7·	1,718	4	24	192	96	5,280	330,000	10·0	100	50
12	6	19·2	288	24·0	7·1	2,062	4	24	192	96	6,336	396,000	9·8	117	58½
14	7	20·6	332	23·7	7·1	2,357	4½	22	196	98	7,392	462,000	9·0	126	63
16	8	21·75	373	23·3	7·1	2,666	4½	22	198	99	8,448	528,000	8·7	140	70
18	9	23·0	412	22·9	7·2	3,000	4½	22	198	99	9,504	594,000	8·5	153	76½
20	10	24·0	452	22·6	7·3	3,300	5	20	200	100	10,560	660,000	8 3	166	83
22	11	25·1	493	22·4	7·35	3,630	5	20	200	100	11,616	726,000	8·0	176	88
24	12	26·1	532	22·2	7·4	3,960	5½	18	200	100	12,672	792,000	7·8	187	93½
26	13	26·9	569	21·9	7·5	4,290	5½	18	200	100	13,728	858,000	7·6	197	98½
28	14	27·8	605	21·6	7·6	4,620	5½	18	200	100	14,784	924,000	7·4	207	103½
30	15	28·7	645	21·5	7·6	4,897	6	17	204	102	15,840	999,000	7·2	216	108
32	16	29·5	682	21·3	7·59	5,176	6	17	204	102	16,896	1,056,000	7·1	227	113½
34	17	30·3	721	21·2	7·49	5,500	6	17	204	102	17,952	1,122,000	7·0	238	119
36	18	31·	756	21·0	7·7	5,823	6	17	204	102	19,008	1,188,000	6·9	249	124½
38	19	31.8	794	20·9	7·6	6,028	6½	16	208	104	20,064	1,254,000	6·8	258	129
40	20	32·6	832	20·8	7·6	6,346	6½	16	208	104	21,120	1,320,000	6·7	268	134
42	21	33·3	869	20·7	7·65	6,663	6½	16	208	104	22,176	1,386,000	6·6	279	139½
44	22	34·	906	20·6	7·7	6,980	6½	16	208	104	23,232	1,452,000	6·5	286	143
46	23	34·7	943	20·5	7·7	7,298	6½	16	208	104	24,288	1,518,000	6·4	294	147
48	24	35·3	979	20·4	7·7	7,543	7	15	210	105	25,344	1,584,000	6·3	302	151
50	25	36·	1020	20·4	7·7	7,857	7	15	210	105	26,400	1,650,000	6·2	310	155
52	26	36·6	1055	20·3	7·75	8,171	7	15	210	105	27,456	1,716,000	6·1	317	158½
54	27	37·3	1091	20·3	7·77	8,485	7	15	210	105	28,512	1,782,000	6·1	329	164½
56	28	38·	1136	20·3	7·79	8,800	7	15	210	105	29,568	1,848,000	6·0	336	168
58	29	38·8	1172	20·2	7·79	9,114	7½	14	210	105	30,624	1,914,000	6·0	348	174
60	30	39·2	1206	20·1	7·8	9,428	7½	14	210	105	31,680	1,980,000	5·9	354	177
62	31	39·8	1246	20·1	7·8	9,742	7½	14	210	105	32,736	2,046,000	5·9	366	183
64	32	40·4	1280	20·0	7·85	10,057	7½	14	210	105	33,792	2,112,000	5·9	378	189
66	33	41·	1320	20·0	7·9	10,371	7½	14	210	105	34,848	2,178,000	5·8	382	191
68	34	41·6	1360	20·0	7·9	10,686	7½	14	210	105	35,904	2,244,000	5·8	394	197
70	35	42·	1386	19·9	8·0	11,106	8	13	208	104	36,960	2,310,000	5·8	406	203
72	36	42·7	1433	19·9	8·0	11,423	8	13	208	104	38,016	2,376,000	5·7	410	205
74	37	43·3	1472	19·9	8·0	11,740	8	13	208	104	39,072	2,442,000	5·7	422	211
76	38	43·7	1505	19·8	8·0	12,058	8	13	208	104	40,128	2,508,000	5·7	433	216½
78	39	44·4	1544	19·8	8·0	12,375	8	13	208	104	41,184	2,574,000	5·6	437	218½
80	40	45·	1590	19·8	8·0	12,692	8	13	208	104	42,240	2,604,000	5·6	448	224
85	42½	46·2	1674	19·7	8·2	13,750	8½	12	204	102	44,880	2,805,000	5·6	476	238
90	45	47·5	1773	19·7	8·2	14,558	8½	12	204	102	47,520	2,970,000	5·6	504	252
95	47½	48·7	1862	19·6	8·2	15,367	8½	12	204	102	50,160	3,135,000	5·5	522	261
100	50	50.	1963	19·6	8·2	16,176	8½	12	204	102	52,800	3,300,000	5·5	555	277½
105	52½	51·	2043	19·5	8·2	16,995	9	11	198	99	55,440	3,365,000	5·5	577	288½
110	55	52·2	2145	19·5	8·5	18,333	9	11	198	99	58,080	3,630,000	5·5	605	302½
115	57½	53·4	2242	19·5	8·5	19,166	9	11	198	99	60,720	3,795,000	5·5	632	316
120	60	54·7	2340	19·5	8·5	20,000	9	11	198	99	63,360	3,960,000	5·5	660	330
126	63	56·	2463	19·5	8·5	21,000	9	11	198	99	66,528	4,158,000	5·5	693	346½
132	66	57·	2552	19·4	8·5	22,000	9	11	198	99	69,696	4,356,000	5·5	726	363
136	68	58·	2642	19·4	8·6	22,666	9	10¾	197	99	71,808	4,488,000	5·5	748	374
140	70	59·	2734	19·4	8·6	23,503	9	10¾	197	99	73,920	4,620,000	5·5	770	385
145	72½	60·	2827	19·4	8·6	24,413	9	10½	196	98	76,560	4,785,000	5·5	797	398½
151	75½	61·	2922	19·3	8·6	25,424	9·6	10½	196	98	79,728	4,983,000	5·5	830	415
156	78	62·	3019	19·3	8·7	26,265	9·6	10¼	196	98	82,368	5,148,000	5·5	858	429
161	80½	63·	3117	19·3	8·7	27,246	9·6	10¼	195	97½	85,008	5,313,000	5·5	885	442½
166	83	64·	3217	19·3	8·7	28,092	9·6	10	195	97½	87,648	5,478,000	5·5	913	456½
172	86	65·	3318	19·2	8·8	29,258	9·6	9¾	194	97	90,816	5,676,000	5·5	946	473
178	89	66·	3421	19·2	8·8	30,435	10·	9¾	193	96½	93,984	5,874,000	5·5	979	489½
189	94½	68·	3632	19·2	8·9	32,484	10·	9½	192	96	99,792	6,237,000	5·5	1039	519½
200	100	70·	3848	19·2	8·9	34,555	10·	9½	191	95½	105,600	6,600,000	5·5	1100	550
212	106	72·	4071	19·2	9·0	36,821	10·	9½	190	95	111,936	6,996,000	5·5	1166	583

444. A table may now be referred to, which shows the force which the connecting-rod of a steam engine has to turn round the crank at different parts of the motion. The parts of the engine are supposed to have the following proportions:—length of the stroke 1; length of the beam, 2; length of the crank 5; length of the connecting-rod 3:—

Decimal portions of the descent of the piston, the whole descent being 1.	Angle between the connecting-rod and crank.	Effective length of the lever, upon which the connecting-rod acts, the whole crank being 1.	Decimal portion, half a revolution of the fly-wheel.
·0	180°	·0	·0
·05	151½	·46	·128
·10	141	·62	·158
·15	131½	·74	·228
·2	123⅛	·830	·271
·25	117¼	·892	·308
·3	110¾	94	·342
·35	104	·976	·377
·4	97½	·986	·41
·45	91¾	1·000	·441
·5	85½	1·000	·473
·55	80	·986	·507
·6	75	·956	·538
·65	69	·92	·572
·7	62½	·88	·607
·75	57¼	·824	·642
·8	49	·746	·68
·85	42	·66	·723
·9	34	·546	·776
·95	23½	·390	·84
1·0	0	·0	1·0

The third column of this table also shows the force which is communicated to the fly-wheel, expressed in decimals, the force of the piston being 1.

445. The above table explains itself by the titles of its different columns; and it is only necessary to remark that the variations of force are not to be considered as an absolute loss of power, because, when the crank has but slight power, or arriving towards the top or bottom of the stroke, the piston descends proportionally slow; and in consequence the steam has more time to flow into the cylinder, and press upon the piston with a greater power; therefore, what the piston loses in force upon the crank, it makes up in some degree by an increase of its force; and, from moving slower, it consumes less steam than when moving with its whole velocity, and acting with full force upon the crank. Hence both the power and the velocity of the piston in the cylinder are to be considered as varying continually; and, if the fly is sufficiently heavy, it will be found that the rotative motion is very nearly regular, while the ascent and descent of the piston are accelerated from nothing at the top of the cylinder, to its greatest velocity at the middle, or near the middle, and from that point it is retarded, till it comes to nothing at the bottom of the motion. The table shows the exact increments and decrements.

446. Mr. Taylor has made considerable improvements in the steam engine. His last patent consists of an arrangement of the piston rods of cylinders of steam engines, when in an horizontal or inclined position, to prevent the pistons from pressing unequally on the cylinders, and a method of combining two or more cylinders so as to direct their joint powers to one operation.

447. The patentee directs, for attaining the first object, that the piston rod shall pass through the piston, and out through the opposite end of the horizontal or inclined cylinder, being provided with fit stuffing boxes at both of its extremities, and that each end of this long piston rod shall be furnished with a vertical wheel, grooved at its rim, and moving between two metal guides, parallel to each other, and to the sides of the cylinder. These guides, being of course one above and the other below the wheels, would prevent the weight of the piston from making it press too much at the lower side of the cylinder, if the rod were perfectly inflexible; but, as this cannot be, the patentee supposes that he will effect his purpose by causing considerable weights to act on each end of the rod in opposite directions, by appending them to the horizontal arms of 'bell cranks,' or bent levers, so as to tend to keep the rods straight by their being in a state of tension. These weights may either consist of pump rods at each extremity when the engine is employed in pumping the water from deep mines, or a pump rod may be at one extremity and the weight at the other, in which latter case the power of the engine exerted in lifting the weight would not be lost, as the weight would react on the piston rod in its descent, and assist the engine in lifting the pump rod and water at its opposite extremity.

448. It is obvious that these engines may be employed in producing rotary movements for mill work, as well as those of a reciprocating nature mentioned; but with the rotary movement the tension of the piston rod would not be effected, without weights being appended for this purpose to the bent levers at each of its extremities.

449. The action of two cylinders managed in this manner may be combined by placing them parallel to each other, and uniting their piston rods at each end to strong cross pieces, from the middle of which rods are to proceed to the bent levers, weighted as before. In the specification two cylinders are represented, lying on the same horizontal plane, and having the wheels and guides at each end of the cross pieces, instead of being in the same line with the piston rod; but it is evident they may be placed one over the other also on the same principle, and that any number of them may be combined in this manner by properly disposing the cross pieces and wheels, which latter, however, need not be multiplied as the number of cylinders are increased, as the same number of wheels that will serve for the piston rods of two cylinders may also be made to support those of several more.

450. A method of binding these cylinders down firmly to their supports, whether the latter

are constructed of stone or of cast-iron, is described by the patentee; as is also the mode of disposing the tubes that convey the steam to the several cylinders, and from them to the condenser, or to the open air (according to the nature of the engines), so as to make one set of valves or slides serve for them all. But as there is nothing particular in the arrangement of these tubes, or in the method of fastening down the cylinders, being such as may be easily conceived, they do not require further explanation.

451. The steam carriages described in Mr. James's specification are intended solely for common roads. Instead of the former method, of using one steam cylinder, or at most two, for each steam-carriage, the patentee directs that a steam cylinder shall be used for each wheel, and in his draft, in fact, two cylinders are represented at each extremity of the two axles, so that eight steam cylinders will be required altogether for this plan.

452. These cylinders the patentee states are to be very small, but does not mention their precise dimensions; and, as the pistons of each pair of them are arranged to operate so on the cranks with which they are connected, that when one is vertical the other will be at right angles to it, to save the use of fly wheels, every pair may be considered as one engine acting on the wheel which it is intended to move. These cylinders are placed beneath the axles of the carriage, and the cranks are fixed above them, and each of these cranks is furnished with a spur wheel, which, by another wheel of the same sort, acts on a toothed ring, attached to the nave of the carriage wheel, which nave turns freely on its axle. From these cylinders, pipes run to the steam boiler, on which cocks are so placed that, by turning them in certain directions, the steam may be let on or shut off from each pair of cylinders as required, and also may be admitted partially sometimes; by which means each wheel can have its degree of velocity regulated in respect to that of the others, as may be best suited for making the carriage turn round a corner, or move in any curve desired.

453. The steam boiler is placed beneath the perch, near the hind wheels, and the chimney still further back, together with the seat of the engine-man, who not only keeps up the fire, but, by handles placed near him, which communicate with the cocks before mentioned, can stop either of the hind wheels or diminish their motion, as may be most suitable to the slope of the hills, in descending which locking of the wheels might be necessary. The engines used with these carriages are to be of the high pressure species, so that the steam might be discharged from the cylinders at once after being used; but to obviate the inconveniences which this would cause, pipes pass from them to the chimney, to carry off the waste steam along with the smoke.

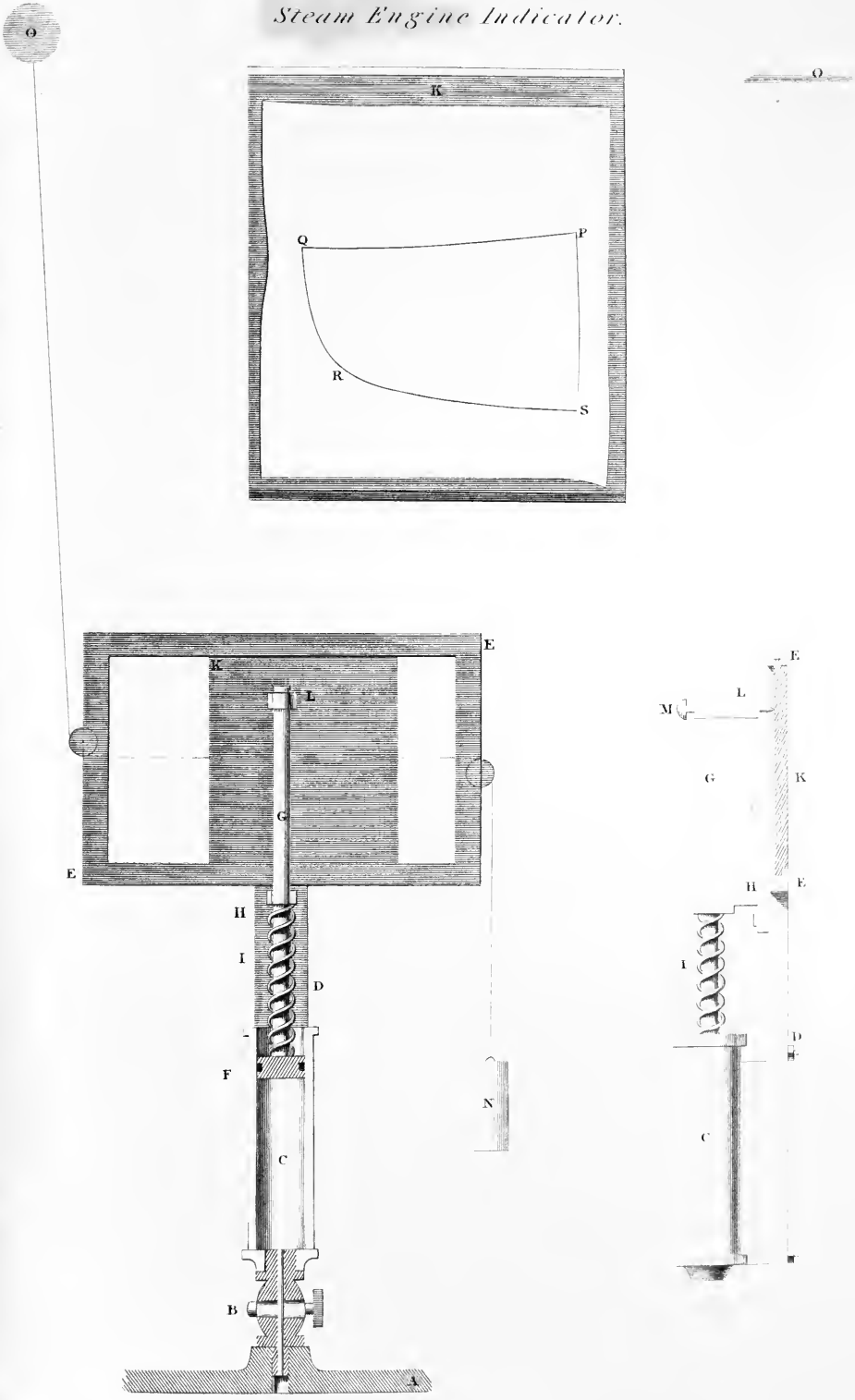
454. The front axletree is made to turn on its centre as usual, and the steam pipes on it have joints at the centre of motion, similar to those of cocks, to admit of their being turned along with it; a segment of a horizontal toothed wheel is attached to this axle, in which a pinion works, from which a vertical shaft ascends to the seat of the director, which is placed directly above it, and is constructed like a coach-box. On the top of this shaft a horizontal wheel, furnished with handles like the steering wheel of a ship, is fixed, by which the director can turn the front axletree as the curvature of the road may require. Horizontal rods are also so arranged, between this axle and the cocks, that in proportion as it is turned the steam may be shut off from the cylinders at the side next the centre or centres of the curvature of the road, by which means the wheels at that side move more slowly than the others. Besides the steering wheel, there are two levers with handles, placed near the seat of the conductor, which communicate by cranks with the rods just mentioned, by which the cocks are turned, and by moving which he can either diminish the motion of the wheels at one side, as he pleases, or stop off the steam from all the cylinders at once, when it is required to stop the progress of the carriage.

455. Mr. Vaughan's steam engine is of a very peculiar kind. An idea of its arrangement may be formed by supposing the cylinder of a single steam engine to be placed with its bottom upwards, and another similar cylinder to be fixed in the usual position directly upon it, so that the piston rods of both may be in the same vertical line. Each of these cylinders has its separate piston, and the two piston rods are connected together by two bars, which pass outside the cylinders, from the ends of a cross-piece on the extremity of one of the piston rods, to the ends of a similar cross-piece on the extremity of the other piston rod; the two pistons being previously so placed that one of them shall be near the open end of its cylinder, when the other is near the closed end of that in which it moves. A case is directed to be put over the two cylinders, to confine the heat, and the openings between this case and them at each end are to be closed, so as to exclude the air. A pipe, furnished with a cock, is to pass from the steam-pipe, near where it enters the valve box, to the inside of this case, to convey steam into the space between it and the cylinders when the cock is opened, to keep the cylinders hot; and from the lowest part of the case another pipe passes out, furnished also with a cock, to let off the water formed within the case by the condensation of the steam. The bars which connect the two piston rods pass through tubes of copper or other metal, placed vertically between the case and the cylinders, and fastened at each extremity to the ends of the case so as to be air-tight.

456. The valve box is fixed at the junction of the two cylinders, and in it a sliding valve is used, having a cavity within it, which, as it is moved up and down, alternately forms a communication between the passages that lead to the two cylinders and those which go to the steam-pipe and to the condenser, the rod which works this valve passing through a stuffing box at the top of the valve box. The beam of the engine is to be connected with the piston rods by the links of the parallel gear being joined to

STEAM ENGINE.

Steam Engine Indicator.



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J. Shury sculp.

der rails of the frame E E. L a small brass socket, which may be fixed at any height upon the piston-rod, by the tightening screw M. It carries in the other end a short pencil, with a weak spring to push it forward against the surface of the sliding-board. N a weight attached by a cord to the sliding-board K. O any convenient part of the parallel motion, traversing a space of about four inches and a half during each half stroke of the engine.

462. From this description the principle on which the instrument acts will be evident. By opening the stop-cock B a direct communication is made between the interior of the large and small cylinders, and the density of the steam in the indicator becomes the same as in the steam engine cylinder above the piston. When this density is less than that under the atmospheric pressure, the indicator piston will sink, when it is greater the piston will rise; but the spiral spring, which, if carefully made, stretches through equal distances with equal weights, restrains the motion of the piston; and, by the distance to which it allows it to move from its state of rest, indicates the pressure it is undergoing. During each stroke of the engine, therefore, the indicator piston will rise at the instant the upper steam valve opens, and during the descent of the large piston will maintain a height proportioned to the density of the steam in the cylinder. When the eduction valve opens it will sink, and by the rapidity of its descent, and the distance to which it falls, denote the quality of the vacuum. If, during this perpendicularly alternating motion of the small piston, the sliding-board be made to perform its reciprocating and horizontal course, the pencil, in the socket L, will trace upon the board, or upon a piece of paper applied to its surface, a figure, something like P Q R S; of which figure, the part P Q is drawn during the descent of the large piston. At Q, the condensation taking place, the atmospheric pressure acts upon the piston indicator, and makes it descend until the tension of the spring counteracts the force of the pressure. Meanwhile the engine begins to perform the up-stroke, and, as the board traverses, produces the line R S. When the engine piston arrives at the top, the admission of the steam destroys the vacuum that existed below the indicator piston, and allows the spring to raise the latter until the equilibrium is restored. It consequently follows that the distance between the line P Q, and the line R S, will be greater in proportion to the difference between the pressure in the cylinder during the existence of the vacuum and the pressure of the steam, and the curve Q R be more acute in proportion to the rapidity with which the vacuum is formed. If this distance be measured in eight or ten places, and an average taken, then a simple proportion gives the pressure upon each square inch of the piston. Let $a =$ area of indicator piston,—b, any weight applied experimentally to that piston, —d, the distance to which it falls with that weight,—and let e be the average distance taken from a diagram, and f the average pressure in pounds upon the steam engine piston during the formation of that diagram. Then, as d to $\frac{b}{a}$ so is e to f, or $\frac{b \cdot e}{d\,a} = f$. And as, for every individual instrument, $a\,b\,d$ are constant quantities, then $\frac{b}{d\,a} = x$, a constant number by which to multiply the average distance obtained from a diagram, for the average pressure in pounds upon each square inch of the steam piston.

463. A table of the amount of work really effected by the principal engines in Cornwall in one month may here be furnished. The whole number of engines reported in the month was, fifty-three pumping engines, fourteen whim engines, three stamping engines. Of the pumping engines fifty are single and three double power, and three of the single power engines have combined cylinders; the diameters of the cylinders as under:—

Engines.	Inch.		Bushels.
4	90	of coals consumed in the month	11864
4	80	. . do. . . do. . .	10332
1	76	. . do. . . do. . .	2660
10	70	. . do. . . do. . .	16078
1	64	. . do. . . do. . .	1368
3	63	. . do. . . do. . .	9507
7	60	. . do. . . do. . .	11798
3	58	. . do. . . do. . .	5899
3	53	. . do. . . do. . .	5111
2	50	. . do. . . do. . .	1044
1	48	. . do. . . do. . .	1083
3	45	. . do. . . do. . .	4498
1	42	. . do. . . do. . .	1010
2	40	. . do. . do. . .	630
4	36	. . do. . . do. . .	2619
2	30	. . do. . . do. . .	1310
1	28	. . do. . . do. . .	1080
1	27	. . do. . . do. . .	1080
53			88971

464. *Relative duty of the pumping engines expressed by the number of millions of pounds of water lifted one foot by each bushel of coal.*

Greatest duty	47	millions nearly by	1	engine 60	inch cylinder.
	41	do. by	1	do. 80	do.
	40	do. by	1	do. 90	do.
	39	do. by	1	do. 76	do.
	38	do. by	2	engines 63 and 70	do.
	36	do. by	3	do. 2 of 80 and 1 of 63	do.
36 to 34		do. by	4	do.	
34 to 30		do. by	5	do.	
under 30		do. by	28	do.	
		duty not reported	7		
			53		

465. Six Engines performing best Duty.

Mines.	Diameter of Cylinder.	Load per square inch on the Piston.	Length of the stroke in the Cylinder.	No. of Lifts.	Depth.	Diameter of the Pump.	Time.	Consumption of Coals in bushels.	Number of Strokes.	Length of stroke in the Pump.	Load in pounds.	Pounds lifted one foot high, by consuming one bushel of Coals.	Number of strokes per minute.	Remarks, and Engineers' Names.
		lbs.	ft. in.		fath. ft.	inches.				ft. in.				
Wheal Hope	60 inch single	8·37	9 0	1 1 1	46 5 11 2 11 2	15 12⅛ 11	Nov. 27th to Dec. 30th.	1242	261,890	8 0	27,766	46,838,246	5·5	Drawing all the load perpendicularly. Main beam over the cylinder. One balance-bob at surface.—*Grose.*
Wheal Vor	80 inch single	13·37	10 0	5 4 1 1	135 2 44 0 12 0 11 5	15 16 9½ 9¼	Dec. 4th to Dec. 29th.	3274	199,960	7 6	89,607	41,045,698	5·56	Drawing perpendicularly 135 fathoms, and on the underlay 27 fathoms. Main beam over the cylinder. Two balance-bobs under ground.—*Sims and Richards.*
Consolidated Mines	90 inch single	9·42	9 11	1 1 6	6 0 15 0 144 1	12 12 16	Dec. 7th to Jan. 2d.	4680	304,500	7 6	81,673	39,854,853	8·12	Drawing perpendicularly with main beam over the cylinder. One balance-bob at surface.—*Woolf.*
Dolcoath	70 inch single	10 05	8 9	1 5 1 3 1	2 0 93 1 22 0 65 1 15 3	8⅛ 11½ 12 11¾ 13	Nov. 29th to Dec. 28th.	2660	264,970	7 3	55,021	39,375,762	6·3	Drawing perpendicularly 179 fathoms, and on the underlay 33 fathoms. Main beam over the cylinder. Four balance-bobs under ground, and one at the surface. 60 fathoms of dry rods in the shaft.—*Jeffries.*
Ting-Tang	63 inch single	13·4	7 9	2 4 1 1 1	39 0 81 3 20 3 11 3 12 0	9 14 12 9 8	Dec. 7th to Jan. 21.	1980	229,520	6 9	48,646	38,063,288	6·1	Drawing perpendicularly with main beam under the cylinder and 15 fathoms of horizontal rods under ground.—*Sims and Sons.*
Binner Down	70 inch single	6·12	10 0	1 1 1	2 5 23 2 40 4	10 9 18	Nov. 28th to Jan. 1st.	2628	420,550	7 6	31,395	37,680,271	8·6	Drawing all the load perpendicularly. Main beam over the cylinder.—*Thomas.*

466. It may be remarked that the time of the year is the most unfavorable to the work of the engines; as, from the abundance of water in the mines, many are pushed beyond their most advantageous rate.

467. Duty of the best whim engines, rotatory, double, 6,000,000 drawn one foot high, by each bushel of coals, or thirty kibbles, drawn from the depth of 100 fathoms by ditto. Duty of the best stamping engines, rotatory, double, 15,000,000 lifted one foot high, by each bushel of coals.

468. The monthly report of the duty of steam engines in Cornwall is taken and computed by Messrs. John and Thomas Lean, who are specially appointed and paid for that purpose by the adventurers in the mines, whose object is to obtain a correct comparative statement, by which they may ascertain the merits of the respective engines, and may judge of the skill and care of the engineers they employ.

469. Messrs. Leans have the custody of the keys of the counters on the engines, they themselves measure the capacity and lengths of the pumps, and they receive the returns of the quantity of coals consumed from the persons who measure it, and make oath of the consumption at the custom-houses for the debenture which is allowed.

470. The engineers whose names are given are not manufacturers of engines, nor are they allowed to participate in any business of that kind; they plan the construction and superintend the execution and erection of engines, for which they are paid according to the power of each; and they have the care of them after being erected, and direct repairs, &c., for which they receive regular salaries from the mines.

471. The Royal Academy of Paris has been called upon by the government, to report on the means proper to be adopted for the prevention of accidents and injury from the explosion of steam engine boilers. The means proposed had the double object of preventing the rupture of the boilers, or, in case of their destruction, preventing injury to neighbouring buildings. They directed that the boiler should be proved by the hydraulic press, with a force five times that which they would have to bear during the working of the engines: that a safety valve should be attached to the boiler and locked up, the valve being so loaded as to open at a pressure just above that by which the boilers have been tried: that the boiler should be surrounded by a wall of masonry one metre (39·371 inches) in thickness; an interval of a metre being left between the boiler and the wall, and again between the wall and the neighbouring buildings. Another precaution has been added by M. Dupin, and adopted by the academy; namely, the introduction of a metallic plug into the upper surface of the boilers, formed of such an alloy as should melt at a temperature a few degrees above that at which the engine is intended to work.

472. In consequence of this application, it became necessary to form a table of the pressure and temperature of vapor. The academy appear very doubtful of the estimates as yet published, but give the following table up to eight atmospheres, as nearly correct: above that they say it was impossible to go without farther experiments.

Elasticity in atmospheres.	Height of mercury.	Temperature of Fahrenheit.	Pressure on a square inch.
1	29·22 in	212·0°	14·61 lbs. avoir.
1½	44·88	234·0	21·92
2	59·84	251·6	29·23
2½	74·80	264·2	36·44
3	89·76	275·0	43·84
3½	94·73	285·3	51·15
4	119·69	293·4	58·46
4½	134·65	302·0	65·76
5	149·61	309·2	73·07
5½	164·57	316·4	80·37
6	179·53	322·7	87·69
6½	194·49	328·5	94·99
7	209·45	334·4	102·30
7½	224·41	339·3	109·60
8	239·37	343·4	116·92

It is advised that no direction should be given for the composition of the fusible plugs or plates, but their preparation entrusted to some competent person who should be responsible for the accuracy of their fusing points. The fittest place for them, all things being considered, is the upper surface of the boiler. Their proper diameter and thickness have not yet been ascertained; they should be such as to bear the force of the vapor without risk of breaking; and, when the plate is fused, to leave an aperture sufficient for the ready escape of the vapor.

473. Mr. Prideaux has furnished a series of ingenious arguments, illustrative of the use of high pressure steam, that may be here quoted. He states,

i. That the caloric of steam, *in contact with water*, is a constant quantity at all temperatures.

ii. That every elastic fluid, *at a given density*, has its expansive force in proportion to its temperature, increasing $\frac{1}{480}$ for each ascending degree of Fahrenheit.

iii. That every elastic fluid, *at a given temperature*, has its expansive force directly as its density.

474. From these premises it follows that the force of steam is directly as its density multiplied by $\frac{481}{480}$ for each degree of increased temperature, the caloric corresponding with the density alone. For instance: steam at 212° has an elastic force = 30 inches of mercury; and at 300° = nearly 140 inches, neglecting fractions.

475. By the second law, steam of the density due to 212° raised 88° with a geometrical increase of $\frac{481}{480}$ for each degree, shall gain about 5·6 inches; or possess at 300° a force = 35·6 inches of mercury.

476. And by the third the density due to 300° shall be as 35·6 inches to the force found = 140 inches, or about 3·9 times greater than at 212°. But the caloric being constant is in simple proportion to this density; and the fuel consumed must be expected to correspond with the caloric. Then 30 inches × 39 = 117 inches, the force due to the density at 300°, deducted from 140

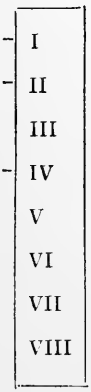
inches, the force found by experiment, gives 23 inches, the profit by working at 300°.

477. If this example be just, the weight of steam employed having its caloric constant, shall be a measure of the fuel consumed; and there is a direct profit in the ratio of $\frac{481}{480}$ for each ascending degree of Fahrenheit, as above stated.

478. It is plain, from the nature of geometrical progression, that this profit will increase as the temperature is more elevated: if we work at 600° the force of each pound of steam will be double of that at 212°; and if we go up to 960° or 980°, it will be quadruple; the caloric, and consequently the fuel, remaining a constant quantity. It is easy to illustrate this from the reports of working engines; but the effects in these cases are dependent on such mixed causes that no uniform conclusion can be drawn from them. In taking the caloric contained in the steam as a measure of the fuel consumed, there is not exact precision: radiation will of course increase with temperature; but I thought this might probably be more than compensated by the diminished surface of the vessels; and that, in the rapid action of a steam engine, it could hardly make an appreciable difference.

479. A collateral advantage of not less importance, well known to engineers, and which did not escape the sagacity of Mr. Watt, is gained in allowing high pressure steam to expand in the cylinder. Mr. Watt has given a formula for calculating the profit on this proceeding; but for a much more perspicuous demonstration we are indebted to Mr. Perkins.

480. Suppose we have to work at a pressure of ten pounds on the inch. Let the steam be raised to a force of eighty pounds on the inch, and let in one-eighth of the stroke; then stop the communication, the piston being at I. We have thus one-eighth at eighty pounds. When the steam has expanded to II the volume is doubled, and the force reduced to forty pounds (supposing the cylinder to keep the temperature constant), the mean from I to II being sixty pounds. Hence we have one-eighth at sixty pounds. When the piston reaches IV the volume is again doubled, and the force reduced to twenty pounds, the mean from II to IV being thirty pounds. This gives one-fourth stroke at thirty pounds. On reaching VIII the volume will again double itself, and the force will be reduced to one-half; thus becoming ten pounds on the inch as proposed; but the mean, from IV to the bottom, is fifteen pounds. Which makes half a stroke at fifteen pounds. Adding these quantities together, we have



	I. $\frac{1}{8}$ at 80 lbs. =	10lbs.
I to	II. $\frac{1}{8}$ at 60 lbs. =	7·5
II to	IV. $\frac{1}{4}$ at 30 lbs. =	7·5
IV to	VIII. $\frac{1}{2}$ at 15 lbs. =	7·5
		32·5 lbs. on the inch.

for the mean impetus communicated to the fly-wheel by each stroke of the piston: and, as the cylinder full of steam is at a density of only ten pounds on the inch, the power thus gained appears at first view enormous. But against this must be set the irregularity of the impulse communicated to the fly, and of the temperature supplied to the cylinder; beside the additional weight and friction of the machinery, and other considerations, involving too many theoretical principles to allow of a satisfactory estimate from calculation without direct and repeated experiment.

481. The comparative advantages of high and low pressure steam have however been most fully discussed by a Committee of the French Institute, and an analysis of their labors is well worth perusal.

482. Amongst the advantages of high pressure engines, that of occupying the least possible space must be enumerated, and will be the more important as the space for their erection is more confined, or the ground more valuable: where manufactories, and private houses, are so crowded together that each establishment can obtain but a very limited space, and great power is at the same time necessary, this advantage is particularly felt; and it is no less important in the interior of mines, for the same reason.

483. A second advantage of high pressure engines, and one that is even greater than the former, is the economy of fuel which results from the effects of a high temperature. This will be readily granted, when it is stated that the repairs and expenses of the steam engines employed in draining a single large coal-mine in England amount annually to the sum of £25,500.

484. On this account several large proprietors of copper and tin mines, in Cornwall, adapted machinery to their engines, in 1811, by which an account is regularly kept of the work which they perform; and, from the results of these experiments, conducted on the largest scale, the comparative effect of the different kinds of engines has been ascertained for more than ten years.

485. In the month of August, 1818, the Cornish steam engines raised 15,760,000 lbs. one foot high, for each bushel of coals consumed. From December, of the same year, the improvements were so material, either in the management of the engines, or in some of their parts, that the mean total product was increased to 17,075,000 lbs.

486. By a series of similar improvements, and by the construction of new and more perfect engines, the product was,

In December, 1812,	18,200,000 lbs.
——————— 1814,	19,784,000
——————— 1815,	20,766,000

and, since 1815, the product is even still larger, in consequence of the improvements that have been made in the construction of the fire places and boilers, and, in short, in every part of the machinery. At the present day, it is calculated that Watt's improved steam engines raise more than 30,000,000 lbs. of water one foot high, by the consumption of one bushel of coals.

487. By the side of this augmentation we

must place that which results from the employment of Woolf's steam engines, which, as is well known, are condensing engines, and work with a pressure intermediate between that of the high and the low pressure engines.

488. Such a machine, with a double cylinder, has been constructed for the mine Whealvor, in Cornwall; the diameter of the large cylinder is fifty-three inches, and that of the small one 5·3 inches. This engine has raised 49,980,822 lbs. one foot high, by one bushel of coals, whilst the mean product of the other engines was only 20,479,350 lbs. raised to the same height. In 1815 the mean product of two of Woolf's engines was 46,255,250 lbs.

489. One of the inconveniences attending engines of mean and high pressure, is loss of power by the wear of the more delicate parts of their structure, and the consequent loss of steam; at the same time it must be admitted that the improvements in the construction of the steam vessels have materially lessened this serious evil.

490. Experiments made in France support the truth of these reports. MM. Girard and Prony have made separate comparative experiments on the power of low pressure engines, and the condensing engines of mean pressure on Woolf's system, as improved by Edwards. They find that the latter deserves the preference, as to economy of fuel, though their results do not exactly agree as to the extent of the saving in this respect; their conclusions, however, tend to the same end, and their discrepancies are referrible to particular circumstances.

491. Instead of estimating the power of a steam engine by assuming the vague and ill-defined *power of a horse* as unity, it would be better to assume a given weight, raised to a given height in a given time, as one hundred-weight raised one yard in a second, which might be called *a power*. The working force of the engine would thus be indicated by the number of *powers* it is equal to, which may easily be ascertained by loading the piston with a sufficient determinate weight, and marking the space it passes through, so loaded, in one second of time. The tension of the vapor being measured by its relation to the pressure of the atmosphere, taken as unity, it must always be referred to the standard barometrical pressure of thirty inches, and the temperature of 32°.

492. According to the preceding details, it may be assumed as incontestable that it is most economical to employ steam at such a temperature that its tension shall be equal to that of several atmospheres; but it is not so easy to decide to what exact tension it should be raised; or what is the mathematical law which expresses the product of steam engines' powers in the function of the temperature, and the tension resulting from it.

493. We have hitherto, says the report, compared low pressure engines only with those of mean pressure; we now proceed to compare them with high pressure engines, which, as is well known, act without condensation of the vapor. Mr. Trevithick in England, and Mr. Oliver Evans in America, are the persons who first made high pressure engines.

494. In 1814 Mr. Trevithick exported to Peru nine of these engines, for the purpose of clearing the mines of water, from the accumulation of which many of the richest had been abandoned: so effectual were the engines that the treasurer of the province proposed to erect a silver statue to Mr. Trevithick, as a memorial of the gratitude of the new world, for the services he had rendered it.

495. In Philadelphia the saving in fuel, by the substitution of one of Evans's high pressure engines, for the low pressure one previously employed, amounted to about £1250 per annum. This engine raises 20,000 tons (tonneaux) of water, about ninety-eight feet in height, every twenty-four hours, and consumes about 1535 cubic feet of wood per diem. The prime cost of the machine was rather more than £5000; whereas, according to M. Marestier, a low pressure engine, of equal power, would cost considerably more than £8000.

496. Evans's engines work with a pressure of from eight to ten atmospheres; several of them have been constructed in America; and, in 1814, the congress of the United States extended Mr Evans's patent ten years beyond the usual period, as an acknowledgment, on the part of the republic, of the benefit his invention has conferred on his country. A similar extension was granted in England to Messrs. Boulton and Watt, for their condensing engines.

497. More lately Mr. Perkins, an American, well known by his ingenious processes for employing steel plates, instead of copper, in engraving, has surpassed all his predecessors by the boldness of his conceptions. He employs, for his moving powers, steam under a pressure of more than thirty atmospheres, and apparently with great advantage.

498. With respect to economy of fuel, we must, therefore, consider the high pressure engines, hitherto constructed, as not having attained the maximum. The use of condensed steam is yet in its infancy; and, notwithstanding the services it has already rendered us, we must consider them as far below what may still be expected, when we shall be more capable of availing ourselves of the full benefit of its effects.

499. Habit reconciles us to danger. Hundreds of sailors perish annually by the power of the wind on the sails of our ships, and we think nothing of it, because we are become familiar to that mode of navigation. But if a steam-boat be blown up, or burnt, the accident is reported in the public prints to every corner of the world; the alarm is given, and that is looked upon as the most dangerous of all mechanical powers which perhaps is the least so in the common course of navigation, and especially on nearing the land.

500. But destruction in some shapes is more appalling to the imagination than in others. Death from explosions, accompanied with noise and confusion, seems more horrible than when it comes in a more tranquil form; and, in all our discussions on the relative dangers of different machines, we should divest them of those accessary circumstances, which frequently produce the greatest effect on the minds of the vulgar and ill-

informed. Whenever man accumulates natural powers, to effect certain purposes, they may, by mischance, be diverted from their proper courses, and become the cause of serious accidents; and no machine, by which those powers are concentrated, was ever constructed that has not its peculiar dangers.

501. To wish to employ only such machines as might be secure from the consequences of want of skill, imprudence, and rashness, were to wish to deprive ourselves of the happiest fruits of human skill and industry; at the same time it were a culpable neglect to suffer any man, for the sake of attaining an end of secondary importance, to employ means which might obviously endanger the lives and property of his neighbours. In such a case public authority has a right to interfere, and exercise a beneficial and protecting influence.

502. Does this observation apply to steam engines in general, or only to a particular class? Should the use of high and mean pressure engines be restricted to certain situations?

503. The British parliament has lately taken this subject into serious consideration, and has adopted most of the precautions recommended by a committee of the House of Commons appointed to enquire minutely into it, particularly with the view of obviating the dangers to which steam passage-boats are liable from ill-constructed machinery, carelessness, or mismanagement. The committee particularly recommended that the boilers of the steam engines shall be made of wrought iron or copper, and furnished with safety valves, of proper size and form, one of which shall be so secured as to be inaccessible to the workman who has charge of the engine: it also recommends that this valve shall be loaded only with such a weight that the pressure shall never exceed one-third of that which the boiler has been found, by actual trial, to be capable of supporting without bursting, or one-sixth of its calculated strength; and that any person overloading the valve shall be liable to punishment.

504. Although the British legislature has not forbidden the use of high pressure steam engines, either in passage-boats or manufactories, the preference has been given, especially for boats, to low pressure engines; and much prejudice has been excited against the former from deplorable accidents which have occurred in America, in England, and France. Mr. Evans, however, according to Mr. Marestier, has defied his opponents to produce a single instance of the explosion of one of his engines, although they work with a pressure of ten atmospheres. But serious accidents are not confined to high pressure engines—they have happened with those of low pressure, both in England and America; and more than once explosions occasioned by the latter have been attributed to the former.

505. An account is given by Mr. Stevenson, in the Edinburgh Philosophical Journal, of a dreadful explosion which occurred near Edinburgh, of a high pressure steam-boiler; and, in France, accidents have happened both with low, mean, and high pressure engines, which require our particular attention. Explosions, which have cost many persons their lives, have happened with what are called *low pressure* engines, but which in reality cease to be such whenever the fire is strongly urged, and the escape of the condensed steam prevented, either by the accidental derangement of the safety valves, or by its being purposely overloaded. Amongst others, we may mention the deplorable accident which happened at Creusot, by which many individuals were killed by the bursting of the boiler of a *low pressure* engine. Let us turn to the other engines. At Péronne the balance beam of an English high pressure engine having broken, the steam in the cylinder drove up the piston and its rod through the planks and roof of the building in which it was placed; but no person was killed or hurt.

506. At Paris, the lower part of the boiler of a mean pressure engine having split, the water flowed into the fire-place, and put out the fire; the walls of the furnace were not even shaken, and no noise was heard except that of the rupture of the boiler. A similar accident occurred about three years since in another establishment, unattended by any more serious consequences. But at Essonne a more serious accident happened lately with a mean pressure engine, the boiler of which had been cast at a foundry not calculated for such work; and it has been satisfactorily proved that the mischief was occasioned solely by the clumsy construction of the boiler, and the faulty manner in which its parts were put together. It results, from all the details which we have collected, that no mean or high pressure steam-boiler, constructed in any regular establishment in France, has ever met with an explosion; although they are more numerous than those imported from foreign countries. During the last year thirty-six of these engines have been made in one manufactory at Paris, and a still greater number are making in the present year; and the more they are used the more they are approved of. Since 1815 more than 120 mean and high pressure engines have been made in the French manufactories.

507. Since 1815 thirty-two mean pressure engines have been sent to St. Quentin from one manufactory at Paris; and the purchasers are universally well satisfied with the service they perform.

508. It became important to ascertain if the safety of the French engines, from their introduction to the present time, be merely owing to chance, or if it be the necessary consequence of multiplied precautions in their manufacture, and the previous trials to which the boilers are submitted. On this point the following information has been obtained respecting the cast iron boilers, which are considered as the most unsafe.

509. The mean-pressure condensing engines, on Woolf's construction, are those which are made in the principal manufactory in France. With these engines the pressure may be varied from that of one atmosphere to two and a half, or three atmospheres, and is indicated by a mercurial gauge. The true boiler and boiling pipes in Woolf's engines (which must not be confounded) are made of the purest cast iron. The form of the boiler is cylindrical, its axis being horizontal. The thickness of the boilers and boiling pipes of large and small steam engines

varies from about an inch and a quarter to an inch and three-quarters. The diameter of the boiling pipes is much less than that of the boiler; for small engines it is less than half, for large engines less than one-third, of the diameter of the boiler. The axes of the boiling pipes are parallel to the axis of the boiler; they are placed below it, and immediately over the fire-place, in such a way that the flame is in contact with the pipes only. As the boiler is less exposed to the fire than the pipes, it is less subject to injury from its action; and, if any part give way from that cause, it is the lower part of the pipes, and not the boiler; the consequence of which is the inundation of the fire-place, and extinction of the fire, as happened in one of the accidents mentioned above.

510. The parts of the engine are united with every possible attention to strength, and to closeness at the joints, so that there may be no loss of power from the escape of steam. Before the pipes and boiler are used they are separately submitted, by a hydraulic press, to five times the pressure that they will have to support when the engine is at work. Before any conclusions are drawn from the preceding facts and observations, it may be well briefly to recapitulate them.

511. High-pressure steam engines are employed with most advantage. 1st. Because the greater the compression of the steam the less is the space the engine occupies. 2d. Because it produces an equal power to that of a low pressure engine, with a smaller quantity of fuel. But they are considered as more dangerous than low pressure engines. Nevertheless engines may be constructed with which explosions, if not absolutely impossible, are at least extremely rare; and with which not a single instance of an explosion has occurred in France since they have been used in that country.

512. Such are the mean-pressure engines, of three or four atmospheres, made in France, on Woolf's construction, as improved by Edwards, with boilers four or five times stronger than can be burst by the force of the steam which they have to resist. Such also are the high-pressure engines of ten atmospheres, constructed on the plan of Oliver Evans, of the United States of America. With these engines the boiler is capable of resisting ten times the force it is daily subjected to. But engines constructed with less care, or managed with less prudence, have occasioned dreadful accidents, especially in Great Britain.

513. In France only one accident has ever happened by which any lives were lost, which were those of two individuals engaged in the service of the engine; and not one single instance has occurred in that country in which any damage has been sustained by any individuals, from the explosion of a steam engine, on the adjoining premises.

514. Although it appears, from the preceding statement, that no one in the neighbourhood of a steam engine, in France, has ever suffered either in his person or property from any explosion, yet the impossibility of such consequences has not been proved; and the bare apprehension of the danger is a real evil, attendant on the erection of a mean or high-pressure steam engine in the neighbourhood of a dwelling house. To reduce that apprehension as much as possible the following precautions should be adopted:—

515. (1.) Every steam engine boiler should be furnished with two safety valves, one of them inaccessible to the workman who attends the engine, the other under his command, in order that he may be able to diminish the pressure on it, as occasion may require. If he attempt to overload this valve, it will have no effect, since the steam will find vent through the other, which is out of his reach. The reporter, M. Dupin, suggests in this place, that if any apprehension of danger be entertained, from the possibility of the inaccessible valve becoming fixed by rust, or negligence, it may be obviated, by fixing in the upper part of the boiler two plugs of fusible metal, formed of such an alloy as to melt at a few degrees above the working temperature of the steam. One of these plugs is to be considerably larger than the other, and to be made of a rather less fusible alloy, so that if the steam does not escape with sufficient rapidity on the fusion of the smaller, it may have ample room to fly off, as soon as the larger has given way. The temperature, at which the least fusible alloy melts, must of course be considerably below that at which the increased elasticity of the steam would endanger the safety of the boiler.

516. (2.) All the boilers should be proved by being submitted, by means of the hydraulic press, to four or five times the working pressure, for engines that work with a pressure of from two to four atmospheres. Beyond that term the proof pressure should as much exceed the working pressure as the latter exceeds the simple pressure of the atmosphere.

517. (3). Every steam engine maker should be obliged to make known his method of proving the boilers, as well as whatever may guarantee the solidity and safety of his engines, especially as regards the boiler and its appendages. He should also declare this working pressure, estimated by the number of atmospheres, or in pounds, on each square inch of surface exposed to the action of the steam.

518. (4.) For further security, the boilers of very powerful engines, when near a dwelling-house, may be surrounded by a thick wall, at the distance of between three and four feet from the boiler, and at least as far from the party wall of the adjoining house.

519. Lastly, if an exact account were taken, and published by the proper authorities, of all accidents that happen to steam engines of every kind, minutely detailing both the causes and effects of such accidents, with the names of the proprietors, and the makers of the engines, it would mainly tend to render unfrequent, though it cannot wholly obviate, the evils that may arise from the use of mean and high-pressure engines.

520. While on the subject of high pressure steam, and the best form of the boiler, we cannot do better than furnish our readers with the substance of a most important paper by Mr. Taylor, the mining engineer. He observes that 'it has been remarked by some practical men who have had most opportunity of examining the circum-

stances under which the bursting of boilers has taken place, that the causes have sometimes appeared to be not of that simple character which is commonly assigned to them; and that some such accidents have occurred where neither excessive expansive force of steam, neglect of the usual precaution, weakness of material or bad construction, existed to a degree equal to the effect. Mr. Woolf, in a conversation upon this subject some time since, expressed to me his opinion of some case where, as he thought, there was ground to suspect the operation of an explosion of gas in the flues, or at least outside the boiler. Any enquiry or discussion into the causes of circumstances which continue to be a reproach to our mode of using steam, must, I conceive, be useful; and my principal object will rather be to provoke it, and to encourage a record of facts, than to propound any particular theory of my own, though I admit that some recent cases appear to countenance Mr. Woolf's idea. In the mines of Cornwall, and in those of North Wales, the use of high-pressure steam has become general: in the former district it is, I believe, universal, and is applied to condensing engines not differing very much from Boulton and Watt's construction, among which engines are many of enormous power, and the largest in the world. The steam is commonly so as to balance from fifteen to forty pounds on each inch of the safety-valve; and some difference of opinion exists among the engineers as to the importance of using it at a higher or lower degree of pressure.

521. 'It will be necessary to describe the boilers which have been employed, in order to understand the subject, and to notice those which have been subject to accidents; which indeed, as far as I know, have been confined to one sort of boiler,—or at least such accidents as have been attended with any fatal or distressing consequences.

522. 'This description of boiler, though appearing therefore to be the most hazardous, is yet most generally adopted; and, as it is believed to have some advantages over others in other respects and under certain circumstances, it will probably continue to be generally preferred, or at least until some construction that shall unite these advantages with more perfect security may be brought into use: this, indeed, it will not be very easy to do, as the experiments on boilers have been multiplied to a great extent in Cornwall, and the expense incurred by many of the mines in this way has been so great that but few of the managers will probably be inclined to enter upon them again without some very clear prospect of success.

523. 'The steam boilers which I mean to describe as the most common are those which are constructed by fixing one tube within another: the interior one containing the fireplace, and the space between it and the exterior containing water, and in the upper part steam. This kind of boiler was, I believe, first introduced by Trevithic for his simple high-pressure engines: he made the outer tube of cast iron, and the inner one, which was often recurved so as to make a double circuit within, of wrought iron. At present both the tubes are made of wrought iron or rolled plates: the form is simply that of one straight tube passing through the other; the ends of the boiler fix the tubes together, so that the interior tube is open at both ends; at one of which is placed the fire-grate, and at the other the smoke and flame pass out, and are conveyed to the stack or chimney most commonly by flues passing under and along the sides of the outer case. The boilers are commonly from twenty to thirty-five feet in length, the diameter of the inner tube from three to four feet, and of the outer one from five and a half to six and a half or seven feet. The former are usually half an inch thick, and the outer case three-eighths.

524. 'The weakest parts of this construction have generally been supposed to be the outer tube, by having too great a diameter for the strength of iron used, and the ends of the boiler, which, by being square and rivetted to angle iron, are more likely to break than if a spherical form were adopted. It does not appear, however, in practice, that these have been the first parts to give away.

525. 'The advantages which this boiler seems to possess over others may be shortly stated. It has been found, by comparing the duty of the engines by means of the monthly reports, and checking this by the observations of the agents, that the fuel goes further in them than in any others yet tried. Circumstances, at first sight apparently trivial, may perhaps conduce to this result. I suspect that the peculiarities of coal of different districts influence more the success of different kinds of boilers than has been generally supposed. In Cornwall all the coal is from South Wales, and is brought from the neighbourhood of Swansea; it is less bituminous than most other coal, is not easy to inflame, but gives a strong and durable fire: it is subject to the objection of producing a great deal of clinker, and this unites with and adheres strongly to any brick-work which the fire may come in contact with, so as to require frequent cleansing of the fire-place. In the boilers I have been describing there is no brick-work near the fire, the clinker does not adhere to the iron sides, and the process of cleansing is easy and rapid; the action of the fire is therefore regular and uninterrupted.

526. 'The second kind of boiler used is a single tube made of wrought iron plates of considerable length but of small diameter, with ends of the same material generally of a hemispherical form; it is placed horizontally, the water occupying by far the larger portion of the space within, and the fire is applied under the bottom part.

527. 'In our mines in North Wales I have used them with great advantage, and our agents and engineers prefer them to any other, and find that they generate steam rapidly, and apparently with economy; but, as there is no monthly report there as in Cornwall, this point cannot be ascertained precisely.

528. 'I expected the same advantage by using them in Cornwall, with the further one of increased security. In this I have been disappointed: the difference in the quality of the coal

appears to be the reason ;—in North Wales it is a free burning and bituminous coal, and makes little or no clinker, and therefore essentially different from what I have described the coal used in Cornwall to be. With the latter these boilers do not appear to afford steam freely ; whilst the brick sides of the fire-place are so rapidly encrusted with clinker, and the door so frequently kept open to cleanse them, that much of the effect of the fire is destroyed.

529. 'The third class of boilers which have been used in the mines is that which includes Mr. Woolf's invention of a series of tubes filled with water and exposed to the fire. These boilers were the subject of one of his patents, and various descriptions of them are to be found in works which treat on these subjects. If one objection to them could be surmounted, they would probably be the best description of boilers we know of, but this has caused the use of them to be discontinued ;—the tubes by expanding and contracting not only injure the joints, which must necessarily be numerous, but by sudden influences of the fire the water is displaced in some of them, and the tubes are injured and burst. No other inconvenience has occurred from this than what is occasioned by the frequent repairs thus called for ; but it amounts of itself to a serious evil.

530. 'Of four accidents by the bursting of steam boilers which have come more under my notice as having occurred in mines where I am interested, and in the last two or three years, I would remark that the boilers were all of the first description. In other respects the circumstances differed very much. They were erected under the superintendence of different engineers, —were made by different manufacturers, in parts of the country distant from each other, of materials from various sources ; they were mostly nearly new or not apparently the worse for wear, and were each furnished with a safety-valve and gauge cocks ; though I admit that there is not so much attention to the care of these matters in the boiler-houses of mines as could be wished.

531. 'The first accident was at Wheal Fortune, to one of six boilers which are employed to work the large engine there of ninety inch cylinder. I do not recollect that any thing remarkable occurred to observe upon with regard to this ; the injury was limited to the boiler itself, and it occasioned no particular discussion. The engineer was Mr. Woolf.

532. 'The next was extraordinary, from the circumstance of two boilers blowing up at the same moment or nearly so. This happened at Polgooth tin mine, where three were employed in the same house to work the engine (eighty inch cylinder). The engine had been stopped a short time for some repairs to the pump-work in the shaft ; but it seemed clear after the accident, by the most accurate investigation that could be made, that the steam had not acquired any formidable degree of pressure, nor was the water so low as to endanger the tube being improperly heated. The engineer was Mr. Sims, and the boilers as well as the engine were nearly new. One man, unfortunately, was killed, and the stack of the engine-house was much shattered, as well as the building itself. The interior tubes of the boilers were much contorted and rent. Captain Reed, who was near the spot, remarked that the one explosion was heard a little before the other, but the noise had hardly ceased when the second took place.

533. 'Some time after, one of the boilers of the sixty-four inch cylinder engine at East Crennis Mine blew up. This engine was also under the care of Mr. Sims, but had been much longer at work than that at Polgooth. The inner tube was compressed as if the fire had softened the part above it, though there did not appear to be any other reason to think that the water was too low. The ends were torn to pieces, and the tube was projected out of the case and out of the house, while the case itself remained in its place, and scarcely injured. No person was materially hurt.

534. 'The last accident, which has led more particularly to these remarks, happened at the Mold Mines in Flintshire, to a boiler of a similar construction ; one of three working the Pen-y-Fron engine sixty-six inch cylinder erected by Captain Francis the principal agent, but of late under the care of Mr. Bawden, engineer. The outer case remained in its seat uninjured, as at East Crennis, and even the weight on the lever of the safety-valve was not disturbed ; the inner tube was not moved out of its place, although it was very much flattened or compressed for a great part of its length, but in a contrary direction to that at East Crennis ; the sides as it were having come together, and not the top and bottom, they approached so close to each other as to hold a brick, which it is not easy to account for being there. The part which contained the fireplace, and for some length near it, remained in the original form. The ends both here and at East Crennis presented an appearance as if they had broken the angle iron rather by the contraction of the tubes than by being pressed outwards.

535. 'Circumstances rendered it possible to get better evidence of the state of the steam and water, &c., than happens in most such instances ; and it seemed certain that the former did not exceed a pressure of thirty pounds an inch, and that the other was quite at its proper height. There was a lead plug indeed above the fire which would have been destroyed if it were not so.

536. 'The engine had been stopped a few minutes ; the engine-man had opened the fire-doors of the three boilers, and had closed the dampers of the other two : he was on this boiler, putting down the damper in the flue, which was no sooner done than he observed a gust of flame rushing from the fire-place, and almost immediately after an explosion, which made him jump from a door-way considerably above the level of the ground below, as the engine stands on the side of a steep hill : this door was used to discharge the cinders from the ash-pits. He alighted on the heap, and escaped out of the way just before the hot water gushed out. Two other men, who were in the boiler-house, were not so fortunate, and they were killed instantly by the boiling water, no mark of any other injury being to be found on their bodies. In this case, had the rush

of flame from the fire-place any thing to do with the subsequent explosion? And admitting that the steam was so far within the pressure that could by mere expansive force regularly exerted injure such a boiler—might not the rupture be occasioned by the aid that a vacuum suddenly created might produce?

537. 'Does not the bursting of the one boiler after another, as at Polgooth, seem to indicate that exterior causes operated? Is it possible to conceive, supposing the pressure equal in two boilers, as was the case at Polgooth, both being connected to the same steam-pipe, that the relative strength of the two should be so exactly the same as that what would by mere expansive force burst the one should have the same effect upon the other?

538. 'Have not all calculation and reasoning with respect to the strength of boilers hitherto had regard merely to such expansive force uniformly exerted; and if we suspect or admit the action of concussion, or the effects that any thing like a blow would exert, ought we not to make a very different estimate in their construction? My intention was rather to state the facts than to attempt an explanation of what is certainly at present very obscure; but, that I may do all in my power to direct attention to the subject, I will venture on a supposition. At the Pen-y-Fron engine we see that the fire-door is thrown open, and then the current of air up the flue is stopped by closing the damper; the interior is filled with atmospheric air mixed to a certain extent with coal gas; the latter is increased by the distillatory action of the fire until the proportion is attained which is explosive; it takes fire, producing the rush of flame which would be followed by a sudden vacuum in the tube; while the other side, pressed by the steam, gives way to this sudden impulse, and is destroyed by a force very much smaller than would be required if uniformly exerted. By some it has been suggested that hydrogen may have been generated by the decomposition of water from leaks in the boiler.

539. 'That sudden inflammations of gas in the chimneys of these engines do take place is, I believe, sufficiently obvious. By night it is observable that bursts of flame, suddenly illuminating the surrounding scene, and rising to a considerable height above the summit of the stack, are seen to emerge, and after a blaze of some minutes diminish and retire into the flue, leaving all once more in perfect darkness. This effect I certainly do not recollect to have noticed where the coal is less bituminous. The fact is not, perhaps, of much importance; but it has been remarked upon by some who have witnessed the accident I have described, and has been discussed by them in reference to it, and therefore it is right to mention it.

540. 'Though I have been led to describe the bursting of boilers where what is called high-pressure steam has been used, I by no means think that boilers are safer because the steam in them is supposed to be limited to a lower degree of expansive force. High-pressure boilers are or ought to be very strong, and can only give way by a great increase of force beyond what they are calculated to resist, which should happen but seldom. Low-pressure boilers are from their construction very weak, and a little carelessness raises the power of the steam within them to the bursting point, and when they give way the consequences are often very fatal. Not to mention other instances, I may remark, that about twelve months since one of the old spherical construction, which is still much used in some parts of the kingdom, burst at a mine in Flintshire, about seven miles from the Mold Mines, and occasioned the death of sixteen persons; it was replaced by two smaller boilers of the second kind I have described, and high-pressure steam applied with good effect to the engine, and with perfect security.'

541. The patent American engine by Mr. M'Curdy is adapted for steam of great expansive force. Instead of boilers, for producing steam, the patentee proposes to use tubular chambers, which being brought to a due degree of heat, by any of the usual methods, water is to be injected into them by a forcing pump, through a pipe an inch in diameter, that passes along the centre of each, and has small perforations on every side, through which it is emitted in 'sprees,' or small streams, against the inside of the chambers. The water being then converted instantly into steam, by the heat of the chamber, the steam passes off by a tube at its other end, to work the piston of a steam cylinder in the common manner. From the bottom of each chamber a pipe descends, furnished with a cock, by which may be known whether the whole of the water injected each time by the pump be converted into steam; the quantity of which, to equal a four or five-horse power, should be about 'half a gill.'

542. To add to the power of the engine the number of tubular chambers may be increased, together with the heat applied to them, and the portion of water injected. To cut off the communication between each separate chamber and the rest, in case of accidents, cocks are added to the pipes where the water enters them, and where the steam goes forth.

543. In using these tubular chambers, at first the forcing pump is to be worked by hand, till the pressure of the steam is found to be what is required, after which the engine is set to work, and moves the forcing pump or pumps with the rest of the machinery.

544. The patentee divides his claims relative to this patent into three heads; the first of which comprises the tubular chambers; the second the mode of distributing the water evenly in them by the perforated tube; and the third the method of getting a 'head' or pressure of steam before the engine begins to work. We understand that the general size of the tubular chambers which the patentee has tried is eleven or twelve feet in length, and about six inches in diameter inside, and that they are made of wrought iron.

545. There are several contrivances for consuming smoke in steam engine furnaces that are especially worthy of consideration. Indeed a parliamentary enquiry has been instituted into the subject. In this there are two inventions for the destruction of smoke, which appear princi-

pally to have occupied the attention of the committee, and which also profess to accomplish that desirable object with a very considerable saving of fuel.

546. Mr. Brunton is the patentee of one of these inventions; he applies to the engine-boiler a newly constructed fire-place, containing a circular grate, which is made slowly to revolve upon its axis; the fire upon this grate is fed in front by a kind of hopper, continually delivering small coal, which, from the rotatory motion of the grate itself, becomes equally spread upon its surface, so as to maintain a thin fire and a sharp draught; the coal is thus rapidly and perfectly decomposed and burned, the smoke at first produced having to pass across the grate and over the red-hot and already coked fuel. The great advantages of this plan consist in the uniformity of heat, and its proportionate production to the work which the engine has to perform, or to the quantity of steam consumed; the fire bricks are not injured; the clinkers or scoriæ are produced in thin layers; and the bars are so little heated that, while three bushels of coal per hour are consuming, they are seldom hot enough to singe paper; the boilers are less injured than by a common fire; and there is a considerable saving in the consumption of fuel. The disadvantages of Mr. Brunton's plan are, the expense of the apparatus; the requisite alteration of the boiler, or rather the addition of a supplementary boiler; the necessity of a moving power to effect the rotation of the grate; and the labor of breaking the coals into small pieces before they are put into the hopper. Upon the last point Mr. Brunton, when questioned by the committee, replies as follows:—'No coals should be put on a steam engine fire until they are small enough to pass a three-inch mesh; therefore the necessity of breaking the coal to that size is advantageous; but we have lately burned a species of small coal in our own furnace, and also in the town of Birmingham, which has till now been regarded as perfectly useless, and as such there are thousands of tons encumbering the ground in the Staffordshire collieries, incapable of being used with effect in any other furnace, and we have produced with this hitherto supposed rubbish seventy per cent. of the effect of saleable coal.'

547. How far Mr. Brunton's invention bears upon the main point of our enquiry, namely, the consumption of smoke, will appear from the following evidence: Mr. James Scott Smith, of the Whitechapel Distillery, says, 'We can consume the smoke to a very great extent, and, although it is not completely invisible, yet it is never offensive; we never have any of those dark volumes of smoke which are the cause of so much complaint.' Mr. Brancker, of Liverpool (a sugar refiner), also gives evidence as to the great diminution of smoke effected by Mr. Brunton's 'fire-regulator;' and both these gentlemen speak in terms the most unequivocal respecting the saving of fuel, amounting, according to their joint evidence, to from thirty to thirty-eight per cent. Upon this subject, however, we greatly apprehend that such evidence is open to unavoidable fallacy. When any new thing is going on in a manufactory, the heads of the concern are generally themselves on the alert, and more than ordinary care and attention are bestowed upon all its details; we are pretty well convinced, and it is indeed obvious, that in any great establishment a monstrous saving of all materials, but of coals more especially, would be effected by the personal superintendence of the master, and of scientific persons well versed in the minutiæ of the concern; yet we are willing to allow that one great merit of Mr. Brunton's contrivance consists in its being almost independent of the stokers and laborers; there is none of that eternal pitching of coals into the furnace which goes on with such lavish waste in all ordinary engine fires; 'the grand principle in this machine,' says Mr. Smith, 'is, that it makes all stokers alike good, and they always use the same quantity of coals when doing the same work.' This is indeed a great point carried. We think it but justice to Mr. Brunton to add that private information, derived from various quarters, confirms, to a considerable extent, the extracts we have made from the Minutes of Evidence; we are inclined to consider the saving of fuel quite as important as the consumption of smoke, and in that respect his pretensions seem indisputable; there is also much original ingenuity in his contrivance; indeed we are not aware that a rotatory grate was ever before either devised or constructed.

548. Another very effectual, and in some respects preferable method of consuming smoke, is the invention of Messrs. Parkes, of Warwick. These gentlemen, who are the proprietors of an extensive worsted manufactory, were greatly annoyed by the smoke of their engine-boilers, especially in their bleaching and drying ground; they have now so far effected its consumption that, for about twelve hours of the day, the smoke is nearly invisible, and there is no soot; moreover these desirable objects are accompanied, they say, by a considerable saving in the article of coals.

549. In the plan adopted by Messrs. Parkes the boilers remain in statu quo; the fire-place is somewhat altered in shape and dimensions, but the principal agent, as far as regards the destruction of the smoke, is a current of air which is admitted just beyond the end of the fire-place, by means of an aperture which may be increased or closed at pleasure, and which they call an air-valve. A small fire is first made to burn brightly at the back of the grate; coals are then filled in towards the front, in which direction the fire gradually spreads; their smoke necessarily passes over the clear fire, where it becomes sufficiently heated to constitute flame, as soon as it meets with the current of air entering at the valve; and a striking experiment with this apparatus consists in alternately shutting and opening the air-valve, which is accompanied by the alternate appearance and disappearance of the smoke.

550. Even from this brief and incomplete view of Messrs. Parkes' contrivance, it is obviously preferable, in some respects, to that of Mr. Brunton; it is much less complex and expensive, and, when properly and assiduously attended to, it effects a more complete destruction of smoke; but, on the other hand, its success is infinitely

STEAM ENGINE.

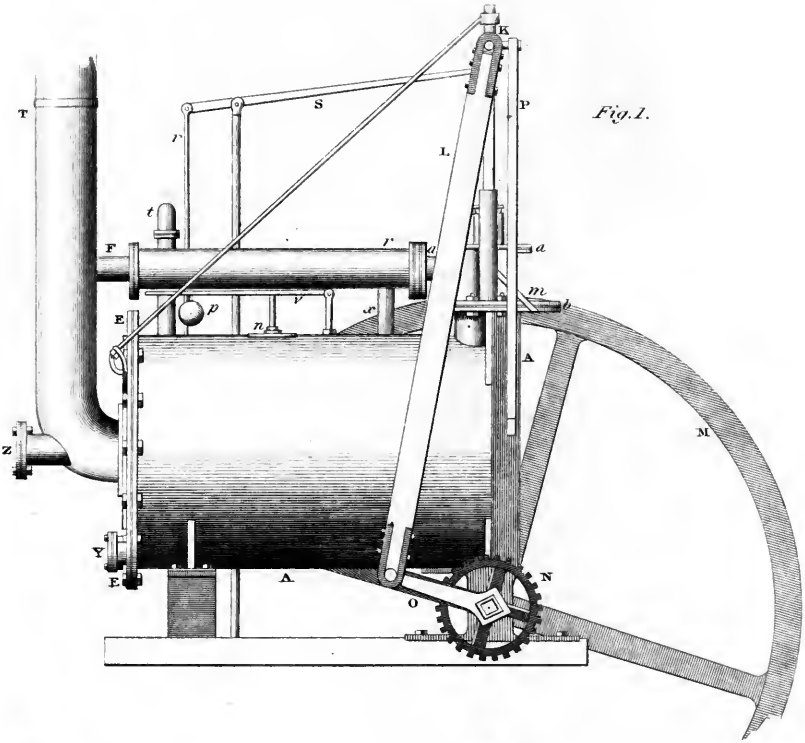


Fig. 1.

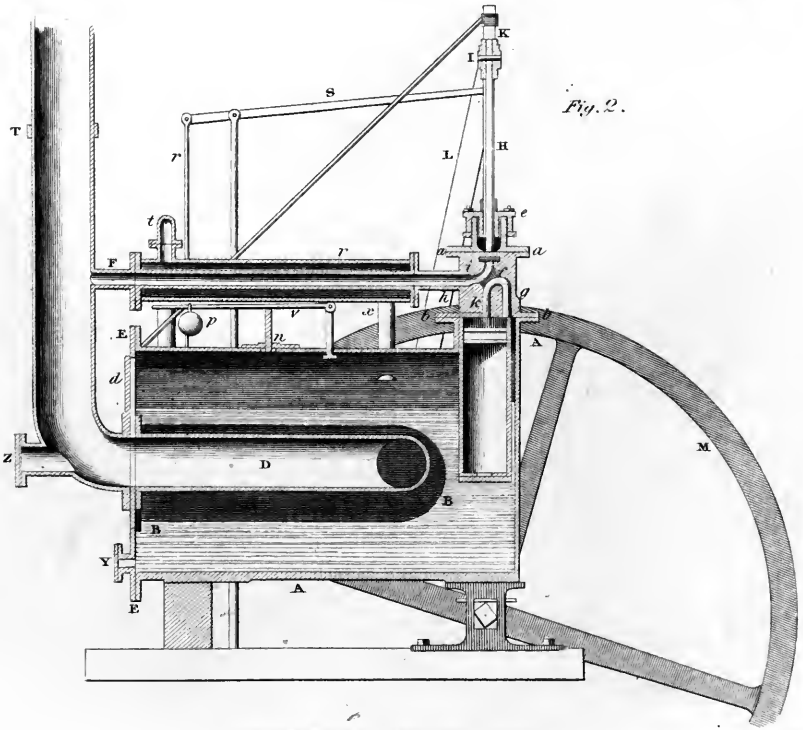


Fig. 2.

London. Published by Thomas Tegg, 73, Cheapside.

J. Shury sculp.

more dependent upon the persons who manage the fire, and whose dispositions are generally a mixture of ignorance and prejudice, duly tempered with the warmth of the element over which they preside; we also doubt whether the same unequivocal testimony can be adduced in respect to the saving of fuel, for this again is more in the stoker's power. In point of originality, too, Mr. Parkes must undoubtedly yield the palm to Mr. Brunton; he is anticipated in every part of his invention by the words of Mr. Watt's patent; and we rather think that Mr. Gregson has also touched upon some of the most important parts of his contrivance. We, however, by no means state this opinion with a view to detract from Mr. Parkes's merit; on the contrary, if he has attained that in which Mr. Watt failed, the nearer his means approach to those unavailingly employed by his eminent predecessor, the more substantial is the service which he has rendered the public, and the more praiseworthy the perseverance by which he has accomplished his object. We believe that Mr. Watt never affected to combine diminution in the consumption of fuel with the destruction of smoke, and that, on the contrary, with additional expense and trouble, there were more coals burned; at least this is the only cause to which we can refer the non-consumption of smoke, and the non-application of his patent, in the greater number, if not in all, the large engines of his erection which we have had occasion to visit.

551. One subject seems to us to have been overlooked by the majority of smoke-reformers, namely, the construction, and more especially the height, of the furnace chimneys. By conveying black smoke, and other pernicious fumes, into a capacious and very lofty chimney, much of the noxious matters that otherwise escape into the atmosphere are decomposed and precipitated, or condensed within; we were much struck some years ago with the effect of a long flue and lofty chimney attached to the steam engine of the Dartford Powder-mills; scarcely any smoke issued from its funnel, the fuliginous particles being almost entirely deposited in the chambers of the flue. The chimneys of the grand junction engine at Paddington, and of the West Middlesex water-works at Hammersmith, are more illustrative instances; when these machines are at work the former produces little smoke; the latter inundates the neighbouring gardens with perpetual showers of the solid soot, and is the greatest of all conceivable nuisances; yet the only difference is in the height of the two chimneys, the boilers being in all respects set and constructed alike. Besides, if a high chimney does void smoke, it is generally wafted away and dissipated, except under particular circumstances of wind and weather.

552. As to the requisite height of a chimney for the diminution of nuisance from smoke we are not prepared to give an opinion; it will depend very much on the circumstances of the case; from 150 to 200 feet would, we presume, in most instances, prove effectual; the expense of such a structure may certainly be urged against the proposal, but we are to recollect that one shaft might receive all the tributary fumes of many flues, and that a great saving would be effected in reducing the number of chimneys of medium height. The intolerable nuisance of brewers' chimneys, to whose coppers we fear neither Parkes's nor Brunton's inventions are applicable, would in this way be greatly diminished, if not altogether remedied.

553. Among other probable causes of the diminution of smoke, we look to the employment of steam as a substitute for fires; in Whitbread's brewery high-pressure steam is thus very extensively employed, and, although they make quite smoke enough, it certainly has lately sustained a very perceptible diminution.

554. Lastly, we come to the most absurd portion of the speculations of theoretical smoke-burners, namely, the improvement of the atmosphere of the metropolis. Though some are sceptical upon the subject, we will admit that, if no smoke were made in London for a twelve-month, or if wood-fuel were substituted for coals, there might be some amelioration of the atmosphere, although our locality and climate always render it turbid and misty, independent of adventitious effluvia; it is, however, folly to ascribe any sensible influence upon the great mass of London smoke to some few steam engine chimneys, while every house is busy in the work of contamination, and every street yielding a proportion of filth far exceeding that of any single furnace, though less observed, because administered by separate vents, and in divided doses.

555. A portable high-pressure engine is a desideratum of considerable importance in the erection of buildings and other temporary works. We propose therefore concluding our present article with an account of one which is exceedingly simple in the arrangement of its parts. Fig. 1 plate IV. is an external elevation, and fig. 2 a section of the apparatus. The same letters of reference are employed in both. The cylindrical boiler is represented at A, the cylinder and piston entering at the top of one extremity, and the chimney passing from the other. A four-way cock *i f k* serves to limit and regulate the passage of the steam above and beneath the piston. The steam after its escape passes by the pipe *a r* F into the chimney T. E, E, are the flanches of the chimney, the clearing hole being placed at Y. The steelyard safety-valve is seen at *p n v*. The piston-rod is kept in its proper situation by the guides H, I, K, L, and the fly-wheel M is driven by a connecting-rod and crank attached to the wheel N.

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STEATITE, or soapstone, in mineralogy, a sub-species of rhomboidal mica. Color grayish, or greenish-white. Massive, disseminated, imitative, and in the following suppositious figures: an equiangular six-sided prism; an acute double six-sided pyramid; and a rhomboid. The first two are on rock crystal, the last on calcareous spar. Dull. Fracture coarse splintery. Translucent on the edges. Streak shining. Writes but feebly. Soft. Very sectile. Rather difficultly frangible. Does not adhere to the tongue. Feels very greasy. Specific gravity 2·4 to 2·6.

Infusible. Its constituents are, silica 44, magnesia 44, alumina 2, iron 7·3, manganese 1·5, chrome 2. Trace of lime and muriatic acid. It occurs frequently in small contemporaneous veins that traverse serpentine in all directions; at Portsoy and Shetland; in the limestone of Icolmkill; in the serpentine of Cornwall; and in Anglesey. It is used in the manufacture of porcelain, and for taking greasy spots out of silk and woollen stuffs. It is also employed in polishing gypsum, serpentine, and marble. When pounded, and slightly burned, it forms the basis of certain cosmetics. It writes readily on glass. Humboldt assures us that the Otomacks, a savage race on the banks of the Orinoco, live for nearly three months of the year principally on a kind of potters' clay; and many other savages eat great quantities of steatite, which contains absolutely no nourishment.

STEATO'MA, *n. s.* Gr. στεατωμα. A fat wen.

If the matter in a wen resembles milk-curds, the tumour is called atheroma; if like honey, meliceris; and if composed of fat, *steatoma*. *Sharp's Surgery.*

STEATOMA is a kind of encysted tumor, consisting of a matter like suet or lard, soft, without pain, and without discoloring the skin.

STEBBING (Dr. Henry), a learned English divine and controversialist. He attacked the bishop of Bangor, Dr. Sykes, and bishop Warburton; and published many tracts and sermons. He died in 1763.

STEED, *n. s.* Sax. ſteda. A horse for state or war.

My noble *steed* I give him,
With all his trim belonging. *Shakspeare. Macbeth.*

Impresses quaint, caparisons and *steeds*. *Milton.*

Stout are our men, and warlike are our *steeds*. *Waller.*

She thought herself the trembling dame that fled,
And him the grisly ghost that spurred the infernal *steed*. *Dryden.*

Who like our active African instructs
The fiery *steed*, and trains him to his hand? *Addison.*

See the bold youth strain up the threatening steep;
Hang o'er their coarsers' heads with eager speed,
And earth rolls back beneath the flying *steed*. *Pope.*

Some nymphs affect a more heroic breed,
And vault from hunters to the managed *steed*. *Young.*

STEEDMAN (captain John Gabriel), a Scottish navigator, born in 1745. He wrote an interesting Narrative of an Expedition against the revolted Negroes of Surinam, in 2 vols. 4to., with eighty engravings from his own drawings. He himself was much concerned in the military transactions related in it. He died at Tiverton in Devonshire, in 1797.

STEEL, *n. s.*, *adj.*, & *v. a.* } Saxon ſtal;
STEE'LY, *adj.* } Belg. *stael*; Goth. *stal*. A kind of iron refined and purified by fire with other ingredients. See below. Made of steel: to point or edge with steel; to harden: steely is made of steel; or hard, firm.

That she would unarm her noble heart of that *steely* resistance against the sweet blows of love. *Sidney.*

At her back a bow and quiver gay,
Stuffed with *steel*-headed darts, wherewith she quelled
The savage beasts in her victorious play. *Spenser.*

Brave Macbeth with his brandished *steel*,
Which smoked with bloody execution,
Carved out his passage till he had faced the slave. *Shakspeare.*

Add proof unto mine armour with thy prayers,
And with thy blessings *steel* my lance's point. *Id. Richard II.*

Lies well *steeled* with weighty arguments. *Shakspeare.*

From his metal was his party *steeled*;
Which, once in him rebated, all the rest
Turned on themselves, like dull and heavy lead. *Id.*

O God of battles! *steel* my soldier's hearts,
Possess them not with fear. *Id. Henry V.*

Thy brother's blood the thirsty earth hath drunk,
Broached with the *steely* point of Clifford's lance. *Shakspeare.*

A looking-glass, with the *steel* behind, looketh whiter than glass simple. *Bacon's Natural History.*

With mighty bars of long enduring brass
The *steel*-bound doors, and iron gates he ties. *Fairfax.*

They are not charmed against your points, of *steel* nor iron framed. *Chapman.*

A lance then took he, with a keene *steele* head,
To be his keepe off both 'gainst men and dogges. *Id.*

Diamonds, though hard bodies, will not readily strike fire with *steel*, much less with one another; nor a flint easily with a *steel*, if they both be wet; the sparks being then quenched in their eruption. *Browne's Vulgar Errours.*

Both were of shining *steel*, and wrought so pure,
As might the strokes of two such arms endure. *Dryden.*

He, sudden as the word,
In proud Plexippus' bosom plunged the sword;
Toxeus amazed, and with amazement slow,
Stood doubting; and, while doubting thus he stood,
Received the *steel* bathed in his brother's blood. *Id.*

Why will you fight against so sweet a passion,
And *steel* your heart to such a world of charms? *Addison.*

Man, foolish man!
Scarce know'st thou how thyself began;
Yet, *steeled* with studied boldness, thou dar'st try
To send thy doubted reason's dazzled eye
Through the mysterious gulf of vast immensity. *Prior.*

Here smokes his forge, he bares his sinewy arm,
And early strokes the sounding anvil warm;
Around his shop the *steely* sparkles flew,
As for the steed he shaped the bending shoe. *Gay.*

After relaxing, *steel* strengthens the solids, and is likewise an anti-acid. *Arbuthnot.*

Let the *steeled* Turk be deaf to matron's cries,
See virgins ravished with relentless eyes. *Tickel.*

So perish all whose breasts the furies *steeled*,
And cursed with hearts unknowing how to yield. *Pope.*

Steel is made from the purest and softest iron, by keeping it red-hot, stratified with coal-dust and wood-ashes, or other substances that abound in the phlogiston, for several hours in a close furnace. *Hill's Materia Medica.*

STEEL, in modern chemistry and metallurgy, has been defined to be iron united with carbon. See IRON. Steel has properties distinct from those of iron, which render it of superior value. From its higher degree of hardness it admits a finer polish and assumes a brighter color. When tempered, it possesses a higher degree of elasticity, and is more sonorous. It is more weakly

attracted by the loadstone, it receives more slowly the magnetic power, but it preserves it longer. When exposed to a moist air, it does not contract rust so easily as iron. It is also heavier, increasing in weight, according to Chaptal, 170th part. M. Rinman has given, as the result of several accurate experiments on different kinds of steel, the following specific gravity 7·795, while he makes ductile iron 7·700, and crude iron 7·251. All iron is convertible into steel, by exposing it to a certain degree of heat for a certain time, along with a quantity of charcoal. Chemists differ in opinion concerning the nature and effects of this process. Some say that steel is produced by absorbing a quantity of caloric. Lavoisier seems to have ascribed the qualities of steel to a slight degree of oxidation; others to a combination with plumbago, and others to a union with carbon. In agreeing with those who say the formation of steel is owing to carbon, we do not differ essentially from those who attribute it to plumbago; for the art of chemistry has now found that these substances are very nearly allied. See CHEMISTRY. There are two ways of making steel; by fusion and by cementation. The first is used to convert iron into steel immediately from the ore, or from crude or cast iron. By the second way, bar iron is exposed to a long continued heat surrounded by charcoal. Each of these ways has advantages peculiar to itself; but the same causes in fact predominate in both, for both kinds of steel are produced by heat and charcoal. The only difference between the two methods is this: in making steel by fusion the charcoal is not so equally defended from the access of air as in the other way. See IRON. The method of converting iron into steel by cementation is a very simple process. It consists solely in exposing it for a certain time to a strong degree of heat, while closely covered with charcoal and defended from the external air. The furnaces employed for converting iron into steel (says a manufacturer of this metal) are of different sizes; some capable of converting only three or four tons weight, while others are capacious enough to contain from seven to eight or ten tons. The outsides of these furnaces rise up in the form of a cone or sugar-loaf, to the height of a very considerable number of feet. In the inside, opposite to each other, are placed two very long chests, made either of stone, or of bricks capable of bearing the strongest fire; which is placed between the two chests. The bars of iron, after the bottom is furnished with a necessary quantity of charcoal dust, are laid in stratum super stratum, with intermediate beds of the charcoal dust, to such a height of the chests as only to admit of a good bed at top; which is then all covered over, to prevent the admission of the common air; which, could it procure an entrance, would greatly injure the operation. The iron being thus situated, the fire is lighted, which is some time before it can be raised to a sufficient degree of heat to produce any considerable effect; after which it is continued for so many days as the operator may judge proper; only now and then drawing out what they call a proof-bar. This is done by openings fit for the purpose at the ends of the chest, which are easily, and with expedition stopped up again, without occasioning any injury to the contents left behind. When the operator apprehends the conversion is sufficiently completed, the fire is suffered to go out, and the furnace, with its contents, is left gradually to cool. This may take up several days; after which the furnace is discharged, by taking out the bars of steel and the remainder of the charcoal dust. There is a manufactory established in the parish of Cramond, about five miles from Edinburgh, in which this method is practised with great success. Great quantities of steel are made there which is said to be of as excellent a quality as any that can be procured from other countries. When the charcoal is taken out, it is found as black as before it was introduced into the furnace, unless by accident the external air has got admittance. The bars preserve their exterior form only; the surface frequently exhibits a great number of tumors or blisters, whence they are called blistered steel. The hardness of steel is much increased by tempering. This consists in heating it to a red heat, and then plunging it suddenly into cold water. If it be allowed to cool slowly it still preserves its ductility; or, if it be heated again after being tempered, it loses its hardness, and again becomes ductile. In heating steel for tempering it, the most remarkable circumstance is the different colors it assumes, according to the degree of heat it has received. As it is gradually heated, it becomes white, then yellow, orange, purple, violet, and at last of a deep blue color. According to Reaumur, the steel which is most heated in tempering is generally the hardest. Hence it is believed that the more violent the heat to which steel is exposed, and the more suddenly it is plunged into cold water, the harder the steel will be. Rinman, again, has deduced a conclusion directly opposite, that the steel which is naturally hardest demands the least degree of heat to temper it. Different methods have been proposed to determine what degree of heat is most proper; but the easiest method is to take a bar of steel, so long that while one end is exposed to a violent heat the other may be kept cold. By examining the intermediate portions, it may be found what degree of heat has produced the greatest hardness. By tempering, steel is said to increase both in bulk and in weight. Reaumur says that a small bar six inches long, six lines broad, and half an inch thick, was increased at least a line in length after being tempered to a reddish white color; that is, supposing the dilatation proportional in all dimensions increasing at the rate of 48 to 49. Iron also expands when heated; but, when the heat passes off, it returns to its former dimensions. That the weight of steel is also augmented by tempering has been found by experiment. Rinman having weighed exactly in an hydrostatic balance two kinds of fine steel made by cementation, and not tempered, found their density to be to that of water as 7·991 to 1; after being tempered the density of the one was 7·553, and that of the other 7·708. M. de Morveau took three bars just of a size to enter a certain calibre twenty-eight lines long, and each side two lines broad; one of the bars was

soft iron, and the two others were taken from the same piece of fine steel. In order to communicate an equal degree of heat to each, in an earthen vessel in the midst of a wind furnace, the bar of soft iron and one of the bars of steel were thrown into cold water; the other bar of steel was cooled slowly over some pieces of charcoal at a distance from the furnace. The bar of iron, and the one of steel that was allowed to cool slowly, passed easily into the calibre again; but the bar of tempered steel was lengthened almost one-ninth of a line. Tempering changes the grain, or at least the appearance of the texture of a piece of steel when broken. This is the mark, which is usually observed in judging of the quality of steel, or of the tempering which suits it best. The tempered bar is broken in several places after having received different degrees of heat in several places. What proves completely the effect of heat upon the grain, at least in some kinds of steel, is that a bar of steel exposed to all the intermediate degrees of heat, from the smallest sensible heat to a red heat, is found to increase in fineness of grain from the slightly heated to the strongly heated end. The celebrated Rinman has made many experiments on the qualities of steel exposed to different degrees of heat in tempering, but particularly to three kinds, viz. steel heated to an obscure red, to a bright red, and to a red white. Hard brittle steel, made by cementation, and heated to an obscure red, and tempered, exhibited a fine grain, somewhat shining, and was of a yellow white color. When tempered at a bright red heat, the grain was coarser and more shining; when tempered at a red white heat, the grain was also coarse and shining. To determine how far steel might be improved in its grain by tempering it in different ways, M. de Morveau took a bar of blistered steel, and broke it into four parts nearly of the same weight. They were all heated to a red heat in the same furnace, and withdrawn from the fire at the same instant. One of the pieces was left at the side of the furnace to cool in the air, the second was plunged into cold water, the third into oil, and the fourth into mercury. The piece of steel that was cooled in the air resisted the hammer a long time before it was broken; it was necessary to notch it with the file, and even then it was broken with difficulty. It showed in its fracture a grain sensibly more fine and more shining than it was before. The second piece, which had been plunged into water, broke easily: its grain was rather finer than the first, and almost of the same white color. The third piece, which was tempered in oil, appeared very hard when tried by the fire; it was scarcely possible to break it. Its grain was as fine, but not quite so bright, as that which was tempered in water. The fourth piece, which was dipped into mercury, was evidently superior to all the rest in the fineness and color of the grain. It broke into many fragments with the first stroke of the hammer, the fractures being generally transverse. M. de Morveau repeated these experiments with finer steel, and with similar results. From these experiments, it appears that steel may be hardened by tempering it with any liquid which is capable of accelerating its cooling. Steel may be unmade, or reduced to the state of iron, by a management similar to that by which it is made, that is, by cementation. But the cement used for this purpose must be composed of substances entirely free from inflammable matter, and rather capable of absorbing it, as calcareous earth or quicklime. By a cementation with calcareous earth, continued during eight or ten hours, steel is reduced to the state of iron. After it has been tempered, it may be again untempered and softened to any degree that we think proper; for which purpose we have only to heat it more or less, and to let it cool slowly. By this method we may soften the hardest tempered steel.

For the following important facts respecting the manufacture of steel Dr. Ure was indebted to the proprietor of the Monkland manufactory, where bar and cast steel of superior quality are made.

The chests or troughs in which the iron bars are stratified are nine feet long, and composed of an open-grained siliceous freestone, unalterable by the fire. The Dannemora or Oregrounds iron is alone employed for conversion into steel at Monkland. The increase of weight is from four to twelve ounces per cwt. The average is therefore 1 in 224 parts. The first proportion constitutes mild, and the second very hard steel. Should the process be pushed much farther, the steel would then melt, and in the act of fusion would take a dose of charcoal sufficient to bring it to the state of No. 1, cast iron. The charcoal used in stratifying with the bar iron is bruised so as to pass through a quarter-inch riddle. Whenever the interior of the troughs arrives at 70° Wedgewood, the carbon begins to be absorbed by the iron. There is no further diminution of the weight of the charcoal than what is due to this combination. What remains is employed at another charge. Great differences are found between the different kinds of bar iron imported at the same time; which occasion unexpected differences in the resulting steel. The following letter contains important information, from a gentleman possessing great experience in the manufacture of steel.

'Monkland steel-works,

'9th November, 1820.

'Sir,—Mr. William Murray has written me, that you wished I should communicate to you the reason why bar iron should run into the state of soft cast iron, by the operation being carried too far in the blister steel furnace, and how it does not make cast steel, as cast steel is said to be formed by the fusion of the blister steel in the crucible with charcoal.

'The usual practice of making cast steel is to fuse common steel in a crucible, without any charcoal being mixed. The degree of hardness required in the cast steel is regulated by selecting blister steel of the proper degree of hardness for what is wanted.

'This statement is made with the view to correct a common mistake, that to make cast steel it is necessary, and that it is the practice, to mix with the steel to be melted a quantity of charcoal.

'Pursuing this mistake, it naturally leads to others. Dr. Thomson says, when speaking on this subject, that cast steel is more fusible than

common steel, and for that reason it cannot be welded to iron. It melts before it can be heated high enough; and that the quantity of carbon is greater than in common steel; and that this seems to constitute the difference between the two substances.

'The statement of a simple fact will show that this conclusion is erroneous. Suppose a piece of blister steel, pretty hard, yet fit to stand the operation of welding to iron without any difficulty: let this steel be made into cast steel in the ordinary way. It will not then stand the process of welding. It will not melt before reaching the welding heat; but when brought to that heat, and submitted to the blows of the hammer, it will fall like a piece of sand, and the parts being once separated, they refuse to become again united. This difficulty of working the steel cannot arise from the steel containing more carbon; for the fact is it contains less, part of it being burnt out in the operation of melting it. And, if the same steel was to be melted a second time, more of the carbon would be burnt out; of course the steel would be softer, but at the same time the difficulty of working it would be increased; or, in other words, the red-short property it had acquired in the first melting would be doubly increased in the second, although a person who has not had the experience would very naturally conclude that, as the metal kept retrograding to the state of malleable iron, in the same proportion it would acquire all the properties of the metal in that state. When taking this view of the subject, it would appear that the difference between these two kinds of steel must arise from some other cause than that pointed out by Dr. Thomson.

'When the iron has absorbed a quantity of carbon in the blister steel furnace sufficient to constitute steel of a proper degree of hardness, and the heat after this is continued to be kept up, the steel will keep absorbing more and more carbon. The fusibility of it will continue to increase just in the same proportion, till at last it becomes so fusible that even the limited heat of a blister steel furnace brings it down; and, just at the time it is passing to the fluid state, it takes so great a quantity of charcoal as changes it from the state of steel to that of cast-iron. It appears to me that the charcoal is combined in rich cast-iron, in the mechanical state, and not in the chemical, as in steel.

'With this you will receive a specimen from the blister steel furnace. The fracture of the bar will show you steel in the highest state of combination with carbon in which it can exist; and another part of the same fracture presents the transition from the state of steel to that of cast-iron. Should you require it, I will send you a specimen of cast-steel in the ingot, and, from the same ingot, one in the hammered state.

I am, &c.

'JOHN BUTTERY.'

A new memoir on the alloys of steel has been lately published by Messrs. Stodart and Faraday, of which the following is an abstract. The first curious fact that occurs relates to the compound with silver, of which steel will only retain $\frac{1}{500}$th part in union; when more was used, it either evaporated, or separated as the button cooled, or was forced out in forging. The alloy was excellent, and the trifling addition of price furnishes no obstacle to its general employment.

Steel, alloyed with 100th part of platinum, though not so hard as the silver alloy, has more toughness; hence its value where tenacity as well as hardness are required: the extra cost is more than repaid by its excellence. The alloy with rhodium exceeds the former in its valuable qualities, but the scarcity of the metal precludes its general use. To the compounds with iridium and osmium the same remarks apply. The action of acids on these alloys is curious, and especially in respect to that of platinum, which is acted upon by dilute sulphuric acid with infinitely greater rapidity than the unalloyed steel; indeed an acid that scarcely touches the pure steel dissolves the alloy with energetic effervescence. This is no doubt referrible to electrical excitation; and we should apprehend that it would be fatal to the employment of this particular alloy, in any case where chemical action is likely to ensue.

The alloys of steel with gold, tin, copper, and chromium, we have not attempted in the large way. In the laboratory, steel and gold were combined in various proportions; none of the results were so promising as the alloys already named, nor did either tin or copper, as far as we could judge, at all improve steel. With titanium we failed, owing to the imperfection of crucibles. In one instance, in which the fused button gave a fine damask surface, we were disposed to attribute the appearance to the presence of titanium; but in this we were mistaken. The fact was, we had unintentionally made wootz. The button, by analysis, gave a little silex and alumina, but not an atom of titanium. Menachanite, in a particular state of preparation, was used; this might possibly contain the earths or their basis, or they may have formed a part of the crucible.

Our authors advert to the probable importance of certain triple alloys, only one of which is noticed in their paper, namely, that of steel, iridium, and osmium. 'Some attempts to form other combinations of this description proved encouraging, but we were prevented at the time from bestowing on them that attention and labor they seemed so well to deserve.'

The following is an important and curious paragraph of this paper:—

When pure iron is substituted for steel, the alloys so formed are much less subject to oxidation. Three per cent. of iridium and osmium, fused with some pure iron, gave a button, which, when forged and polished, was exposed with many other pieces of iron, steel, and alloys to a moist atmosphere; it was the last of all in showing any rust. The color of this compound was distinctly blue; it had the property of becoming harder when heated to redness, and quenched in a cold fluid. On observing this steel-like character, we suspected the presence of carbon; none, however, was found, although carefully looked for. It is not improbable that there may be other bodies, besides charcoal, capable of giving to iron the properties of steel;

and though we cannot agree with M. Boussingault, Annales de Chimie, xvi. 1, when he would replace carbon in steel by silica, or its base, we think his experiments very interesting on this point, which is worthy of farther examination. In conclusion, our authors observe, that, to succeed in making these compounds, much attention is requisite on the part of the operators; that the purity of the metals is essential; that the perfect and complete fusion of both must be ensured; that they must be kept a considerable time in a state of thin fusion; that, after casting, the forging is with equal care to be attended to; that the metal must on no account be overheated; and that the hardening and tempering must be most carefully performed.

Upon the whole, though we consider these researches upon the alloys of steel as very interesting, we are not sanguine as to their important influence upon the improvement of the manufacture of cutlery, and suspect that a bar of the best ordinary steel, selected with precaution, and most carefully forged, wrought, and tempered, under the immediate inspection of the master, would afford cutting instruments as perfect and excellent as those composed of wootz, or of the alloys.—*Phil. Trans.* 1822.

STEELE (Sir Richard), was born about 1676, in Dublin, in Ireland. One branch of the family was possessed of a considerable estate in the county of Wexford. His father, a barrister at law in Dublin, but of English descent, was private secretary to James duke of Ormond; and his son, while young, being carried to London, he put him to school at the Charter House, whence he was removed to Merton College, Oxford. Our author left the university, without taking any degree, and resolved to enter into the army. This step displeased his friends; but his passion for a military life rendered him deaf to any other proposal. He entered as a private gentleman in the horse guards, and thereby lost the succession to his Irish estate. But as he had a flow of good nature, a generous openness of spirit, and a sparkling vivacity of wit, he became the delight of the soldiery, and obtained an ensign's commission in the guards. In the mean time, as he had chosen a profession which set him free from all ordinary restraints, he indulged in the wildest excesses. Yet his gaieties and revels did not pass without some cool hours of reflection; in these he drew up his treatise entitled The Christian Hero, printed in 1701, with a dedication to lord Cutts, who had appointed him his private secretary, and procured for him a company in lord Lucas's regiment of fusileers. The same year he brought out his comedy called The Funeral, or Grief à la Mode. This play procured him the regard of king William, who resolved to give him some essential marks of his favor; and though, by that prince's death, his hopes were disappointed, yet, in the beginning of queen Anne's reign, he was appointed gazetteer, by the friendship of lord Halifax and the earl of Sunderland, to whom he had been recommended by his schoolfellow Mr. Addison. That gentleman also assisted him in promoting the comedy called The Tender Husband, which was acted in 1704 with great success. But his next play, The Lying Lover, had a very different fate. Upon this rebuff from the stage, he turned his humorous current into another channel; and, early in 1709, began to publish The Tatler, in concert with Dr. Swift. His reputation was perfectly established by this work; and, during the course of it, he was made a commissioner of the stamp duties in 1710. Upon the change of the ministry he joined the duke of Marlborough, who had entertained a friendship for him; and, upon his dismission from all employments in 1711, Mr. Steele addressed a letter of thanks to him for his public services. However, as he still held his place in the stamp office under the new administration, he forbore entering with his pen upon political subjects; but, adhering more closely to Mr. Addison, he dropt the Tatler, and afterwards, by the assistance chiefly of that steady friend, he carried on the same plan much improved, under the title of The Spectator. The success of this paper was equal to that of the former; which encouraged him, before the close of it, to proceed upon the same design in the character of the Guardian. This was opened in the beginning of the year 1713, and was laid down in October the same year. But in the course of it his thoughts took a stronger turn to politics: he engaged with great warmth against the ministry; and, being determined to prosecute his views that way by procuring a seat in the house of commons, he resigned his post in the stamp office; and at the same time gave up a pension, which had been till this time paid him by the queen as a servant to the late prince George of Denmark. He then wrote the famous Guardian, upon the demolition of Dunkirk, which was published August 7th, 1713; and, the parliament being dissolved next day, the Guardian was soon followed by several other warm political tracts against administration. Upon the meeting of the new parliament, Mr. Steele, having been returned a member for the borough of Stockbridge in Dorsetshire, took his seat accordingly in the house of commons; but was expelled in a few days after, for writing the close of the paper called The Englishman, and one of his political pieces entitled The Crisis. Presently after his expulsion, he published proposals for writing the history of the duke of Marlborough: he also wrote the Spinster; and, in opposition to the Examiner, he set up a paper called The Reader, and continued publishing in favor of the Whigs till the death of the queen. Immediately after which, as a reward of these services, he was taken into favor by king George I. He was appointed surveyor of the royal stables at Hampton Court, governor of the royal company of comedians, a justice of the peace for Middlesex, and, in 1715, was knighted. In the first parliament of king George he was chosen member for Boroughbridge, in Yorkshire; and, after the suppression of the rebellion in 1715 was appointed one of the commissioners of the forfeited estates in Scotland. In 1718 he buried his second wife, who had brought him a handsome fortune and a good estate in Wales; but neither that, nor the ample additions made to his income, were sufficient to answer his demands. The thoughtless vivacity of his spirit

often reduced him to little shifts for its support; and the project of the fish-pool this year owed its birth chiefly to Sir Richard's necessities. This vessel was intended to carry fish alive from Ireland, and without wasting, to any part of the kingdom; but the scheme proved very ruinous, for after he had been at an immense expense in building his vessel, besides the charge of the patent, the fish, though supplied with a continual stream of water while at sea, yet, uneasy at their confinement, shattered themselves to pieces against the sides of the pool; so that when they were brought to market they were worth very little. In 1719 he opposed the remarkable peerage bill in the house of commons; and for this opposition his license for acting plays was revoked, and his patent rendered ineffectual. On this, finding every direct avenue to his royal master barred against him by the lord chamberlain, he had recourse to the public, in hopes that his complaints would reach the ear of his sovereign by that channel. In this spirit he formed the plan of a periodical paper, to be published twice a-week, under the title of The Theatre; the first number of which came out on the 2d of January, 1719-20. During the course of this paper, in which he had assumed the name of Sir John Edgar, he was outrageously attacked by Mr. Dennis, the noted critic, in a very abusive pamphlet, entitled The Character and Conduct of Sir John Edgar. To this insult our author made a proper reply in the Theatre. While he was struggling to save himself from ruin, he turned his pen against the mischievous South Sea scheme, which had nearly brought the nation to ruin in 1720; and in 1721 he was restored to his office in Drury Lane theatre. Of this it was not long before he made an additional advantage, by bringing his celebrated comedy called The Conscious Lovers upon that stage, where it was acted with prodigious success; the receipts must have been very considerable, besides the profits accruing by the sale of the copy, and a purse of £500 given to him by the king, to whom he dedicated it. Yet, notwithstanding these ample supplies, in 1722, being reduced to the utmost extremity, he sold his share in the theatre; and soon after commenced a law-suit with the managers, which in 1726 was decided against him. Having now again brought his fortune, by the most heedless profusion, into a desperate condition, he was rendered altogether incapable of retrieving the loss, by being seized with a paralytic disorder, which greatly impaired his understanding. In these unhappy circumstances, he retired to his seat at Languanor near Caermarthen, in Wales, where he died the 21st of September, 1729, and was interred in the church of Caermarthen. Among his papers were found the MSS. of two plays, viz. The Gentlemen, founded upon the Eunuch of Terence, and The School of Action, both nearly finished. Sir Richard was a man of undissembled and extensive benevolence, a friend to the friendless, and, as far as his circumstances would permit, the father of every orphan. His works are chaste and manly. He was a stranger to the most distant appearance of envy or malevolence; never jealous of any man's growing reputation; and so far from arrogating any praise to himself from his conjunction with Mr. Addison, that he was the first who desired him to distinguish his papers. His greatest error was want of economy.

The STEEL-YARD is one of the most ancient presents which science made to society; and, though in comparative desuetude in this country, is in most nations of the world the only instrument for ascertaining the weight of bodies. What is translated balance in the Pentateuch was in fact a steel-yard, being the word used by the Arabs to this day for that instrument. It is in common use in all the Asiatic nations. It was the statera of the Greeks and Romans, and seems to have been more confided in by them than the balance; for which reason it was used by the goldsmiths, while the balance was the instrument of the people.—Non aurificis statera sed populari trutina examinare.—Cic. de Or. 238. The steel-yard is a lever of unequal arms, and, in its most perfect form, is constructed much like a common balance. It hangs in sheers resting on a nail, and the scale for holding the goods hangs on the short arm. The counter weight hangs by a ring of tempered steel, made sharp inside that it may bear by an edge on the long arm of the steel-yard. The under edge of the centre nail, and the upper edge of that by which the parts hang, are in the straight line formed by the upper edge of the long arm. Thus the three points of suspension are in one straight line. The needle or index of the steel-yard is perpendicular to the line of the arms, and plays between the sheers. The short arm may be made so massive that, together with the scale, it will balance the long arm unloaded. When no goods are in the scale, and the counter weight with its hook are removed, the steel-yard acquires a horizontal position, in consequence of its centre of gravity being below the axis of suspension. The rules for its accurate construction are the same as for a common balance.

The weight in the scale will always be indicated by the division at which it is balanced by the counterpoise. This fundamental property of the lever was discovered by the renowned Archimedes, or at least first demonstrated by him; and his demonstration, besides the defect of being applicable only to commensurable lengths of the arms, has been thought by metaphysicians of the first note to proceed on a postulate which seems equally to need a demonstration. It has accordingly employed the utmost refinement of the first mathematicians of Europe to furnish a demonstration free from objection. M. D'Alembert has given two, remarkable for their ingenuity and subtlety; Foncenex has done the same; and professor Hamilton of Trinity College, Dublin, has given one which is thought the least exceptionable. But critics have even objected to this, as depending on a postulate which should have been demonstrated. In the Philosophical Transactions, 1794, there is a demonstration by Mr. Vince, which we think unexceptionable, and of great simplicity. Let AE (fig. 1. plate STEEL-YARD, &c.) be a mathematical lever, or inflexible straight line, resting on the prop A, and supported at E by a force acting upwards. Let

two equal weights *b* and *d* be hung on at B and D, equidistant from A and E. Pressures are now exerted at A and E; and, because every circumstance of weight and distance is the same, the pressure at E, arising from the action of the weight *b* on the point B, must be the same with the pressure at A, arising from the action of the weight *d* on the point D; and the pressure at E, occasioned by the weight *d*, must be the same with the pressure at A, occasioned by the weight *b*. This must be the case wherever the weights are hung, provided that the distance A B and D E are equal. Moreover, the sum of the pressures at A and E is unquestionably equal to the sum of the weights, because the weights are supported solely at A and E. Let the two weights be hung on at C the middle point; the pressure at E is still the same. Therefore, in general, the pressure excited at the point E, by two equal weights hanging at any points B and D, is the same as if they were hung on at the middle point between them; but the pressure excited at E is a just measure of the effort or energy of the weight *b* and *d* to urge the lever round the point A. It is, at least, a measure of the opposite force which must be applied at E to sustain or balance this pressure. A very fastidious metaphysician may still say that the demonstration is limited to a point E, whose distance from A is twice AC, or = AB + AD. But it extends to any other point, on the authority of a postulate which cannot be refused, viz. that in whatever proportion the pressure at E is augmented or diminished, the pressure at this other point must augment or diminish in the same proportion. This being proved, the general theorem may be demonstrated in all proportions of distance, in the manner of Archimedes, at once the most simple, perspicuous, and elegant of all. All this difficulty (and it is a real one to the philosopher who aims at rendering mechanics a demonstrative science) has arisen from an improper search after simplicity. Had Archimedes taken a lever as it really exists in nature, and considered it as material, consisting of atoms united by cohesion; and had he traced the intermediate pressures by whose means the two external weights are put in opposition to each other, or rather to the support given to the fulcrum; all difficulty would have vanished. The quantity of goods which may be weighed by this instrument depends on the weight of the counterpoise, and on the distance C D from the fulcrum at which the goods are suspended. A double counterpoise hanging at the same division will balance or indicate a double quantity of goods hanging at D; and any counterpoise will balance and indicate a double quantity of goods, if the distance C D be reduced to one-half.

Many steelyards have two or more points of suspension D, to which the scale may be occasionally attached. See Balance. It is evident that in this case the valve or indication of the divisions of the long arm will be different, according to the point from which the scale is suspended. The same division which would indicate twenty pounds when C D is three inches, will indicate thirty pounds when it is two inches. As it would expose to chance of mistakes, and be otherwise troublesome to make as many divided scales on the long arm as there are points of suspension, D, on the short arm; and each scale having its own numbers; all trouble and all chance of mistake is avoided. But the range of this instrument is not altogether at the pleasure of the maker. Besides the inability of a slender beam to carry a great load, the divisions of the scale answering to pounds or half pounds become very minute when the distance C D is very short: and the balance becomes less delicate, that is, less sensibly affected by small differences of weight. This is because in such cases the thickness which it is necessary to give the edges of the nails does then bear a sensible proportion to the distance C D between them; so that when the balance inclines to one side, that arm is sensibly shortened, and therefore the energy of the preponderating weight is lessened. We have hitherto supposed the steelyard to be in equilibrio when not loaded. But this is not necessary, nor is it usual in those which are commonly made. The long arm preponderates considerably. This makes no difference except in the beginning of the scale. The preponderancy of the long arm is equivalent to some goods already in the scale, suppose four pounds. Therefore, when there are really ten pounds in the scale, the counterpoise will balance it when hanging at the division 6. This division is therefore reckoned ten, and the rest of the divisions are numbered accordingly. A scientific examination of the steelyard will convince us that it is inferior to the balance of equal arms in point of sensibility; but it is extremely compendious and convenient; and, when accurately made and attentively used, it is abundantly exact for most commercial purposes. There is one at Leipsic which has been in use since the year 1718, which is very sensible to a difference of one pound, when loaded with nearly three tons on the short arm; and we saw a waggon loaded with more than two tons weighed by it in about six minutes. The steelyard in common use in the different countries of Europe is of a construction still simpler than the one above described. It consists of a batten of hard wood, having a heavy lump A (fig. 2) at one end, and a swivel hook B at the other. The goods to be weighed are suspended on the hook, and the whole is carried in a loop of whip-cord C, in which it is slid backward and forward till the goods are balanced by the weight of the other end. The weight of the goods is estimated by the place of the loop on a scale of divisions in harmonic progression. They are marked (we presume) by trial with known weights. The chief use that is now made of the steelyard in these kingdoms is for the weighing of loaded waggons and carts. For this it is extremely convenient, and sufficiently exact for the purpose in view.

Steel-Yard of Leipsic: this is represented in fig. 3 as run out, and just about to be hooked for lifting up the load. The steelyard itself is O P Q, and is about twelve feet long. The short arm P Q has two points of suspension, *c* and *b*; and the stirrup which carries the chains for holding the load is made with a double hook,

instead of a double eye, that it may be easily removed from the one pin to the other. For this purpose the two hooks are connected above by a hasp or staple, which goes over the arm of the steelyard like an arch. This is represented in the little figure above the steelyard. The suspension is shifted when the steelyard is run in under cover, by hooking to this staple the running block of a small tackle which hangs in the door through which the steelyard is run out and in. This operation is easy, but necessary, because the stirrup, chains, and the stage on which the load is placed, weigh some hundreds. The outer pin *b* is fourteen inches, and the inner one *c* is seven inches, distant from the great nail which rests in the sheers. The other arm is about ten feet and a half long, formed with an obtuse edge above. On the inclined plane on each side of the ridge is drawn the scale of weights adapted to the inner pin *c*. The scales corresponding to the outer pin *b* are drawn on the upright sides. The counterpoise slides along this arm, hanging from a saddle-piece made of brass, that it may not contract rust. The motion is made easy by means of rollers. This is necessary, because the counterpoise is greatly above a hundred weight. This saddle-piece has like two laps on each side, on which are engraved vernier scales, which divide their respective scales on the arm to quarters of a pound. Above the saddle is an arch, from the summit of which hangs a little plummet, which shows the equilibrium of the steelyard to the weigher, because the sheers are four feet out of the house, and he cannot see their coincidence with the needle of the steelyard. Lastly, near the end of the long arm are two pins, *d* and *e*, for suspending occasionally two eke-weights for continuing the scale. These are kept hanging on adjoining hooks, ready to be lifted on by a little tackle, which is also hooked immediately above the pins *d* and *e*. The scales of weights are laid down on the arm as follows:—Let the eke-weights appropriated to the pins *d* and *e* be called D and E, and call the counterpoise C. Although the stirrup with its chains and stage weigh some hundreds, yet the length and size of the arm O P gives it a preponderancy of 300 pounds. Here, then, the scale of weights must commence. The counterpoise weighs about 125 pounds. Therefore, 1. When the load hangs by the pin *b*, fourteen inches from the centre, the distance from one hundred to another on the scale is about eleven inches, and the first scale (on the side of the arm) reaches from 300 to 1200. In order to repeat or continue this, the eke-weight E is hung on the pin *e*, and the counterpoise C is brought back to the mark 300; and the two together balance 1100 pounds hanging at *b*. Therefore a second scale is begun on the side of the arm, and continued as far out as the first, and therefore its extremity marks 2000; that is, the counterpoise C at 2000, and the eke-weight E at *e* balance 2000 hanging at *b*. 2. To continue the scale beyond 2000, the load must be hung on the inner pin *c*. The eke-weight E is taken off, and the eke-weight D is hung on its pin *d*. The general counterpoise being now brought close to the sheers, it, together with the weight D at *d*, balances 2000 pounds hanging at *c*. A scale is therefore begun on one of the inclined planes a-top, and continued out to 4000, which falls very near to the pin *d*, each hundred pounds occupying about five inches on the arm. To complete the scale hang the eke-weight E on its pin *e*, and bring back the counterpoise to the sheers, and the three together balace 3800 hanging at *c*. Therefore, when the counterpoise is now slid out to 4000, it must complete the balance with 5800 hanging at *c*. It required a little consideration to find out what proportion of the three weights C, D, and E, would make the repetitions of the scale extend as far as possible, having very little of it expressed twice, or upon two scales, as is the case here. We see that the space corresponding to a single pound is a very sensible quantity on both scales, being one-ninth of an inch on the first two scales, and one-twentieth on the last two. This very ponderous machine, with its massy weights, cannot be easily managed without some assistance from mechanics. It is extremely proper to have it susceptible of motion out and in, that it may be protected from the weather, which would soon destroy it by rust. The contrivance here is very effectual, and abundantly simple. When the steelyard is not in use, it is supported at one end by the iron rod F, into which the upper end of the sheers is hooked. The upper end of this rod has a strong hook E, and a little below at *a* it is pierced with a hole, in which is a very strong bolt or pin of tempered steel, having a roller on each end close to the rod on each side. These rollers rest on two joists, one of which is represented by M N, which traverse the building, with just room enough between them to allow the rod F to hang freely down. The other end O of the steelyard rests in the bight of a large flat hook at the end of a chain W, which hangs down between the joists, and is supported on them by a frame with rollers H. This is connected with the rollers at G, which carry the sheers by means of two iron rods, of which one only can be seen. These connect the two sets of rollers in such a manner that they must always move together, and keep their distance invariable. This motion is produced by means of an endless rope H I Z L K V H passing over the pulleys I and K, which turn between the joists, and hanging down in a bight between them. It is evident that by pulling on the part L Z we pull the frame of rollers in the direction G H, and thus bring the whole into the house in the position marked by the dotted figure. It is also plain that by pulling on the part L K we force the roller frame and the whole apparatus out again. It remains to show how the load is raised from the ground and weighed. When the steelyard is run out for use, the upper hook E just enters into the ring D, which hangs from the end of the great oaken lever B C A about twenty-two feet long, turning on gudgeons at C about five feet from this end. From the other end A descends a long iron rod S R, which has one side formed into a toothed rack that is acted on by a frame of wheel work turned by an endless screw and winch Q. Therefore, when the hook E is well engaged in the ring D, a man

turns the winch, and thus brings down the end A of the great lever, and raises the load two or three inches from the ground. Every thing is now at liberty, and the weigher now manages his weights on the arm of the steelyard till he has made an equilibrium. The operation of letting down the load, disengaging the steelyard from the great lever, and bringing it under cover, is performed by two men, and may be done in succession by one, and is over in five or six minutes.

The most compendious and economical machine of this kind is one, first used (we have heard) for weighing the riders of race horses, and afterwards applied to the more reputable service of weighing loaded carriages. Fig. 4 is a plan of the machine; K L M N is the plan of a rectangular box, which has a platform lid or cover, of size sufficient for placing the wheels of a cart or waggon. The box is about a foot deep, and is sunk into the ground till the platform cover is even with the surface. In the middle of the box is an iron lever supported on the fulcrum pin *i k*, formed like the nail of balance, which rests with its edge on arches of hardened steel, firmly fastened to the bottom of the box. This lever goes through one side of the box, and is furnished at its extremity with a hard steel pin *l m*, also formed to an edge below. In the very middle of the box it is crossed by a third nail of hardened steel *g h*, also formed to an edge, but on the upper side. These three edges are in one horizontal plane, as in a well made balance. In the four corners A, A′, E′, E, of the box are firmly fixed four blocks of tempered steel, having their upper surfaces formed into spherical cavities, well polished and hard tempered. A B C D E represents the upper edge of an iron bar of considerable strength, which rests on the cavities of the steel blocks in A and E, by means of two hard steel studs projecting from its under edge, and formed into obtuse angled points or cones. These points are in a straight line parallel to the side K N of the box. The middle part C of this crooked bar is faced with hard tempered steel below, and is there fomed into an edge parallel to A E and K N, by which it rests on the upper edge of the steel pin *g h* which is in the lever. In a line parallel to A E, and on the upper side of the crooked bar A C E, are fixed two studs or points of hardened steel B and D, projecting upwards above half an inch. The platform cover has four short feet like a stool, terminated by hard steel studs, which are shaped into spherical cavities and well polished. With these it rests on the four steel points B, B′, D′, D. The bar A C E is kneed in such a manner vertically, that the points A, B, D, E, and the edge C, are all in a horizontal plane.

These particulars will be better understood by looking at the elevation in fig. 5. What has been said of the bar A C E, must be understood as also said of the bar A′ C′ E. Draw through the centre of the box the line *a b c* perpendicular to the line A E, B D. It is evident that the bar A C E is equivalent to a lever *a b c*, having the fulcrum or axis A E resting with its extremity C on the pin *h g*, and loaded at *b*. It is also evident that *a* C is to *a b* as the load on this lever to the pressure which it exerts on the pin *g h*, and that the same proportion subsists between the whole load on the platform and the pressure which it exerts on the pin *g h*. It will also appear, on an attentive consideration, that this proportion is no-wise deranged in whatever manner the load is placed on the platform. If very unequably, the two ends of the pin *g h* may be unequably pressed, and the lever wrenched and strained a little; but the total pressure is not changed. If there be now placed a balance or steelyard at the side L K, in such a manner that one end of it may be directly above the pin *l m* in the end of the lever E O F, they may be connected by a wire or slender rod, and a weight on the other arm of the balance or steelyard may be put in equilibrio with any load that can be laid on the platform. A small counterpoise being first hung on, to balance the apparatus when unloaded, any additional weight will measure the load really laid on the platform. If *a b* be to *a c* as one to eight, and E O to E F also as one to eight, and if a common balance be used above, sixty-four pounds on the platform will be balanced by one pound in the scale, and every pound will be balanced by a quarter of an ounce. This would be a very convenient partition for most purposes, as it would enable us to use a common balance and common weights to complete the machine; or it may be made with a balance of unequal arms, or with a steelyard. Some have thought to improve this instrument by using edges like those of the nails of a balance, instead of points. But, unless made with uncommon accuracy, they will render the balance very dull. The small deviation of the two edges A and E, or of B and D, from perfect parallelism to K N, is equivalent to a broad surface equal to the whole deviation. Without extraordinary care, the machine may be made to weigh within $\frac{1}{2000}$th part of the truth, which is exact enough for any purpose in commerce. It is necessary that the points be attached to the bars. Some have put the points at A and E in the blocks of steel fastened to the bottom, because the cavity there lodged water or dirt, which soon destroyed the instrument with rust. But this occasions a change of proportion in the first lever by any shifting of the crooked bars; and this will frequently happen when the wheels of a loaded cart are pushed on the platform. The cavity in the steel stud should have a little rim round it, and it should be kept full of oil. In a nice machine a quarter of an inch of quicksilver would effectually prevent all these inconveniences. The simplest and most economical form of this machine is to have no balance or second steelyard; but to make the first steelyard E O F a lever of the first kind, viz. having the fulcrum between O and F, and allow it to project far beyond the box. The long or outward arm of this lever is then divided into a scale of weights, commencing at the side of the box. A counterpoise must be chosen, such as will, when at the beginning of the scale, balance the smallest load that will probably be examined. It will be convenient to carry on this scale by means of ekeweights hung on at the extremity of the lever,

and to use but one moveable weight. By this method the divisions of the scale will have always one value. The best arrangement is as follows: Place the mark O at the beginning of the scale, and let it extend only to 100, if for pounds; or to 112, if for cwts.; or to ten, if for stones; and let the eke-weights be numbered one, two, three, &c. Let the lowest weight be marked on the beam. This is always to be added to the weight shown by the operation. Let the eke-weights stand at the end of the beam, and let the general counterpoise always hang at O. When the cart is put on the platform, the end of the beam tilts up. Hang on the heaviest eke-weight that is not sufficient to press it down. Now, complete the balance by sliding out the counterpoise. Suppose the constant load to be 312 lbs., and that the counterpoise stands at eighty-six, and that the eke-weight is nine; we have the load = 986 + 312 = 1298 lbs.

STEEN (John), an eminent Dutch painter, born at Leyden in 1636. He was the disciple of Brower and Van Goyen. He painted conversations and droll subjects with admirable humour; and died in 1689.

STEEP, *adj.* & *n. s.* STEEP'NESS, *n. s.* STEEP'Y, *adj.* Sax. ſteap. Rising or descending with a great inclination; precipitous: a precipice: steepness is precipitous declivity: steepy, having much declivity.

The mountains shall be thrown down, and the *steep* places shall fall. *Ezekiel.*

The craggedness or *steepness* of that mountain maketh many parts of it inaccessible. *Brerewood on Language.*

Lord Lovel swam over Trent on horseback, but could not recover the farther side, by reason of the *steepness* of the bank, and so was drowned. *Bacon's Henry VII.*

Who hath disposed, but thou the winding way,
Where springs down from the *steepy* crags do beat? *Wotton.*

As that Thebean monster that proposed
Her riddle, and him, who solved it not, devoured;
That once found out and solved, for grief and spight
Cast herself headlong from the Ismenian *steep.* *Milton.*

A prophet some, and some a poet cry,
From *steepy* Othrys' top to Pylus drove
His herd! and for his pains enjoyed his love. *Dryden.*

No more, my goats, shall I behold you climb
The *steepy* cliffs, or crop the flowery thyme. *Id.*

As high turrets for their airy *steep*
Require foundations in proportion deep:
And lofty cedars as far upward shoot
As to the nether heavens they drive the root;
So low did her secure foundation lie,
She was not humble, but humility. *Id.*

He now had conquered Anxur's *steep* ascent. *Addison.*

We had on each side naked rocks and mountains, broken into a thousand irregular *steeps* and precipices. *Id.*

Vineyards, meadows, and cornfields lie on the borders, and run up all the sides of the Alps, where the barrenness of the rocks, or the *steepness* of the ascent, will suffer them. *Id.*

Leaning o'er the rails, he musing stood,
And viewed below the black canal of mud,
Where common shores a lulling murmur keep,
Whose torrents rush from Holborn's fatal *steep.* *Gay.*

STEEP, *v. a.*. Belg. *steppen.* To soak; macerate; imbue; dip.

When his brother saw the red blood trail
Adown so fast, and all his armour *steep,*
For very fellness loud he 'gan to weep. *Spenser.*

He, like an adder lurking in the weeds,
His wandering thought in deep desire does *steep;*
And his frail eye with spoil of beauty feeds. *Id.*

A napkin *steeped* in the harmless blood
Of sweet young Rutland. *Shakspeare. Henry VI.*

The conquering wine hath *steeped* our sense
In soft and delicate Lethe. *Shakspeare.*

Most of the *steepings* are cheap things, and the goodness of the crop is a great matter of gain. *Bacon.*

Whole droves of minds are by the driving god
Compelled to drink the deep Lethean flood;
In large forgetful draughts to *steep* the cares
Of their past labours and their irksome years. *Dryden.*

Wheat *steeped* in brine twelve hours prevents the smuttiness. *Mortimer's Husbandry.*

STEEPHOLMES, a rocky islet of England, in the Bristol Channel, under Quantock hills, which divides the counties of Somerset, Gloucester, and Bristol. It is a rock, about a mile and a half in circumference, in many parts overhanging the water, and inaccessible except by two very steep passages. A few rabbits find subsistence upon it; and it is the resort of vast numbers of sea-fowl.

STEEPLE, *n. s.* Sax. ſteopel, ſtypel, of Sax. ſteap. A turret of a church; a spire.

Blow, winds, and crack your cheeks; rage blow!
You cataracts and hurricanoes, spout!
Till you have drenched our *steeples,* drowned the cocks. *Shakspeare.*

What was found in many places, and preached for wheat fallen on the ground from the clouds, was but the seed of ivy berries; and though found in *steeples* or high places, might be conveyed thither or muted by birds. *Browne's Vulgar Errours.*

They, far from *steeples* and their sacred sound,
In fields their sullen conventicles found. *Dryden.*

A raven I saw *steeple*-high, just over your house. *L'Estrange.*

STEER, *n. s.* Sax. ſtyre, ſteor, ſtiore; Belg. *stier.* A young bullock.

They think themselves half exempted from law and obedience; and, having once tasted freedom, do, like a *steer* that hath been long out of his yoke, grudge and repine ever after to come under rule again. *Spenser's Ireland.*

Lacaon, Neptune's priest,
With solemn pomp then sacrificed a *steer.* *Dryden.*

Nor has the *steer,*
At whose strong chest the deadly tiger hangs,
E'er plowed for him. *Thomson.*

STEER, *v. a.* & *v. n.* STEER'AGE, *n. s.* STEERS'MATE, STEERS'MAN. Sax. ſteoran, ſtyran; Belg. *stieren.* To direct; guide in a passage; originally used of a ship, but applied to other things: the noun substantives corresponding.

A comely palmer, clad in black attire,
Of ripest years, and hairs all hoary gray,
That with a staff his feeble steps did *steer,*
Lest his long way his aged limbs should tire. *Spenser.*

He that hath the *steerage* of my course,
Direct my suit. *Shakspeare. Romeo and Juliet.*

If a pilot cannot see the pole star, it can be no fault in him to *steer* his course by such stars as do best appear to him. *King Charles.*

As when a ship, by skilful *steersman* wrought,
Nigh river's mouth, or foreland, where the wind
Veers oft, as oft so *steers*, and shifts her sail.
Milton.

What pilot so expert but needs must wreck,
Embarked with such a *steersmate* at the helm? *Id.*

His costly frame
Inscribed to Phœbus, here he hung on high,
The *steerage* of his wings and cut the sky. *Dryden.*

Through it the joyful *steersman* clears his way,
And comes to anchor in his inmost bay. *Id.*

In a storm, though the vessel be pressed never so hard, a skilful *steersman* will yet bear up against it. *L'Estrange.*

In a creature, whose thoughts are more than the sands and wider than the ocean, fancy and passion must needs run him into strange courses, if reason, which is his only star and compass, be not that he *steer* by. *Locke.*

Having got his vessel launched and set afloat, he committed the *steerage* of it to such as he thought capable of conducting it. *Spectator.*

You raise the honour of the peerage,
Proud to attend you at the *steerage*. *Swift.*

Steerage, on board a ship is that part of the ship next below the quarter-deck, before the bulk head of the great cabin where the steersman stands in most ships of war. See Steering.

Steering, in navigation, the art of directing the ship's way by the movements of the helm; or of applying its efforts to regulate her course when she advances. The perfection of steering consists in a vigilant attention to the motion of the ship's head, so as to check every deviation from the line of her course in the first instant of its motion, and in applying as little of the power of the helm as possible. By this she will run more uniformly in a straight path, as declining less to the right and left; whereas, if a greater effort of the helm is employed, it will produce a greater declination from the course, and not only increase the difficulty of steering, but also make a crooked and irregular tract through the water. See Helm. The helmsman should diligently watch the movements of the head by the land, clouds, moon, or stars; because, although the course is in general regulated by the compass, yet the vibrations of the needle are not so quickly perceived as the sallies of the ship's head to the right or left; which, if not immediately restrained, will acquire additional velocity in every instant of their motion, and demand a more powerful impulse of the helm to reduce them; the application of which will operate to turn her head as far on the contrary side of her course. The phrases used in steering a ship vary according to the relation of the wind to her course. Thus, if the wind is fair or large, the phrases used by the pilot or officer who superintends the steerage are, port, starboard, and steady. The first is intended to direct the ship's course farther to the right; the second is to guide her farther to the left; and the last is designed to keep her exactly in the line whereon she advances according to the course prescribed. The excess of the first and second movement is called hard a-port, and hard-a-starboard; the former of which gives her the greatest possible inclination to the right, and the latter an equal tendency to the left. If, on the other hand, the wind is foul or scant, the phrases are luff, thus, and no nearer: the first of which is the order to keep her close to the wind; the second, to retain her in her present situation; and the third, to keep her sails full. In a ship of war, the exercise of steering the ship is usually divided among a number of the most expert sailors, who attend the helm in their turns; and are accordingly called timoneers, from the French timonier, which signifies helmsman. The steerage is constantly supervised by the quartermasters, who also attend the helm by rotation. In merchant ships every seaman takes his turn in this service, being directed therein by the mate of the watch, or some other officer.—As the safety of a ship, and all contained therein, depends in a great measure on the steerage or effects of the helm, the apparatus by which it is managed should often be diligently examined by the proper officers. Indeed, a negligence in this important duty appears almost unpardonable, when the fatal effects which may result from it are duly considered.

STEEVENS (George), one of the most successful of the editors and commentators of Shakspeare, was born in 1735. His parents were in affluent circumstances. George received the rudiments of his education at Kingston-upon-Thames, under the tuition of Dr. Woodeson and his assistants; and had for a companion at that school Gibbon the historian. From Kingston he went to Eton, whence, after some years, he was admitted a fellow-commoner of King's College, Cambridge. After he left the university, he accepted a commission in the Essex militia on its first establishment; and he spent the latter years of his life at Hampstead in almost total seclusion from the world; seldom mixing with society but in the shops of booksellers, in the Shakspeare Gallery, or in the morning conversations of Sir Joseph Banks. He died January 1800. Mr. Steevens was a classical scholar of the first order. He was equally acquainted with the belles lettres of Europe. He had studied history, ancient and modern, but particularly that of his own country. He possessed a strong original genius, and an abundant wit; his imagination was of every color, and his sentiments were enlivened with the most brilliant expressions. Mr. Steevens also had a very handsome fortune; and his generosity was equal to it.

STEFANESCHI (John Baptist), an historical painter, born at Florence in 1582. He was much esteemed and patronised by Ferdinand II. duke of Tuscany, for whom he painted several sacred subjects in miniature. He died in 1659.

STEFANO (J.), an eminent Italian painter, born at Florence in 1301, and hence called Florentino. He was the disciple of Giotto, and became superior to all his contemporaries except his master. One of his best pictures is of Christ delivering the demoniac. He died in 1650, aged forty-nine.

STELLA (Lat. i.e. a star), a name given by dean Swift to Mrs. Johnson, an amiable lady, whom he long loved, and at last married; but, as he never publicly acknowledged her to be his

wife, nor cohabited with her as such, the disappointment broke her heart. The most plausible reason ever assigned for his strange conduct in this affair, is that he had discovered that she was his sister. But this is no longer believed. See SWIFT.

STELLA (James), a celebrated French painter, born at Lyons in 1596. He studied painting early, and at twenty went to Rome. In passing through Florence, Cosmo de Medicis, the great duke, employed him, gave him lodgings, and a pension. He afterwards went to Paris, where he was patronised by Louis XIII., who gave him a good pension, lodgings in the Louvre, and honored him with the order of St. Michael. He died in 1647.

STELLA (Francis), brother and disciple of James, was born at Lyons in 1601, and travelled with his brother into Italy; but, though a good painter, he never equalled James. He died in 1661.

STEL'LAR, *adj.* STEL'LATE, STEL'LED. } Lat. *stella*. Relating to the stars: pointed in the manner of a star.

And quenched the *stelled* fires.
Shakspeare. King Lear.

In part shed down
Their *stellar* virtue, on all things that grow
On earth; made hereby apter to receive
Perfection from the sun's more potent ray. *Milton.*

Salt dissolved, upon fixation, returns to its affected cubes, and regular figures of minerals; as the hexagonal of chrystal, and *stellar* figure of the stone asteria. *Glanville.*

One making a regulus of antimony, without iron, found his regulus adorned with a more conspicuous star than I have seen in several *stellate* reguluses of antimony and mars. *Boyle.*

STELLARIA, stitchwort, or great chickweed, in botany, a genus of plants belonging to the class decandria, and order trigynia; natural order twenty-second, caryophylleæ: CAL. pentaphyllous and spreading. There are five petals, each divided into two segments: CAPS. oval, unilocular, and polyspermous. There are nine species, viz. 1. S. arenaria; 2. Biflora; 3. Cerastoides; 4. Dichotoma; 5. Graminea; 6. Holostea; 7. Nemorum; 8. Radians; and, 9. Undulata. Of these three are natives of Britain: viz. 1. S. graminea, less stitchwort. The stem is nearly a foot high. The leaves are linear and entire; and the flowers grow in loose panicles. It is frequent in dry pastures. There is a variety of this species called bog stitchwort, with smooth, oval, sessile leaves, and few leaves, which grows often in wet marshy places. The stalk is quadrangular; the petals scarcely longer than the calyx, and bifid to the base.

2. S. holostea, greater stitchwort. The stalks are about two feet long; the petals are nearly twice the length of the calyx, and divided halfway to the base. It is common in woods and hedges.

3. S. nemorum, broad-leaved stitchwort. The stalks are about twelve or eighteen inches high, and branched in a panicle at the top. The leaves are heart-shaped, and of a paler green on the under than on the upper side; the lower ones being supported by foot-stalks which are hairy and channelled; the upper ones are sessile. The calyx is erect, somewhat hairy, and white on the margins. The petals are bifid almost to the base. There is a small nectarium between the lower stamina and the calyx.

STELLATE, among botanists, expresses leaves which grow not less than six at a joint, and are arranged like the rays of a star.

STELLENBOSCH AND DRAKENSTEIN, an extensive district of the settlement of the Cape of Good Hope. They include from Cape Agulhas, the southernmost point of Africa, to the river Koussie, the northern boundary of the colony. The district is 380 miles long, about 150 broad, and may contain an area of 55,000 square miles. The greater part consists of mountains, sandy hills, and Karroo plains, but the remainder is the finest land in the colony. About 39,146 English acres are under cultivation. See CAPE OF GOOD HOPE.

STELLENBOSCH, a town delightfully situated twenty-six miles to the east of Cape Town, Cape of Good Hope, at the foot of a range of lofty mountains, near the Cape.

STELLERA, German groundsel, in botany a genus of the monogynia order, and octandria class of plants; natural order thirty-first, vepreculæ: CAL. none: COR. quadrifid; the stamina are very short. There is only one seed, which is black. The species are only two:—1. S. chamæjasme, and 2. S. passerina.

STEL'LIONATE, *n. s.* Fr. *stellionat;* Lat. *stellionatus*. A kind of crime which is committed (in law) by a deceitful selling of a thing otherwise than it really is: as, if a man should sell that for his own estate which is actually another man's.

It discerneth of crimes of *stellionate*, and the inchoations towards crimes capital, not actually committed. *Bacon.*

STEM, *n. s.* Latin *stemma*. Stalk; twig: hence family; race; pedigree; progeny: also the fore part of a ship.

Two lovely berries molded on one *stem*,
So with two seeming bodies, but one heart.
Shakspeare.

This is a *stem*
Of that victorious stock, and let us fear
His native mightiness. *Id. Henry V.*

After they are first shot up thirty foot in length, they spread a very large top, having no bough nor twig in the trunk or *stem*. *Raleigh's History.*

Set them aslope a reasonable depth, and then they will put forth many roots, and so carry more shoots upon a *stem*. *Bacon.*

Whosoever will undertake the imperial diadem, must have of his own wherewith to support it; which is one of the reasons that it hath continued these two ages and more in that *stem*, now so much spoken of. *Howel's Vocal Forest.*

This, ere it was in th' earth,
God made, and ev'ry herb before it grew
On the green *stem*. *Milton.*

I will assay her worth to celebrate;
And so attend ye toward her glittering state,
Where ye may all, that are of noble *stem*,
Approach. *Id.*

The *stem* thus threatened and the sap in thee,
Drops all the branches of that noble tree. *Waller.*

Farewell you flowers, whose buds with early care
I watched, and to the cheerful sun did rear.

Who now shall bind your *stems*? or, when you fall,
With fountain streams your fainting souls recall?
Id.

The lowering spring with lavish rain
Beats down the slender *stem* and bearded grain. *Id.*

Orante's barque, ev'n in the hero's view,
From *stem* to stern by waves was overborn. *Id.*

Dost thou in hounds aspire to deathless fame?
Learn well their lineage and their ancient *stem*.
Tickell.

STEM, *v.a.* Isl. *stæmma.* To oppose a current; pass cross or forward notwithstanding the stream.

Above the deep they raise their scaly crests,
And *stem* the flood with their erected breasts.
Denham.

They on the trading flood,
Through the wide Ethiopian to the cape,
Ply, *stemming* nightly toward the pole. *Milton.*

In shipping such as this, the Irish kern
And untaught Indian on the stream did glide,
Ere sharp-keeled boats to *stem* the flood did learn,
Or fin-like oars did spread from either side.
Dryden.

At length Erasmus, that great injured name,
Stemmed the wild torrent of a barb'rous age,
And drove those holy Vandals off the stage. *Pope.*

STEM, in botany, is that part of a plant arising out of the root, and which sustains the leaves, flowers, fruits, &c. By washing and rubbing the stems of trees their annual increase is promoted; for the method of doing which see TREE.

STEM OF A SHIP, a circular piece of timber into which the two sides of a ship are united at the fore-end; the lower end of it is scarfed to the keel, and the bowsprit rests upon its upper end. The stem is formed of one or two pieces, according to the size of the vessel; and, as it terminates the ship forward, the ends of the wales and plank of the sides and bottom are let into a groove or channel, in the midst of its surface, from the top to the bottom; which operation is called rabbeting. The outside of the stem is usually marked with a scale or division of feet, according to its perpendicular height from the keel. The intention of this is to ascertain the draught of water at the fore part when the ship is in preparation for a sea-voyage, &c. The stem at its lower end is of equal breadth and thickness with the keel, but it grows proportionally broader and thicker towards its upper extremity. See SHIP BUILDING.

STEMMATA, in entomology, are three smooth hemispheric dots placed generally on the top of the head, as in most of the hymenoptera and other classes. The name was first introduced by Linnæus.

STEMODIA, in botany, a genus of the angiospermia order, and didynamia class of plants; natural order fortieth, personatæ: CAL. quinquepartite: COR. bilabiated; there are four stamina; each of the filaments are bifid, and have two antheræ: CAPS. bilocular. There is only one species, S. maritima.

STEMPHYLA, a word used by the ancients to express the husks of grapes, or the remains of the pressings of wine. The same word is also used by some to express the remaining mass of the olives after the oil is pressed out.

STEMPHYLITES, a name given by the ancients to a sort of wine pressed hard from the husks.

STEMPLES, in mining, cross bars of wood in the shafts which are sunk to mines. In many places the method is to sink a perpendicular hole or shaft, the sides of which they strengthen from top to bottom with wood-work, to prevent the earth from falling in: the transverse pieces of wood used for this purpose are called stemples, and by means of these the miners in some places descend without using any rope, catching hold of these with their hands and feet.

STEMSON, in a ship, an arching piece of timber fixed within the apron, to reinforce the scarf thereof, in the same manner as the scarf supports the scarf of the stern. In large ships it is usually formed of two pieces.

STENCH, *n. s.* & *v.a.* Sax. ȝrencan, a stink. A stink or bad smell: to make to stink. Not proper. Used corruptly, for to staunch; stop.

So bee's with smoke, and doves with noisome *stench*,
Are from their hives and houses driven away.
Shakspeare.

Physicians, by the *stench* of feathers, cure the rising of the mother. *Bacon's Natural History.*

Black bulls and bearded goats on altars lie,
And clouds of savory *stench* involve the sky. *Dryden.*

The ministry will be found the salt of the earth, the thing that keeps societies of men from *stench* and corruption. *South.*

The foulness of the ponds only *stencheth* the water.
Mortimer.

The hoary Nar
Corrupted with the *stench* of sulphur flows,
And into Tiber's streams th' infected current throws.
Addison.

They had better skill to let blood than *stench* it.
King Charles.

Restringents to *stench* and incrassatives to thicken the blood. *Harvey on Consumptions.*

STENDAL, or STENDEL, a town of the Prussian states, the former capital of the Old Mark of Brandenburg, but now included in the government of Magdeburg. It is situated in a plain on the Ucht, and is of considerable size. Here is a colony of French Calvinists, who carry on woollen and other manufactures, established by their ancestors. The town is old, and suffered greatly from fire in 1575, 1680, and 1687. Winckelmann was a native of this place. Inhabitants 5000. Thirty-one miles N. N. W. of Brandenburg, and sixty-two west of Berlin.

STENNET (Samuel), D. D., a Baptist clergyman, pastor of a congregation in Little Wild Street, London, was born in 1727, and died August 22d, 1795, at his residence at Muswell-hill near Highgate. He was a man much respected among the Protestant dissenters, both for the excellence of his character and for his learning and ability. Besides some single sermons, he was the author of Discourses on Personal Religion, 2 vols. 12mo.; Discourses on Domestic Duties, 8vo.; Sermons on the Divine Authority and various Use of the Holy Scriptures, 1790, 8vo. He also carried on a controversy on the subject of baptism with Dr. Stephen Addington.

STENO (Nicolas), a celebrated Danish anatomist, born in 1638. He studied under Bartholin, with whom he was a favorite. He then

travelled through France, Germany, Holland, and Italy; and obtained a pension from Ferdinand II., grand duke of Tuscany. In 1669 he renounced the Protestant religion, became a popish priest, and was appointed by the pope his apostolical vicar for the north. He published several tracts on anatomy and medical subjects. He died in 1603.

Steno Sture, a celebrated Swedish patriot. See Sweden.

STENOGRAPHIC, or Stenographical, (from stenography). Of or belonging to stenography, or writing in short-hand.

STENOGRAPHIST, a short-hand writer.

STENOGRAPHY.

STENOG'RAPHY, *n.s.* Gr. στενος and γραφω. Short-hand. See below.

O the accurst *stenography* of state!
The princely eagle shrunk into a bat. *Cleaveland.*

Sect. I.—Brief History and General Sketch of the art.

Stenography. The art of stenography, or short-hand writing, was known and practised by several ancient nations. The Egyptians, who were distinguished for learning at an early period, at first expressed their words by a delineation of figures called hieroglyphics: a more concise mode of writing seems to have been afterwards introduced, in which only a part of the symbol or picture was drawn. This answered, in some degree, the purpose of a short-hand. After them the Hebrews, Greeks, and Romans, adopted different methods of abbreviating their words and sentences, suited to their respective languages. The initials, the finals, or radicals, often served for whole words; and various combinations of these sometimes formed a sentence. Arbitrary marks were likewise employed to determine the meaning, and to assist legibility; and it seems probable that every writer, and every author of antiquity, had some peculiar method of abbreviation, calculated to facilitate the expression of his own sentiments, intelligible only to himself. It is also probable that some might by these means take down the heads of a discourse or oration: but few, very few, it is presumed, could have followed a speaker through all the meanders of rhetoric, and noted with precision every syllable, as it dropt from his mouth. To arrive at such a degree of excellence in this art was reserved for modern times, and is still an acquisition by no means general.

Some writers have ascribed to the Roman poet Ennius the merit of having first invented a method of writing, by which the notarii were enabled to follow the most rapid of their orators. This, however, is extremely hypothetical. It is added, that Ennius's method was much improved upon by Tyro, Cicero's freed-man; and still more by the learned Seneca. Ennius, it appears, began at first to write with 1100 marks of his own contrivance, to which he might add, as circumstances and necessity demanded. In what the subsequent improvements consisted we have no account; probably only in the invention of new symbols or characters, and not in any attempt to write in a short manner, by the combination of new and more simple letters. The Romans certainly held this art in great estimation; for Suetonius, speaking of Caligula, expresses his surprise, that an emperor, who, notwithstanding his numerous vices, was not deficient in capacity and parts, should remain ignorant of the art of stenographic writing. Titus Vespasian, in almost every respect a very different character from Caligula, is mentioned as being remarkably attached to short hand, and himself practised it with great facility, and often made it both his business and his amusement. He seemed to have great pleasure in calling his amanuenses together, and witnessing which of them wrote the fastest.

The art after this was much neglected, as is evident from two books of short-hand, mentioned by Trithemius. The first was a Short-Hand Dictionary, which he bought of an abbot, a doctor of law, for a few pence, to the great satisfaction of the community to which he belonged, who had desired the short-hand marks to be erased, for the sake of the parchment on which they were written. The other was a short-hand copy of the Book of Psalms, which he met with in another monastery, where the monks has inscribed upon it, by way of title, A Psalter in the Armenian Language. Several copies, however, of a Dictionary and Psalter, in Roman short-hand, are mentioned as extant in different libraries; but they are in general the same method, as may be conjectured from those who mention them, and also from the appearance of an old short-hand Psalter in the library of St. Germains, at Paris, carefully preserved as a stenographical curiosity. The late Mr. Byrom had a few pages of this transcribed for his inspection. Plutarch, in his Life of Cato, informs us, that the celebrated speech of that patriot, relating to the Catilinian conspiracy, was taken and preserved in short-hand; and there are numerous epigrams of Ausonius, Martial, and Manilius, commendatory of the art. But we must pass other ancient allusions and conjectures, only observing, that, probably, the oldest method of short-writing at present extant or known is a Latin MS., entitled Ars Scribendi Characteris, or The Art of Writing in Characters. The author of this is unknown; but it was printed about the year 1412.

In every language of Europe, till about the close of the sixteenth century, the Roman plan of abbreviating (viz. substituting the initials or radicals, with the help of arbitraries, for words) appears to have been employed. Till then no regular alphabet had been invented expressly for stenography, when an English gentleman of the name of Willis invented and published one. His plan was soon altered and improved, or at least pretended to be so. One alteration succeeded another; and at intervals, for a great number of years, men of ingenuity and application have

composed and published systems of stenography, and doubtless have themselves reaped all the advantages that attend it. But among the various methods that have been proposed, and the different plans that have been adopted by individuals, none has yet appeared fortunate enough to gain universal approbation; or proved sufficiently simple, clear, and concise, to be generally studied and practised. This would seem, indeed, to be an art so largely depending on practical and manipular skill, that no theory, however simple or scientific, can without extensive practice be of much importance to the student: while a comparatively imperfect system, in which the writer is well and habitually exercised, will be found of importance to many professions and stations in life.

English writers on stenography, are Addy, Aldridge, Angell, Annet, Blandemore, Blosset, Botley, Bridges, Byrom, Coles, Cross, Dix, Everardt, Ewen, Facey, Farthing, Gibbs, Græme, Gurney, Heath, Holdsworth, Hopkins, Jeake, Labourer, Lane, Lyle, Macauley, Mason, Mavor, Metcalfe, Nicholas, Palmer, Rich, Ridpath, Shelton, Steele, Tanner, Taylor, Thicknesse, Tiffen, Webster, Weston, Williamson, Willis, B. D., and Willis, &c. Of all these Dr. Mavor has been thought to give the most complete work in his Universal Stenography, now used as a class book in many schools: others, however, prefer Rich's system as improved by Dr. Doddridge. Mr. Gurney's, perhaps, has been most extensively and respectably practised in this country.

Some systems are replete with unmeaning symbols, perplexing arbitraries, and ill judged contractions; which render them so difficult to be attained by a common capacity, or ordinary application, that it is not to be wondered at if they have sunk into neglect, and are now no longer known. Other schemes, by being too prolix, by containing a multiplicity of characters, and those characters not simple or easily remembered, become ineffectual to the purpose of expedition, and are only superior in obscurity to a common hand. Some, again, not only reject all arbitrary characters and contractions, but even prepositions and terminations; which last, if not too lavishly employed and badly devised, highly contribute to promote both expedition and legibility; and, though they reduce the characters to fewer than can possibly express the various modifications of sound, yet they make nearly one-half of them complex. In the disposition of the vowels, there is the greatest perplexity in most systems. A dot is sometimes substituted for all the vowels indiscriminately, and the judgment is left to determine which letter out of six any dot is intended to express; or a minute space is allotted them; so that, unless they be arranged with mathematical precision, they cannot be distinguished from one another; but such a minute attention is inconsistent with the nature of short hand, which should teach us to write down in a short time, as well as in small bounds, what we wish to preserve of what we hear. Nor is the plan of lifting the pen and putting the next consonant in the vowel's place, in the middle of words, less liable to objections; or that of representing all the vowels by distinct characters, being obviously ill calculated for facility and despatch, and consequently inadmissible into any useful system. The person who first proposed the omission of vowels in the middle of words, which it is obvious are not wanted, and invented letters, which could be connected as in a running hand without lifting the pen in the middle of the word, made a real improvement on the works of his predecessors. But most systems labor under the capital defect of being too complicated, and so defeat the end of their invention; for they can neither be learned with ease, nor remembered with accuracy, nor be practised with the expedition which is requisite.

The method first subjoined will be found superior to most yet published, in the disposition of the vowels and the facility of arranging them, the confusion in placing which seems to detract from the merit of the best performances: and it may be affirmed, without ostentation, that characters, simpler in their form, and more perfect in their union, have not been applied to the art of stenography. As well as it could be determined, the simplest characters are appropriated to the letters most usually employed: indeed, as far as possible, those which are complex have been rejected; but as it was an object always kept in view that the writing should be on a line, a few were admitted into the alphabet for that reason.

In forming the characters for the double and triple consonants, care has been taken to provide against all obscurity which might arise by adopting letters too similar in their formation; and, with respect to the prepositions and terminations, those which occur most frequently are expressed by the simplest characters. The arbitraries are few in number, and the abbreviations, as they are entirely from the letters of the alphabet, and chosen from some thousands of words in common use, will well repay the learner for an hour's trouble in committing them to memory.

In the last section is laid down a scheme of abbreviation, comprised in a few rules, perfectly easy to be understood and practised by proficients in this art. The learner is, however, advised by no means to adopt any of them, till experience has convinced him that they may be used without error or injury to legibility. All abbreviating rules are suited to those only who have made some progress in the stenographic art; for although they certainly promote expedition, and afford the greatest ease to a proficient, yet a learner, as expedition is not his first, though his ultimate view, should admit of nothing that in the least renders the reading difficult.

Sect. II.—Of the Principles of Stenography.

The English alphabet consists of twenty-six letters; six of which are vowels, as every schoolboy knows. This alphabet, as is observed by the best grammarians who have written on the language, is both defective and redundant in expressing the various modifications of sound. But all modern alphabets are equally, and some more anomalous in these respects. But as it is not our intention to propose a mode of spelling different from that in common use, when applied to printing or long-hand writing, we shall only

observe that in stenography, where the most expeditious and concise method is the best, if consistent with perspicuity, the following simple rules are studiously to be practised.

Rule I.—All quiescent consonants in words are to be dropped, and the orthography to be directed only by the pronunciation; which, being known to all, will render this art attainable by those who cannot spell with precision in long-hand.

Rule II.—When the absence of consonants, not entirely dormant, can be easily known, they may often be omitted without the least obscurity.

Rule III.—Two, or sometimes more, consonants may, to promote greater expedition, be exchanged for a single one of nearly similar sound; and no ambiguity as to the meaning ensue.

Rule IV.—When two consonants of the same kind or same sound come together, without any vowel between them, only one is to be expressed; but, if a vowel or vowels intervene, both are to be written: but if they are perpendicular, horizontal, or oblique lines, they must only be drawn a size longer than usual; and characters with loops must have the size of their heads doubled. See plate Stenography.

Might is to be written *mit*, fight *fit*, machine, *mashin*, enough *enuf*, laugh *laf*, prophet *profet*, physics *fisiks*, through *thro'*, foreign *foren*, sovereign *soveren*, psalm *sam*, receipt *reset*, write *rite*, wright *rit*, island *iland*, knavery *navery*, temptation *temtation*, knife *nife*, stick *stik*, thigh *thi*, honor *onor*, indictment *inditement*, acquaint *aquaint*, chaos *kaos*, &c. Strength *strenth*, length, *lenth*, friendship *frenship*, connect *conek*, commandment *comanment*, conjunct *conjunt*, humble *humle*, lumber *lumer*, slumber *slumer*, number *numer*, exemplary *exemlary*, &c. Rocks *rox*, acts *aks* or *ax*, facts *faks* or *fax*, districts *distriks* or *distrix*, affects *afeks* or *afex*, afflicts *afliks* or *aflix*, conquer *konkr*, &c. Letter *leter*, little *litle*, command *comand*, error *eror*, terror *teror*, &c. But in *remember*, *moment*, *sister*, and such like words, where two consonants of the same name have an intervening vowel, both of them must be written.

These four rules, with their examples, being carefully considered by the learner, will leave him in no doubt concerning the disposition and management of the consonants in this scheme of short-writing; we shall therefore proceed to lay down rules for the application of the vowels with ease and expedition.

Rule I.—Vowels, being only simple articulate sounds, though they are the connectives of consonants, and employed in every word and every syllable, are not necessary to be inserted in the middle of words; because the consonants, if fully pronounced, with the assistance of connexion, will always discover the meaning of a word, and make the writing perfectly legible.

Rule II.—If a vowel is not strongly accented in the incipient syllable of a word, or if it is mute in the final, it is likewise to be omitted; because the sound of the incipient vowel is often implied in that of the first consonant, which will consequently supply its place.

Rule III.—But if the vowel constitutes the first or last syllable of a word, or is strongly accented at its beginning or end, that vowel is continually to be written.

Rule IV.—If a word begins or ends with two or more vowels though separated, or when there is a coalition of vowels, as in diphthongs and tripthongs, only one of them is to be expressed, which must be that which agrees best with the pronunciation.

Rule V.—In monosyllables, if they begin or end with a vowel, it is always to be inserted, unless the vowel be *e* mute at the end of a word.

Such are the general principles of this art; in vindication and support of which it will be needless to offer any arguments, when it is considered that brevity and expedition are the chief objects, if consistent with legibility; and the subsequent specimens in the orthography recommended will, we hope, be sufficient to show that there is no real deficiency in the last mentioned particular.

He who md us mst be etrnl, grt, nd mnptnt. It is ur dty, as rsnl bngs, to srv, lv, nd oby hm. A mn tht wd avd blm shd be srkmspk in al his axns, nd ndvr wth al hs mt to pls evry bdy.—I wd nt frm any knxns wth a mn who hd no rgrd fr hmslf; nthr wd I blv a mn who hd ons tld me a li.—Onr is of al thngs the mst df klt to prsrv ntrnshd; nd whn ons mpchd, lk the chstty of a wmn, nvr shns wth its wntd lstr.—Wth gd mnrs, kmplsns, nd an esy plt adrs, mny mk a fgr in the wrl, whs mntl ablts wd skrsly hv rsd thm abv the rnk of a ftmn.—Idlns is the prnt of a thsnd msfitns, wch ar nvr flt by the ndstrs: it is a pn nd a pnshmnt of itslf, nd brngs wnt nd bgry in its trn.—Vrtu is the frst thng tht shd be rgrdd; it is a rwrd of tslf: mks a mn rspktbl hr, nd wl mk hm etrnly hpy hrftr.—Prd is a mst prnss psn, wch yt ws plnted by hvn in ur ntr, to rs ur emisn to imtt grt nd wrthy krktrs or axns, to xt in us a sl fr wht is rt nd grst, nd a ldbl ndgnsn gnst oprsrs nd wrkrs of any knd of nkty; in shrt, to mk us st a prpr vlu upn urslvs, nd dsps a wrthls flo, hu evr xltd. Ths fr prd is a vrtu, nd my gstly be kld a grtns of sl. Bt prd, lk othr psns, gnrly fxs upn rng obgks, or is apld in rng prprsns. Hu kmn is it to se a rtch whm evry vs hs rndrd msrbl, nd evry fly kntmtbl, ving hmslf on hs hi brth, nd bstng hs ilstrs nsstrs, of whm he nhrts nthng bt the nm or ttl! nsstrs who, if thy nu hm, wd dsn thr dscndnt wth kntmt. But al prd of ths srt is fly, nd evr to be avdd.

Sect. III.—Of the Stenographic Alphabet.

As the whole of this art depends upon a regular method, and a simple alphabet, we have not only endeavoured to establish the former on satisfactory principles, but have been careful to appropriate, according to the comparative frequency of their occurrence, such characters for the letters, as, after repeated trials and alterations, were conceived to be the best adapted for despatch.

The stenographic alphabet consists of eighteen distinct characters (viz., two for the vowels and the rest for the consonants), taken from lines and semicircular curves; the formation and application of which we shall now explain, beginning with the vowels. For the first three vowels, *a*, *e*, and *i*, a comma is appropriated in different positions; and for the other three, *o*, *u*, and *y*, a point. The comma and point, when applied to *a* and *o*, is to be placed, as in the plate at the top of the next character; when for *e* and *u*, oppo-

STENOGRAPHY.

ALPHABET, WITH THE DOUBLE & TRIPLE CONSONANTS.

Let.	Char.	Arb. Abbrev.
a	·	a, an, above
b	(	be, by, because
c	⌒	
d	)	do, did
e	·	ever, every, mid
f	⌒	from, if
g, j	⌒	God, give, gives
h	⌒	he, had, his
i	·	I, eye, below
k	\	king, know
l	/	Lord, will, all
m	⌒	me, my, most
n	⌣	and, in, nature
o	/	O, oh, owe, above
p	⌒	people, peace
q	⌒	ques.tn. quantity
r	/	or, are
s	—	is, as, soon
t	·	the, to, it
v	⌒	have, save
u	·	you, view, middle
w	—	we, with
x	⌒	except, example
y	·	ye, your, yes, bel
z	/	

D.C.&c.	Char.	Arb. Abbrev.
ch	7	each, such
s	6	shall, she
th	⌒	that, they
thr	⌒	therefore
str	⌒	strive, strong
wh	⌣	who, which

VOWELS PLACES.

	a	e	i	o	u	y
b						
d						
f						
g						
h						
k						
m						
n						
p						
r						
s						
t						
v						
w						
x						

PREPOSITIONS & TERMINATIONS.

Prepos.	Char.	Ex.	Signifi.	Term.	Char.	Ex.	Signifi.
abs, obs	(		abstain	able, ible	(		stable
anti, ante	·		antidote	flect			
anta				flect	⌒		conflict
contra				full			
contro	⌣		counterfeit	ference			
counter				ing	⊙		thing
dis-in-com	⌒		discompose	ings	·		things
hyp-o-er	⌒		hypocrite	tion, cion			
mag-n-s-a	⌒		magnify	sian	⊙		petition
multi				cian			
omni	·		omniscience	tian &c			
int-er-ro	⌣		entertain	tions &c	·		petitions
enter				sifs, ces			
post	⌒		postpone	sys, sus			
preter				tious	⌒		thesis
recon	⌒		reconcile	cious &c			
recom				less	/		harmless
satis				ment	⌒		indictment
super	—		satisfy	self			
circum							
trans	/		transfer	stract	—		substract
ext-er-in	⌒		extirpate	strict			
extra				ward	—		forward

ABBREVIATING MARKS.

A. Substantive	Division
An. Adjective	Divisible
A. Verb	Divide
A. Participle	Dividing

THE LORD'S PRAYER.

London, Published by T. T. & J. Pegg, 73 Cheapside.

J. Shury sculp.

site to the middle; and, when for *i* and *y*, at the bottom. This arrangement of the vowels we take to be the most simple and distinct that can easily be imagined. Places at the top, the middle, and the bottom of characters, which make three different positions, are as easily distinguished from one another as any three separate characters could be; and a comma is made with the same facility as a point.

Simple lines may be drawn four different ways; perpendicular, horizontal, and with an angle of about 45° to the right and left. An ascending oblique line to the right, which will be perfectly distinct from the rest when joined to any other character, may likewise be admitted. These characters, being the simplest in nature, are assigned to those five consonants which most frequently occur, viz., *l*, *r*, *t*, *c* hard or *k*, and *c* soft or *s*. Every circle may be divided with a perpendicular and horizontal line, so as to form likewise four distinct characters. These being the next to lines, in the simplicity of their formation, we have appropriated them for *b*, *d*, *n*, and *m*.

The characters expressing nine of the consonants are all perfectly distinct from one another; eight only remain which are needful, viz. *f*, *g* or *j*, *h*, *p*, *q*, *v*, *w*, and *x*; to find characters for which we must have recourse to mixed curves and lines. The characters which we have adopted are the simplest in nature after those already applied, admit of the easiest joining, and tend to preserve lineality and beauty in the writing. It must be observed that we have no character for *c* when it has a hard sound, as in castle; or soft, as in city; for it always has the sound of *k* or *s*, which in all cases will be sufficient to supply its place; or *c*, being easier written, might be used in all cases for the hard sound. *R* likewise is represented by the same character as *l*; only with this difference, *r* is written with an ascending stroke and *l* with a descending; which is always to be known from the manner of its union with the following character; but in a few monosyllables where *r* is the only consonant in the word, and consequently stands alone, it is to be made as is shown in the alphabet for distinction's sake. The character for *h*, when lineality requires it, may be made from the bottom and inverted, as already described. And often *h* may be omitted entirely. *Z*, as it is a letter seldom employed in the English language, and only a coarser and harder expression of *s*, may be supplied by *s* whenever it occurs: as for Zedekiah write Sedekiah, &c., or *z* itself may be used.

Sect. IV.—Of the Prepositions and Terminations.

The prepositions and terminations in this scheme are so simple, that the greatest benefit may be reaped from them, and very little trouble required to attain them; as the incipient letter or the incipient consonant of all the prepositions, and of several of the terminations, is used to express the whole. But, although we have already given sufficient specimens of the manner of their application, that the learner of more slow perception may have every assistance, we have subjoined the following directions:—

Rule I.—The preposition is always to be written without joining, yet so near as plainly to show what word it belongs to; and the best way is to observe the same order as if the whole was to be connected.

Rule II.—A preposition, though the same letters that constitute it may be met with in the middle or end of a word, is never to be used, because it would expose to obscurity.

Rule III.—Observe that the preposition *omni* is expressed by the vowel *o* in its proper position; and for *anti*, *anta*, *ante*, by the vowel *a*, which the radical part of the word will easily distinguish from being only simple vowels.

The first rule for the prepositions is (allowing such exceptions as may be seen in the plate) to be observed for the termination; and also the second mutatis mutandis; except that whenever *sis*, *sus*, *sys*, *cious*, *tious*, and *ces*, occur, they are to be expressed as directed in the fourth rule for the consonants, whether in the beginning, middle, or end of words. But in a few words, where three horizontal characters meet, it will be better to express the *sis*, &c., by the semielliptical character in plate I. opposite *tious*.

Rule IV.—The terminative characters for *tion*, *sion*, *cion*, *cian*, *tian*, is to be expressed by a small circle joined to the nearest letter, and turned to the right; and the plurals *tions*, *sions*, *cions*, *cians*, *tians*, *tience*, by a dot on the same side.

Rule V.—The terminative character for *ing* is to be expressed likewise by a small circle, but drawn to the left hand; and its plural *ings* by a dot. In horizontal characters, by the left hand is meant the top, and by the right the space below the letter. See *ing* which is joined. In all other characters the right and left positions cannot be mistaken.

Rule VI.—The plural sign *s* is to be added to the terminative characters when necessary.

Rule VII.—The separated terminations are never to be used but in polysyllables, or words of more syllables than one.

These rules duly observed will point out a method as concise and elegant as can be desired, for expressing the most frequent and longest prepositions and terminations in the English language. If it should be thought necessary to increase their number, by the addition of others, it will be an easy matter for any one of the least discernment to do so, by proceeding on the principles before laid down.

Sect. V.—Rules for Abbreviations.

Though a more concise method of writing, or more numerous abbreviations may not be indispensably necessary, if the foregoing directions be practised for a considerable time, yet contractions will be found extremely useful and convenient to those who have attained a proper knowledge of the subject, and lead to a greater degree of expedition, at the same time that they diminish the labor of writing. It has been observed in the introduction that abbreviations are only to be employed by proficients in this art; because expedition is not the first, though the ultimate object in view; and that an easy legibility is of the utmost consequence to the learner; which, however, cannot be preserved, if he adopts too soon

those very rules which in time will afford him the greatest ease when applied with judgment.

The following short and practical rules will be found fully adequate to every purpose for which they were intended, and are far superior in the facility of their application to any which we have seen.

RULE I.—The usual abbreviations in longhand are always to be followed; as Mr. for Master, M. D. for Doctor of Physic, and Abp. for Archbishop, &c.

RULE II.—Substantives, adjectives, verbs, and participles, when the sense will direct to the meaning, are to be expressed by their initial consonant with the distinguishing marks exhibited in our plate; viz. as substantive must have the dot exactly over its initial consonant; an adjective must have a dot under it; a verb is to be expressed by a comma over its initial consonant; and a participle by a comma under. The dot or comma, being placed thus, will never occasion them to be mistaken for vowels, because they should always be on one side or other; whereas the marks for parts of speech must constantly be placed exactly over or under. These being the four principal parts of speech will be sufficient; and an adept will never be at a loss to know when he can with safety apply this rule to them.

RULE III.—To render the writing more legible, the last letter of the word may be joined to the first, and the proper mark applied.

RULE IV.—The constituent or radical part of words, especially if they are long, will often serve for the whole, or sometimes the first syllable; as, we ought to moderate our *ex.* by our *circum.*; a man's *man.* commonly shape his *for.*

RULE V.—All long words without exception may have their prepositions or terminations expressed by the incipient consonant of such preposition or termination.

RULE VI.—When there is a great dependence between the parts of a sentence, the initial letter will often suffice; as, *L.* is the capital of Great *B.*; the eldest *S.* of the king of *G. B.* is styled *P.* of *W.* Every one, it is presumed, will allow this to be perfectly legible, either in long or short hand.

RULE VII.—The termination *ness* and *less* may be omitted; as faithfulness is only to be written *faithful;* forwardness, *forward;* heedless, *heed;* stubborness, *stubborn,* &c.

RULE VIII.—The second and third persons of verbs, ending in *eth* and *est,* may be expressed by *s;* as, he *loves,* thou *teaches;* instead of he *loveth,* thou *teachest;* or even without *s;* as, he *love,* &c.

RULE IX.—Words naturally supplied by the sense may only often be entirely omitted, and yet no ambiguity ensue; as, In beginning God created heaven and earth, for In *the* beginning God created *the* heaven and *the* earth.

RULE X.—When there is an immediate repetition of a sentence or word, a line is to be drawn under the sentence or word to be repeated; as, Amen, Amen, is to be written Amen; but if any words intervene, before a word or sentence is to be repeated, the line must be drawn as before, and a ⌄ or mark of omission placed where the repetition should begin; as, Is it just the innocents should be condemned ⌄, reviled?

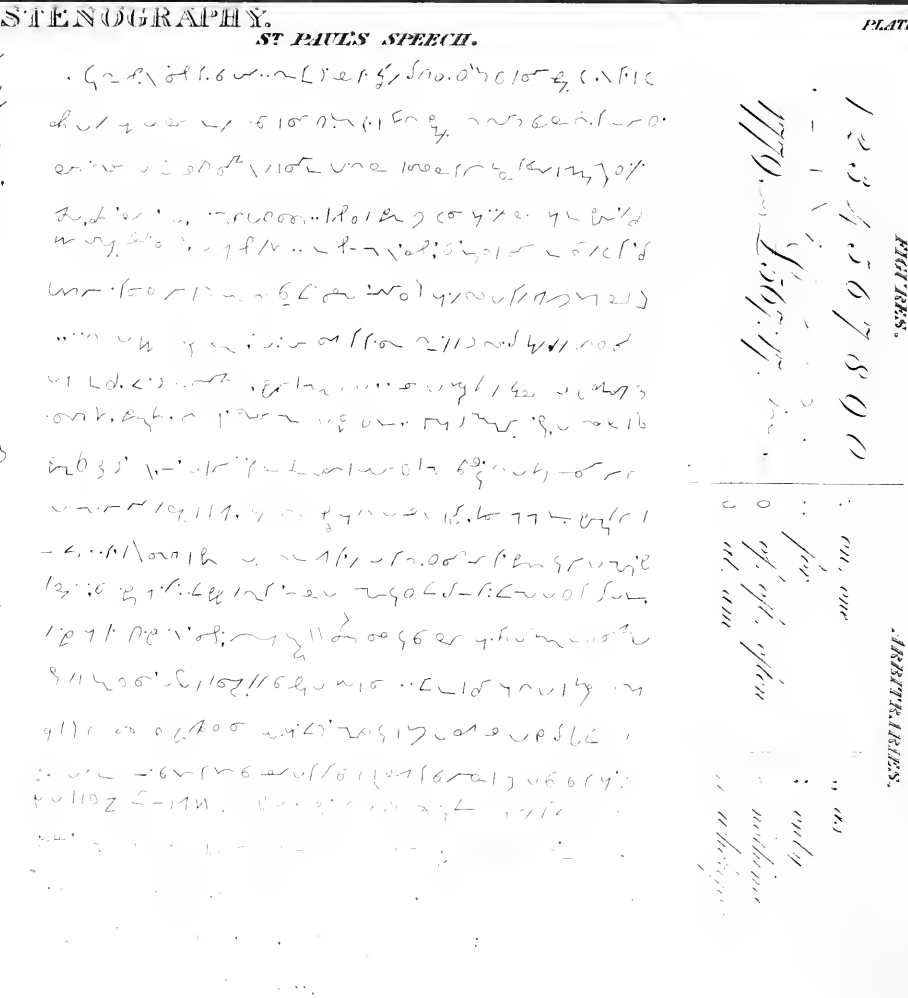
SPECIMEN OF STENOGRAPHIC LETTER.

I. *Fabricius's Reply to Pyrrhus.*—As to my poverty, you have indeed, Sir, been rightly informed. My whole estate consists in a house of but mean appearance, and a little spot of ground, from which by my own labor I draw my support. But if by any means you have been persuaded to think that this poverty makes me less considered in my country, or in any degree unhappy, you are extremely deceived. I have no reason to complain of Fortune: she supplies me with all that nature requires; and, if I am without superfluities, I am also free from the desire of them. With these, I confess I should be more able to succor the necessitous, the only advantage for which the wealthy are to be envied; but, as small as my possessions are, I can still contribute something to the support of the state and the assistance of my friends. With regard to honors, my country places me, poor as I am, upon a level with the richest; for Rome knows no qualifications for great employments but virtue and ability. She appoints me to officiate in the most august ceremonies of religion; she entrusts me with the command of her armies; she confides to my care the most important negociations. My poverty does not lessen the weight and influence of my counsels in the senate; the Roman people honor me for that very poverty which you consider as a disgrace; they know the many opportunities I have had in war to enrich myself without incurring censure; they are convinced of my disinterested zeal for their prosperity; and, if I have any thing to complain of in the return they make, it is only the excess of their applause. What value then can I set upon your gold and silver! What king can add any thing to my fortune! Always attentive to discharge the duties incumbent on me, I have a mind free from self-reproach, and I have an honest fame.—Dodsley's Preceptor.

II.—*A letter to a friend against waste of time.* Converse often with yourself, and neither 'avish your time nor suffer others to rob you of it. Many of our hours are stolen from us, and others pass insensibly away; but of both these losses the most shameful is that which happens through our own neglect. If we take the trouble to observe, we shall find that one considerable part of our life is spent in doing evil, and the other in doing nothing, or in doing what we should not do. We don't seem to know the value of time, nor how precious a day is: nor do we consider that every moment brings us nearer our end. Reflect upon this, I entreat you, and keep a strict account of time. Procrastination is the most dangerous thing in life. Nothing is properly ours but the instant we breathe in, and all the rest is nothing; it is the only good we possess; but then it is fleeting, and the first comer robs us of it. Men are so weak that they think they oblige by giving of trifles, and yet reckon that time as nothing for which the most grateful person in the world can never make amends. Let us therefore consider time as the most valuable of all things; and every moment spent without

STENOGRAPHY.

I. FABRICIUS' REPLY TO PYRRHUS.



II. LETTER &c.

ST PAUL'S SPEECH.

ENGLISH.

ARBITRARIES.

some improvement in virtue, or some advancement in goodness, as the greatest sublunary loss.

III. *St. Paul's speech before Agrippa and Festus.* See Acts, xxvi. 1—29.

Sect. VI.—Mr. Gurney's System.

This, as we have intimated, is the system which has been for many years most extensively patronised by parliament and the government. We subjoin the Introduction of the late Mr Gurney; and cannot do better than give a general outline of his published remarks which are said to contain 'the whole theory.

To constitute a good system of short-hand, says this writer, it is essential—1. That the characters be as simple as possible, in order to their being written with facility: and, 2. That they be so distinct as to be read with ease at any distance of time.

The only distinct marks which can be made use of are a point, a circle, a straight line, and a curve. These may be varied by position.

As a point cannot be distinctly joined with any other character, it is unfit to be introduced into the alphabet. There are no other distinct positions of a straight line than horizontal, perpendicular, and oblique: thus; — | \ /

The curve may be varied in the same manner; thus: ○ ○ ○ ○

The practise of placing a character above o below the line; and also of varying it, by thickness or length, I totally expunge; as it could never be written swiftly, with any tolerable degree of precision.

We have therefore but nine simple distinct marks: namely, a straight line, and a curve, each in four different directions; and a circle: whence it is obvious that these nine marks should be made to express those consonants which most frequently occur in the short-hand orthography (the vowels being never written but when used to begin a word). The rest of the alphabet must necessarily consist of compound characters, which I have endeavoured to render as simple as possible.

It will, likewise, be noticed, that the same character being made to express *a*, *s*, and *z*, the *a* must be struck upwards, the *s* and *z* downwards. As the *a* is never written singly, the succeeding character will, at first view, show which letter is intended to be expressed.

When the letter *r* does not begin a word, it is expressed by a stroke upwards; of which there are several specimens in the second column of the first page.

The long *s* is only to be used at the beginning and end of words. The circle is not to be written for *s*, at the beginning of a word, except when *t* immediately follows; and never at the end of a word, for it would then stand for *ing* or *ong*. When *s* immediately follows *r*, the oblique upward stroke is only prolonged.

The first four engraved pages in Mr. Gurney's admirable book contain the whole theory of the art.

The alphabet should be got perfectly in memory; and also the words which the letters stand for when wrote single. The other column, on the first page, is designed to give the learner an idea of the manner of joining the letters, and of spelling words; but need not be committed to memory.

On the second page, the method of expressing the vowels is shown. Here the rules only are to be got in memory; the short-hand characters being merely an illustration of the rules.

When a person has made himself master of the alphabet, and of the method of expressing the vowels, he will then be able to write any thing in the English language. But as it would be impossible, in that case, to write with swiftness sufficient to answer the usual purposes of short-hand, we are under the necessity of using contractions, and arbitrary characters; care, however, should be taken that too many of these be not crowded upon the memory. I have dismissed a great number which had place in the former editions of this system: and, to shorten the trouble of the learner, have disembarassed the art from many needless difficulties and real incumbrances.

The arbitrary characters, on the remainder of the second and third pages, should be got in memory; as should, too, the abbreviating rules, on the fourth page.

The whole residue of the engraved pages is all mere matter of example and explanation.

It will be observed that in the spelling of words no particular regard is had either to the retaining or omitting of vowels; but such letters only are made use of as convey, by their sound, a competent idea of the word designed: and, therefore, one person may, if he so choose, admit more letters in a word than another. The farther, however, any person is advanced in the practice and experience of the art the more concisely he will write; that is, the fewer letters will he use in spelling a word.

It is impossible to compose any system of short-hand, in which various words will not be spelt alike, or written with the same letters. For instance: despise and dispose. *Dsps* will stand for either word. But, in such case, the sense and connexion will immediately distinguish for which of these two words the contraction stands.

If any arbitrary character, or contracting rule, should not be instantaneously recollected; it will be attended with no other inconvenience than the loss of the advantage arising from the use of such abbreviation; as the writer will then be obliged to pen it in the same manner as any other word for which there is no arbitrary character.

'When a word is meant to be erased, draw two lines through it. If several words are meant to be obliterated, a single line drawn through them all will be sufficient. I need say nothing with regard to punctuation. Were points, or stops, introduced into short-hand, they would both impede the writer's despatch, and tend to confuse the characters. Though of manifest use in long-hand, the admission of them would be quite unserviceable and even highly detrimental in brachygraphy. To remedy the want of them, the writer has only to leave a short vacancy between each sentence; and, for every new paragraph, to begin a fresh line.'

STENTOR, a Grecian herald who went to the Trojan war, and whose voice, says Homer, was so strong that it exceeded that of fifty men together.—Hom. Il. v. 784. Hence the following derivatives.

STENTOREAN, strong-voiced; long-tongued.

STENTOROPHON'ICK, *adj.* From Stentor, the Homerick herald, and φωνη, a voice. Loudly speaking or sounding.

Of this *stentorophonick* horn of Alexander there is a figure preserved in the Vatican.
Derham's Physico-Theology.

STENWYCK (Henry), an eminent Dutch painter, born in 1550. He studied under John de Vries, who was eminent in architecture and perspective, but Henry excelled him. His Night Views of the Insides of Churches, illuminated by candles and flambeaux, were much admired. He died in 1603.

STENWYCK (Henry), the Younger, son of the old Henry, was taught by his father, and became also eminent. He came over to England, where he was much patronised by Charles I. He died at London in 1640.

STEP, *v. n.* & *n. s.* } Sax. ȝcœppan; Belg.
STEPPING-STONE, } *stappen, stap;* Goth *stef.*
To move by a single movement of the foot; advance by a sudden progression; go; move mentally; walk gravely or slowly: a movement of this kind, corporeal or mental; the space moved over; progression; gradation; gait: in composition, step signifies one removed one degree from affinity by blood, i. e. one related only by marriage.

There is but a *step* between me and death.
1 *Sam.* xx. 3.

Whosoever first, after the troubling the water, *stepped* in, was made whole. *John* v. 4.

His wanton *step-dame* loved him the more;
But when she saw her offered sweets refuse,
Her love she turned to hate. *Spenser.*

How should their minds chuse but misdoubt, lest this discipline, which always you match with divine doctrine as her natural and true sister, be found unto all kinds of knowledge a *step-mother.* *Hooker.*

The same sin for substance hath sundry *steps* and degrees, in respect whereof one man becometh a more heinous offender than another. *Perkins.*

Pyrrhus, the most ancient of all the bashaws *stept* forth, and, appealing unto his mercies, earnestly requested him to spare his life.
Knolles's History of the Turks.

While Solyman lay at Buda, seven bloody heads of bishops slain in battle were set in order upon a wooden *step.* *Knolles.*

Ventidius lately
Buried his father, by whose death he 's *stepped*
Into a great estate. *Shakspeare. Timon.*

See where he comes; so, please you, *step* aside:
I'll know his grievance. *Id. Romeo and Juliet.*

Thou sound and firm-set earth,
Hear not my *steps,* which way they walk.
Id. Macbeth.

Lingering perdition, worse than any death
Can be at once, shall *step* by *step* attend
You and your ways. *Id. Tempest.*

You shall not find me, daughter,
After the slander of most *step-mothers,*
Ill-eyed unto you. *Id. Cymbeline.*

A father cruel, and a *step-dame* false. *Shakspeare.*

Cato the elder being aged, buried his wife, and married a young woman: his son came to him, and said, Sir, what have I offended, that you have brought a *step-mother* into your house? The old man answered, Nay, quite the contrary, son; thou pleasest me so well, as I would be glad to have more such.
Bacon.

The breadth of every single *step* or stair should be never less than one foot, nor more than eighteen inches. *Wotton.*

One of our nation hath proceeded so far that he was able, by the help of wings, in a running pace, to *step* constantly ten yards at a time.
Wilkins's Mathematical Magick.

When you *stepped* forth, how did the monster rage,
In scorn of your soft looks and tender age!
Cowley.

My brothers, when they saw me wearied out,
Stepped, as they said to the next thicket side
To bring me berries. *Milton.*

O may thy power, propitious still to me,
Conduct my *steps* to find the fatal tree
In this deep forest. *Dryden's Æneid.*

The name of *step-dame,* your practised art,
By which you have estranged my father's heart,
All you have done against me, or design,
Shows your aversion, but begets not mine.
Id. Aurengzebe.

A *step-dame* too I have, a cursed she,
Who rules my hen-pecked sire, and orders me.
Dryden.

Who was the first to explore the untrodden path,
When life was hazarded in every *step?*
Addison's Cato.

The old poets *step* in to the assistance of the medalist. *Addison.*

Those heights where William's virtue might have staid,
And on the subject world look'd safely down,
By Marlbro' passed, the props and *steps* were made
Sublimer yet to raise his queen's renown. *Prior.*

To derive two or three general principles of motion from phenomena, and afterwards to tell us how the properties and actions of all corporeal things follow from those manifest principles, would be a very great *step* in philosophy, though the causes of those principles were not yet discovered. *Newton.*

The gradus, a Roman measure, may be translated a *step,* or the half of a passus or pace.
Arbuthnot on Coins.

Any body would have guessed Miss to have been bred up under the influence of a cruel *step-dame,* and John to be the fondling of a tender mother.
Id. History of John Bull.

The reputation of a man depends upon the first *steps* he makes in the world. *Pope.*

They are *stepping* almost three thousand years back into the remotest antiquity, the only true mirrour of that ancient world.
Id. Preface to the Iliad.

One injury is best defended by a second, and this by a third: by these *steps* the old masters of the palace in France became masters of the kingdom; and by these *steps* a general during pleasure might have grown into a general for life, and a general for life into a king. *Swift.*

When your master wants a servant who happens to be abroad, answer, that he had but that minute *stept* out. *Id.*

Like *stepping-stones* to save a stride,
In streets where kennels are too wide. *Id.*

Home the swain retreats,
His flock before him *stepping* to the fold.
Thomson's Summer.

It was a saying among the ancients, Truth lies in a well; and, to carry on this metaphor, we may

justly say, that logick does supply us with *steps*, whereby we may go down to reach the water. *Watts.*

The querist must not proceed too swiftly towards the determination of his point, that he may with more ease draw the learner to those principles *step* by *step*, from whence the final conclusion will arise. *Id.*

Step, in a ship, a block of wood fixed on the docks or bottom of a ship, and having a hole in its upper side, fitted to receive the heel of a mast or capstern. The steps of the main and foremasts of every ship rest upon the kelson, to which they are firmly secured by knees, bolts, or spike-nails. The step of the mizen-mast usually rests upon the lower deck.

To Step, in military affairs, is to move forward or backward, by a single change of the place of the foot. To step out, to lengthen your pace. To step short, according to the regulations, is to diminish or slacken your pace. This step is useful when a momentary retardment of either a battalion in line, or of a division in column, shall be required. To step out, according to the regulations, is to lengthen the step to thirty-three inches, by leaning forward a little, but without altering the cadence. This step is necessary when a temporary exertion in line and to the front is required; and is applied both to the ordinary and quick time. These phrases are frequently used in military movements, when it is found necessary to gain ground in front, or to give the rear of a column, &c., time to acquire its proper distance. The officer who leads a head division, should be particularly attentive, when he is ordered to step out, or step short, especially in the different wheelings, not to lose the precise moment when either may be thought expedient; and, in marching in open column, every successive officer should watch the seasonable moment, after a wheel, of preserving his relative distance.

To Step off, in a military sense, to take a prescribed pace from a halted position, in ordinary or quick time, in conformity to some given word of command or signal.

Balancing Step (Fr. pas d'école), a step so called from the body being balanced upon one leg, in order to render it firm and steady in military movements, &c. Men at the drill should be frequently exercised in this step.

The side or closing Step (Fr. pas de côté, ou pas serré), a step which is taken in order to gain ground to the right or left, without altering the front of the battalion, or of closing it to its centre, whenever a chasm occurs in the line after it has wheeled from the column, &c. According to the regulations, this step is performed from the halt, in ordinary time, by the following words of command :—Close to the right—march (Fr. appuyez, à la droite). Close to the left—march (Fr. appuyez à la gauche).

Back Step (Fr. pas en arrière), a step taken to the rear from any position without any change of aspect. According to the regulations, the back step is performed in the ordinary time and length of pace, from the halt, on a given word of command. It will be generally recollected that a few paces only of the back step can be necessary at a time.

Step Back, March (Fr. en arrière, marche), a word of command which is given when one or more men are ordered to take the back step according to the regulation.

Quick Step (Fr. pas accéléré), a military step consisting of thirty inches (of which 108 are to be taken in a minute, making 270 feet in a minute), which constitutes what is technically called quick time in marching.

Quickest Step (Fr. pas précipité), a step measuring thirty inches, and of which 120, making 300 feet, may be taken in a minute. This step is applied chiefly to the purpose of wheeling, and is the rate at which all bodies accomplish their wheels; the outward file stepping thirty-three inches, whether the wheel is from line into column, during the march in column, or from column into line. In this time also, and by this step, should divisions double, and move up, when they pass obstacles in line; or when in the column of march the front of divisions is increased, or diminished.

To Step Between, to interfere.

To Step Forth or Forward, to take an active part in any thing. Thus, when the circle was formed, the grenadiers stepped forward to beg off their comrade, &c. The officers stepped forward, and remonstrated against their colonel.

Step (Fr. échelon), according to the translator of rules and regulations for the field exercise and manœuvres of the French infantry, échelon means, in a figurative sense, what we understood by step in military promotion. See Grades Militaires in the Nouveau Dictionnaire Militaire, by A. T. Gaigne.

Step is likewise figuratively used to signify promotion. As, the next step from a lieutenancy is a troop or company, and from that to a majority; except in the guards, who have the exclusive privilege of going over this intermediate rank, and stepping into a lieutenant-colonelcy at once. The engineers enjoy the same privilege.

To Step over, to rise above another. This term is generally used in a bad sense. As, young men of interest and connexion frequently step over old soldiers.

Step and Leap is one of the seven airs, or artificial motions of a horse, being as it were three airs. The step puts the horse upon the hand, and gives him a rise to leap, like unto one that runs before he leaps, and so may leap higher than he that goes every time a leap.

Step-Child, the child of a husband or wife by a former marriage.

Step-Dame (step and dame), a step-mother. See Step, and Step-mother.

Step-Daughter (step and daughter), the daughter of one's husband or wife, by a former wife or husband; often very absurdly styled daughter-in-law, a term which should be restricted to the son's wife. See Affinity.

Step-Father (step and father), the husband of a widow, who has children by a former husband. This degree is also confounded in common language, as well as in writing, and absurdly called father-in-law, a term which should be solely restricted to the father of a son's wife, or of a daughter's husband. See Affinity, and Father-in-law.

STEPHANAS, one of the first Christian converts at Corinth, baptized by Paul. He came to Paul at Ephesus with Fortunatus and Achaicus.

STEPHANIDES (Gulielmus), or William Fitz-Stephen, an ancient English historian of the twelfth century, who flourished from the reign of king Stephen to that of Richard I. See FITZ-STEPHEN. He is highly praised by Leland, as well as Bayle, who compares him to Plato.

STEPHANIUM, in botany, a genus of the monogynia order, and pentandria class of plants; natural order forty-seventh, stellatæ: CAL. monophyllous, turbinated, and quinquepartite: COR. monopetalous, funnel-shaped, having its tubes curved and ventricose: the pericarpium is a bilocular berry containing two seeds, flattened on one side and round on the other. This genus is nearly allied to that of psychotria. There is only one species, viz. S. Guianense, a native of the warmer parts of America.

STEPHANOPHORUS, in antiquity, the chief priest of Pallas, who presided over the rest. It was usual for every god to have a chief priest; that of Pallas was the Stephanophorus just mentioned, and that of Hercules was called Daduchus. Stephanophorus was also a priest that assisted the women in the celebration of the festival Thesmophoria.

STEPHANUS, an able grammarian, a native of Byzantium, who lived in the fifth or sixth century. He wrote a dictionary, in which he made a great number of observations, which showed the origin of cities and colonies, of which we have nothing remaining but a mean abridgment by Hermolaus the grammarian; but from that work the learned have received great light; and Sigonius, Casaubon, Scaliger, Salmasius, &c., have employed themselves in illustrating it.

STEPHANUS, the Latin name assumed by the learned printers of the name of Stephens. See STEPHENS.

STEPHEN, the first of the seven deacons, and first martyr for Christianity; whence he is called the protomartyr, from πρωτος, first. His election, miracles, apprehension, examination, glorious defence, and martyrdom, A. D. 33, are recorded in Acts vi. and vii. There is little else certain recorded of him. He is said to have been a leading man among the Helenistic Jews, educated by Gamaliel, and one of our Lord's seventy disciples.

STEPHEN I., bishop of Rome, succeeded Lucius A. D. 253. He had a dispute with St. Cyprian and Firmilian about the rebaptisation of heretics, which he condemned. He suffered martyrdom, A. D. 257, during the persecution under Valerian.

STEPHEN II. was born in Rome, and was elected pope in 752. Astolphus, king of the Lombards, having threatened Rome, Stephen went to France, and asked the assistance of king Pepin, who marched into Italy, and prevailed on Astolphus to desist from his invasion. But on Pepin's departure Astolphus returned with his troops; on which Pepin attacked and defeated him, took several of his cities, and gave them to Stephen, which laid the foundation of that temporal power of the popes which afterwards became so enormous. Stephen died in 757.

STEPHEN III., a native of Sicily, was chosen Pope in 768. He was opposed by the anti-pope Constantine, who was condemned in a general council in 769. Stephen died in 772.

STEPHEN IV., a Roman, was elected in 816, and crowned Louis I. in France, but died in 817.

STEPHEN V. succeeded Adrian III. in 885; and is celebrated for his virtues, learning, and humility. He died in 891.

STEPHEN VI. was chosen by a party in 896, after the anti-pope Boniface VI. He caused the body of his predecessor Formosus to be taken up and thrown into the Tiber. But this act of vindictive malice rendered him so unpopular that the citizens revolted, took him prisoner, put him in jail, and soon after strangled him.

STEPHEN VII. succeeded Leo VI. A. D. 929, and died in 931.

STEPHEN VIII., a German, and a relation of the emperor Otho I., was elected pope in 939, after Leo VII. His conduct was tyrannical and very disagreeable to the Romans. He died in 942.

STEPHEN IX., brother of Godfrey duke of Lower Lorrain, was elected pope in 1057. He assembled councils for a reformation of the morals of the clergy; which indeed they stood much in need of. He died in 1058.

STEPHEN, king of England. See ENGLAND.

STEPHEN BATTORI, an excellent king of Poland, if he had not been too zealous a Catholic. See POLAND.

STEPHEN (St.), king of Hungary, succeeded his father Geisa in 947. He was the apostle of his country; propagated Christianity among the wild Hungarians, and enacted wise laws: for which Benedict IX. canonised him. He died at Buda in 1038.

STEPHENS, a family of printers who flourished at the revival of learning, and contributed greatly towards dispelling the cloud of ignorance which had so long overshadowed Europe. Some of the classics before the sixteenth century were in a great measure lost, and all of them were exceedingly corrupted. By their abilities and indefatigable industry these defects were supplied, and the learned were furnished with beautiful and correct editions of the Greek and Roman authors.

STEPHENS (Henry), the first of these illustrious men, was born in France soon after the discovery of printing, about 1465. He settled as a printer at Paris under Louis XII. A great proportion of the books which he published were Latin: they are printed in the Roman letter, and are not inelegant, though some of them abound rather too much in contractions. He died about 1520, and left behind him three sons. His widow married Simon de Colines (Colinæus, Lat.), who thus got possession of Henry's printing-house, and continued the profession till his death.

STEPHENS (Francis), the eldest son, carried on business along with his step-father Colinæus, and died at Paris in 1550.

STEPHENS (Robert), the second son, was born in 1503. In his youth he made great proficiency in the Roman, Greek, and Hebrew languages, and at the age of nineteen had acquired so much knowledge that his step-father Colines entrusted him with the management of his press. An

edition of the New Testament was published under his inspection, which gave great offence to the Paris divines, who accused him of heresy, and threatened to prevent the sale of the book. Soon after he began business himself, and married Perrete the daughter of Jodocus Badius, a printer and an author. She was a woman of learning. In 1531 he published his Thesaurus: a work of great importance, at which he labored for two years. The mark which he put upon all his books was a tree branched, with a man looking upon it, and these words, Noli altum sapere, to which he sometimes added sed time. In 1539 Francis I. made him his printer, and ordered a new set of elegant types to be founded for him. His frequent editions of the New Testament gave great offence to the doctors of the Sorbonne, who accused him of heresy for his annotations, and insisted upon the suppression of some of his books. Although Henry the French king in some measure protected him, the persecution of these divines rendered him so unhappy, not to mention the expense and loss of time which an almost constant attendance at court unavoidably occasioned, that in 1552 he abandoned his country and went to Geneva, where he embraced the Protestant religion. He was burnt in effigy at Paris, for having changed his religion, and was falsely calumniated with having stolen the king's types. After his arrival at Geneva he published an account of the dispute between him and the Paris divines, which does as much honor to his abilities as his Thesaurus does to his learning. He died in 1559, after a life of the most extraordinary industry. The books of which he was the editor were not fewer than 360. Many of them were ancient classics in different languages. Several were accompanied with annotations which he collected, and all of them were corrected by collating MSS. He was so anxious to attain perfect accuracy that he used to expose his proofs in public, and reward those who discovered a mistake. His books consequently were very correct. It is said that his New Testament, called O Mirificam (because the preface begins with these words), has not a single fault. He first divided the New Testament into verses. His estate was left exclusively to such of his children as should settle at Geneva. He left behind him three sons, Henry, Robert, and Francis.

Stephens (Charles), the third son of Henry, was also familiarly acquainted with the learned languages. This recommended him to Lazarus, de Baif, who made him tutor to his son, and in 1540 carried him along with him to Germany. He studied medicine, and practised it with success in France. He did not, however, forsake the profession of his family, but exercised it in Paris, where he became the editor of many books remarkable for neatness and elegance. He wrote above thirty treatises on different subjects, particularly on Botany, Anatomy, and History. He died in 1564.

Stephens (Robert), the son of Robert, did not accompany his father to Geneva, but continued to profess the Catholic religion, and to reside at Paris. His letter was remarkably beautiful. He was made king's printer, and died about 1589.

Stephens (Francis), brother to the preceding, was also a printer. He embraced the Protestant religion, and resided at Geneva.

Stephens (Henry), the remaining son of Robert, was born at Paris in 1528. He became the most learned and most celebrated of all his family. From his very birth almost he gave proofs of uncommon abilities, and displayed an ardent passion for knowledge. He settled at Paris, and published the Odes of Anacreon. In 1554 he went to Rome, and thence to Naples. This journey was undertaken in the service of the French government. He was discovered, and would have been arrested as a spy, had he not by his skill in the language of the country been able to pass for a native of Italy. On his return to France he assumed the title of printer to Ulric Fugger, a very rich and learned German nobleman, who allowed him a considerable pension. In 1560 he married a relation of Henry Scrimzeour, a Scottish nobleman, with whom he was intimately acquainted. See Scrimzeor. In 1572 he published his Thesaurus Linguæ Græcæ, one of the greatest works, perhaps, that ever was executed by one man, if we consider the wretched materials which more ancient dictionaries could furnish. This work had been carried on at a greater expense than he could well bear. He expected to be reimbursed by the sale of the book, as he doubtless would have been; but John Scapula, one of his own servants, extracted from it whatever he thought would be most serviceable to students, and published it beforehand in 4to. By this act of treachery Henry was reduced to poverty. See Scapula. About this time he was much beloved by Henry III. of France, who treated him so kindly, and made him such flattering promises, that he resided frequently at court. But these promises were never fulfilled, owing to the civil wars which soon after distracted France, and the unfortunate death of king Henry himself. During the remainder of his life his situation was very unsettled. We find him sometimes at Paris, sometimes in Geneva, in Germany, and even in Hungary. He died at Lyons in 1598, at the age of seventy. He was fond of poetry from his very infancy. It was a custom of his to compose verses on horseback, and even to write them, though he generally rode a very mettlesome steed. His Thesaurus was his great work, but he was also the author of several other treatises. His poems are humorous: his Apology for Herodotus is a witty satire on the Roman Catholics. His Concordance to the New Testament must have been a laborious work, and has deservedly endeared him to every Christian who wishes to acquire a rational and critical knowledge of the Scriptures. The number of books which he published, though fewer than his father, was great, and superior in elegance to any thing which the world had then seen. He left behind him a son and two daughters, one of whom was married to the learned Isaac Casaubon.

Stephens (Paul), the son of Henry, continued his father's profession at Geneva. He was a man of learning, and wrote translations of several

books, and published a considerable number of the ancient classics; but not with his father's elegance. He died in 1627, aged sixty, after selling his types to one Chouet a printer.

Stephens (Anthony), son of Paul, the last printer of the family, abandoned the Protestant religion, and returned to France, the country of his ancestors. He received letters of naturalization in 1612, and was made printer to the king; but, managing his affairs ill, he was reduced to poverty, and obliged to retire into an hospital, where he died in 1674, miserable and blind, aged eighty.

Stephens (Robert), a learned English antiquary, born at Eastington, in Gloucestershire. He was educated at Wotton, and thence sent to Lincoln College, Oxford, in 1681. He then entered at the Middle Temple, and was called to the bar. In 1702 he published A Collection of Bacon Lord Verulam's Letters, with valuable notes. He died in 1732, when a second Collection of Bacon's Letters, made by him, was printed.

Stephens, Cape, a cape on the north-west coast of America, in long. 197° 41′ E., lat. 63° 33′ N.

Stephens, Fort (St.), a new town of the United States, in Washington county, Alabama territory. It is situated on the west bank of the Tombigbee, at the head of the sloop navigation, and is in a state of rapid improvement. It is built on very uneven ground, but in a healthy situation, and is the seat of government for the Alabama territory. 100 miles above Mobile by land, 120 or 130 by the river; 1081 miles from Washington.

Stephen's Chapel, (St.), the old building on the site of the late house of commons, and frequently giving name to it. See Westminster.

Stephen's Day, (St.), a festival of the Christian church, observed on the 26th of December, in memory of the first martyr St. Stephen.

Stephen's Island, an island so called by Vancouver on the north-west coast of North America, about thirty miles in length. It is about ten miles to the north of Pitt's archipelago. On the north-west side is a range of innumerable rocky islets and rocks, occupying a space of about two miles in width. Long. 229° 30′ E., lat. 54° 11′ N.

Stephen's Islands, two small islands in the Eastern Seas, discovered by Carteret in 1767. They run about north-west by west, and south-east by east; one is about three miles long, and the other about six. The passage between them appeared to be about two miles broad. They are surrounded with extensive reefs. Long. 138° 39′ E., lat. 0° 22′ S.

Stephen's Island, in Torres Strait, north of Darnley's island, lying about long. 143° E., lat. 9° S. The cocoa nut grows abundantly here, and the natives dwell in huts, wherein are images of their gods, also several human skulls.

Stephen's Passage, the strait which divides Admiralty Island from the west coast of North America. Its general direction is nearly north, in which direction it extends along the eastern shore of Admiralty Island. The channel between Douglas's Island and the mainland was found by Vancouver's exploring party to be interrupted with ice, even in the month of August. The other takes a north-east direction from Point Salisbury about thirteen miles, and was encumbered with a great quantity of floating ice, the weather also being extremely cold. The shores at its termination spread out to east and west, and form a basin about a league broad and two across. From the shores of this basin the party saw a compact body of ice extending some distance all around; and the adjacent region is composed of a lofty range of frozen mountains, whose sides, almost perpendicular, are formed entirely of rock, excepting close to the water side, where a few scattered dwarf pine trees found sufficient soil to vegetate in. Above these the mountains were wrapt in undissolving frost and snow. From the gullies in their sides were projected immense bodies of ice, that reached perpendicularly to the surface of the water in the basin, and exhibited as dreary and inhospitable an aspect as the imagination can suggest. Long. of the south entrance 226° 35′ E., lat. 57° 29′ N.

Step-Mother. The wife of a man, who has children by a former marriage; often erroneously styled mother-in-law, though no degrees in affinity can be more distinct. See Affinity and Step. The situation of a step-mother is one of the most trying and critical in life. No woman should enter into it who cannot boast the prudence of Abigail, and the philosophy and fortitude of Socrates or Zeno. The sæva noverca has been long and often justly complained of, but the fault is sometimes on the part of the step-children.

STEPNEY (George), an English poet and statesman, descended from an ancient family at Pendigrast, in Pembrokeshire, but born at London, in 1663. He was educated at Westminster, and then sent to Trinity College, Cambridge, in 1682; where he formed a strict friendship with Charles Montague, afterwards earl of Halifax; through whose influence, after the revolution, he was nominated to several foreign embassies; as, in 1692, to the elector of Brandenburg; in 1693 to the emperor; in 1694 to the elector of Saxony; in 1696 to the electors of Mentz and Cologn, and the congress at France; and in 1696 queen Anne sent him envoy to the states-general. In all his negociations he was very successful. He published several poems, and some political tracts; and died at Chelsea in 1707, aged only forty-four.

Stepney, or Stebunhethe, a large and ancient parish in the hundred of Ossulston, Middlesex, may be regarded as a suburb of London. It comprises the hamlets of Mile-End, Ratcliffe, Poplar, and Blackwall.

The origin of the name Stepney is very doubtful, but is supposed to have been derived from the Saxon ȝtɛb-hýthe, a timber-wharf; or from Stiben, a corruption of Stephen. It is bounded by the parishes of Bromley, Stratford-Bow, Hackney, Bethnal Green, Spitalfields, St. George in the East, and Shadwell; all of which, about a century since, were parts of the parish of Stepney. In the year 1794 it contained, as Mr. Lysons remarks, 'about 1530 acres of land

(exclusive of the site of buildings), of which about eighty were then arable, about fifty occupied by market gardeners, and the remainder meadow, pasture, and marshy land.' But, since that year, the increase of buildings has produced a considerable diminution in the ground appropriated to agricultural and horticultural purposes. In 1299 Edward I. held a parliament here, in the house of Henry Walleis, lord mayor of London, and gave his confirmation to the great charter. The manor of this place was formerly possessed by the bishops of London; and Roger Niger is thought to have died at the manorial residence in 1241. It passed, however, from that see to king Edward VI., by gift from the ill-fated Ridley; and, after having been granted to lord Wentworth, descended through him to Thomas, earl of Cleveland; by whose influence with the king it was endowed with a court of record, a weekly market at Ratcliffe cross, and an annual fair on Michaelmas day. Stepney manor is now vested in the family of Colebrook. Exclusive of this, the principal manor, the Domesday Survey states that the parish of Stepney contained several smaller ones; all these were held, with the exception of two, of the bishop of London, and were entitled Stepney-Huskarls, Pomfret, lord Wake's, Helles, Poplar, Cobham, Mile-End, Ewell, and Rumbalds. In 1567 a water-course, which had formerly belonged to the convent of Friars-Minors, was granted to William, marquis of Winchester, with liberty to conduct its streams to his mansion-house in London.

Opposite the present rectory house, Henry, first marquis of Worcester, possessed a large mansion in 1663, of which the gateway only remains. It afterwards devolved to the family of Mead; and in this dwelling Dr. Richard Mead was born, and commenced the practice of his profession. The church, dedicated to St. Dunstan and All Saints, is large, and consists of a chancel, nave, and two aisles, separated by columns and pointed arches. At the west end is a square tower. Tombs of several illustrious characters are to be found here, as of Sir Henry Colet, lord mayor in 1486 and 1495, the father of Dr. John Colet, who founded St. Paul's school; Sir John Berry, a distinguished officer in the reign of Charles II., by whom he was knighted; and Sir Thomas Spert, comptroller of the navy to Henry VIII., and founder of the Trinity House. The font stands on a circular pillar, surrounded by four others of a smaller size. The wall of a porch towards the north-east contains a stone, on which some verses, dated 1663, state it to have been brought from Carthage. The church-yard contains, with many other celebrated names, those of Dr. Mead and his father. A short distance to the west is an ancient wooden mansion, built, it is supposed, in 1524, by Sir Henry Colet, and leased to Thomas, earl of Essex. Another of these relics of antiquity stands on Mile-End Green, and is now let in separate apartments. This latter, with some other contiguous habitations, are held under Clare Hall, Cambridge. John Colet, before mentioned, who was vicar of Stepney, lived at the north end of White Horse Street, Ratcliffe. Some time after his resignation, it was received by Dr. Pace, who died here in 1532, and was buried in Stepney church. This parish likewise contains several Dissenting and Methodist meeting-houses; Sion chapel; a chapel belonging to the Society of Friends in Brook Street, Ratcliffe; that formerly occupied by Mr. Brewer, and some others of recent erection.

Stepping off to Music. In stepping off to music, or to the tap of the drum, it will be recollected that the word of command is the signal to lift up the left foot, and that it comes down, or is planted, the instant the tap is given, or the music completes its first note, so that the time must be invariably marked by the left foot, and not by the right, as has been practised by the guards and the artillery, until a recent regulation.

STERCORANISTÆ, Stercorarians, or Stercorists, from stercus, dung, a name which those of the Romish church anciently gave to such as held that the host was not only liable to digestion, but to all its consequences, as well as other food. See Scotus.

STERCORA'CEOUS, *adj.* Lat. *stercoraceus*. Belonging to or partaking of the nature of dung.

Green juicy vegetables, in a heap together, acquire a heat equal to that of a human body; then a putrid *stercoraceous* taste and odour, in taste resembling putrid flesh, and in smell human fæces.
Arbuthnot on Aliments.

STERCORA'TION, *n. s.* Lat. *stercora*. The act of dunging; the act of manuring with dung.

The first help is *stercoration*: the sheep's dung is one of the best, and the next dung of kine and that of horses. *Bacon.*

The exterior pulp of the fruit serves not only for the security of the seed, whilst it hangs upon the plant, but, after it is fallen upon the earth, for the *stercoration* of the soil, and promotion of the growth, though not the first germination of the seminal plant.
Ray on the Creation.

Stercoration is seasonable. *Evelyn's Kalendar.*

STERCULIA, in botany, a genus of plants belonging to the class of monœcia, and order of monodelphia; natural order thirty-eighth, tricocceæ: male cal. quinquepartite: cor. none, but there are fifteen filaments: female cal. quinquepartite; cor. none: the germen is placed on a pillar, and the caps. quinquelocular, and many seeded. There are three species; viz. 1. S. balanghas; 2. S. fœtida; and 3. S. platanifolium; which are all foreign plants.

STERE, a denomination, or rather a radical part of a denomination, in the new system of French measures, compounded like metre, litre, gramme, &c., with myria, kilo, &c., and producing the new terms, myriastere, kilostere, hectostere, decastere, decistere, centistere, and millistere. All these are new terms for measures of wood for fuel. See Measure.

STEREOGRAPHIC Projection is the projection of the circles of the sphere on the plane of some one great circle, the eye being placed in the pole of that circle. See Projection of the Sphere.

STEREOMETER, an instrument invented in France for measuring the volume of a body however irregular, without plunging it in any

liquid. If the capacity of a vessel, or the volume of air contained in that vessel, be measured when the vessel contains air only, and also when the vessel contains a body whose volume is required to be known, the volume of air ascertained by the first measurement, deducting the volume ascertained by the second will be the volume of the body itself. Again, if it be admitted as a law that the volume of any mass of air be inversely as the pressure to which it is subjected, the temperature being supposed constant, it will be easy to deduce, from the mathematical relations of quantity, the whole bulk, provided the differences between the two bulks under two known pressures be obtained by experiment. Let it be supposed, for example, that the first pressure is double the second, or, which follows as a consequence, that the second volume of the air be double the first, and that the difference be fifty cubic inches; it is evident that the first volume of the air will likewise be fifty cubic inches. The stereometer is intended to ascertain this difference at two known pressures. The instrument is a kind of funnel A B fig. 6, plate STEEL-YARD, &c. composed of a capsule A, in which the body is placed, and a cube B, as uniform in the bore as can be procured. The upper edge of the capsule is ground with emery, that it may be hermetically closed with a glass cover M slightly greased. A double scale is pasted on the tube, having two sets of graduations; one to indicate the length, and the other the capacities, as determined by experiment. When this instrument is used it must be plunged in a vessel of mercury with the tube very upright, until the mercury rises within and without to a point C of the scale. See fig. 2. The capsule is then closed with the cover, which being greased will prevent all communication between the external air and that contained within the capsule and tube. In this situation of the instrument, in which the mercury stands at the same height within and without the tube, the internal air is compressed by the weight of the atmosphere, which is known and expressed by the length of the mercury in the tube of the common barometer. The instrument is then to be elevated, taking care to keep the tube constantly in the vertical position. It is represented in this position, fig. 7, second position. The mercury descends in the tube, but not to the level of the external surface, and a column D E of mercury remains suspended in the tube, the height of which is known by the scale. The interior air is therefore less compressed than before, the increase of its volume being equal to the whole capacity of the tube from C to D, which is indicated by the second scale. It is known therefore that the pressures are in proportion to the barometrical column, and to the same column diminished by the subtraction of D E. And the bulks of the air in these two states are inversely in the same proportion; and again the difference between these bulks is the absolute quantity left void in the tube by the fall of the mercury; from which data, by an easy analytical process, the following rule is deduced:—Multiply the number which expresses the less pressure by that which denotes the augmentation of capacity, and divide the product by the number which denotes the difference of the pressures. The quotient will be the bulk of the air when subject to the greater pressure. To render this more easy by an example, suppose the height of the mercury in the barometer to be seventy-eight centimetres, and the instrument being empty to be plunged in the mercury to the point C. It is then covered, and raised until the small column of mercury D E is suspended, for example, at the height of six centimetres. The internal air, which was at first compressed by a force represented by seventy-eight centimetres, is now compressed only by a force represented by 78—6, or 72, centimetres. Suppose it to be observed, at the same time, by means of the gradations of the second scale, that the capacity of the part C D of the tube which the mercury has quitted is two cubic centimetres. Then by the rule $\frac{78}{72} \times 2$ give twenty four cubical centimetres, which is the volume of the air included in the instrument when the mercury rose as high as C in the tube. The body of which the volume is to be ascertained must then be placed in the capsule, and the operation repeated. Suppose, in this case, the column of mercury suspended to be eight centimetres, when the capacity of the part C D of the tube is equal to two centimetres tube. Then the greatest pressure being denoted by seventy-eight centimetres, as before, the least will be seventy centimetres, the difference of the pressures being eight, and the difference of the volumes two cubical centimetres. Hence $\frac{78}{8} \times 2$ gives the bulk of the included air under the greatest pressure 17·5 cubic centimetres. If therefore 17·5 centimetres be taken from twenty-four centimetres, or the capacity of the instrument when empty, the difference 6·5 cubic centimetres will express the volume of the body which was introduced. And if the absolute weight of the body be multiplied by its bulk in centimetres, and divided by the absolute weight of one cubic centimetre of distilled water, the quotient will express the specific gravity of the body in the common form of the tables where distilled water is taken as unity, or the term of comparison. After this description and explanation of the use of his instrument, the author proceeds with the candor and acuteness of a philosopher to ascertain the limits of error in the result; an object seldom sufficiently attended to in the investigation of natural phenomena. From his results it appears that with the dimensions he has assumed, and the method prescribed for operating, the errors may affect the second figure. He likewise gives the formulæ by means of which the instrument itself may be made to supply the want of a barometer in ascertaining the greatest pressure. He likewise adverts to the errors which may be produced by change of temperature. To prevent these, as much as possible, the actual form of the instrument and arrangements of its auxiliary parts are settled, as in fig. 3, by which means the approach of the hand near the vessel and its tube is avoided. In this figure the vertical position of the tube is secured by the suspension of the vessel, and a perforation in the table through which the tube passes. The table itself supports the capsule in

STEEL-YARD & STEREOMETER

Fig. 3.

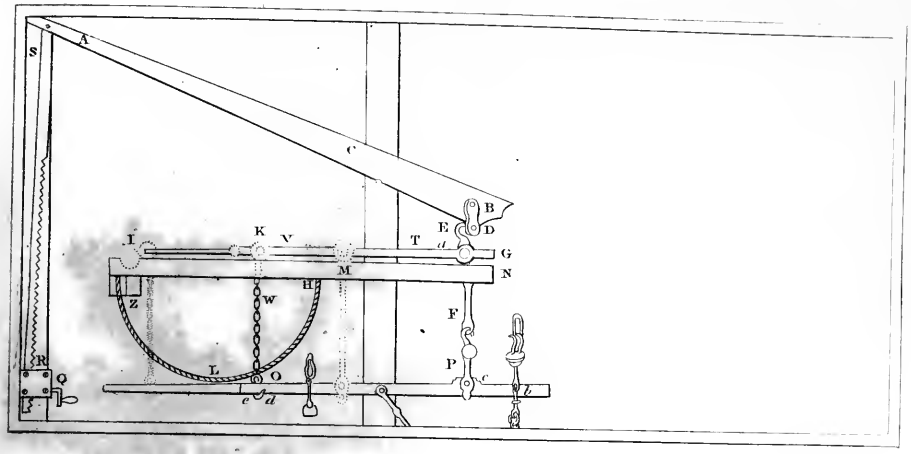


Fig. 4.

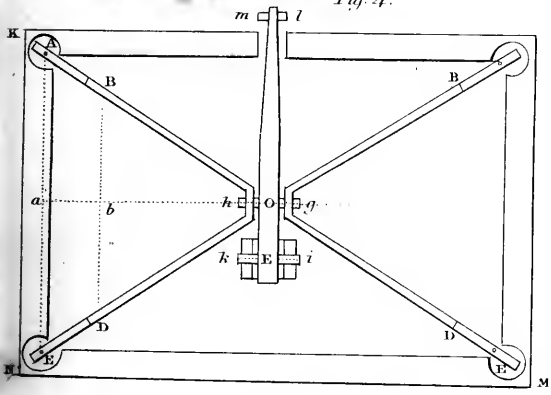


Fig. 2.

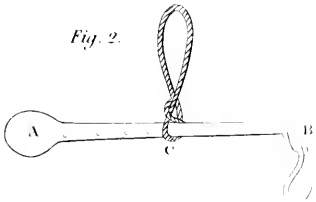


Fig. 1.

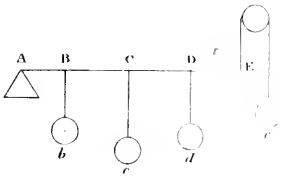


Fig. 5.

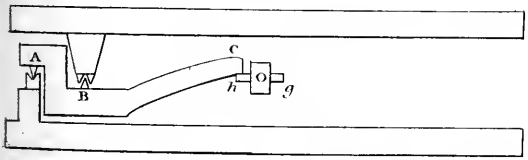


Fig. 6.

Fig. 1.

Fig 7. Fig. 2.

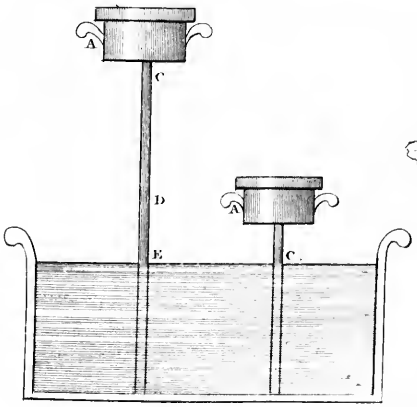
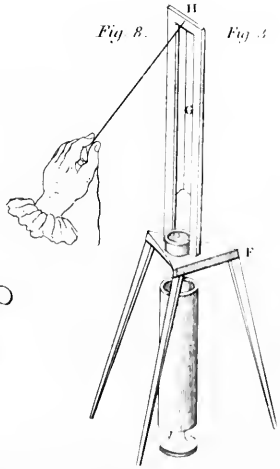


Fig 8. Fig. 3



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its first position, namely, that at which the cover is required to be put on. Mr. Nicholson, from whose Journal this abstract is immediately taken, supposes, with great probability, that the author of the invention had not finished his meditations on the subject, when the memoir giving an account of it was published. If he had, says the ingenious journalist, it is likely that he would have determined his pressures, as well as the measures of bulks by weight. For it may be easily understood that if the whole instrument were set to its positions, by suspending it to one arm of a balance at H (fig. 8), the quantity of counterpoise, when in equilibrio, might be applied to determine the pressures to a degree of accuracy much greater than can be obtained by linear measurement.

STEREOMETRY, Στερεομετρια (of στερεος solid and μετρον measure), is that part of geometry which teaches how to find the solidity or solid contents of bodies; as globes, cylinders, cubes, vessels, ships, &c.

STEREOTOMY, (from στερεος, and τομη, section), the art or act of cutting solids, or making sections thereof, as walls and other membranes in the profiles of architecture.

STEREOTYPE PRINTING. See PRINTING.

STER'IL, *adj.* } Fr. *sterile*; Lat. *sterilis.*
STERIL'ITY, *n. s.* } Barren; unfruitful; not
STER'ILIZE, *v. a.* } productive; wanting fecundity: the noun substantive and verb corresponding.

Our elders say,
The barren, touched in this holy chase,
Shake off their *steril* curse.
Shakspeare. Julius Cæsar.

The sea marge *steril*, and rocky hard. *Id. Tempest.*

In very *steril* years, corn sown will grow to another kind. *Bacon's Natural History.*

Spain is thin sown of people, by reason of the *sterility* of the soil, and because their natives are exhausted by so many employments in such vast territories. *Id. War with Spain.*

To separate seeds, put them in water; such as are corrupted and *steril* swim.
Browne's Vulgar Errours.

She is grown *steril* and barren, and her births of animals are now very inconsiderable.
More against Atheism.

When the vegetative stratum was once washed off by rains, the hills would have become barren, the strata below yielding only mere *sterile* and mineral matter, such as was inept for the formation of vegetables. *Woodward.*

May we not as well suppose the *sterilizing* the earth was suspended for some time, till the deluge became the executioner of it? *Id. Natural History.*

An eternal *sterility* must have possessed the world, where all things had been fastened everlastingly, with the adamantine chains of specifick gravity, if the Almighty had not said, Let the earth bring forth grass, the herb yielding seed, and the fruit-tree yielding fruit. *Bentley's Sermons.*

Go! *sterilize* the fertile with thy rage. *Savage.*

He had more frequent occasion for repetition than any poet; yet one cannot ascribe this to any *sterility* of expression, but to the genius of his times, which delighted in these reiterated verses.
Pope's Essay on Homer.

STERILITY. It has been asserted by many authors that all monsters produced by a mixture of different species of animals, such as mules, are barren; but this does not hold universally, even with the mule, which is the instance most generally adduced. See MULE. Sterility in women sometimes happens from a miscarriage, or violent labor, injuring some of the genital parts; but one of the most frequent causes is the suppression of the menstrual flux.—There are other causes arising from various diseases incident to those parts, by which the uterus may be unfit to receive or retain the male seed; —from the tubæ fallopianæ being too short, or having lost their erective power; in either of which cases no conception can take place;—from universal debility and relaxation; or a local debility of the genital system; by which means, the parts having lost their tone or contractile power, the semen is thrown off immediately post coitum;—from imperforation of the vagina, the uterus, or the tubæ, or from diseased ova, &c. Hence medical treatment can only avail in cases arising from topical or universal debility; in correcting irregularities of the menstrual flux, or in removing tumors, cicatrices, or constrictions of the passage, by the art of surgery.

STERIS, in botany, a genus of the digynia order, and pentandria class of plants: CAL. quinquepartite: COR. wheel-shaped; the berry is unilocular, and many seeded. There is only one species, viz. S. Javana, a foreign plant; a native of the isle of Java.

STER'LING, *adj.* & *n. s.* Camden derives this word from the Easterlings, or inhabitants of the Hanse towns, who were employed as coiners. An epithet by which genuine money is discriminated.

The king's treasure, that he left at his death, amounted unto eighteen hundred thousand pounds *sterling*. *Bacon.*

Several of them would rather chuse to count out a sum in sesterces than in pounds *sterling*. *Addison.*

This visionary various projects tries,
And knows that to be rich is to be wise:
By useful observation he can tell
The sacred charms that in true *stirling* dwell;
How gold makes a patrician of a slave,
A dwarf an Atlas, a Thersites brave. *Garth*

Great name! which in our rolls recorded stands,
Leads honours, and protects the learned bands,
Accept this offering to thy bounty due,
And Roman wealth in English *sterling* view.
C. Arbuthnot.

There is not one single witty phrase in this collection, which hath not received the stamp and approbation of one hundred years: he may therefore be secure to find them all genuine, *sterling*, and authentick. *Swift's Polite Conversation.*

STERLING, among goldsmiths, is used synonymously with standard, and applied to gold and silver plate of the same degree of fineness with the sterling money of Great Britain; i. e. with a mixture of one-twelfth of copper alloy in each metal; which reduces the silver to eleven deniers, or eleven deniers two grains fineness per ounce. All goldsmiths in both kingdoms are bound to make every piece of gold or silver plate that is sold by weight of this standard or sterling fineness; and assay-masters are appointed and sworn, in the principal cities in both kingdoms, to try their work and stamp it, when found sterling (see ASSAY-MASTER), and to break it down, if found deficient. Trinkets not

sold by weight may be made of any degree of coarseness.

STERN, *adj.* & *n. s.* / STERN'AGE, *n. s.* / STERN'LY, *adv.* / STERN'NESS, *n. s.* } Saxon ſtýrn. Severe of countenance, aspect, or manners; hard; afflictive; the adverb and noun substantive corresponding. The stern of a ship is from Sax. ſteorn, ern, the steering place.

Of stature huge, and eke of courage bold,
That sons of men amazed their *sternness* do behold.
Spenser.

She all at once her beastly body raised
With doubled forces high above the ground,
Though wrapping up her wreathed *stern* around. *Id.*

It shall not be amiss here to present the *stern* but lively countenance of this so famous a man.
Knolles's History of the Turks.

I would outstare the *sternest* eyes that look,
Outbrave the heart most daring on the earth,
Pluck the young suckling cubs from the she-bear,
Yea, mock the lion when he roars for prey,
To win thee, lady. *Shakspeare. Merchant of Venice.*

Women are soft, mild, pitiful, and flexible;
Thou, *stern*, obdurate, flinty, rough, remorseless.
Shakspeare.

If wolves had at thy gate howled that *stern* time,
Thou shouldst have said, Go, porter, turn the key,
All cruels else subscribed. *Id. King Lear.*

Did this in Cæsar seem ambitious?
When that the poor have cried, Cæsar hath wept;
Ambition should be made of *sterner* stuff.
Id. Julius Cæsar.

How would he look to see his work so noble
Wildly bound up! or how
Should I, in these my borrowed flaunts, behold
The *sternness* of his presence! *Shakspeare.*

Mischiefe stood,
And with his *stern* steele drew in streames the blood.
Chapman.

No mountaine lion tore
Two lambs so *sternly*. *Id.*

Gods and men
Feared her *stern* frown, and she was queen of the woods. *Milton.*

Sternly he pronounced
The rigid interdiction. *Id. Paradise Lost.*

Then shall the war, and stern debate, and strife
Immortal be the business of my life;
And in thy fame, the dusty spoils among,
High on the burnished roof my banner should be hung. *Dryden.*

Yet sure thou art not, nor thy face, the same,
Nor thy limbs moulded in so soft a frame;
Thou look'st more *sternly*, dost more strongly move,
And more of awe thou bearest, and less of love.
Id.

They turn their heads to sea, their *sterns* to land.
Id.

Let a barbarous Indian, who had never seen a ship, view the separate and disjointed parts, as the prow and *stern*, the ribs, masts, ropes, and shrouds, he would form but a very lame idea of it.
Watts on the Mind.

The judge supreme soon cast a stedfast eye,
Stern, yet attempered with benignity. *Harte.*

The STERN is the posterior face of a ship; or that part which is represented to the view of a spectator placed on the continuation of the keel behind. It is terminated above by the taffarel, and below by the counters; it is limited on the sides by the quarter-pieces, and the intermediate space comprehends the galleries and windows of the different cabins. See QUARTER, SHIP, and SHIP-BUILDING.

STERNA, the tern or noddy, a genus of birds arranged under the order of palmipides. The marks of this genus are a straight, slender, pointed bill; linear nostrils; a slender and sharp tongue; very long wings; a small back toe, and a forked tail. There are twenty-five species, according to Dr. Latham; viz. 1. S. Africana; 2. alba; 3. australis; 4. Boysii; 5. Caspia; 6. Cayana; 7. cinerea; 8. fissipes; 9. fuliginosa; 10. hirundo; 11. metopoleucos; 12. minuta; 13. nigra; 14. nilotica; 15. obscura; 16 panaya; 17. phillippina; 18. piscata; 19. simplex; 20. sinensis; 21. spadicea; 22. stolida; 23. striata; 24. Surinamensis; 25. vittata Of these only three are found in Britain; viz. 1. S. fissipes the black tern, is of a middle size between the hirundo (No. 2.) and the minuta (No. 3). The usual length is ten inches; the breadth is twenty-four; the weight two ounces and a half. The head, neck, breast, and belly, as far as the vent, are black; beyond is white; the male has a white spot under its chin; the back and wings are of a deep ash color; the tail is short and forked; the exterior feather on each side is white; the others ash colored; the legs and feet of a dusky red. Mr. Ray calls this a cloven footed gull, as the webs are depressed in the middle, and form a crescent. These birds frequent fresh waters, breed on their banks, and lay three small eggs of a deep olive color, much spotted with black. They are found during spring and summer in vast numbers in the fens of Lincolnshire, make an incessant noise, and feed on flies, as well as water insects and small fish. Birds of this species are seen very remote from land. Kalm saw flocks of hundreds in the Atlantic Ocean, midway between England and America, and a later voyager saw one 240 leagues from the Lizard in the same ocean.

2. S. hirundo, the common tern, or great sea swallow, weighs four ounces and a quarter; the length is fourteen inches; the breadth thirty; the bill and feet are of a fine crimson; the former tipped with black, straight, slender, and sharp pointed; the crown, and hind part of the head, black; the throat, and whole under side of the body, white; the upper part and coverts of the wings, a fine pale gray. The tail consists of twelve feathers; the exterior edges of the three outmost are gray, the rest white; the exterior on each side is two inches longer than the others: in flying, the bird frequently closes them together, so as to make them appear one slender feather. These birds are very common; frequent our sea-coasts and banks of lakes and rivers during summer, but are most common in the neighbourhood of the sea. They are found also in various parts of Europe and Asia, according to the season; in summer as far as Greenland and Spitzbergen, migrating in turn to the south of Austria and Greece. The female lays three or four eggs in June, of a dull olive color, an inch and three-quarters in length, marked with irregular black spots, intermixed with some others of a smaller size, and less bright; the little end is almost free from any marking. These are laid among grass or moss

The young are hatched in July, and quit the nest very soon after. They are carefully fed by their parents, and fly in about six weeks. This species appears to have all actions on the water which the swallow has on land, skimming on the surface, and seizing on every insect which comes in its way; besides which, the moment it spies a fish in the water, darts into that element, and, seizing its prey, arises as quickly to the place from which it dipped. These birds are also found in America, come into New England in May, and go away in autumn, and are called there the mackarel gull. At Hudson's Bay they are known by the name of black head. They lay their eggs in small hollows on the shore, sometimes lined with a few leaves. They are often found in great numbers on the islets in the rivers, and are thought good eating. They are bold, not fearing mankind, and in the time of incubation will attack any one, darting down so as to touch a person's hat, without his giving the least offence.

3. S. minuta, the smaller sea swallow (called by Linnæus larus minuta), weighs only two ounces five grains, is in length eight inches and a half; in breadth nineteen and a half. The bill is yellow, tipped with black; the forehead and cheeks white; from the eyes to the bill is a black line; the top of the head and hind part black; the breast and under side of the body clothed with feathers so closely set together, and of such an exquisite rich gloss and so fine a white, that no satin can be compared to it: the back and wings of a pale gray; the tail short, less forked than that of the former, and white; the legs yellow; the irides dusky. These two species are very delicate, seem unable to bear the inclemency of the weather on our shores during winter; for they quit their breeding places at the approach of it, and do not return till spring. The manners, haunts, and food of this species are the same with those of the former; but they are far less numerous.

STERNBERG, a town of Moravia, thirteen miles N. N. E. of Olmutz. It is well built with large houses, wide streets, and a spacious square; having manufactures of woollen, linen, and canvas. It is a thriving place, and its population has for some time back increased. Inhabitants 8000. Long. 17° 13′ E., lat. 49° 40′ N.

STERNE (Laurence), a writer of a very peculiar cast, born at Clonmell, in the south of Ireland, 24th of November 1713. His father Roger Sterne was the grandson of Sterne archbishop of York, who has been supposed to have been the author of the excellent book entitled The Whole Duty of Man. Laurence inherited nothing of his grand-father's manner of writing, but rather resembled Rabelais, whose wit he carried with him even into the pulpit. In 1722 he was sent to school at Halifax in Yorkshire, where he continued till 1732, when he was removed to Jesus College in Cambridge. How long he resided in college, or what progress he made in literature or science, is not known: his works display rather native genius than profound erudition. Upon quitting the university he went to York, and, being in orders, was presented to the living of Sutton by the interest of his uncle Dr. Sterne, a prebendary of that church. In 1741 he married, and was soon afterwards made a prebendary of York, by the interest also of his uncle, who was then upon very good terms with him; but 'quickly quarelled with him,' he says, 'and became his bitterest enemy, because he would not be a party man, and write paragraphs in the newspapers.' By his wife's means he got the living of Stillington, but remained nearly twenty years at Sutton, doing duty at both places. He was then in very good health, which, however, soon after forsook him; and books, painting, fiddling, and shooting, were, as he tells us, his amusements. In 1760 he went to London to publish his two first volumes of Tristram Shandy; and was that year presented to the curacy of Coxwold. In 1762 he went to France, and two years after to Italy, for the recovery of his health; but his health never was recovered. He languished under consumption, without the slightest depression of spirits, till 1768, when he died. His friend Garrick penned these four elegant lines for his epitaph:—

Shall pride a heap of sculptored marble raise,
Some worthless, unmourned, titled fool to praise;
And shall we not by one poor grave-stone learn,
Where genius, wit, and humor, sleep with Sterne

The works of Sterne are very generally read. They consist of, 1. The Life and Opinions of Tristram Shandy; 2. Sermons; 3. A sentimental Journey; 4. Letters published since his death.

Stern fast, a rope used to confine the stern of a ship or boat to any wharf or jetty-head, &c.

STERNHOLD (Thomas), an English poet, born in Hampshire, and educated at Wykeham's school near Winchester, about 1480. He afterwards studied at the university of Oxford, but did not graduate. He obtained the place of groom of the robes of king Henry VIII., and was left 100 marks by the will of that monarch. He enjoyed the same office under Edward VI and was held in some esteem at court for his poetical abilities. With the honest intention of discouraging wanton songs, he turned into English metre fifty-one of the Psalms of David; the rest were executed by Hopkins; and this version of the Psalms of Sternhold and Hopkins was long so much esteemed that it was used in the English service, printed along with the book of common prayer, till Tate and Brady's more elegant version was preferred. But by the time of queen Anne, from the alteration of the language, &c., this version was become so obsolete, that Dean Swift treats these two poets with as little respect as Virgil treated Mævius and Bavius. Speaking of a bad poet of his own time, he says, 'Sternhold himself he out-sternholded.' But the dean should have made allowance for the period at which they wrote. Sternhold died at London, in 1549, with the excellent character of a zealous reformer, and a very strict moralist.

STERNO-CLEIDO Mastoideus. Sterno-mastoideus, and cleido-mastoideus, of Albinus; mastoideus of Douglas and Cowper; and sterno-clavio-mastoidien of Dumas; are names of a muscle on the anterior and lateral part of the

neck, which turns the head to one side, and bends it forward. It arises by two distinct origins; the anterior tendinous and fleshy, from the top of the sternum near its junction with the clavicle; the posterior fleshy, from the upper and anterior part of the clavicle. Both unite a little above the anterior articulation of the clavicle to form one muscle, which runs obliquely upwards and outwards to be inserted by a thick strong tendon, into the mastoid process of the temporal bone which it surrounds; and, gradually becoming thinner, is inserted as far back as the lambdoidal suture.

STERNO-COSTALES. These are considered as forming a single muscle on each side of a triangular shape; hence we find the name of triangularis adopted by Douglas and Albinus; but Verheyen, who first taught that they ought to be described as four or five distinct muscles, gave them the name of sterno-costales; and in this he is very properly followed by Winslow, Haller, and Lieutaud. These muscles are situated at each side of the under surface of the sternum, upon the cartilages of the third, fourth, fifth, and sixth ribs. Their number varies in different subjects; very often there are only three, sometimes five, and even six, but most usually we find only four.

The lowermost of the sterno-costales, or what would be called the inferior portion of the triangularis, arises tendinous and fleshy from the edge and inner surface of the lower part of the cartilago ensiformis, where its fibres intermix with those of the diaphragm and transversalis abdominis. Its fibres run nearly in a transverse direction, and are inserted, by a broad thin tendon, into the inner surface of the cartilage of the sixth rib, and lower edge of that of the fifth. The second and largest of the sterno-costales arises tendinous from the cartilago ensiformis and lower part of the sternum laterally; and, running a little obliquely outwards, is inserted into the lower edge of the cartilage of the fifth, and sometimes of the fourth rib. The third arises tendinous from the sides of the middle part of the sternum, near the cartilages of the fourth and fifth ribs, and, ascending obliquely outwards, is inserted into the cartilage of the third rib. The fourth and uppermost, which is the most frequently wanting, arises tendinous from the beginning of the cartilage of the third rib and the adjacent part of the sternum; and, running almost perpendicularly upwards, is inserted by a thin tendon (which covers a part of the second internal intercostal) into the cartilage and beginning of the bony part of the second rib. All these muscles are more or less intermixed with one another at their origin, and this probably occasioned them to be considered as one muscle. Fallopius informs us that the plate Vesalius has given of them, was taken from a dog, in which animal they are much larger than in man. Douglas has endeavoured to account for this difference, but his explanation is far from being satisfactory. See Anatomy.

STERNO-HYOIDEUS. This muscle, which arises from the clavicle as well as from the sternum, Winslow calls sterno-cleido-hyoideus. It is a long, flat, and thin muscle, situated obliquely between the sternum and os hyoides, behind the lower part of the mastoideus, and covering the sterno-thyroideus and the hyo-thyroideus. It arises by very short tendinous fibres, from the cartilaginous part of the first rib, from the upper and inner part of the sternum, from the capsular ligament that connects that bone with the clavicle, and commonly from a small part of the clavicle itself; thence ascending along the anterior and lateral part of the neck, we see it united to its fellow, opposite to the inferior part of the larynx, by means of a thin membrane, which forms a kind of linea alba. After this the two muscles separate again; and, each passing over the side of the thyroid cartilage, is inserted into the basis of the os hyoides, immediately behind the insertion of the last described muscle. Its use is to draw the os hyoides downwards.

STERNOMANTIS, in antiquity, a designation given to the Delphian priestess, more usually called Pythia. Sternomantis is also used for any one that had a prophesying demon within him.

STER'NON, *n. s.* Gr. στερνον. The breast-bone.

A soldier was shot in the breast through the *sternon*. *Wiseman.*

STERNO-THYROIDEUS, the sterno-thyroidien of Dumas; is flat and thin like the sterno-hyoideus, but longer and broader. It is situated at the fore part of the neck, between the sternum and thyroid cartilage, and behind the sterno-hyoideus. It arises broad and fleshy from the upper and inner part of the sternum, between the cartilages of the first and second ribs, from each of which it receives some few fibres, as well as from the clavicle, where it joins with the sternum. Thence, growing somewhat narrower, it ascends; and, passing over the thyroid gland and the cricoid cartilage, is inserted tendinous into the lower and posterior edge of the rough line of the thyroid cartilage, immediately under the insertion of the sterno-hyoideus. Now and then a few of its fibres pass on to the os hyoides. Its use is to draw the thyroid cartilage, and consequently the larynx, downwards.

Stern Post, a long straight piece of timber erected on the extremity of the keel, to sustain the rudder and terminate the ship behind. This piece ought to be well secured and supported; because the ends of all the lower planks of the ship's bottom are fixed in a channel, cut on its surface; and the whole weight of the rudder is sustained by it.

Stern-Sheets, that part of a boat which is contained between the stern and the aftmost or hindmost seat of the rowers. It is generally furnished with benches to accommodate the passengers. See Boat.

STERNUM (pectoris os). The breast-bone. The sternum, os pectoris, or breast-bone, is the oblong flat bone placed at the fore part of the thorax. The ossification of this bone in the fœtus beginning from many different points at the same time, we find it in young subjects composed of several bones united by cartilages; but, as we advance in life, most of these cartilages ossify, and the sternum, in the adult state.

is found to consist of three, and sometimes only of two pieces, the two lower portions being united into one; and very often, in old subjects, the whole is formed into one bone. But, even in the latter case, we may still observe the marks of its former divisions; so that, in describing the bone, we may very properly divide it into its upper, middle, and inferior portions. The upper portion forms an irreuglar square, which, without much reason, has by many writers been compared to the figure of a heart as it is painted on cards. It is of considerable thickness, especially at its upper part. Its anterior surface is irregular, and slightly convex; posteriorly it is somewhat concave. Its upper middle part is hollowed, to make way for the trachea. On each side, superiorly, we observe an oblong articulating surface, covered with cartilage in the recent subject, for receiving the ends of the clavicles. Immediately below this, on each side, the bone becomes thinner, and we observe a rough surface for receiving the cartilage of the first rib, and, almost close to the inferior edge of this, we find the half of such another surface, which, combined with a similar surface in the middle portion of the sternum, serves for the articulation of the cartilage of the second rib. The middle portion is much longer, narrower, and thinner than the former; but is somewhat broader and thinner below than above, where it is connected with the upper portion. The whole of its anterior surface is slightly convex, and within it is slightly concave. Its edge, on each side, affords four articulating surfaces, for the third, fourth, fifth, and sixth ribs; and parts of articulating surfaces at its upper and lower parts, for the second and seventh ribs. About the middle of this portion of the sternum we sometimes find a considerable hole, large enough in some subjects to admit the end of the little finger. Sylvius seems to have been the first who described it. Riolanus, and some others after him, have, without reason, supposed it to be more frequent in women than in men. In the recent subject it is closed by a cartilaginous substance; and, as it does not seem destined for the transmission of vessels, as some writers have asserted, we may perhaps very properly, with Hunauld, consider it as an accidental circumstance, occasioned by an interruption of the ossification, before the whole of this part of the bone is completely ossified. The third and inferior portion of the sternum is separated from the former by a line, which is seldom altogether obliterated, even in the oldest subjects. It is smaller than the other parts of the bone, and descends between the ribs, so as to have been considered as an appendix to the rest of the sternum. From its shape, and its being constantly in a state of cartilage in young subjects, it has been commonly named cartilago xiphoides, ensiformis, or sword-like cartilage; though many of the ancients gave the name of xiphoides to the whole sternum; comparing the two first bones to the handle, and this appendix to the blade of the sword. The shape of this appendix varies in different subjects; in some it is longer and more pointed, in others shorter and more obtuse. Veslingius has seen it reaching as low as the navel, and incommoding the motion of the trunk forwards. In general it terminates obtusely, or in a single point; sometimes, however, it is bifurcated; and Eustachius and Haller have seen it trifid. Very often we find it perforated, for the transmission of branches of the mammary artery. In the adult it is usually ossified and tipped with cartilage, but it very often continues cartilaginous through life; and Haller once found it in this state in a woman who died in her 100th year. The substance of the sternum internally is of a light spongy texture, covered externally with a thin bony plate; hence it happens that this bone is easily fractured.

STERNUTATION, *n. s.* Lat. *sternutatio*. The act of sneezing.

Concerning *sternutation*, or sneezing, and the custom of saluting upon that motion, it is generally believed to derive its original from a disease wherein *sternutation* proved mortal, and such as sneezed died. *Browne's Vulgar Errours.*

Physicians, in persons near death, use *sternutatories*, or such medicines as provoke unto sneezing; when, if the faculty arise, and *sternutation* ensueth, they conceive hopes of life. *Browne.*

Sternutation is a convulsive shaking of the nerves and muscles, occasioned by an irritation of those in the nostrils. *Quincy.*

STERSICHORUS, a Greek lyric poet of Sicily, born in Himera. He wrote twenty-six books on music, poetry, &c., which are all lost, except a few fragments. He flourished about A. A. C. 556, and died at Catana, aged eighty-five. His name was originally Tysias, but changed to Stersichorus, on account of his improvements on music and dancing. He was a man of rank, and distinguished as a statesman among the Sicilians.

STETTIN, a town of the Prussian States, the capital of Pomerania, is situated on the Oder, about sixty miles from the Baltic. It stands on an eminence on the left bank of the river, being here divided into four streams. Opposite to it, and connected by a long bridge over the main stream, is a part of the town called Lastadie. It has five gates and several squares. The principal public buildings are the castle, government-house, arsenal, barracks, hospitals, exchange, theatre, and public library. The majority of the inhabitants are Lutherans; and there is here an academical gymnasium, with several professors, and two assistants, who hold classes of divinity, law, medicine, as well as of philosophy, mathematics, the classical, and some modern languages. The town school has been united with this institution since 1805; here is also a navigation school. The manufactures comprise woollens, linens, cotton, leather, soap, and tobacco; but above all, ships' anchors, of which, as of ships and boats built here, there is a large export. Stettin is the great outlet for the manufactures of Silesia, and the import of colonial goods and foreign fabrics required by that province. The vessels, in general small, that visit this town annually are about 1000, of which nearly one-fourth are the property of the place. Of the exports, the leading articles are linen, corn, and timber; of the imports, coffee, sugar,

cotton, dye-woods, and wine. Stettin is a place of strength, but fell 29th of October, 1806, without resistance, into the hands of the French. It was garrisoned by them after their retreat from Russia in 1812, but obliged to capitulate in October 1813, when the Dutch troops belonging to the garrison hoisted the Orange cockade. The adjoining country, called formerly the duchy of Stettin, was ceded to Sweden by the peace of Westphalia, but seized by the Prussians in the misfortunes of the latter years of Charles XII. Eighty miles N. N. E. of Berlin. Population 20,000. Long. 14° 45′ 45″ E., lat. 53° 25′ 36″ N.

Stettin, a government of the Prussian States, comprising the middle part of Pomerania, begins at the river Peene, and extends eastward to a few miles beyond the Bega. Its area is computed at 6625 square miles, and its population at 300,000. It is divided into the following thirteen circles, viz. Randow, Anclam, Demmin, Usedom, Wollin, Greifenhagen, Pyritz, Saatzig, Naugard-Daber, Flemming, Greifenberg, Osten-Blucher, and Bork.

Stettin, New, a small town of Pomerania, in the government of Coslin, with 1800 inhabitants, and a gymnasium. Forty-one miles south by east of Coslin, and fourteen south by west of Baldenburg.

STEUART-Denham (Sir James), was born at Edinburgh on the 10th of October, O. S. 1713. His father was Sir James Steuart of Goodtrees, Bart., solicitor-general for Scotland; and his mother was Anne, daughter of Sir Hugh Dalrymple of North Berwick, Bart., president of the college of justice. The first rudiments of his education he received at the grammar school of North Berwick, which at his father's death he quitted, at the age of fourteen, with merely the reputation of being a good scholar. From North Berwick, Sir James was sent to the university of Edinburgh, where he continued until 1735, when he passed advocate before the Court. of Session, and immediately afterwards went abroad to visit foreign countries. He was then in his twenty-third year, and had made himself well acquainted with the Roman law and history, and the municipal law of Scotland. He travelled till 1740, when he returned to Scotland, and married Lady Frances Wemyss, eldest daughter of the earl of Wemyss, in 1742. A few months after his marriage the representation of Mid-Lothian became vacant, by the member being made a lord of trade and plantations. The candidates were the late member and Sir John Baird of Newbyth. On the day of election Mr. Dundas of Arniston, one of the senators of the college of justice, was chosen preses of the meeting, and omitted to cause the name of Sir James Steuart to be called on the roll of freeholders. For this illegal use of his temporary power, Sir James commenced a suit against the president; and resuming the gown as an advocate, he pleaded his own cause with great energy and eloquence, and with the applause of the bench, the bar, and the public. This called lord Arniston from the bench to plead his own defence at the bar; and Sir James could not have been opposed to an antagonist better qualified to call forth all his powers; for that judge is talked of at this day in Edinburgh as the profoundest lawyer and the ablest pleader that ever graced the Scottish bench or the Scottish bar. With the issue of this contest we are not acquainted; but it drew upon Sir James Steuart very general attention, and convinced the public that had he continued at the bar he must have risen rapidly to the head of his profession. On his travels, however, he had contracted friendships with lord Marischal, and other eminent men, attached to the pretensions of the royal family of Stuart, and had received flattering attentions from the pretender to the British throne; the impressions arising from which, added to the irritations of the controversy with the powerful party in Scotland attached to the court, led him, unadvisedly, into connexions with the movers of the rebellion in 1745. As he was by far the ablest man of their party, the Jacobites engaged him to write the prince regent's manifesto, and to assist in his councils. Information having been given of his participation in these affairs, he thought it prudent, on the abortion of this unhappy attempt, to leave Britain; and by the zeal it is said of Arniston he was excepted afterwards from the bill of indemnity, and rendered an exile from his country. He chose France for his residence during the first ten years of his banishment, and was chiefly at Angoulesme, where he superintended the education of his son; thence he went to Tubingen in Suabia, for the benefit of its university, in prosecution of the same laudable design; but in the end of the war, 1756, having been suspected by the court of Versailles of communicating intelligence to the court of London, he was seized at Spa, and kept some time in confinement; from which being liberated, after the accession of the late king of Great Britain, he came by toleration to England, and resided at London, where he put the last hand to his System of Political Economy, the copyright of which he sold to Andrew Millar; and, being permitted to dedicate this work to the king, he applied for a noli prosequi, which, after some malicious objections, he obtained, and had the comfort of returning to his family estate in Scotland. Having nothing professional to do, during his long residence in France, the active mind of Sir James was occupied in study. His book on the Principles of Political Economy contains most of the fruits of it. In the beginning of 1755 Sir James wrote his Apology or Defence of Sir Isaac Newton's Chronology, which at that time he intended to publish, but was prevented by other engagements. It was communicated to several persons of eminence in France and Germany in MS., and produced, in December that year, in the Mercure de France, an answer from M. Deshoulieres; to which Sir James soon after replied. The great Newton, applying astronomical and statistical principles to the ancient chronology of Greece, had chastised the vanity of nations, and arrested the progress of infidelity in delineating the history of the world. Lost in the confusion of excessive pretensions to an antiquity beyond all measure, and disgusted by the superstitious aids that were assumed to support these pretensions among ancient nations, the

revivers of learning in Europe, during the last and the preceding century, turmoiled themselves with controversies between the comparative merits of the ancients and moderns; and the abettors of the latter, entrenching themselves behind the falsehoods of the ancients, on the scope of their remote history, gave the lie to all antiquity, and in despair plunged themselves into the ocean of scepticism. Happy had it been for society if this scepticism had confined itself to the history of ancient nations in general; but the same spirit, taking disgust at the horrors of Christian ambition and bigotry, and contemplating with derision the ridiculous legends of modern miracles, gave the lie to all religious scripture of the Jews and Christians, and attempted to banish divine intelligence, the superintending providence of Deity, and the true dignity of the human species, from the face of the earth! It was a noble undertaking, therefore, in Sir James, to attempt to disperse this mist of error by dispassionately and scientifically explaining and supporting the chronology of Sir Isaac Newton. He has done it with great precision and effect; and it is a book well worth the perusal of those who wish to read ancient history with improvement, or to prevent themselves from being bewildered in the mazes of modern conjecture. It was printed in 4to. at Frankfort on the Maine, for John Bernard Eichemberg the Elder, in 1757. In 1758 and 1759 the British House of Commons took up the consideration of a statute to regulate a general uniformity of weights and measures throughout the united kingdoms, which had been so often unsuccessfully attempted. This called the attention of Sir James not only to the investigation of the particular subject that engaged that of the House of Commons, but to devise a method of rendering a uniformity of weights and measures universal. He thought the cause of former disappointments in this useful pursuit had been the mistaken notion that one or other of our present measures should be adopted for the new standard. After the plan had been relinquished by the parliament of England he digested his note and observations on this important disquisition into the form of an epistolary dissertation, which he transmitted to his friend lord Barrington, and resolved, if there had been a congress assembled, as was once proposed, to adjust the preliminaries of the general peace in 1763, to have laid his plan before the ministers of the different nations, who were to prepare that salutary pacification of the contending powers. This epistolary dissertation Sir J. afterwards reduced at Coltness, in 1777, into a form more proper for the public eye, and sent a corrected copy to a friend, reserving another for the press, which was printed in 1790 for Stockdale in Piccadilly. In this tract the author shows, from the ineffectual attempts that have been made to alter partially, by innovation, the standards of measures or weights, that the effectual plan to be adopted is to depart entirely from every measure whatsoever now known, and to take, ad libitum, some new mass instead of our pound, some new length instead of our ell, some new space instead of our acre, and some new solid instead of our gallon and bushel. For this purpose Sir James proposes as the unit a mass to be verified with the greatest possible accuracy, equal in weight to 10,000 grs. Troy. The pendulum, as it swings at London, to beat seconds of time, he proposes to be the measure of length; and, after having laid down his fundamental principles, he proposes an ingenious plan for rendering their adoption universal through the whole world. Having obtained his pardon, Sir James Steuart retired to Coltness, in the county of Lanark, the paternal estate of his family, where he turned his attention to the improvement of his neighbourhood by public works and police, and drew the first good plan for a turnpike bill, suited to the circumstances of Scotland, which has been since generally adopted. He repaired his house, planted, improved, and decorated his estate, and in social intercourse rendered himself the delight of his neighbourhood and country. He was engaged by the directors of the East India Company of England to digest a code for the regulation of the current coin of Bengal; the plan for which important regulation he printed, and received from the court of directors a handsome diamond ring as a mark of their approbation. He prepared for the press, but never published, an antidote to the Systeme de la Nature by Mirabeau, wherein the parallelogisms and foolish reasoning of that infidel work are examined, detected, and confuted. It is written in French; and, were the works of Mirabeau worth refutation, it might be printed with much advantage to Sir James's reputation as a controversial writer. This great and good man died in November 1780, and was buried at Cambusnethan, in Lanarkshire, on the 28th; the duke of Hamilton and his neighbours performing the last offices to the remains of their highly valued friend, and bedewing his ashes with their tears. For this short sketch of the principal events of the life of Sir James Steuart Denham we are indebted to the direct communications of his nephew, the earl of Buchan, to the Encyclopædia Perthensis.

STEUARTIA, in botany, a genus of the polyandria order, and monodelphia class of plants; natural order thirty-seventh, columniferæ: CAL. simple, with a quinquefid stigma; the apple is without juice, quinquelobed, monospermous, bursting open with a spring five ways. There is only one species, viz. S. malacadendron, which is a foreign plant.

STEUBEN, a county of the United States, in New York, bounded north by Ontario county, east by Seneca Lake and Tioga county, south by Pennsylvania, and west by Allegany county. Chief town, Bath.

STEUBENVILLE, a post town of the United States, the capital of Jefferson county, Ohio, situated on the Ohio. It is a very flourishing town, regularly laid out, having three churches, an academy, two banks, a market-house, a woollen manufactory, the machinery of which is put in motion by a steam engine; a steam paper-mill; a flour-mill and cotton manufactory, driven by steam power; a printing office, from which is issued a weekly newspaper; an air foundry, twenty-seven mercantile stores, and sixteen public inns. The progress of this place has been

uncommonly rapid. In 1805 there were scarcely any houses where this town now stands. Sixty-nine miles by the river below Pittsburgh, thirty-eight by land; 109 above Marietta, twenty-five north-east of St. Clairsville, and 150 east by north of Columbus. Population, in 1810, 800; and, in 1817, 2032.

STE'VEN, *n. s.* Sax. ꝑteꝑen. A cry; loud clamor.

Ne sooner was out, but swifter than thought,
Fast by the hide the wolf Lowder caught;
And had not Roffy renne to the *steven*,
Lowder had been slaid thilke same even. *Spenser.*

STEVENAGE, a market-town and parish in Broadwater hundred, Herts, twelve miles north from Hatfield, and thirty-one north-west from London. It was anciently called Stigenhaght, and belonged to the abbey of Westminster, but at the dissolution it was granted to the bishops of London, who have enjoyed it ever since. The town consists of one large street, and several small ones, indifferently built; the church is an ancient building, and consists of one isle on each side, with a large chancel in the middle, and has a square tower. To the south of the town are six hills, supposed to have been the site of a Danish or Roman camp. Here is an alms-house, called All-Christian-Souls'-House, and a grammar free-school. Market on Wednesday. Fairs nine days before Easter and Whitsun-weeks, July 15th, and the first Friday in September.

STEVENS (Alexander), an ingenious English architect, who is said to have erected more stone bridges and other buildings in water than any other person in Britain. The aqueduct over the Lune at Lancaster, the bridge over the Liffey at Dublin, and the locks and docks on the Grand Canal of Ireland, are monuments of his professional skill. He died at an advanced age in 1796.

Stevens (George Alexander), a poet and actor, born in London. Having spent some of his early years from inclination or necessity with itinerant companies of players, he at length procured an engagement at Covent Garden Theatre, but his performances were not admired. After living in every kind of dissipation, generally necessitous, and sometimes extravagant, he at length hit upon a measure by which he acquired independence. He composed a strange medley of humor and satire, sense and nonsense, wit and ribaldry, adapted to his own powers of performance, which is called A Lecture upon Heads, and read to crowded audiences; at the same time exhibiting caricatures of the different heads, as he entered upon every new character of the lawyer, parson, statesman, politician, miser, spendthrift, &c. With this medley he travelled through England, and part of Scotland, and, from the novelty of the exhibition, was so uncommonly successful that he acquired a fortune sufficient to afford him a comfortable retreat in his old age. He wrote a novel in 2 vols., entitled The Adventures of Tom Fool, and some poems and dramatic pieces; and died in 1784.

Stevens, or Stephens (captain John), an English antiquary, born in the seventeenth century, and educated a Roman Catholic. His religion led him to follow the fortunes of James II., in whose service he accepted a commission, and accompanied him to Ireland. He compiled a Dictionary of the Spanish Language, and continued Sir William Dugdale's Monasticum Anglicanum. See Dugdale. He died in 1726.

Stevens (William), esq., of Broad Street, in the city of London, hosier, and many years treasurer of Queen Anne's bounty, was born in Southwark on the 2d March 1732. His father was a tradesman, and died while Mr. Stevens and a sister, the only issue of the marriage, were infants. His mother, who was the late bishop Horne's paternal aunt, removed after her husband's death to Maidstone, to be near her brother's family. At the school of Maidstone Mr. Stevens was educated along with his cousin, under the Rev. Deodotus Bye. When Mr. Horne went to Oxford, to complete his studies, Mr. Stevens was at the same period, in August 1746, placed out as an apprentice with Mr. Hookham, of No. 68 Old Broad Street (in which house from that time forth he lived and died), an eminent wholesale hosier, and a most respectable man. Of Mr. Steven's progress in business we shall say nothing. It led him to respectability and independence. But in this he has been equalled and surpassed by thousands. In his literary attainments, in the soundness of his principles, and in the unaffected purity of his manners, he has been equalled by few, and surpassed by still fewer, even of the learned professions and of the sacred order. He corresponded regularly with his cousin the Oxonian, who informed him of the studies in which he was engaged; and Mr. Stevens spent all his leisure time in the acquisition, by his own labor and industry, of those stores which his cousin was acquiring under happier auspices. He acquired a complete knowledge of the learned languages; and, though a layman, he became particularly eminent as a theologian, and intimately acquainted with the most eminent churchmen of his day. Being an excellent Hebrew scholar he became a great admirer of the works of John Hutchinson, whose principles he warmly espoused through life. In the year 1773 he published, anonymously, An Essay on the Nature and Constitution of the Christian Church, by a Layman; which has been highly esteemed. He soon after published Cursory Observations, on the attempt to alter the articles and liturgy. In 1776 he published A Discourse on the English Constitution, &c. In 1777 he published two distinct works, in answer to two sermons (on the principles of the Revolution 1688), preached by bishop Watson before the university of Cambridge. Previous to these political discussions he published A New and Faithful Translation of Letters from M. l'Abbé de ———, Hebrew professor in the university of ———, to the Rev. Benj. Kennicott, &c. This we believe, notwithstanding the title, was an original work of his own. In the year 1800 Mr. Stevens was induced by his numerous friends to collect and publish his works together. He did so with the title of Ουδενος εργα, the Works of Nobody, by which humble name he was known among his friends for upwards of twenty years. In the preface to the second edition of Jones's life of Horne, the author

has introduced a defence of the Hutchinsonian divines of the church of England, which was somewhat severely criticised in the British Critic, February 1800. Mr. Stevens, under the name of Ain, the Hebrew word for Nobody, published A Review of the Review of a new Preface to the Second Edition of Jones's Life of Horne. The last literary work in which he engaged was a uniform edition of the works of Mr. Jones of Nayland, in 12 vols., 8vo., to which he prefixed a life of the venerable author, composed in such a style of artless and pathetic religious eloquence, as did no less honour to the deceased than to the head and heart of the affectionate writer. It is impossible not to perceive the striking resemblance between Isaac Walton (see that article) and William Stevens. Both were tradesmen. Both were men of reading. Both were divines. Both were sincere Christians and zealous churchmen; and at the same time of the utmost cheerfulness of disposition. Both were the companions and friends of the most eminent prelates and divines that adorned the church of England. Both of them wrote at an advanced period of life, and in a style of artless simplicity remarkably similar. Stevens's Life of Jones was written, says his biographer, in his seventieth year, with great intellectual ability: and he may justly be denominated the Isaac Walton of the eighteenth century. We could fill many pages in detailing the worth of this amiable man. His charities were particularly remarkable, and in general were equally varied, extensive, and judicious. In his private books of account he had three heads of Clericus, Pauper, and Gifts, to which he regularly devoted certain proportions of his income, with large additions under each head when unforeseen demands (as was frequently the case) seemed to require more than the usual proportion. In one year it was accidentally discovered that Mr. Stevens's personal expenses amounted to £300 sterling, 'while the aggregate of clericus, pauper, and gifts, considerably exceeded £600 sterling; the whole income in that year amounting to £1200 sterling.' Much, equally or more extraordinary, on this head, might easily be added; while every thing was done with the most admirable delicacy, with the most unassuming modesty, and without ostentation. This amiable man, this admirable Christian, died suddenly in the beginning of February 1807, and was buried on the 14th, by his own desire, in the church yard of Otham Church, Kent; in repairing and adorning which he had laid out £600 sterling. 'Mark the perfect man, and behold the upright; for the end of that man is peace.'

Stevenson (Sir John), musical composer, was a native of Ireland, and being admitted into the choir of St. Patrick's Cathedral, in the city of Dublin, under the tuition of Dr. Doyle, soon gave promise of what he lived to realize in the most successful manner. At an early age he was elected a Vicar Choral, and afterwards Doctor of Music. He obtained prize medals, and ornamental pieces of plate for glees, that displayed the utmost power and extent of harmonic science. His first dramatic music was composed for O'Keefe's "Agreeable Surprise." His church music is of a high and sublime character. His glees and songs are numerous, popular, and beautiful. The best known and most admired of his operas, are Love in a Blaze, The Bedouins, or Arabs of the Desert—The Swiss Patriot—Spanish Patriots—and The Burning of Moscow. He had the good fortune to have his sacred music introduced to the public by his friend Dr. Spray, perhaps the finest cathedral singer that has been known in any age; and the advantage of being associated with Moore, in the publication of the Irish Melodies. After a life passed honourably and beneficially to his country, he expired at an advanced age, at the seat of his son-in-law, the Marquis of Headfort, in the county of Meath, Ireland, in Sept., 1833.

STEVERS (Palmedes), an eminent painter born at London in 1607, but his father was a Fleming. He studied painting at Delft, and acquired great excellence in representing camps and battles. His paintings are scarce. He died in 1638.

Stevers (Anthony), brother of Palmedes, was also a good painter of portraits, conversations, &c. He died in 1680.

STEVIN, or Stevinus (Simon), a celebrated Dutch mathematician and engineer, was born at Bruges about 1560. He invented the sailing chariots made in Holland. He published an excellent System of Mathematics in 1598 (see Statics), and wrote several other mathematical works in Dutch; which Snellius translated into Latin, and published in 2 vols, folio. He died in 1633.

STEW, *v. a.* Fr. *estuver.* To seethe any thing in a slow moist heat, with little water.

> Ere I was risen from the place that showed
> My duty kneeling, came a reeking post,
> *Stewed* in his haste, half breathless.
>
> *Shakspeare. King Lear*

Stew, *n. s.* Fr. *estuve;* Ital. *stufa;* Span *estufa.* A stove bath; a bagnio; a hot house.

> As burning Ætna from his boiling *stew*
> Doth belch out flames, and rocks in pieces broke,
> And ragged ribs of mountains molten new,
> Enwrapt in coal-black clouds and filthy smoke.
>
> *Spenser.*

> I have seen corruption boil and bubble,
> Till it o'er-run the *stew.* *Shakspeare.*

STEW'ARD, *n. s.* } Sax. ȝtipapo. One
Stew'ardship. } who manages the affairs of another; one who has charge of an establishment or place; a state officer: the other noun substantive corresponding.

> There sat yclad in red
> Down to the ground a comely personage,
> That in his hand a white rod managed;
> He *steward* was, high diet, ripe of age,
> And in demeanour sober, and in council sage.
>
> *Spenser.*

> The duke of Suffolk is the first, and claims
> To be high *steward.* *Shakspeare.*

> Take on you the charge
> And kingly government of this your land:
> Not as protector, *steward,* substitute,
> Or lowly factor for another's gain.
>
> *Shakspeare. Richard III.*

If they are not employed to such purposes, we are false to our trust, and the *stewardship* committed to us, and shall be one day severely accountable to God for it. *Calamy's Sermons.*

What can be a greater honour than to be chosen one of the *stewards* and dispensers of God's bounty to mankind? What can give a generous spirit more complacency than to consider that great numbers owe to him, under God, their subsistence, and the good conduct of their lives? *Swift.*

Just *steward* of the bounty he received,
And dying poorer than the poor relieved. *Harte.*

STEWARD, an officer in a ship of war, appointed by the purser to distribute the different species of provisions to the officers and crew; for which purpose he is furnished with a mate and proper assistants.

STEWARD, LORD HIGH, OF ENGLAND, the greatest officer under the crown, an office that was anciently the inheritance of the earls of Leicester, till forfeited by Simon de Mountfort to king Henry III. But the power of this officer is so very great that it has not been judged safe to trust it any longer in the hands of a subject, excepting only pro hac vice, occasionally: as to officiate at a coronation, at the arraignment of a nobleman for high treason, or the like. During his office the steward bears a white staff in his hand; and the trial, &c., ended, he breaks the staff, and with it his commission expires.

STEWARD, LORD HIGH, OF GREAT BRITAIN, COURT OF THE, is a court instituted for the trial of peers indicted for treason or felony, or for misprision of either. The office of this great magistrate is very ancient, and was formerly hereditary, or at least held for life, or dum bene se gesserit: but now it is usually, and has been for many centuries past, granted pro hac vice only; and it has been the constant practice (and therefore seems now to have become necessary) to grant it to a lord of parliament, else he is incapable to try such delinquent peer. When such an indictment is therefore found by a grand jury of freeholders in the king's bench, or at the assizes before the justices of oyer and terminer, it is to be removed by a writ of certiorari into the court of the lord high steward, which has the only power to determine it. A peer may plead a pardon before the court of king's bench, and the judges have power to allow it, to prevent the trouble of appointing a high steward merely for the purpose of receiving such plea: but he may not plead in that inferior court any other plea as guilty or not guilty of the indictment, but only in this court; because, in consequence of such plea, it is possible that judgment of death might be awarded against him. The king, therefore, in case a peer be indicted of treason, felony, or misprision, creates a lord high steward pro hac vice by commission under the great seal; which recites the indictment so found, and gives his grace power to receive and try it secundum legem et consuetudinem Angliæ. Then when the indictment is regularly removed by writ of certiorari, commanding the inferior court to certify it up to him, the lord high steward directs a precept to a sergeant at arms, to summon the lords to attend and try the indicted peer. This precept was formerly issued to summon only eighteen or twenty selected from the body of the peers; then the number came to be indefinite; and the custom was for the lord high steward to summon as many as he thought proper (but of late years not fewer than twenty-three); and that those lords only should sit upon the trial; which threw a monstrous weight of power into the hands of the crown and this its great officer, of selecting only such peers as the then predominant party should most approve of. And, accordingly, when the earl of Clarendon fell into disgrace with Charles II., there was a design formed to prorogue the parliament, to try him by a select number of peers; it being doubted whether the whole house could be induced to fall in with the views of the court. But now, by stat. 7 W. III. c. 3, upon all trials of peers for treason or misprision, all the peers who have a right to sit and vote in parliament shall be summoned at least twenty days before such trial to appear and vote therein; and every lord appearing shall vote in the trial of such peer, first taking the oaths of allegiance and supremacy, and subscribing the declaration against popery. During the session of parliament the trial of an indicted peer is not properly in the court of the lord high steward, but before the court last mentioned of our lord the king in parliament. It is true a lord high steward is always appointed in that case to regulate and add weight to the proceedings: but he is rather in the nature of a speaker pro tempore, or chairman of the court, than the judge of it; for the collective body of the peers are therein the judges both of law and fact, and the high-steward has a vote with the rest in right of his peerage. But in the court of the lord high-steward, which is held in the recess of parliament, he is the sole judge of matters of law, as the lords triers are in matters of fact; and, as they may not interfere with him in regulating the proceedings of the court, so he has no right to intermix with them in giving any vote upon the trial. Therefore upon the conviction and attainder of a peer for murder in full parliament, it hath been holden by the judges, that, in case the day appointed in the judgment for execution should lapse before execution done, a new time of execution may be appointed by either the high court of parliament during its sitting, though no high steward be existing, or in the recess of parliament by the court of king's bench, the record being removed into that court. It has been a point of controversy whether the bishops have now a right to sit in the court of the lord high steward and to try the indictments of treason and misprision. But Blackstone decides it in the negative, and says, 'What makes their exclusion more reasonable is, that they have no right to be tried themselves in the court of the lord high steward, and therefore surely ought not to be judges there. For the privilege of being thus tried depends upon nobility of blood rather than a seat in the house, as appears from the trials of popish lords, of lords under age, and (since the union) of the Scottish nobility, though not in the number of the sixteen; and from the trials of females, such as the queen consort or dowager, and of all peeresses by birth; and peeresses by marriage also, unless they have, when dowagers, disparaged

themselves by taking a commoner to their second husband.'

Steward of the King's Household, a lord, who is the chief officer of the king's court, has the care of the king's house, and authority over all the officers and servants of the household, except such as belong to the chapel, chamber, and stable.

STEWART, Stuart, or Steuart, the surname of the royal family of Scotland, from A. D. 1371, when Robert II., but first of the name of Stewart, succeeded king David Bruce, till 1714, when the protestant royal line of that house ended by the death of queen Anne, and the accession of the house of Hanover took place in the person of her second cousin king George I. During that period of 345 years it furnished eight monarchs to Scotland, or nine, reckoning lord Darnley, and six to Great Britain. Of these three were murdered, two killed in battle, two died of grief, two were ignominiously and unjustly executed on a scaffold, and one was justly deposed and expelled for his bigotry and tyranny. In short, a more unfortunate family has hardly reigned in any nation; and yet the majority of them were well-meaning monarchs; some of them learned, most of them brave, and many of them seemed to merit a better fate.

Stewart (Walter), the founder of the house of Stewart, was the son of Fleance, by a daughter of Lewellyn, prince of Wales, and grandson of Banqhuo, thane of Lochaber, who was murdered by Macbeth. See Scotland. Walter acquired the surname of Stewart from his office, being appointed lord high steward of Scotland.

Stewart (princess Elizabeth), daughter of king James I. of England, and VI. of Scotland, wife of prince Frederick, elector palatine of the Rhine, mother of prince Rupert, and princess Sophia, electress of Hanover, by whom she became grandmother of king George I. She, and her husband and family, suffered much for their attachment to the protestant religion; but in the course of Providence their losses have been amply made up to their posterity.

Stewart (Dr. Matthew), an eminent mathematician, was born in 1717 at Rothsay in the isle of Bute, of which parish his father was minister. Being intended for the church, he was in 1734 received as a student into the University of Glasgow. There he had the happiness of having for his preceptors the celebrated professors Hutcheson and Simson, until, wishing to remove to Edinburgh, he was introduced by Dr. Simson to Mr. Maclaurin. Mr. Stewart, however, had acquired from his intimacy with Dr. Simson a great predilection for the ancient geometry; and while the second invention of porisms, to which more genius was perhaps required than to the first discovery of them, employed Dr. Simson, Mr. Stewart pursued the same subject in a new and different direction. In doing so, he was led to the discovery of those curious and interesting propositions which were published under the title of General Theorems in 1746. He had before this period entered into the church; and obtained, through the patronage of the duke of Argyll and the earl of Bute, the living of Roseneath. But in 1747 he was elected to the mathematical chair in the University of Edinburgh, which had become vacant by the death of Mr. Maclaurin. The duties of his office gave a new turn to his pursuits, and this solution of Kepler's problem, which appeared in the second volume of the Essays of the Philosophical Society of Edinburgh for 1756, was the first specimen of this kind which he gave to the world; it was impossible to have produced one more to the credit of the method he followed. In the first volume of the same collection there are some other propositions of Mr. Stewart's, which are an extension of a curious theorem in the fourth book of Pappus. The prosecution of the plan which he had formed of introducing into the higher parts of mixed mathematics the strict and simple form of ancient demonstration, produced the Tracts Physical and Mathematical, published in 1761, and the Essay on the Sun's Distance, in 1763: but in this last work it is acknowledged that he employed geometry on a task which geometry cannot perform. The investigation, however, is every where elegant, and will probably be long regarded as a specimen of the most arduous enquiry which has been attempted by mere geometry. The Sun's Distance was the last work which Dr. Stewart published; and, though he lived to see several animadversions on it made public, he declined entering into any controversy. A few months before this he gave to the world another work, entitled Propositiones Geometricæ, More Veterum Demonstratæ. It consists of a series of geometrical theorems, mostly new; investigated first by analysis, and afterwards synthetically demonstrated by the inversion of that analysis. Dr. Stewart's health beginning to decline, and the duties of his office becoming burdensome to him, he retired in 1772 into the country, and never resumed his labors in the university, though mathematics continued to be his chief amusement till a very few years before his death, which took place on the 23d January 1785, at the age of sixty-eight.

Stewart (Dugald), esq., professor of moral philosophy in the university of Edinburgh, was the only son of the above Dr. Matthew Stewart who survived the period of infancy. He was born in the college of Edinburgh November 22d, 1753, and, being of feeble constitution, his education was long committed to the sole and admirable management of his mother.

At seven years of age, however, he entered the High School, and acquitted himself with great credit in his classical studies. Under such a mathematician as his father he could not fail to attain a respectable knowledge of the exact sciences; but we find him, on his mother's death, in 1771, removing to the university of Glasgow to avail himself of the tuition of Dr. Reid, who was then illustrating in that city those great principles of metaphysical science to which Mr. Stewart became afterwards so much attached. On attaining his majority he was nominated assistant to his father, and continued to conduct the mathematical studies of the university of Edinburgh until the death of that honored parent. In 1778 he first attempted

to read a course of lectures in the moral philosophy class of the university, during the temporary absence of Dr. Ferguson; and when his father died, in 1785, he effected an exchange with Dr. F., who retired on the salary of the mathematical professor, while Mr. Stewart undertook to preside permanently over the moral philosophy class. In 1792 he first appeared as an author, in the publication of his introductory volume on the Philosophy of the Human Mind; this was succeeded in the following year by his Outlines of Moral Philosophy, and from about the same period to 1796 he read at meetings of the Royal Society of Edinburgh biographical sketches of the lives of Dr. Adam Smith, Dr. Robertson, and Dr. Reid.

These were his only known writings, until in 1810 appeared his volume of Philosophical Essays; in 1813 he published the second volume of his Philosophy of the Mind, and his admirable Preliminary Essay to the Supplement of the Encyclopædia Brittannica; in 1827 a continuation of the second part of the philosophy; and finally, in 1828, at the age of seventy-five, the third volume, on the Active and Moral Powers of Man. Mr. Stewart was twice most happily married, but left no children. His oratorical powers are said to have been as remarkable as the eloquence of his written style; and he had the honor of training as his private pupils, at different periods of his life, some of the most celebrated statesmen and parliamentary orators of modern times. We need only mention the late lord Ashburton, the present marquis of Lansdowne, earl Dudley, and lord Palmerston; much regretting that our limits forbid us to enlarge the present sketch of the life of so distinguished a philosopher and amiable and excellent a man. Mr. Stewart died at Edinburgh, 11th of June, 1828, having suffered by rather a severe stroke of palsy ever since the year 1822.

Stewart (the Hon. Admiral Keith), a late brave British naval officer, only brother of the earl of Galloway, was born in 1739. He was appointed a captain in the royal navy in 1762; commanded the Berwick of seventy-four guns, with a commodore's broad pendant, at the action of the Dogger Bank, in 1781; and the Cambridge in lord Howe's squadron, sent to the relief of Gibraltar in 1782. He represented the county of Wigton in four successive parliaments. He married Miss D'Aquilar, a jewess, by whom he got a fortune, and left issue. He was afterwards raised to be vice admiral of the white, and was appointed receiver-general of the land-rents in Scotland. Like many other great men he was addicted to deep gaming; but, though often successful, did not increase his fortune by it. He died at Glasserton, in Wigtonshire, on the 5th March 1795, aged fifty-six.

Stewart (John), called Walking Stewart, from his pedestrian feats, was a late eccentric individual, who in the course of a long life wandered on foot over the greater part of the globe. He was born in Bond Street, and, having received the rudiments of education at the Charterhouse, was sent out in 1763 as a writer to Madras. In this situation he remained not quite two years. Smitten with a strong inclination to travel, he prosecuted his route over Hindostan, walking to Delhi, Persepolis, and other parts of Persia, to Abyssinia and to Nubia. In the Carnatic he obtained the favor of the then nawaub, who made him his private secretary, and to this circumstance he owed his support in his latter days, the British house of Commons voting him £15,000, some little time before his death, in liquidation of his demands upon the nawaub. Quitting the service of this prince, he set out to walk to Seringapatam, where he was arrested by Tippo Saib, who compelled him to enter his army, and bestowed on him a commission as captain of sepoys. While serving in this capacity he was wounded in the arm. He did not succeed in quitting the situation in which he was thus placed, till the exertions of Sir James Sibbald, the commissioner for settling the terms of peace between the presidency and the sultan, procured his liberation. Mr. Stewart now started to walk to Europe, crossing the desert of Arabia, and arriving at length safely at Marseilles. Thence he proceeded through France and Spain. Having walked through England, Scotland, and Ireland, he crossed the Atlantic, and perambulated the United States of America. In the course of his migrations he was of course frequently exposed to dangers, and once, on crossing from Ireland, narrowly escaped shipwreck; in anticipation of which he entreated earnestly the crew, in case they should survive him, to take care of a MS. he then intended to publish, which he called his Opus Maximum. This, if kept with any care, must be a curious journal. The last ten years of his life were passed in the vicinity of Charing Cross, London, that he might be, to use his own expression, 'in the full tide of human existence.' He died at his house in Northumberland Street, the 20th of February, 1822.

STEWARTOWN, a pleasant and thriving town of Scotland, on the Annock water, in the district of Cunninghame, in Ayrshire. It is the seat of an extensive parish; the chief manufactures are bonnet-making, for which it has long been famed, and other branches of weaving. Four miles north by west of Kilmarnock, and eight north-east of Irvine.

STEWARTRY (from Stewart, a magistrate in Scotland), a term anciently used synonymously with county or shire, and still applied in the same sense to the counties of Kircudbright or Galloway, and of Orkney and Zetland.

STEYER, a town of Upper Austria, the chief place of the circle of the Traun, situated at the confluence of the rivers Steyer and Enns. It is a neat place, of considerable size, being about three miles in circumference, and has a number of country seats in the environs. The town has some manufacturing establishments of cottons and woollens; but they are insignificant when compared with those of iron, which are said to give employment to above 12,000 men in the town and neighbourhood. The largest establishment is a manufactory of fire arms and cutlery, for account of government. Steyer was originally a castle, built about the end of the tenth century, to check the inroads of the Magyars. On the expulsion of that horde from the Austrian states,

houses were built round the castle, so as at last to form a town, which was for some time the capital of a duchy, and gave name to the province of Styria. Steyer has suffered repeatedly from fires. Inhabitants 10,000. Ninety-two miles west by south of Vienna, and sixteen S. S. E. of Lintz.

STEYNING, a post and market-town in Steyning hundred, rape of Bramber, Sussex, fifteen miles west from Lewes, and fifty-one south by west from London. This town consists of four streets, poorly built: it is chiefly noted for its church, which is a small but curious Norman built structure. The tower is more modern. In this church were buried St. Cuthman, and Ethelwolf, king of Wessex, father of Alfred. Its name is supposed to be derived from a Roman way, called Steene street, running from Arundel to Dorking, in Surry. It was anciently a borough, and sent two members to parliament; the number of voters being about 100. The returning officer was the constable; he is chief magistrate, and annually chosen at the court-leet of the lord of the manor. Here is a free school and extensive barracks for infantry. Market on Wednesday, and on the second Wednesday in every month for cattle. Fairs June 9th, September 19th, and October 10th. The Michaelmas fair is very considerable for Welsh and other cattle, sheep, hogs, and seed wheat.

STHENELUS, in fabulous history, the son of Perseus and Andromeda, king of Mycenæ. He married Nicippe, the daughter of Pelops, by whom he had Eurystheus and two daughters. See EURYSTHEUS. Sthenelus made war against Amphitryon, king of Argos, because he had accidentally killed his father-in-law Electryon, Sthenelus's brother, and took him prisoner. And, according to the poets, it was during this war that Jupiter put on the appearance of Amphitryon, and went to his wife Alcmena. See ALCMENA.

STHENIC (from σθενος, strength), of or belonging to, or arising from strength, or a strong constitution or habit; the opposite of asthenic. Dr. Brown, in the first edition of his Elementa Medicinæ, made use of the word phlogistic to express this idea; because this class of diseases includes many of the inflammatory kind; but, as it does not include them all, many diseases apparently inflammatory being in fact asthenic, or diseases of debility, he adopted the terms sthenic and asthenic, and totally laid aside the terms phlogistic and antiphlogistic.

STHENIC DIATHESIS, that state of the body which produces sthenic diseases. 'The cause of sthenic diathesis,' says Dr. Brown, 'is too great an excitement of the whole living system by the stimulant powers. All the functions are first increased; a disturbance or irregularity then takes place in some; others are impaired; but not as long as this diathesis lasts by a debilitating operation.' See BRUNONIAN SYSTEM.

STHENIC DISEASES, general diseases arising from excessive excitement, the opposite of asthenic diseases, or diseases of debility. Dr. Brown calculates the proportion of sthenic diseases to asthenic in our country and climate, where there is little to stimulate the majority of the people very highly, to be as three in 100. But with all the poverty, poor diet, and debilitating powers of the climate in Scotland, it is thought he might have safely made the proportion ten in 100. See BRUNONIAN SYSTEM.

STHENO, one of the three Gorgons.

STHENOBOEA, in fabulous history, the daughter of Jobates, king of Lycia, wife of Proetus, king of Argos, and step-mother to Bellerophon, with whom she fell in love. See BELLEROPHON.

STIBADIUM, among the Romans, a low kind of table couch, or bed of a circular form, which succeeded to the triclinia, and was of different sizes, according to the number of guests they were designed for. They were called hexaclina, octaclina, or enneaclina, according as they held six, eight, or nine guests, and so of any other number.

STIB'IAL, *adj.* } Lat. *stibium*. Antimo-
STIBIA'RIAN, *n. s.* } nial: a man violent from the operation of antimony.

The former depend upon a corrupt incinerated melancholy, and the latter upon an adust *stibial* or eruginous sulphur. *Harvey.*

This *stibiarian* presseth audaciously upon the royal throne, and, after some sacrification, tendereth a bitter pill of sacrilege and cruelty; but, when the same was rejected because it was violent, then he presents his antimonian potion. *White.*

STICHI, an ancient kind of verse.

STICHOS, a name given by the old writers to a pectoral confection, the principal ingredient of which was the herb marrubium, or horehound.

STICK, *v. n.*, *v. a.*, & *n. s.* } *Pret* & *part.*
STICKLE, *v. a.* } *pass.* stuck; Sax.
STICKLER, *n. s.* } ræican. To ad-
STICKY, *adj.* } here; fasten upon; be united with, or rest upon; stop; lose motion: hence to be constant; remain; scruple; hesitate: as a verb active, to fasten on, fasten by transfixion; stab; pain with any thing pointed: as a noun substantive, any long and slender instrument; a long and slender piece of wood: 'to stick out' is to be remarkably prominent: to stickle is (literally) to interpose with sticks, as the seconds of prize fighters formerly did: to interpose between combatants; contest; altercate; act between opposite parties: the noun substantive corresponding: sticky is viscous; adhesive.

His flesh is consumed away that it cannot be seen, and his bones that were not seen *stick out*.
Job xxxiii. 21.

I will cause the fish of thy rivers to *stick* unto thy scales. *Ezek.*

Basilius, the judge, appointed *sticklers* and trumpets, whom the others should obey. *Sidney.*

Now does he feel
His secret murthers *sticking* on his hands.
Shakspeare. Macbeth.

Wherefore could I not pronounce amen?
I had most need of blessing, and amen
Stuck in my throat. *Id.*

If we should fail,
—We fail!
But screw your courage to the *sticking* place,
And we'll not fail. *Id.*

The knave will *stick* by thee, I can assure thee that: he will not out, he is true bred.
Shakspeare. Henry IV.

Though the sword be put into the sheath, we must not suffer it there to rust, or *stick* so fast as that we shall not be able to draw it readily when need requires. *Raleigh.*

The green caterpillar breedeth in the inward parts of roses not blown, where the dew *sticketh*. *Bacon.*

The going away of that which had staid so long, doth yet *stick* with me. *Id. Natural History.*

Herbs which last longest are those of strong smell, and with a *sticky* stalk. *Id.*

The church of Rome, under pretext of exposition of scripture, doth not *stick* to add and alter. *Bacon.*

Let them go to't, and *stickle*,
Whether a conclave or conventicle. *Cleaveland.*

The first contains a *sticking* fast to Christ, when the Christian profession is persecuted; and the second a rising from sin, as he rose to a new Christian life. *Hammond.*

They never doubted the commons; but heard all *stuck* in the lords house, and desired the names of those who hindered the agreement between the lords and commons. *Clarendon.*

Fortune, as she's wont, turned fickle,
And for the foe began to *stickle*. *Hudibras.*

Quercetanus, though the grand *stickler* for the tria prima, has this concession of the irresolubleness of diamonds. *Boyle.*

They could not but conclude that to be their interest, and, being so convinced, pursue it and *stick* to it. *Tillotson.*

None of those, who *stick* at this impediment, have any enemies so bitter and implacable as they found theirs. *Kettlewell.*

Some strike from clashing flints their fiery seed,
Some gather *sticks* the kindled flames to feed.
Dryden.

Two troops in fair array one moment showed;
The next, a field with fallen bodies strowed:
The points of spears are *stuck* within the shield,
The steeds without their riders scour the field,
The knight's unhorsed. *Id.*

Some *stick* to you, and some to t'other side. *Id.*

I'll stand betwixt; it first shall pierce my heart,
We will be *stuck* together on his dart.
Id. Tyrannick Love.

A lofty pile they rear;
The fabrick's front with cypress twigs they strew,
And *stick* the sides with boughs of baleful yew.
Dryden.

When he sees half of the Christians killed, and the rest in a fair way of being routed, he *stickles* betwixt the remainder of God's host and the race of fiends. *Id.*

Our former chiefs, like *sticklers* of the war,
First sought to inflame the parties, then to poise:
The quarrel loved, but did the cause abhor;
And did not strike to hurt, but make a noise. *Id.*

Rather than impute our miscarriages to our own corruption, we do not *stick* to arraign providence itself. *L'Estrange.*

If the matter be knotty, the mind must stop and buckle to it, and *stick* upon it with labour and thought, and not leave it till it has mastered the difficulty. *Locke.*

That two bodies cannot be in the same place is a truth that nobody any more *sticks* at than at this maxim, that it is impossible for the same thing to be and not to be. *Id.*

Where they *stick*, they are not to be farther puzzled by putting them upon finding it out themselves. *Id.*

I shudder at the name!
My blood runs backward, and my fault'ring tongue
Sticks at the sound. *Smith's Phædra and Hippolitus.*

The Heruli, when their old kindred fell sick, *stuck* them with a dagger. *Grew.*

We are your only friends; *stick* by us, and we will *stick* by you. *Davenant.*

Would our ladies, instead of *sticking* on a patch against their country, sacrifice their necklaces against the common enemy, what decrees ought not to be made in their favour! *Addison.*

The advantage will be on our side, if we *stick* to its essentials. *Id. Freeholder.*

The inferior tribe of common women have, in most reigns, been the professed *sticklers* for such as have acted against the true interests of the nation. *Id.*

To *stick* at nothing for the publick interest, is represented as the refined part of the Venetian wisdom. *Id. on Italy.*

Some *stick* not to say, that the parson and attorney forged a will. *Arbuthnot.*

He is often stigmatized with it, as a note of infamy, to *stick* by him whilst the world lasteth. *Sanderson.*

Oh for some pedant reign,
Some gentle James to bless the land again;
To *stick* the doctor's chair unto the throne,
Give law to words, or war with words alone. *Pope.*

I am satisfied to trifle away my time, rather than let it *stick* by me. *Id. Letters.*

In their quarrels they proceed to calling names, till they light upon one that is sure to *stick*. *Swift.*

The tory or high church clergy were the *sticklers* against the exorbitant proceedings of king James II. *Id.*

All place themselves in the list of the national church, though they are great *sticklers* for liberty of conscience. *Id.*

Souls a little more capacious can take in the connexion of a few propositions; but if the chain be prolix, here they *stick* and are confounded. *Watts on the Mind.*

Proverbial sentences are formed into a verse whereby they *stick* upon the memory. *Watts.*

If on your fame our sex a blot has thrown,
'Twill ever *stick* thro' malice of your own. *Young.*

STICKS, or FOOT-STICKS, in printing, slips of wood that lie between the foot of the page and the chase, to which they are wedged fast by the quoins, to keep the form firm in conjunction with the side-sticks, which are placed at the side of the page, and fixed in the same manner by means of quoins.

STICKLEBACK, or STICKLEBAG, in ichthyology. See GASTEROSTEUS.

STIFELIUS, a German divine and mathematician, born at Eslingen, in 1509. He published a treatise on Algebra, in the German language, and another on the Calendar. He died at Jena in 1657, aged fifty-eight.

STIFF, *adj.* / STIF'FEN, *v. a* & *v. n.* / STIFFHEART'ED, *adj.* / STIFF'LY, *adv.* / STIFF'NECKED, *adj.* / STIFF'NESS, *n. s.* — Sax. ſtiſ; Danish *stiff*; Swed. *styf*. Rigid; inflexible; strong; resisting flexure; not flaccid; not pliant: hence hardy; stubborn; pertinacious, harsh; formal: to stiffen is to make stiff; grow stiff; become torpid or obstinate: the adverb and noun substantive follow the senses of stiff, adjective: and the compounds are of obvious meaning.

He *stiffened* his neck, and hardened his heart from turning unto the Lord. 2 *Chron.* xxxvi. 13.

They are impudent children, and *stiff-hearted*. *Ezek.* ii.

I commended them that stood so *stiffly* for the Lord. 2 *Esdras.*

The poor, by them disrobed, naked lie,
Veiled with no other covering but the sky;
Exposed to *stiff'ning* frosts, and drenching showers,
Which thickened air from her black bosom pours.
Sandys.

An infinite charge to her majesty, to send over such an army as should tread down all that standeth before them on foot, and lay on the ground all the *stiffnecked*. *Spenser.*

There fill yourself with those most joyous sights,
But speak no word to her of these sad plights,
Which her too constant *stiffness* doth constrain. *Id.*

We neither allow unmeet nor purpose the *stiff* defence of any unnecessary custom heretofore received. *Hooker.*

In matters divine, it is still maintained *stiffly*, that they have no *stiffnecked* force. *Id.*

How *stiff* is my vile sense,
That I stand up, and have ingenious feeling
Of my huge sorrows! Better I were distract!
Shakspeare.

This is *stiff* news. *Id.*

When the blast of war blows in our ears,
Stiffen the sinews, summon up the blood,
Disguise fair nature with hard-favoured rage.
Id. Henry V.

The Indian fig of itself multiplieth from root to root; the plenty of the sap, and the softness of the stalk, making the bough, being over-loaden and not *stiffly* upheld, to weigh down. *Bacon.*

The *stiffness* and dryness of iron to melt, must be holpen by moistening or opening it. *Id.*

Yield to others when there is cause; but it is a shame to stand *stiff* in a foolish argument. *Taylor.*

On a *stiff* gale
The Theban swan extends his wings. *Denham.*

This *stiffnecked* pride nor art nor force can bend,
Nor high-flown hope, to reason's lure descend. *Id.*

The pillars of this frame grow weak,
My sinews slacken, and an icy *stiffness*
Benumbs my blood. *Id.*

They, rising on *stiff* pinions, tower
The mid aerial sky. *Milton.*

A war ensues, the Cretans own their cause,
Stiff to defend their hospitable laws. *Dryden.*
Her eyes grow *stiffen'd*, and with sulphur burn. *Id.*

Her *stiff'ning* grief,
Who saw her children slaughtered all at once,
Was dull to mine. *Id. and Lee.*

The tender soil, then *stiff'ning* by degrees,
Shut from the bounded earth the bounding seas.
Dryden.

Some souls we see
Grow hard, and *stiffen* with adversity. *Id.*

Still less and less my boiling spirits flow;
And I grow *stiff* as cooling metals do.
Id. Indian Emperour.

To try new shrouds, one mounts into the wind,
And one below their ease or *stiffness* notes.
Dryden.

The willow bows and recovers, the oak is stubborn and inflexible; and the punishment of that *stiffness* is one branch of the allegory. *L'Estrange.*

Firmness or *stiffness* of the mind is not from adherence to truth, but submission to prejudice. *Locke.*

Mingling with that oily liquor, they were wholly incorporate, and so grew more *stiff* and firm, making but one substance. *Burnet's Theory.*

The vices of old age have the *stiffness* of it too; and, as it is the unfittest time to learn in, so the unfitness of it to unlearn will be found much greater. *South's Sermons.*

The French are open, familiar, and talkative; the Italian *stiff*, ceremonious, and reserved. *Addison on Italy.*

Fix'd in astonishment I gaze upon thee,
Like one just blasted by a stroke from heaven,
Who pants for breath, and *stiffens* yet alive;
In dreadful looks, a monument of wrath. *Id. Cato.*

All this religion sat easily upon him, without any of that *stiffness* and constraint, any of those forbidding appearances, which disparage the actions of the sincerely pious. *Atterbury.*

Rules and critical observations improve a good genius, where nature leadeth the way, provided he is not too scrupulous; for that will introduce a *stiffness* and affectation which are utterly abhorrent from all good writing. *Felton.*

The glittering robe
Hung floating loose, or *stiff* with mazy gold.
Thomson.

Stiff forms are bad, but let not worse intrude,
Nor conquer art and nature to be rude. *Young.*

STIFFLE, or great muscle, in the manege, is the part of the hind leg of a horse which advances towards his belly. This is a most dangerous part to receive a blow upon.

STIGLIANO, or Stiligiano, a town of Naples, in Basilicata, famous for its baths; twenty-four miles S. S. E. of Acerenza.

STIGMA, in botany, the summit or top of the style, accounted by the sexualists the female organ of generation in plants, which receives the fecundating dust of the tops of the stamina, and transmits its vapor or effluvia through the style into the heart of the seed bud, for the purpose of impregnating the seeds.

STIGMATA (plural of stigma), in antiquity, certain marks impressed on the left shoulders of soldiers when listed.

Stigmata were also a kind of notes or abbreviations, consisting only of points, disposed various ways; as in triangles, squares, crosses, &c.

Stigmata is also a term introduced by the Franciscans to express the marks or prints of our Saviour's wounds, said to have been miraculously impressed by him on the body of their seraphic father St. Francis.

Stigmata, in entomology, the apertures in different parts of the bodies of insects, communicating with the tracheæ or air-vessels, and serving for the office of respiration.

STIGMATIZING, among the ancients, was inflicted upon slaves as a punishment, but more frequently as a mark to know them by; in which case it was done by applying a red-hot iron, marked with certain letters, to their foreheads, till a fair impression was made; and then pouring ink into their furrows, that the inscription might be the more conspicuous. Soldiers were branded in the hand with the name or character of their general. It was also customary to stigmatize the worshippers and votaries of some of the gods. The marks used on these occasions were various; sometimes they contained the name of the god, sometimes his particular ensign, as the thunderbolt of Jupiter, the trident of Neptune, the ivy of Bacchus, &c., or they marked themselves with some mystical number, whereby the god's name was described. To these three ways of stigmatizing, St. John is supposed to refer in Rev. chap. xiii. ver. 16, 17. Theodoret is of opinion that the Jews were forbidden to brand themselves with stigmata, because the idolaters, by that ceremony, used to consecrate

themselves to their false gods. Among some nations, stigmatizing was considered as a distinguishing mark of honor and nobility. In Thrace, as Herodotus tells us, it was practised by none but persons of credit, nor omitted by any but persons of the meanest rank. The ancient Britons are also said to have imprinted on the bodies of their infants the figures of animals, and other marks, with hot irons.

STIL, or STIL DE GRAIN, in the color trade, the name of a composition used for painting in oil or water, and is made of a decoction of the lycium or Avignon berry, in alum water, which is mixed with whiting into a paste, and formed into twisted sticks. It ought to be chosen of a fine gold yellow, very fine, tender, and friable, and free from dirt.

STILAGO, in botany, a genus of plants belonging to the class of gynandria, and order of triandria. There is one female: CAL. monophyllous, and almost three-lobed: COR. none; and the berry is globular. There is only one species, viz. S. bonius.

STILBE, in botany, a genus of plants belonging to the class of polygamia, and order of diœcia. The exterior calyx of the hermaphrodite flower is triphyllous; the interior is quinquedentate and cartilaginous. The corolla is funnel-shaped and quinquefid. There are four stamina; and there is one seed in the interior calyx calyptrate. The female flower is similar, has no interior calyx nor fruit. There are three species; 1. S. cornua, 2. S. ericoides, and 3. S. pinastra, which are all foreign plants.

STILBE, or STILBEA, in the mythology, the daughter of the river god Peneus, by Creusa, and sister of the famous Daphne. She was not so shy as her sister, but, according to Diodorus, had two sons by her sister's lover, Apollo; viz. Centaurus and Lapithus, the progenitors of the Centaurs and Lapithæ.—Diod. iv.

STILBITE (from στιλβω, to shine), in mineralogy, a precious stone discovered by Hauy. See MINERALOGY.

STILE, *n. s.* Sax. ꝑtıȝele, from ꝑtıȝan, to climb. A set of steps to pass from one enclosure to another.

There comes my master and another gentleman from Frogmore, over the *stile* this way. *Shakspeare.*

If they draw several ways, they may be ready to hang themselves upon every gate or *stile* they come at. *L'Estrange.*

The little strutting pile,
You see just by the church-yard *stile*. *Swift.*

STILE, *n. s.* } Rather style. Fr. *stile*. A
STI'LAR, *adj.* } pin to cast the shadow on a sun-dial: belonging to the stile of a dial.

Erect the *stile* perpendicularly over the substilar line, so as to make an angle with the dial plane equal to the elevation of the pole of your plane. *Moxon's Mechanical Exercises.*

At fifty-one and a half degrees, which is London's latitude, make a mark; and, laying a ruler to the centre of the plane and to this mark, draw a line from the *stilar* line. *Moxon.*

STILES (Ezra), D.D. and L.L.D, a late learned and pious divine of the United States, born at North Haven in Connecticut, November 19th, 1727, O. S. He studied at Yale College, and graduated there in 1746; and in 1749 was appointed one of its tutors, which station he held six years. In 1755 he was settled minister of Newport, in Rhode Island, and remained there till 1776, when the disturbances occasioned by the war obliged him to remove to Portsmouth in New Hampshire. In 1777 he was elected president of Yale College; which he held till his death, and was also professor of Church History. He maintained a correspondence with learned men on both sides of the Atlantic; and was a member of several philosophical societies. He possessed in an eminent degree the faculty of communicating knowledge to his pupils. He published some tracts suitable to his profession; and died much respected as a citizen and a minister, on the 12th of May 1795, at Newhaven, Connecticut, of a bilious fever.

STILETTO, *n. s.* Ital. *stiletto;* Fr. *stilet*. A small pointed dagger.

When a senator should be torn in pieces, he hired one, who, entering into the senate-house, should assault him as an enemy to the state; and stabbing him with *stilettoes*, leave him to be torn by others. *Hakewill on Providence.*

STILICHO, a brave general of the Romans, under Theodosius the Great and Honorius, who twice merited and obtained the title of Deliverer of Italy. Yet, after all his services, he fell under the suspicion of Honorius, who ordered him to be beheaded, and his family extirpated, A.D. 408. From the confused and partial records of these dark ages it is difficult to discover the truth; but contemporary writers vindicate Stilicho. Claudian is loud in his praises, and Zosimus denies the truth of the charges against him. —Hist. v. See ROME.

STILL, *v. a., adj.,* & *n. s.*
STILL'BORN, *adj.*
STILL'NESS, *n. s.*
STIL'LY, *adv.*
} Saxon ꝑtıllan; Belg. *stillen*; Gothic *stilla* is to fix; To silence; make silent; appease: quiet; calm; silent; motionless: hence in still-born, signifying dead in the birth: a calm; silence: stillness, corresponds with still, adjective and verb active: stilly is silently; calmly.

Gyrecia sit *still*, but with no *still* pensiveness. *Sidney.*

Atin when he spied
Thus in *still* waves of deep delight to wade,
Fiercely approaching to him loudly cried. *Spenser.*

Your wife Octavia, with her modest eyes,
And *still* conclusion, shall acquire no honour,
Demuring upon me. *Shakspeare. Antony and Cleopatra.*

Herne the hunter,
Sometime a keeper here in Windsor forest,
Doth all the winter time, at *still* of midnight,
Walk round about an oak with ragged horns. *Shakspeare.*

How sweet the moonlight sleeps upon this bank.
Here will we sit, and let the sounds of musick
Creep in our ears; soft *stillness* and the night
Become the touches of sweet harmony. *Id.*

Is this the scourge of France?
Is this the Talbot so much feared abroad,
That with his name the mothers *still* their babes? *Id.*

The gravity and *stillness* of your youth
The world hath noted. *Id. Othello.*

From camp to camp, through the foul womb of night,
The hum of either army *stilly* sounds.
Id. Henry V.

Grant that our hopes, yet likely of fair birth,
Should be *stillborn*, and that we now possest
The utmost man of expectation, we are
A body strong enough to equal with the king.
Shakspeare.

He had never any jealousy with his father, which might give occasion of altering court or council upon the change; but all things passed in a *still*.
Bacon's Henry VII.

In all refrainings of anger, it is the best remedy to make a man's self believe that the opportunity of revenge is not yet come; but that he foresees a time for it, and so to *still* himself in the mean time, and reserve it. *Bacon.*

From hence my lines and I depart;
I to my soft *still* walks, they to my heart;
I to the nurse, they to the child of art. *Donne.*

Many casualties were but matter of sense; as, whether a child were abortive or *stillborn*.
Graunt's Bills of Mortality.

When black clouds draw down the lab'ring skies,
An horrid *stillness* first invades the ear,
And in that silence we the tempest fear. *Dryden.*

The pale assistants on each other stared
With gaping mouths for issuing words prepared;
The *stillborn* sounds upon the palate hung,
And died imperfect on the faultering tongue. *Id.*

That, in this state of ignorance, we shortsighted creatures might not mistake true felicity, we are endowed with a power to suspend any particular desire. This is standing *still* where we are not sufficiently assured. *Locke.*

Religious pleasure moves gently, and therefore constantly. It does not affect by rapture, but is like the pleasure of health, which is *still* and sober.
South.

The storm was laid, the winds retired
Obedient to thy will;
The sea that roared at thy command,
At thy command was *still*. *Addison.*

Hope quickens all the *still* parts of life, and keeps the mind awake in her most remiss and indolent hours. *Id.*

Silius Italicus has represented it as a very gentle and *still* river, in the beautiful description he has given of it. *Id.*

He, having a full sway over the water, had power to *still* and compose it, as well as to move and disturb it. *Woodward.*

How all things listen while thy muse complains!
Such silence waits on Philomela's strains
In some *still* evening, when the whispering breeze
Pants on the leaves, and dies upon the trees. *Pope.*

Thy stone, O Sisiphus, stands *still*;
Ixion rests upon his wheel. *Id.*

The third fair morn now blazed upon the main,
Then glassy smooth lay all the liquid plain,
The winds were hush'd, the billows scarcely curled,
And a dead silence *still'd* the wat'ry world. *Id.*

If a house be on fire, those at next door may escape, by the *stillness* of the weather. *Swift.*

I know a trick to make you thrive;
O, 'tis a quaint device!
Your *stillborn* poems shall revive,
And scorn to wrap up spice. *Id.*

STILL, *adv.* Sax. ȝrille. To this time; till now; always; ever; in continuance; nevertheless; after that.

Unless God from heaven did by vision *still* shew them what to do, they might do nothing. *Hooker.*

In the primitive church, such as by fear being compelled to sacrifice to strange gods, after repented and kept *still* the office of preaching the gospel.
Whitgifte.

My brain I'll prove the female to my soul,
My soul the father; and these two beget
A generation of *still*-breeding thoughts.
Shakspeare

I with my hand at midnight held your head;
And, like the watchful minutes to the hour,
Still and anon cheared up the heavy time,
Saying, What want you? *Id. King John.*

It hath been anciently reported, and is *still* received, that extreme applauses of great multitudes have so rarified the air, that birds flying over have fallen down. *Bacon.*

He told them, that if their king were *still* absent from them, they would at length crown apes.
Davies on Ireland.

Whom the disease of talking *still* once possesseth, he can never hold his peace. *Ben Jonson.*

Chymists would be rich, if they could *still* do in great quantities what they have sometimes done in little. *Boyle.*

Trade begets trade, and people go much where many people are already gone: so men run *still* to a crowd in the streets, though only to see. *Temple.*

Thou, O matron!
Here dying, to the shore hast left thy name;
Cajeta *still* the place is called from thee,
The nurse of great Æneas' infancy.
Dryden's Æneid.

As God sometimes addresses himself in this manner to the arts of men; so, if the heart will receive such motions by a ready compliance, they will return more frequently, and *still* more and more powerfully. *South.*

The desire of fame betrays the ambitious man into indecencies that lessen his reputation; he is *still* afraid lest any of his actions should be thrown away in private. *Addison.*

The moral perfections of the Deity, the more attentively we consider, the more perfectly *still* we know them. *Atterbury.*

The fewer *still* you name, you wound the more;
Bond is but one, but Hurpax is a score. *Pope.*

STILL, *n. s.* & *v. n.* STIL'LATORY, *n. s.* STILLICIDE, STILLICID'IOUS, *adj.* } From distil, and Lat. *stillo.* A vessel for distillation; an alembic: to drop; fall in drops: a stillatory is either the still or room where it is used: stillicide, a succession of drops: stillicidious, falling in drops: all these words are out of use.

In all *stillatories*, the vapour is turned back upon itself, by the encounter of the sides of the *stillatory*.
Bacon.

The *stillicides* of water, if there be water enough to follow, will draw themselves into a small thread, because they will not discontinue.
Id. Natural History.

His sceptre against the ground he threw,
And tears *stilled* from him which moved all the crew.
Chapman.

All the offices that require heat, as kitchens, *stillatories*, stoves, should be meridional.
Wotton's Architecture.

Short thick sobs, whose thundering volleys float,
And roul themselves over her lubric throat
In panting murmurs, *stilled* out of her breast,
That ever bubbling spring. *Crashaw.*

Nature's confectioner, the bee,
Whose suckets are moist alchimy

The *still* of his refining mold
Minting the garden into gold. *Cleaveland.*

Crystal is sometimes found in rocks, and in some places not unlike the stirious or *stillicidious* dependencies of ice. *Brown.*

These are nature's *stillatories*, in whose caverns the ascending vapours are congealed to that universal aquavitæ, that good fresh water.

More against Atheism.

In distilling hot spirits, if the head of the *still* be taken off, the vapour which ascends out of the *still* will take fire at the flame of a candle, and the flame will run along the vapour from the candle to the *still*. *Newton's Opticks.*

This fragrant spirit is obtained from all plants in the least aromatick, by a cold *still*, with a heat not exceeding that of summer.

Arbuthnot on Aliments.

STILL-BOTTOM, in the distillery, a name given by the traders to what remains in the still after working the wash into low wines. These bottoms are procured in the greatest quantity from the malt-wash, and are of so much value to the distiller in the fattening of hogs, &c., that he often finds them one of the most valuable articles of the business. See DISTILLATION.

STILLINGFLEET (Edward), bishop of Worcester, was the son of Samuel Stillingfleet, gent. and was born at Cranborn in Dorsetshire in 1635. He was educated at St. John's College, Cambridge; and, having received orders, was, in 1657, presented to the rectory of Sutton in Nottinghamshire. By publishing his Origines Sacræ, one of the ablest defences of revealed religion that has ever been written, he soon acquired such reputation that he was appointed preacher of the Rolls Chapel; and in January 1665 was presented to the rectory of St. Andrew's, Holborn. He was afterwards chosen lecturer at the Temple, and appointed chaplain in ordinary to king Charles II. In 1668 he took the degree of D. D., and was soon after engaged in a dispute with those of the Romish religion, by publishing his Discourse concerning the Idolatry and Fanaticism of the Church of Rome, which he afterwards defended against several antagonists. In 1680 he preached at Guildhall chapel a sermon on Phil. iii. 26, which he published under the title of The Mischief of Separation; and, this being immediately attacked by several writers, he in 1683 published his Unreasonableness of Separation. In 1685 appeared his Origines Britannicæ, or the Antiquities of the British Church, in folio. During the reign of king James II. he wrote several tracts against popery, and was prolocutor of the convocation, as he had likewise been under Charles II. After the Revolution he was advanced to the bishopric of Worcester, and was engaged in a dispute with the Socinians, and also with Mr. Locke; in which last contest he is generally thought to have been unsuccessful. He died at Westminster in 1699, and was interred in the cathedral of Worcester, where a monument was erected to his memory by his son. Dr. Stillingfleet wrote several other works, which, with the above, have been reprinted in 6 vols. folio.

STILLINGFLEET (Edward), son of the bishop, was fellow of St. John's College in Cambridge, F. R. S., M. D., and Gresham professor of physic; but marrying in 1692 he lost his lucrative offices and his father's favor; a misfortune that affected both himself and his posterity. However, going into orders, he obtained, by his father's means, the living of Newington Butts, which he immediately exchanged for those of Wood-Norton, and Swanton in Norfolk. He died in 1708.

STILLINGFLEET (Benjamin), only son of the preceding, was educated at Norwich school, which he left in 1720, with the character of an excellent scholar. He then went to Trinity College in Cambridge, at the request of Dr. Bentley, the master, who had been private tutor to his father, domestic chaplain to his grandfather, and much indebted to the family. Here he was a candidate for a fellowship, but was rejected by the master's influence. This was a severe and unexpected disappointment, and but little alleviated by the doctor's apology, that it was a pity that a gentleman of Mr. Stillingfleet's parts should be buried within the walls of a college. See BENTLEY. This ingratitude of Dr. Bentley was however not of any real disservice to Mr. Stillingfleet. By being thrown upon the world, he formed many honorable and valuable connections. He dedicated some translations of Linnæus to the late lord Lyttleton, partly, he says, from motives of private respect and honor. Lord Barrington gave him the place of the master of the barracks at Kensington; a favor to which Mr. Stillingfleet, in the dedication of his Calendar of Flora to that nobleman, alludes with politeness and gratitude. His Calendar of Flora was found at Stratton in Norfolk in 1755, at the hospitable seat of his worthy and ingenious friend Mr. Marsham, who had made several observations of that kind, and had communicated to the public his curious observations on the growth of trees. But it was to Mr. Wyndham of Felbrig in Norfolk that he appears to have had the greatest obligations; he travelled abroad with him, spent much of his time at his house, and was appointed one of his executors (Mr. Garrick was another), with a considerable addition to an annuity which that gentleman had settled upon him in his lifetime. Mr. Stillingfleet's genius seems to have led him principally to the study of natural history: which he prosecuted as an ingenious philosopher, a useful citizen, and a good man. In this walk of learning he mentions, as his friends, Dr. Watson, Dr. Solander, Mr. Hudson, Mr. Price of Foxley, Mr. Pennant, and some others. Mr. Stillingfleet published a volume of miscellaneous tracts, which is in much esteem, and does great honor to his head and heart. They are chiefly translations of some essays in the Amœnitates Academicæ, published by Linnæus, interposed with some observations and additions of his own. But his Essay on Conversation, published in the first volume of Dodsley's Collection of Poems, entitles him to a distinguished rank among our English poets. Here more than once Mr. Stillingfleet shows himself still sore for Dr. Bentley's cruel treatment of him; and, towards the beautiful and moral close of it, seems to hint at a mortification of a more delicate nature, which he had suffered from the other sex. To these disappointments it was perhaps owing that Mr. Stillingfleet neither married nor went

into orders. His London residence was at a Saddler's in Piccadilly; where he died in 1771, aged above seventy, leaving several valuable papers behind him.

STILLINGIA, in botany, a genus of plants belonging to the class of monœcia, and to the order of monodelphia: MALE CAL. hemispherical and multiflorous: COR. tubulous, and erose or gnawed; FEMALE CAL. uniflorous and inferior: COR. superior. The style is trifid, and the CAPS. three-grained. There is one species; S. sylvatica

STILOBATUM in architecture, denotes the body of the pedestal of any column.

STILPO, a celebrated philosopher of Megara, who flourished in the reign of Ptolemy Euergetes. In his youth he had been addicted to licentious pleasures, from which he religiously refrained from the moment that he ranked himself among philosophers. When Ptolemy Soter, at the taking of Megara, offered him a large sum of money, and requested that he would accompany him into Egypt, he accepted but a small part of the offer, and retired to the island of Ægina, whence, on Ptolemy's departure, he returned to Megara. That city being again taken by Demetrius the son of Antigonus, and the philosopher required to give an account of any effects which he had lost during the hurry of the plunder, he replied that he had lost nothing; for no one could take from him his learning and eloquence. So great was the fame of Stilpo that the most eminent philosophers of Athens took pleasure in attending upon his discourses. His peculiar doctrines were, that species or universals have no real existence, and that one thing cannot be predicated of another. With respect to the former of these opinions, he seemed to have taught the same doctrine with the sect afterwards known by the appellation of nominalists. To prove that one thing cannot be predicated of another, he said, that goodness and man, for instance, are different things, which cannot be confounded by asserting the one to be the other; he argued farther, that goodness is a universal, and universals have no real existence: consequently, since nothing cannot be predicated of any thing, goodness cannot be predicated of man. Thus, whilst this subtle logician was, through his whole argument, predicating one thing of another, he denied that any one thing could be the accident or predicate of another. If Stilpo was serious in this reasoning; if he meant any thing more than to expose the sophistry of the schools, he must be confessed to have been an eminent master of the art of wrangling; and it was not wholly without reason that Glycera, a celebrated courtezan, when she was reproved by him as a corrupter of youth, replied that the charge might be justly retorted upon himself, who spent his time in filling their heads with sophistical quibbles and useless subtilties. In ethics he seems to have been a Stoic, and in religion he had a public and a private doctrine, the former for the multitude, and the latter for his friends. He admitted the existence of a supreme divinity, but had too much sense to reverence the Grecian superstitions.

STILTS, *n. s.* Sax ꝼtœlcan; Swed. *stylter*. Supports on which boys raise themselves when they walk.

Some could not be content to walk upon the battlements, but they must put themselves upon *stilts*.
Howel's England's Tears.

The heron, and such like fowl that live of fishes, walk on long *stilts* like the people in the marshes.
More against Atheism.

Men must not walk upon *stilts*. *L'Estrange.*

STIM'ULATE, *v. a.* } Latin *stimulo*. To
STIMULA'TION, *n. s.* } prick; to prick forward; excite; urge by a pungent motive: in physic, to excite a quick sensation, with a derivation towards the part: the noun substantive corresponding.

Extreme cold *stimulates*, producing first a rigour, and then a glowing heat; those things which *stimulate* in the extreme degree excite pain.
Arbuthnot on Diet.

Some medicines lubricate, and others both lubricate and *stimulate*. *Sharp.*

Some persons, from the secret *stimulations* of vanity or envy, despise a valuable book, and throw contempt upon it by wholesale. *Watts on the Mind.*

STIMULI (Lat.) stimulus; in botany, a species of armature or offensive weapon, with which some plants, as nettle, cassada, acalypha, and tragia are furnished. Their use, says Linnæus, is by their venomous punctures to keep off naked animals that would approach to hurt them.

STIMULI, stimulants, or exciting powers, in the new system of medicine, comprehend every thing that can affect the human body, or mind, inwardly or outwardly. These Dr. Brown divides into internal and external; and the latter he subdivides into durable and diffusible. See BRUNONIAN SYSTEM.

STING, *v. a.* & *n. s.* } *Pret.* I stung or stang;
STING'LESS, *adj.* } *part. pass.* stung or stung. Sax. ꝼtinꝷan; Isl. *stungen*, sore pricked. To pierce or wound with a darted point, as that of wasps or scorpions; to pain acutely: any thing that gives a sharp pain or morbid sensation; the point of an epigram.

The snake, rolled in a flow'ry bank,
With shining checkered slough, doth *sting* a child
That for the beauty thinks it excellent. *Shakspeare.*

His unkindness,
That stript her from his benediction, turned her
To foreign casualties, gave her dear right
To his doghearted daughters; these things *sting* him
So venomously that burning shame detains him
From his Cordelia. *Id.*

Serpents have venomous teeth, which are mistaken for their *sting*. *Bacon's Natural History.*

His rapier was a hornet's *sting*,
It was a very dangerous thing;
For if he chanced to hurt the king,
It would be long in healing. *Drayton.*

He hugs this viper when he thinks it *stingless*
Decay of Piety.

That snakes and vipers *sting*, and transmit their mischief by the tail, is not easily to be justified; the poison lying about the teeth, and communicated by the bite. *Browne.*

It is not the jerk or *sting* of an epigram, nor the seeming contradiction of a poor antithesis.
Dryden.

No more I wave
To prove the hero—slander *stings* the brave. *Pope.*

The *stinging* lash apply. *Id.*

The Jews receiving this book originally with such *sting* in it, shews that the authority was high.
Forbes.

The STING is an apparatus in the bodies of certain insects, in form of a little spear, serving them as a weapon of offence. See BEE.

STING-RAY, in ichthyology. See RAIA.

STIN'GY, *adj.* Ital. *stenau.* A low cant word. Covetous; niggardly; avaricious.

A *stingy* narrow-hearted fellow, that had a deal of choice fruit, had not the heart to touch it till it began to be rotten. *L'Estrange.*

He relates it only by parcels, and won't give us the whole; which forces me to bespeak his friends to engage him to lay aside that *stingy* humour, and gratify the publick at once.
Arbuthnot's History of John Bull.

STINK, *v. n.* & *n. s.* STINK'ER, *n. s.* STINK'INGLY, *adv.* STINK'POT, *n. s.* *Pret.* I stunk or stank. Sax. ȳrinian; Belgic and Teutonic *stincken*; Swed. *stinka.* To emit an offensive smell, commonly a smell of putrefaction: a smell of this kind: a stinker is something intended to emit such a smell: the adverb corresponds with the verb neuter: and stinkpot is a name given to a composition peculiarly offensive to the smell.

When the children of Ammon saw that they *stunk* before David, they sent and hired Syrians.
2 *Sam.* x. 6.

John, it will be *stinking* law for his breath.
Shakspeare.

Those *stinks* which the nostrils straight abhor are not most pernicious; but such airs as have some similitude with man's body, and so betray the spirits.
Bacon's Natural History.

The air may be purified by burning of *stinkpots* or *stinkers* in contagious lanes. *Harvey.*

They share a sin, and such proportions fall,
That, like a *stink*, 'tis nothing to them all.
Dryden.

What a fool art thou to leave thy mother for a nasty *stinking* goat! *L'Estrange.*

Most of smells want names; sweet and *stinking* serve our turn for these ideas, which is little more than to call them pleasing and displeasing. *Locke.*

Chloris, this costly way to *stink* give o'er,
'Tis throwing sweet into a common shore;
Not all Arabia would sufficient be;
Thou smell'st not of thy sweets, they *stink* of thee.
Granville.

By what criterion do ye eat, d' ye think,
If this is prized for sweetness, that for *stink.* *Pope.*

The STINK-POT is an earthen jar or shell charged with powder, grenadoes, and other materials of an offensive and suffocating smell. It is frequently used by privateers, in the western ocean, in the attack of an enemy whom he designs to board; for which purpose it is furnished with a light fuse at the opening or touch-hole. See BOARDING.

STINT, *v. a.* & *n. s.* Swed. and Goth. *stynta*; Isl. *stunta.* To bound; limit; restrain; stop: a limit; bound; restraint: hence a portion or assigned quantity.

Then hopeless, heartless, 'gan the cunning thief,
Persuade us die, to *stint* all further strife. *Spenser.*

The reason hereof is the end which he hath proposed, and the law whereby his wisdom hath *stinted* the effects of his power in such sort that it doth not work infinitely, but correspondently, unto that end for which it worketh. *Hooker.*

Touching the *stint* or measure thereof, rites and ceremonies, and other external things of the like nature, being hurtful unto the church, either in respect of their quality, or in regard of their number; in the former there could be no doubt or difficulty what would be done; their deliberation in the latter was more difficult. *Id.*

Our *stint* of woe
Is common; every day a sailor's wife
The masters of some merchant, and the merchant,
Have just our theme of woe. *Shakspeare.*

He that gave the hint,
This letter for to print,
Must also pay the *stint.* *Denham.*

Nature wisely *stints* our appetite,
And craves no more than undisturbed delight.
Dryden.

The exteriors of mourning, a decent funeral, and black habits, are the usual *stints* of common husbands. *Id.*

A supposed heathen deity might be so poor in his attributes, so *stinted* in his knowledge, that a Pagan might hope to conceal his perjury from his notice.
Addison.

I shall not go about to extenuate the latitude of the curse upon the earth, or *stint* it only to the production of weeds; but give it its full scope, in an universal diminution of the fruitfulness of the earth.
Woodward.

How much wine drink you in a day? my *stint* in company is a pint at noon. *Swift.*

Few countries which, if well cultivated, would not support double their inhabitants; and yet fewer where one-third are not extremely *stinted* in necessaries. *Id.*

She *stints* them in their meals, and is very scrupulous of what they eat and drink, and tells them how many fine shapes she has seen spoiled in her time for want of such care. *Law.*

STIPA, feather-grass, in botany, a genus of plants belonging to the class of triandria and order of digynia; and in the natural system ranging under the fourth order, gramina. The calyx is bivalved. The exterior valve of the corolla is terminated by an awn; the base is jointed. There are nine species; viz. 1. S. arguens; 2. aristella; 3. avenacea; 4. capillata; 5. juncea; 6. membranacea; 7. pennata; 8. spicata; and, 9. tenacissima. Of these only one is British; viz. S. pennata, the common feather-grass. The beards are feathered. The plant rises to ten inches, grows on mountains, and flowers in July or August.

STI'PEND, *n. s.* STIPEND'IARY, *adj.* & *n. s.* Lat. *stipendium.* Wages; settled pay: stipendiary is receiving salaries or a stated price: he who receives such price.

His great *stipendiary* prelates came with troops of evil appointed horsemen not half full.
Knolles's History.

All the earth
Her kings and tetrarchs, are their tributaries;
People and nations pay them hourly *stipends.*
Ben Jonson.

This whole country is called the kingdom of Tunis; the king whereof is a kind of *stipendiary* unto the Turk. *Abbot.*

St. Paul's zeal was expressed in preaching without any offerings or *stipend.* *Taylor.*

If thou art become
A tyrant's vile *stipendiary*, with grief
That valour thus triumphant I behold
Which, after all its danger and brave toil
Deserves no honour from the gods of men. *Glover.*

Place rectors in the remaining churches, which are now served only by *stipendiary* curates. *Swift.*

STIPEND, among the ancient Romans, signified the same with tribute: and hence stipendiarii were the same with tributarii.

STIPULA, in botany, one of the fulcra or props of plants, defined by Linnæus to be a scale, or small leaf, stationed on each side the base of the footstalks of the flower and leaves, at their first appearance, for the purpose of support. Elmgren restricts it to the footstalks of the leaves only.

STIP'ULATE, *v. n.* } Fr. *stipuler;* Lat. *sti-*
STIPULA'TION, *n. s.* } *pulor.* To contract; bargain; settle terms: the noun substantive corresponding.

We promise obediently to keep all God's commandments; the hopes given by the gospel depend on our performance of that *stipulation.* *Rogers.*

The Romans very much neglected their maritime affairs; for they *stipulated* with the Carthaginians to furnish them with ships for transport and war. *Arbuthnot.*

STIPULATION, in the civil law, the act of stipulating, that is, of treating and concluding terms and conditions to be inserted in a contract. Stipulations were anciently performed at Rome with abundance of ceremonies; the first whereof was, that one party should interrogate and the other answer to give his consent and oblige himself. By the ancient Roman law nobody could stipulate for himself; but as the tabelliones were public servants they were allowed to stipulate for their masters; and the notaries succeeding the tabelliones have inherited the same privilege.

STIR, *v. a., v. n.,* & *n. s.* Sax. ȝrinian; Belg. *stooren;* Teut. *stoeren.* To move; remove from its place: hence to raise; excite; agitate; taking *up* (intens.): as a verb neuter, to move one's self; change place; be in motion: a commotion; public disturbance; agitation of the thoughts or passions.

Hell is moved for thee, to meet thee at thy coming; it *stirreth up* the dead for thee. *Isaiah* xiv. 9.

The words of Judas were very good, and able to *stir* them *up* to valour. 2 *Maccabees* xiv. 17.

The greedy thirst of royal crown,
That knows no kindred, no regards, no right,
Stirred Porrex *up* to put his brother down. *Spenser.*

No power he had to *stir,* nor will to rise. *Id.*

Whensoever the earl shall die, all those lands are to come unto her majesty; he is like to make a foul *stir* there, though of himself of no power, yet through supportance of some others who lie in the wind. *Spenser's Ireland.*

Having overcome and thrust him out of his kingdom, he *stirred up* the Christians and Numidians against him. *Knolles.*

With him is come the mother queen:
An Até *stirring* him to blood and strife. *Shakspeare.*

If you *stir* these daughters' hearts
Against their father, fool me not so much
To bear it tamely. *Id. King Lear.*

Come on; give me your hand, Sir; an early *stirrer.* *Shakspeare.*

If the gentlewoman that attends the general's wife be *stirring,* tell her there's one Cassio entreats of her a little favour of speech. *Id. Othello.*

What hallooing and what *stir* is this to-day?
These are my mates, that make their wills their law,
Have some unhappy passenger in chace. *Shakspeare.*

He did keep
The deck, with glove, or hat, or handkerchief,
Still waving, as the *stirs* and fits of 's mind
Could best express how slow his soul sailed on,
How swift his ship. *Id. Cymbeline.*

A perpetual spring, not found elsewhere but in the Indies only, by reason of the sun's neighbourhood, the life and *stirrer up* of nature in a perpetual activity. *Raleigh.*

Preserve the right of thy place, but *stir* not questions of jurisdiction; and rather assume thy right in silence, than voice it with claims. *Bacon.*

Being advertised of some *stirs* raised by his unnatural sons in England, he departed out of Ireland without a blow. *Davies.*

Tumultuous *stirs* upon this strife ensue. *Drayton.*

Nestor next beheld
The subtle Pylian orator range up and down the field,
Embattelling his men at armes, and *stirring* all to blows. *Chapman.*

He did make these *stirs,* grieving that the name of Christ was at all brought into those parts. *Abbot.*

He hath spun a fair thread, to make all this *stir* for such a necessity as no man ever denied. *Bishop Bramhall.*

Tell, said the soldier, miserable Sir,
Why all these words, this clamour, and this *stir?*
Why do disputes in wrangling spend the day? *Denham.*

The vigorous spirit of Montrose *stirred* him *up* to make some attempt, whether he had any help or no. *Clarendon.*

They had the semblance of great bodies behind, on the other side of the hill; the falsehood of which would have been manifest as soon as they should move from the place where they were, and from whence they were not to *stir.* *Id.*

Such mirth the jocund flute or gamesome pipe
Stirs up among the loose unlettered hinds. *Milton.*

Raphael, thou hearest what *stir* on earth
Satan, from hell 'scaped through the darksome gulf,
Hath raised in Paradise, and how disturbed
This night the human pair. *Id.*

One judgment in parliament, that cases of that nature ought to be determined according to the common law, is of greater weight than many cases to the contrary, wherein the question was not *stirred;* yea, even though it should be *stirred,* and the contrary affirmed. *Hale.*

The great *stirs* of the disputing world are but the conflicts of the humours. *Glanville.*

The improving of his own parts and happiness *stirs* him *up* to so notable a design. *More against Atheism.*

After all this *stir* about them, they are good for nothing. *Tillotson.*

My foot I had never yet in five days been able to *stir,* but as it was lifted. *Temple.*

The soldiers love her brother's memory,
And for her sake some mutiny will *stir.* *Dryden.*

To *stir up* vigour in him, employ him in some constant bodily labour. *Locke.*

Consider, after so much *stir* about genus and species, how few words we have yet settled definitions of. *Id.*

Silence is usually worse than the fiercest and loudest accusations; since it proceeds from a kind of numbness or stupidity of conscience, and an absolute dominion obtained by sin over the soul, so that it shall not so much as dare to complain or make a *stir.* *South's Sermons.*

Thou with rebel insolence didst dare,
To own and to protect that hoary ruffian,
To *stir* the factious rabble *up* to arms. *Rowe.*

The great Judge of all knows every different degree of human improvement, from these weak *stirrings* and tendencies of the will, which have not yet formed themselves into regular purposes, to the last entire consummation of a good habit.
Addison's Spectator.

The use of the passions is to *stir up* the mind and put it upon action, to awake the understanding, and to enforce the will. *Addison.*

Other spirits
Shoot through their tracts, and distant muscles fill:
This sovereign, by his arbitrary nod,
Restrains or sends his minister abroad;
Swift and obedient to his high command,
They *stir* a finger, or they lift a hand. *Blackmore.*

Will it not reflect on thy character, Nic, to turn barreter in thy old days; a *stirrer up* of quarrels betwixt thy neighbours? *Arbuthnot.*

If they happen to have any superior character, they fancy they have a right to talk freely upon every thing that *stirs* or appears. *Watts.*

We acknowledge a man to be mad or melancholy, who fancies himself to be glass, and so is afraid of *stirring*; or, taking himself to be wax, dares not let the sun shine upon him. *Law.*

STIRIOUS, *adj.* Lat. *stiria.* Resembling icicles.

Chrystal is found sometimes in rocks, and in some places not much unlike the *stirious* or stillicidious dependencies of ice.
Browne's Vulgar Errours.

STIRLING, an ancient city of Scotland, situated on the river Forth, called also Sterling and Striveling; from the former of which Boethius and others derive the name Sterling money, because Osbeit, a Saxon prince, after the overthrow of the Scots, established a mint there. The name of Striveling is said to have been derived from the frequency of strifes or conflicts in the neighbourhood. The great street is very broad. The other streets are narrow and irregular. Stirling is in miniature a resemblance of Edinburgh, being built on a rock of the same form, with a fortress on the summit. The origin of the castle is unknown. The rock of Stirling was strongly fortified by the Picts, amongst whom architecture and other useful arts had made a considerable progress. As it lay in the extremities of their kingdom the possession of it was the occasion of frequent contests betwixt them and the Scots and Northumbrians; each of whose dominions did for some time terminate near it. When the Scots, under Kenneth II., overthrew the Pictish empire in the ninth century (as related under SCOTLAND) they endeavoured to obliterate every memorial of that people. They not only gave new names to provinces and towns, but, with all the rage of barbarians, demolished many magnificent edifices which had been reared up by them, and this fortress among the rest. The death of Kenneth II., the succession of Donald V., and the invasion of Scotland by the Saxons, under Osbrecht and Ella, two Northumbrian princes, with the Cumbrian Britons, and the Picts, are recorded under SCOTLAND, with Donald's first success against them, and his fatal defeat afterwards, which ended in the total cession of all their dominions upon the south side of the Forth to the conquerors. The rebuilding of the castle of Stirling by the Northumbrians, their planting it with a strong garrison, their erection of the stone bridge over the Forth, with the cross of separation, the Latin distich, and other circumstances so humiliating to the Scots, are also there recorded. Yet none of the ancient English historians mention this conquest. But its authenticity is confirmed by the arms of the town of Stirling, upon which is a bridge with a cross, and the last line of the Latin distich is the motto round it. In those times, however, that fortress bore no resemblance to the present structure. Its size and form resembled those castles which, under the feudal constitution, the English and Scottish barons used to erect upon their estates for dwelling-houses; and which, in those barbarous ages, they fortified for their defence, both against foreign invaders and their own neighbours. It is directly such a Gothic figure as this which represents the Castrum Strivelense upon the arms of Stirling. This fortress, after it had continued in the possession of the Northumbrian Saxons about twenty years, was, together with the whole country upon the south side of the Forth, restored to the Scots upon condition of their assisting the Saxons against their turbulent invaders the Danes. Upon the arms of Stirling are two branches of a tree, to represent the Nemus Strivelense (the wood of Stirling), but the situation and boundaries of that forest cannot be ascertained. Upon the south of Stirling vestiges of a forest are still discernible for several miles. Banks of natural timber still remain in the castle park, at Murray's Wood, and near Nether Bannockburn; and stumps of trees, with much brushwood, are to be seen in all the adjacent fields. When Kenneth III. received intelligence of the Danes having invaded his dominions, he appointed the castle of Stirling to be the place of rendezvous for his army; and he marched thence to the battle of Loncarty, where, by the help of the brave Thomas Hay and his sons, he obtained a victory over those rovers in 970. See SCOTLAND. In the twelfth century this castle is spoken of as a place of great importance, and one of the strongest fortresses in the kingdom. In 1174 king William was taken prisoner in an unsuccessful expedition which he made into England; and, after having been detained twelve months in captivity, was released upon stipulating to pay a large sum of money for his ransom; and, until payment thereof, delivering into the hands of the English the four principal fortresses in the kingdom; viz. Stirling, Edinburgh, Roxburgh, and Berwick. This was the first great ascendant that England obtained over Scotland; and indeed the most important transaction which had passed between these kingdoms from the Norman conquest. Though the Scottish monarchs, in their perambulations through the kingdom, often visited Stirling, and held their courts in the castle, yet it did not become a royal residence till the family of Stewart mounted the throne. It was the birth-place of James II.; and he frequently kept his court in it. It was the place where that prince performed an heroic deed, by stabbing William earl of Douglas with his own hand. Some historians call this an atrocious murder, but we differ from them. The earl had deserved death fifty times by his murders, oppressions, and other atrocities, and was at that

very time engaged in a formidable conspiracy against the king. James, therefore, after making him every offer of pardon, conciliation, and even promotion, all which he obstinately refused, only did an act of justice and necessity, in the lawless state of government that then prevailed, by cutting off a villain who was above the law. The royal apartments were at that time in the north-west corner of the castle. The room where the earl met his well merited death still goes by the name of Douglas's room.

James III., contracting a fondness for the castle on account of its pleasant situation, made it the chief place of his residence, and added several embellishments to it. He built within it a magnificent hall, a noble structure, still entire. It is now called the parliament house, having been designed for the accommodation of that supreme court. It was covered with an oaken roof of exquisite workmanship, which, though very little decayed, was a few years ago removed to make way for one of more modern structure. James also erected a college of secular priests in the castle, which he called the chapel royal, and which proved one cause of his own ruin. As the expenses necessary for maintaining the numerous officers of such an institution were considerable, he annexed to it the revenue of the rich priory of Coldingham, in the Merse, then vacant. This priory had long been holden by persons connected with the family of Hume; and that family, considering it as belonging to them, strongly opposed the annexation. The dispute lasted several years; one parliament passed a vote annexing the priory to the chapel royal; and a subsequent one prohibited every attempt contrary to that annexation. James V. was crowned in the castle of Stirling, and the palace, which is the chief ornament of it, was the work of that prince. This is a stately and commodious structure, all of hewn stone, with much statuary work, built in form of a square, with a small court in the middle, in which the king's lions were kept; and hence it is still called the lions' den. The palace contains many large and elegant apartments: the ground story is now converted into barrack-rooms for the garrison; the upper affords a house for the governor, with lodgings for the subaltern officers. Opposite to the palace, upon the north, stands an elegant chapel, built by James VI. for the baptism of his son prince Henry in 1594. In this chapel is preserved the hulk of a large boat, which that whimsical monarch caused to be built and placed upon carriages, to convey into the castle the provisions for that solemnity. A strong battery, with a tier of guns pointing to the bridge over the Forth, was erected during the regency of Mary of Lorrain, mother to queen Mary. It is called the French battery, because constructed by engineers of that nation. The last addition was made to the fortifications in the reign of queen Anne. Formerly they reached no farther than the old gate, upon which the flag-staff now stands; but in that reign they were considerably enlarged upon the side towards the town; and barracks, which are bomb-proof, with several other conveniences for a siege, were erected. Upon the south side of the castle lies a park enclosed with a stone wall called the King's Park, and near to the foot of the rock on which the castle stands lay the royal gardens, vestiges of the walks and parterres, with a few stumps of fruit trees, still visible; but by long neglect, and the natural wetness of the soil, the place is now little better than a marsh. In the gardens is a mount of earth in form of a table, with benches of earth round it, where, according to tradition, the court sometimes held fêtes champetres. In the castle-hill is a hollow, comprehending about an acre of ground, and having all the appearance of an artificial work, which was used for jousts, tournaments, and other feats of chivalry. Northward of the castle lies the Govan, or Gowling Hill; in the middle of which is a small mount called Hurly Haaky, upon which duke Murdoch and his two sons were executed for treason in the reign of James I. The prospect from the castle is delightful and extensive, being greatly beautified, especially upon the east, by the windings of the Forth, which are so many that though the distance by land from Stirling to Alloa is, in a straight line, not quite six miles, it is twenty-four by water. The lordship and castle of Stirling were a part of the usual dowry of the queens of Scotland, after the family of Stewart came to the throne, in which they were invested at their marriage. Robert lord Erskine was appointed governor of the castle by king David II., and the office continued in that family till 1715. This fortress has been the scene of many transactions. Being by its situation considered as a key to the northern parts of the kingdom, the possession of it was always esteemed of great importance. It was undoubtedly a place of strength when the art of war by ordnance was in its infancy; and it resisted the utmost efforts of the rebels in 1746. The street on the summit of the hill is, as we have said, broad and spacious, but the other streets of the present town are still narrow and irregular. Considerable improvements, however, have been made within the last twenty years. On the north side of the town several new streets have been laid out, in which many new buildings have been erected, on a modern and an improved plan; and in the old part of the town numbers of houses have also been rebuilt. At the south end of the town, on the way to St. Ninian's, has been lately built a number of elegant villas on each side of the road; those on the east side are said to be in Pitt Terrace, and those on the west in Melville Place. West of these, and separated from them by another road, have been built, and are now building, many fashionable houses, in a form something like an oblong, to which has been given the name of Wellington Place. The town is well supplied with excellent water, which is brought in pipes from the hills of Touch, somewhat more than three miles distant; and lately a new road was opened from the head of the High Street by Balenagiech, which, however, has proved to be of very little utility.

Stirling, or Stirlingshire, a county of Scotland, of which Stirling is the capital. It is twenty miles long and twelve broad; being bounded on the west by part of Lennox and Clydesdale; on the east by Clackmannanshire, the Forth, and part of Lothian; on the south-east

by Lothian; and on the north by Monteith. The face of the country is open and agreeable, diversified by hills and dales, well watered with streams and rivers; the principal of which is the Forth, which rising near a high mountain called Ben Lomond, and running east, forms the Frith of Edinburgh. The south part is hilly, affording plenty of game, and pasturage for sheep, horses, and black cattle. The east part is fertile, producing plentiful harvests of corn, and great abundance of coal. Lead ore is found in different parts, and the rivers abound with pike, trout, and salmon.

STIRP, *n. s.* Lat. *stirps.* Race; family; generation. Not used.

Sundry nations got footing in that land, of which there yet remain divers great families and *stirps.* *Spenser.*

Democracies are less subject to sedition than when there are *stirps* of nobles. *Bacon.*

All nations of might and fame resorted hither; of whom we have some *stirps* and little tribes with us at this day. *Id.*

STIR'RUP, *n. s.* Sax. ſtıʒeꝑap, ſtıꝑap; from ſtıʒan, to climb, and ꝑap, a cord. An iron hoop suspended by a strap, in which the horseman sets his foot.

Neither is his manner of mounting unseemly, though he lack *stirrups*; for, in his getting up, his horse is still going, whereby he gaineth way: and therefore the *stirrup* was called so in scorn, as it were a stay to get up; being derived of the old English word sty, which is to get up, or mount. *Spenser.*

Hast thou not kissed my hand, and held my *stirrup*? *Shakspeare.*

His horse hipped with an old mothy saddle, the *stirrups* of no kindred. *Id. Taming of the Shrew.*

My friend, judge not me,
Thou seest I judge not thee.
Between the *stirrup* and the ground,
Mercy I asked, mercy I found. *Camden's Remains.*

At this the knight began to chear up,
And, raising up himself on *stirrup*,
Cried out, Victoria. *Hudibras.*

STIRRUP (Fr. étrier), a well known iron frame fastened to a saddle with a thong of leather for the foot of the rider to rest upon.

It is observed in a publication, entitled the Sportsman's Dictionary, that you should bear vigorously upon your stirrup when you have your foot in it, and hold the point of your foot higher than your heel.

When you would stop your horse you must bear upon your stirrups.

You should keep your right stirrup half a point shorter than the left, for in combat the horseman bears and rests more upon the right; which also, from the weight of the sword, carbine, &c., renders that side heavier than the left, and the pressure consequently greater. Besides, in mounting, the facility is increased by the imperceptible length of the left stirrup.

To lose one's STIRRUPS, to suffer them to slip from the foot; this may happen from the coxcombical practice of resting upon the toe instead of the ball of the foot, which is the true fulcrum.

STIRRUP *foot* is the left foot.

STIRRUPS were unknown to the ancients. The want of them in getting upon horseback was supplied by agility or art. Some horses were taught to stoop to take their riders up; but the riders often leaped up by the help of their spears, or were assisted by their slaves, or made use of ladders for the purpose. Gracchus filled the highways with stones, which were intended to answer the same end. The same was also required of the surveyors of the roads in Greece as part of their duty.

STIRRUP OF A SHIP, a piece of timber put upon a ship's keel when some of her keel happens to be beaten off and they cannot come conveniently to put or fit in a new piece, then they patch in a piece of timber, and bind it on with an iron, which goes under the ship's keel, and comes up on each side of the ship, where it is nailed strongly with spikes; and this they call a stirrup.

STITCH, *v. a.* & *n. s.* } Sax. ſtıcıan; Dan.
STITCH'ERY, *n. s.* } *sticke*; Belg. *sticken.*
Literally to prick: hence to sew; work with a needle on any thing; to join; unite: a stitch is a sharp pricking pain; a single pass of a needle; a link of yarn or thread; having a single ridge or furrow: stitchery, needle work.

It is in your hand as well to *stitch* up his life again, as it was before to rent it. *Sidney.*

If you desire the spleen, and will laugh yourself into *stitches*, follow me; yond gull Malvolio is turned heathen, a very renegado. *Shakspeare. Twelfth Night*

Come lay aside your *stitchery*; play the idle housewife with me this afternoon. *Id. Othello.*

Many men at plow he made, and drave earth here and there,
And turned up *stitches* orderly. *Chapman's Iliads.*

Having *stitched* together those animadversions touching architecture and their ornaments. *Wotton.*

A simple bloody sputation of the lungs is differenced from a pleurisy, which is ever painful, and attended with a *stitch.* *Harvey on Consumptions.*

A *stitch*-fallen cheek, that hangs below the jaw,
Such wrinkles as a skilful hand would draw
For an old grandam ape. *Dryden.*

There fell twenty *stitches* in his stocking. *Motteux.*

I with a needle and thread *stitched* up the artery and the wound. *Wiseman's Surgery.*

STITH'Y, *n. s.* Sax. ſtıð, hard; Isl. *stedie.* An anvil; the iron body on which the smith forges his work.

My imaginations are as foul
As Vulcan's *stithy.* *Shakspeare. Hamlet.*

STIVE, *v. a.* Supposed of the same original with stew. To stuff up close.

You would admire, if you saw them *stive* it in their ships. *Sandy's Journey.*

His chamber was commonly *stived* with friends or suiters of one kind or other. *Wotton.*

STOBÆUS (John), a laborious Greek writer, who lived at the end of the fourth century, composed many works, of which there are only his Collections remaining, and even these are not as he composed them, many things being inserted by later authors. This work contains many important sentiments collected from the ancient writers, poets, and philosophers, on which account it is much valued. The best editions are those of Aurel. Allob. folio, 1609, and Paris, 4to. 1623.

STOBI, a town of European Turkey, in Ma-

cedonia, in the ancient Pœonia, forty-two miles north of Edessa. It retains its ancient name.—Liv. 33. c. 19. l. 40, 41.

STO'CAH, *n. s.* Irish *stoach;* Erse *stochk.* An attendant; a wallet-boy; one who runs at a horseman's foot; a horseboy. Not in use.

He holdeth himself a gentleman, and scorneth to work, which he saith is the life of a peasant; but thenceforth becometh an horseboy or a *stocah* to some kern, inuring himself to his sword, and the gentlemanly trade of stealing. *Spenser.*

STOCCADE (Nicholas de Helt), an historical and portrait painter, born at Nimeguen in 1614. He studied under Riccaert and then went to Italy. His paintings are esteemed.

STOCCA'DO, *n. s.* Ital. *stoccato,* from *stocco,* a rapier. A thrust with the rapier.

You stand on distance, your passes, *stoccados,* and I know not what.
Shakspeare. Merry Wives of Windsor.

STOCK, *n. s.* & *v. a.* / STOCK'JOBBER, *n. s.* / STOCK'ISH, *adj.* / STOCK'LOCK, *n. s.* / STOCK'STILL, *adj.* Sax. ꝑtoc; Goth. Swed. Teut. and Belg. *stock;* Fr. *estoc.* The trunk or body of a plant: hence a log; a post: the support of a ship while building; a very stupid man; the race or lineage of a family; any principal or capital store; body; quantity; a public fund: to stock is to store; lay up in store: 'stock up,' reduce to a mere stock: a stockjobber is a common jobber in the public funds: stockish, blockish; stupid: a stocklock, a lock fixed in a stock of wood: stockstill, motionless, as a stock.

There is hope of a tree, if cut down, that it will sprout again, though the root wax old in the earth, and the *stock* die in the ground. *Job* xiv. 8.

That furious beast
His precious horn, sought of his enemies,
Strikes in the *stock,* ne thence can be released.
Spenser.

What tyranny is this, my heart to thrall,
And eke my tongue with proud restraint to tie,
That neither I may speak nor think at all,
But like a stupid *stock* in silence die? *Id.*

While we admire
This virtue and this moral discipline,
Let's be no stoicks, nor no *stocks.* *Shakspeare.*

Say what *stock* he springs of.
—The noble house of Marcius. *Id. Coriolanus.*

The poet
Did feign that Orpheus drew trees, stones, and floods;
Since nought so *stockish,* hard, and full of rage,
But musick for the time doth change his nature.
Shakspeare.

Call not your *stocks* for me: I serve the king,
On whose employment I was sent to you:
You shall do small respect, shew to bold malice
Against the grace and person of my master,
Stocking his messenger. *Id. King Lear.*

A king, against a storm, must foresee to a convenient *stock* of treasure. *Bacon.*

The cion over-ruleth the *stock* quite; and the *stock* is passive only, and giveth aliment, but no motion, to the graft. *Id.*

Prodigal men
Feel not their own *stock* wasting.'
Ben Jonson's Catiline.

Thy mother was no goddess, nor thy *stock*
From Dardanus; but in some horrid rock,
Perfidious wretch, rough Caucasus thee bred.
Denham.

The wild boar not only spoils her branches, but *stocks up* her roots. *Decay of Piety.*

That they kept thy truth so pure of old,
When all our fathers worshipped *stocks* and stones,
Forget not. *Milton.*

Thou hast seen one world begin and end,
And man, as from a second *stock,* proceed. *Id.*

His early virtues to that ancient *stock*
Gave as much humour as from thence he took.
Waller.

Fresh supplies of ships,
And such as fitted since the fight had been,
Or new from *stocks* were fallen into the road.
Dryden.

Some honour of your own acquire;
Add to that *stock,* which justly we bestow,
Of those blest shades to whom you all things owe.
Id.

Beneath one law bees live,
And with one common *stock* their traffick drive:
All is the state's, the state provides for all.
Id. Georgicks.

I, who before with shepherds in the groves
Sung to my oaten pipe their rural loves,
Manured the glebe, and *stocked* the fruitful plain.
Dryden.

If parents die without actually transferring their right to another, why does it not return to the common *stock* of mankind? *Locke.*

There are locks for several purposes; as street-door-locks, called *stocklocks;* chamber-door-locks, called spring-locks; and cupboard-locks.
Moxon's Mechanical Exercises.

The world begun to be *stocked* with people, and human industry drained those uninhabitable places. *Burnet.*

'Tis the place where God promises and delights to dispense larger proportions of his favour, that he may fix a mark of honour on his sanctuary, and recommend it to the sons of men, upon the *stock* of their own interest as well as his own glory. *South.*

If a man will commit such rules to his memory, and *stock* his mind with portions of scripture answerable to all the heads of duty, his conscience can never be at a loss. *Id.*

Our preachers stand *stockstill* in the pulpit, and will not so much as move a finger to set off the best sermon. *Addison.*

When we brought it out, it took such a quantity of air into its lungs that it swelled almost twice as big as before; and it was perhaps on this *stock* of air that it lived a minute longer the second time.
Id. On Italy.

Why all this fury? What's the matter,
That oaks must come from Thrace to dance?
Must stupid *stocks* be taught to flatter?
And is there no such wood in France? *Prior.*

Of those stars, which our imperfect eye
Has doomed and fixed to one eternal sky,
Each, by a native *stock* of honour great,
May dart strong influence, and diffuse kind heat.
Id.

Springs and rivers are by large supplies continually *stocked* with water. *Woodward.*

Be ready to give, and glad to distribute, by setting apart something out of thy *stock* for the use of some charities. *Atterbury.*

They had law-suits; but, though they spent their income, they never mortgaged the *stock.* *Arbuthnot.*

He proposes to himself no small *stock* of fame in future ages, in being the first who has undertaken this design. *Id.*

As fruits ungrateful to the planter's care,
On savage *stocks* inserted, learn to bear;

The surest virtues thus from passions shoot,
Wild nature's vigour working at the root. *Pope.*

Statesman and patriot ply alike the *stocks*,
Peeres and butler share alike the box. *Id.*

An artificial wealth of funds and *stocks* was in the hands of those who had been plundering the publick. *Swift.*

The *stockjobber* thus from 'Change-alley goes down,
And tips you the freemen a wink;
Let me have but your vote to serve for the town,
And here is a guinea to drink. *Id.*

She has divided part of her state amongst them, that every one may be charitable out of their own *stock*, and each of them take it in their turns to provide for the poor and sick of the parish. *Law.*

Stock, *n. s.* Stock'ing, Stocks. } Swed. *sticka;* Belg. *stikken*, to knit. Stock, in the old language, made the plural stocken, which was used for a pair of stocks or covers for the legs. Stocken was in time taken for a singular, and pronounced stocking. The like corruption has happened to chick, chicken, chickens. The cravat or cloth of the neck; a covering of the leg: stocks are a prison for the legs.

In his first approach before my lady he will come to her in yellow *stockings*, and 'tis a colour she abhors. *Shakspeare.*

His lackey with a linen *stock* on one leg, and a kersey boot hose on the other. *Id. Taming of the Shrew.*

Fetch forth the *stocks:*
As I have life and honour, there shall he sit till noon. *Shakspeare.*

Matrimony is expressed by a young man standing, his legs being fast in a pair of *stocks*. *Peacham.*

By the loyalty of that town he procured shoes, *stockings*, and money for his soldiers. *Clarendon.*

Unless we should expect that nature should make jerkins and *stockings* grow out of the ground, what could she do better than afford us so fit materials for cloathing as the wool of sheep? *More against Atheism.*

Stockinged with loads of fat town dirt he goes. *Dryden.*

Stock-doves and turtles tell their amorous pain,
And, from the lofty elm of love complain. *Id.*

He spent half a day to look for his odd *stocking*, when he had them both upon a leg. *L'Estrange.*

The *stocks* hinder his legs from obeying the determination of his mind, if it would transfer his body to another place. *Locke.*

At amorous Flavio is the *stocking* thrown;
That very night he longs to lie alone. *Pope.*

The families of farmers live in the filth and nastiness, without a shoe or *stocking* to their feet. *Swift.*

Stock, in gardening, &c. What stock is most proper for each kind of fruit, ought as well to be considered and known, as what soil is most suitable to trees; for on these two things the future vigor of trees and the goodness of fruit equally depend. The best way for those who intend to plant is to raise their own stocks, by which they will be better assured of what they do; but, if they should buy their trees of nurserymen, they should diligently enquire upon what stocks they were propagated. See Grafting.

Stock (Christian), a celebrated German philologist, born at Camburg in 1672. He became a professor in the university of Jena. He published, 1. Dissertationes de poenis Hebræorum capitalibus; 2. Clavis Linguæ Sanctæ veteris Testamenti; 3. Clavis Linguæ Sanctæ Novi Testamenti. He died in 1733.

STOCKDALE (Percival), rev., was a native of Branxton, in Northumberland, where he was born about the year 1736. He was sent into Scotland for education, and studied at St. Andrew's, where he graduated, but afterwards embraced a military life, and served abroad. At length, on his return to England, he recurred to the line of life for which he had been originally designed, and entered the church in 1759. Settling in London, he for some time continued to support himself by combining the profession of an author with that of a clergyman, till he again entered the king's service, in the capacity of chaplain to a ship, and eventually obtained the livings of Long Houghton and Lesbury in his own county. He published a series of Lectures on the Poets, an Essay on the Genius of Pope, and a Biographical Memoir of Waller, besides a volume of miscellaneous poems of no great merit, and a few sermons. He also wrote his own life with a sufficient portion of vanity. His death took place at the rectory house, in Long Houghton, in 1811.

STOCKHOLM, the capital of Sweden, is situated at the junction of the lake Maelar with an inlet of the Baltic. Its form is an irregular oblong, extending from north to south; the waters cross it in two channels from east to west. The situation is extremely picturesque. Stockholm, strictly speaking, stands on three islands; as, one large one to the southward called Sodermalm, a small one in the centre, another somewhat larger to the north-west, and a track of the mainland to the north, called Norrmalm. The smaller islands, or rather islets, contain forts or buildings for naval purposes.

The central island constituted the old city, and is still the most busy part of the town, its quays being bordered by a stately range of buildings, the residences of the principal merchants. It contains the palace and other public buildings; but, its houses being high and its streets narrow, its appearance is somewhat gloomy. We soon after, however, enter on the long streets of the Norrmalm. Of these the principal is Queen's Street, extending in a straight line more than a mile from the observatory to the side of the lake. In this part of the town are the prince's palace, the opera house, and in the centre of a square, a bronze equestrian statue of Gustavus Adolphus. The streets are at right angles to each other, but several of them are narrow and indifferently paved; a remark applicable also to the Sodermalm, or southern division of the city, which contains but few public buildings, but has, on an eminence called the Mount of Moses, a view displaying an assemblage of rocks, houses, plantations, ships, and water, in all the variety of romantic scenery. The number of bridges, great and small, is twelve. The houses are built in the central part of the town, either of stone or of brick covered with plaster. Their foundations are on piles; their height seldom less than four or five stories; but in the suburbs they are of only one or two stories, and a number of them are of wood.

The principal public building is the royal palace, a large quadrangular structure, with a square or court in the middle. The situation is elevated, and the style of the architecture grand but simple. The lower part of the walls is of polished granite, and, though the upper part is of brick, a covering of stucco gives it the appearance of stone; the roof, like that of a number of public buildings in Sweden, is of copper. In one of the halls are preserved certain relics of antiquity, brought from Italy by Gustavus III. (father of the king deposed in 1809), comprising a number of statues; among others the famous Endymion discovered in the Villa Adriana. At a short distance, on the quays, stands a fine bronze statue of Gustavus III., raised on a pedestal of polished porphyry. The palace, or house of assembling for the nobility, is an elegant edifice, ornamented on the outside with marble statues and columns, in the inside with paintings and sculptures. The arsenal, situated in a pleasant promenade called the king's garden, contains a number of trophies of the brilliant days of the Swedish monarchy, and other objects, interesting from their connexion with the history of the country. The bank, built at the expense of the city, the mint, and the exchange, are all entitled to the notice of a stranger. After this come the hotel de ville, the royal stables, the great depôt or warehouse for iron, the hospitals and philanthropic institutions. The churches are substantial, and in some cases elegant; but it would be difficult to point out any one of them particularly remarkable for size, architecture, or decorations.

The literary societies of Stockholm are very respectable bodies. The academy of sciences, founded in 1739 by a small association which counted Linnæus among its members, comprises 100 native and sixty foreign members. Its objects were originally agriculture, trade, and manufactures, but to these it subsequently added the mathematical and philosophical sciences. Its observatory, situated on an eminence in the upper part of the town, affords a beautiful prospect. The Swedish academy, founded by Gustavus III. in 1786, is on a more limited scale, comprising only eighteen members, and confining its labors to the improvement of the Swedish language, and to fixing, by the composition of a grammar and dictionary, on the plan of the academy of France, the standard of vernacular composition. Next in rank is the academy of fine arts, history, and antiquities; a military academy, a patriotic and an agricultural society, an academy for painting and sculpture, and, finally, an academy of music. Here is also a medical college, exercising a superintendence over the medical establishments of the kingdom at large. Of collections, the most interesting are the royal library (about 40,000 volumes), the cabinet of minerals, and the zoological cabinet. This city contains also a more than usual number of private collections.

Stockholm is the emporium of the central part of Sweden—the place to which its products are brought for export. Few harbours have greater depth or capacity. The only drawback on the navigation arises from the number of small islands and detached rocks at the mouth of the inlet from the Baltic and its winding channel. The number of vessels that enter the harbour annually is averaged at 1000. The chief experts are iron, steel, copper, pitch, tar, and timber; the imports, colonial produce, wine, fruit, salt, and, in a limited degree, British manufactures. The extent of inland trade becomes considerable even in this country, by the length of the lake, which extends sixty miles into the interior, with a much further prolongation by the canals of Arboga and Stroemsholm. Iron and steel articles are the chief exports. The timber is not so large as that in the southern parts of the Baltic.

The manufactures of this city are iron foundries, glass-works, sugar refineries; also leather, cotton, hats, stockings, silk, watches, clocks, mathematical instruments, articles of gold and silver. Plates are likewise made in this city. Of late years the trade of the capital, as of the kingdom at large, has been greatly cramped by restrictions imposed partly in England, to favor the import of timber from Canada, and partly in Sweden.

Stockholm was founded in the thirteenth century and owed its increase to the commercial advantages of its situation, the court having continued at Upsal until the seventeenth century. Since that period Stockholm has been the seat of government and the centre of commerce of the whole country. The population of the whole city and suburbs approaches to 80,000. 320 miles north-east of Copenhagen, 420 west of St Petersburg, and 850 north-east of London. Long of the observatory 18° 3′ 30″ E., lat. 59° 20′ 31″ N.

Stockholm, an extensive province of Sweden, comprising the eastern parts of Upland and Sudermania, or the districts of Roslagen and Sodertorn, having an area of 2736 square miles, with 100,000 inhabitants. The city of Stockholm, with a small territory surrounding it, forms, however, a separate government.

Stockings anciently were made of cloth, or of milled stuffs sewed together; but since the invention of knitting and weaving stockings of silk, wool, cotton, thread, &c., the use of cloth stockings is given up. Dr. Howel in his History of the World, vol. ii. p. 222, relates that queen Elizabeth, in 1501, was presented with a pair of black knit silk stockings by her silk woman, and thenceforth never wore cloth ones. He adds that Henry VIII. ordinarily wore cloth hose, except there came from Spain a pair of silk stockings. Edward VI. was presented with a pair of silk stockings by Sir Thomas Gresham, and the present was then much taken notice of. Hence it is said that the invention of knit silk stockings originally came from Spain. Others relate that one William Rider, an apprentice on London bridge, seeing at the house of an Italian merchant a pair of knit worsted stockings from Mantua, took the hint, and made a pair exactly like them, which he presented to William earl of Pembroke, and that they were the first of that kind worn in England in 1564. The modern stockings, woven or knit, are formed of an infinite number of little knots, called stitches, loops, or meshes, intermingled. Knit stockings are wrought with needles made of polished iron, or brass wire, which interweave the threads and form the meshes the stocking consists of. When the art

of knitting was invented is not determined, though it has been attributed to the Scots, as it is said that the first works of this kind came from Scotland. It is added that, on this account, the company of stocking-knitters, established at Paris in 1527, took for their patron St. Fiacre, the son of a king of Scotland. Woven stockings are generally very fine; they are manufactured in a machine made of polished iron, the structure of which it is needless to describe, as it may be seen in almost every considerable town in Great Britain. The invention of this machine is, by Mr. Anderson, attributed to William Lee, M. A. of St. John's College, Cambridge, at a period so early as 1589. Others give the credit of it to a student at Oxford at a much later period, who, it is said by Aaron Hill, was driven to it by dire necessity. This young man falling in love with an innkeeper's daughter, married her, though she had not a penny, and he by his marriage lost a fellowship. They soon fell into extreme poverty; and, their marriage producing the consequences naturally to be expected from it, the amorous pair became miserable, not so much on account of their sufferings, as from the melancholy dread of what would become of their yet unborn infant. Their only means of support was the knitting of stockings, at which the woman was very expert: 'But sitting constantly together from morning to night, and the scholar often fixing his eyes, with stedfast observation, on the motion of his wife's fingers in the dexterous management of her needles, he took it into his imagination that it was not impossible to contrive a little loom which might do the work with much more expedition. This thought he communicated to his wife, and joining his head to her hands, the endeavour succeeded to their wish. Thus the ingenious stocking loom, which is so common now, was first invented, by which he did not only make himself and his family happy, but has left his nation indebted to him for a benefit which enables us to export silk stockings in great quantities, and to a vast advantage, to those very countries whence before we used to bring them at a considerable loss in the balance of our traffic.'

STOCKPORT, a large Borough town and parish in the hundred of Macclesfield, Cheshire, situated on the river Mersey; it is strictly speaking partly in Cheshire, and partly also in Lancashire, the portion in the latter county being called Heaton Norris, and united to the Cheshire part by two stone bridges over the river. On the advance of prince Charles, and his forces from Manchester, in the year 1745, Stockport old bridge was broken down to impede the march of the rebels, and the prince was obliged to ford the Mersey, immersed to the waist in water. Stockport was a Roman station, the site of whose citadel stood upon the Castle Hill. Mr. Ormrod conjectures that Stockport was laid waste at the Norman conquest, and in this way accounts for the name not occurring in Domesday Book. The town gathered round the castle in the time of the Dispensers, and was made a free borough by Robert de Stokeport with the permission of Edward I., earl of Chester. A mayor is regularly appointed, but the office is now little more than nominal. The manorial rights at present (1828) belong to the honorable Francis Maria Warren of Poynton. The police of the town managed by resident and neighbouring magistrates, two constables, four overseers of the poor, and four permanent churchwardens, together with commissioners of an act of parliament for better regulating the town, obtained in the sessions of 1826. It has also its gas company, as well as water works, both incorporated in the year 1825, the latter is the property of one individual. It returns two members to Parliament.

There are three churches. The parish church of St. Mary's is a fine Gothic building erected under the authority of the act of Geo. III. c. 165, on the site of the ancient edifice. St. Peter's is a plain but handsome brick building, erected at the sole expense of William Wright, esq., in the year 1765. The new fine and commodious church of St. Thomas's, built at a cost of £14,000, by the commissioners under an act for erecting additional churches, was opened for divine service September 1825. The town besides these contain four Methodist chapels, one of which built on the Lancashire side of the river, has a school room under it opened August 1826; and one belongs to the new connexion or followers of Kilham, another to the primitive Methodists or Ranters. Three Independent (one of these is also built on the Lancashire side). One Friends' meeting-house, one Baptist, one Catholic, and one Unitarian chapel: to most of these they have their Sunday-schools attached, also a large school 132 feet by fifty-seven for all denominations of children, built in 1805. The national school, built by subscription in the year 1826 at a cost of upwards of £5,500, is well situated on the new line of London and Manchester road: this road is connected to the Lancashire side by a bridge of eleven arches, which passes over several streets as well as the river, the height from the level of the water is forty-seven feet. The free grammar school was founded in the year 1487, by Sir Edmund Shaw, goldsmith and alderman of London. Has also its dispensary and fever wards.

The parish of Stockport contains fourteen townships, viz. Stockport, Bramhall, Bredbury, Brinnington, Disley, Duckinfield Etchells, or Stockport Etchells, Hyde, Marple, Norbury, Offerton, Romiley, Torkington, and Werneth. Silk was the original manufacture of this town, and the first mills in England for winding and throwing silk on the stalion principle are said to have been established here. The superior advantages of the cotton trade induced the proprietors at a subsequent period to turn their machinery to the spinning of cotton, and is now the staple manufacture of the place, together with the power loom weaving. In the year 1825 a calculation was made of them, being seventy steam engines of the power of 1960 horses; within the same limits there were 5730 power looms for weaving calicoes and shirtings, chiefly worked by such steam engines.

Stockport is seven miles south-east of Manchester, and 179 N.N.W. of London.

STOCKS, or public funds, in England. By the word stock was originally meant a particular

sum of money contributed to the establishing of a fund to enable a company to carry on a certain trade, by means of which the person became a partner in that trade, and received a share of the profit made thereby, in proportion to the money employed. But this term has been extended farther, though improperly, to signify any sum of money which has been lent to the government, on condition of receiving a certain interest till the money is repaid, and which makes a part of the national debt. As the security both of the government and of the public companies is esteemed preferable to that of any private person, as the stocks are negociable and may be sold at any time, and as the interest is always punctually paid when due; so they are thereby enabled to borrow money on a lower interest than what could be obtained from lending it to private persons, where there must be always some danger of losing both principal and interest. But as every capital stock or fund of a company is raised for a particular purpose, and limited by parliament to a certain sum, it necessarily follows that when that fund is completed no stock can be bought of the company; though shares already purchased may be transferred from one person to another. This being the case, there is frequently a great disproportion between the original value of the shares and what is given for them when transferred; for, if there are more buyers than sellers, a person who is indifferent about selling will not part with his share without a considerable profit to himself; and, on the contrary, if many are disposed to sell, and few inclined to buy, the value of such shares will naturally fall in proportion to the impatience of those who want to turn their stock into specie. A stock may likewise be affected by the court of chancery; for, if that court should order the money, which is under their direction, to be laid out in any particular stock, that stock, by having more purchasers, will be raised to a higher price than any other of the like value. Hence the reader will perceive how much the credit and interest of the nation depend on the support of the public funds. While the annuities and interest for money advanced are there regularly paid, and the principal insured by both prince and people (a security not to be had in other nations), foreigners will lend us their property, and all Europe be interested in our welfare; the paper of the companies will be converted into money and merchandise, and Great Britain can never want cash to carry on her necessary expences either for peace or war.

Stocks, *n. s.* Ital. *stocco,* a rapier. Thrust; a stoccado.

To see thee here, to see thee there; to see thee pass thy puncto, thy *stock* thy reverse. *Shakspeare.*

Stocks, a frame erected on the shore of a river or harbour, whereon to build shipping. It generally consists of a number of wooden blocks, ranged parallel to each other, at convenient distances, and with a gradual declivity towards the water.

Stocks, a wooden machine to put the legs of offenders in, for securing disorderly persons, and by way of punishment in divers cases, ordained by statute, &c.

STOCKTON, a market town in Stockton ward, Durham, situate on the river Tees, four miles from Yarm, and 241 north of London. It consists chiefly of one main street, nearly half a mile long and sixty yards broad, the houses being neatly built of brick; it is considered, by its recent improvements, to be the handsomest town in the north of England. In the centre of this street stands the town house, a handsome building erected in 1744, in which is a court room, an elegant suite of assembly rooms, and other apartments for public uses; adjoining it is a commodious piazza for the use of the market. South of the town-house is a handsome column of the Doric order, thirty-three feet high, where the market is held. There are several inferior streets, or rather lanes, leading to the river, where there is a custom-house under the proper officers. The whole of the town is well paved, and lighted with gas. The church is a handsome brick structure. At the west end is a tower, eighty feet high, containing six bells. The whole was erected in 1712, previous to which it was only a chapelry to the mother church of Norton. Here is a grammar and charity school. Several alms houses, a public dispensary, and many other useful and benevolent institutions. The bridge over the Tees is an elegant structure of five arches, the span of the centre arch being seventy-two feet, twenty-three feet high from low water, and twenty-one feet broad; it was finished in 1771. Opposite the church is a Presbyterian meeting-house. In the outskirts of the town are a Quaker's meeting-house, a Roman Catholic chapel, a large chapel for Methodists, and a small one for Baptists. The manufactures of Stockton are principally those of sail-cloth, ropes, damask, drapery, huckaback, and linen, &c., besides which it carries on trade to a great extent with the Baltic, Hamburgh, Norway, and Holland. Vessels from forty to 400 tons are annually built here. Its ancient castle was dismantled during the civil war, and the only stone houses in Stockton have been built from its ruins. The borough is governed by a mayor, alderman, and a recorder, who is always steward of the bishop's courts leet and baron. That part which constitutes the borough is all freehold; and the other buildings added to the original town are copyhold or leasehold, under the vicar, and not within the jurisdiction of the borough; each part having its distinct constable. Here are two banks, the Stockton and Cleveland, and the Tees banks. The market day on Wednesday is well supplied with corn, coal, provisions, and vegetables. The church is a vicarge, under the bishop of Durham, and having been made a parish, by a late act of parliament, it pays one-third part of the first fruits, tenths, &c., for the parish of Norton, as a recompense for its separation.

STOEBE, bastard Æthiopian elchrysum, a genus of plants belonging to the class of syngenesia, and order of polygamia segregata; and in the natural system ranging under the forty-ninth order, compositæ. The calycle is uniflo-

rous; the corollets are tubular and hermaphrodite; the receptacle is naked, and the pappus is feathery. There are nine species; viz, 1. S. Æthiopica; 2. disticha; 3. ericoides; 4. gnaphaloides; 5. gomphaloides; 6. prostrata; 7. reflexa; 8. rhinocerotis; and, 9. scabra. They are all natives of foreign countries.

STOECHADES, in ancient geography, five small islands in the Mediterranean, on the coast of Gaul (Lucan. iii. 516, Strabo 4), now called Hieres. See HIERES.

STOENI, an ancient nation, who lived among the Alps.

STOFLER (John), a German mathematician, born in Suabia, in 1452. He taught mathematics at Tubingen, and published several books with great reputation; but, being addicted to astrology, he sunk his fame, as Nathaniel Brassey Halhed, esq., did in our own day, by predicting a great deluge to happen in 1524, which excited a general terror all over Europe. He lived to see himself laughed at, by the failure of his prophecy; and died in 1531.

STOICS, the name given to a sect of Grecian philosophers, from Στοα, the porch in Athens, which the founder of the sect chose for his school. For the peculiar tenets of this sect, see MORAL PHILOSOPHY, and ZENO.

STOKESLEY, a market town and parish in Langbarough wap. North-Riding of York, seven miles from Yarm, and 235 north-west from London. It consists of one well-built and long street, on the banks of the Wisk, which flows to the Tees. A modern church has been built at the eastern extremity of the town. Petty sessions are held here. The town became a place of consequence so early as the Norman conquest. Market on Saturday. Fairs, Saturday before Palm Sunday, first Saturday after May 4th, and once a fortnight till Saturday before Trinity Sunday, the first Saturday in October, and the second Saturday in November.

STOKE-UPON-TRENT, a town and parish of England, in the county of Stafford, and in the north division of the hundred of Prirehill. It is a place of considerable traffic, situated within two miles of Newcastle-under-line, and 152 miles from London. Extensive potteries are established here; and traffic is much promoted by the navigable river Trent, and the Mersey canal, which pass by the place, and on the forum of which, are several potteries. There are two churches; the more ancient containing a tablet to the memory of Josiah Wedgewood, of Etruria; and the living is a rectory in the diocese of Lichfield and Coventry. The Independents, Wesleyans, and New Connexion Methodists, have chapels here. The population amounts to 52,946; and, by the provisions of the Reform Bill, this town returns two members to parliament.

STOLE, *n. s.* Lat. *stola*. A long vest.

STOLE, a sacerdotal ornament worn by the Romish parish priests above their surplice, as a mark of superiority in their respective churches; and by other priests over the alb, at celebrating of mass, in which case it goes across the stomach; and by deacons over the left shoulder, scarf wise; when the priest reads the gospel for any one, he lays the bottom of his stole on his head. The stole is a broad swath, or slip of stuff, hanging from the neck to the feet, with three crosses thereon.

STOLE, GROOM OF THE, the eldest gentleman of his majesty's bed-chamber, whose office it is to present and put on his majesty's first garment, or shirt, every morning, and to order the things in the chamber.

STOLID'ITY, *n. s.* Fr. *stolidité;* Lat. *stolidus.* Stupidity; want of sense.

STOM'ACH, *n. s., v. a.,* & *v. n.*
STOM'ACHED, *adj.*
STOM'ACHER, *n. s.* & *adj.*
STOM'ACHFUL,
STOMACH'ICAL,
STOM'ACHIC,
STOM'ACHOUS.
} Fr. *estomach;* Lat. *stomachus.* The ventricle in which food is digested; appetite or desire of food: hence inclination; liking; dislike; anger; violence or sullenness of temper; pride: to stomach is to resent; as a verb neuter, to be angry: stomached, filled with resentment: stomacher, a female covering of the stomach or breast: stomachful, sullen; obstinate: stomachic and stomachical, relating to or adapted for the stomach: stomachous, sullen; stout; stubborn.

Instead of a *stomacher*, a girding of sackcloth.
Isa. iii. 24.

That stranger knight in presence came,
And goodly salved them; but nought again
Him answered, as courtesy became;
But with stern looks, and *stomachous* disdain,
Gave signs of grudge and discontentment vain.
Spenser.

Disdain he called was, and did disdain
To be so called, and who so did him call:
Stern was his look, and full of *stomach* vain,
His portance terrible, and stature tall. *Id.*

If you are sick at sea,
Or *stomach*-qualmed at land, a dram of this
Will drive away distemper.
Shakspeare. Cymbeline.

Tell me, what is 't that takes from thee
Thy *stomach*, pleasure, and thy golden sleep?
Shakspeare.

He which hath no *stomach* to this fight,
Let him depart. *Id. Henry V*

He was a man
Of an unbounded *stomach*, ever ranking
Himself with princes. *Id. Henry VIII.*

High *stomached* are they both, and full of ire;
In rage deaf as the sea, hasty as fire. *Shakspeare.*

Golden quoifs and *stomachers*,
For my lads to give their dears. *Id. Winter's Tale.*

The unusual distance of time made it subject to every man's note, that it was an act against his *stomach*, and put upon him by necessity of state.
Bacon's Henry VII.

Thou marry'st every year
The lyrick lark, and the grave whispering dove,
The sparrow that neglects his life for love,
The household bird with the red *stomacher*. *Donne.*

Instead of trumpet and of drum,
That makes the warrior's *stomach* come. *Butler.*

A *stomachful* boy, put to school, the whole world could not bring to pronounce the first letter.
L'Estrange.

The lion began to show his teeth, and to *stomach* the affront. *Id.*

The very trade went against his *stomach.* *Id.*

Not courage, but *stomach,* that makes people break rather than they will bend. *Id.*

This sort of crying proceeding from pride, obstinacy, and *stomach,* the will where the fault lies, must be bent. *Locke.*

Obstinate or *stomachful* crying should not be permitted, because it is another way of encouraging those passions which 'tis our business to subdue. *Id.*

This filthy simile, this beastly line,
Quite turns my *stomach.* *Pope.*

By a catarrh the *stomachical* ferment is vitiated.
Floyer.

STOMACH, in anatomy, is a membraneous receptacle, situated in the epigastric region, which receives the food from the œsophagus; its figure is somewhat oblong and round: it is largest on the left side, and gradually diminishes towards its lower orifice, where it is the least. Its superior orifice, where the œsophagus terminates, is called the cardia; the inferior orifice, where the intestine begins, the pylorus. The anterior surface is turned towards the abdominal muscles, and the posterior opposite the lumbar vertebræ. It has two curvatures: the first is called the great curvature of the stomach, and extends downwards from one orifice to the other, having the omentum adhering to it; the second is the small curvature, which is also between both orifices, but superiorly and posteriorly. The stomach, like the intestinal canal, is composed of three coats, or membranes: 1. The outermost, which is very firm, and from the peritonæum. 2. The muscular, which is very thick, and composed of various muscular fibres; and, 3. The innermost, or villous coat, which is covered with exhaling and inhaling vessels, and mucous. These coats are connected together by cellular membrane. The glands of the stomach which separate the mucous are situated between the villous and muscular coat, in the cellular structure. The arteries of the stomach come chiefly from the cœliac artery, and are distinguished into the coronary, gastro-epiploic, and short arteries; they are accompanied by veins which have similar names, and which terminate in the vena portæ. The nerves of the stomach are very numerous, and come from the eighth pair and intercostal nerves. The lymphatic vessels are distributed throughout the whole substance, and proceed immediately to the thoracic duct. The use of the stomach is to excite hunger and partly thirst, to receive the food from the œsophagus, and to retain it, till, by the motion of the stomach, the admixture of various fluids, and many other changes, it is rendered fit to pass the right orifice of the stomach, and afford chyle to the intestines. See ANATOMY, Index.

STOMACHICA PASSIO, a disorder in which there is an aversion to food; even the thought of it begets a nausea, anxiety, cardialgia, an effusion of saliva, and often a vomiting. Fasting is more tolerable than eating; if obliged to eat, a pain follows that is worse than hunger itself.

STOMACHICS are medicines that strengthen the stomach and promote digestion, &c. Stomachic corroboratives are such as strengthen the tone of the stomach and intestines; among which are carminatives, as the roots of galangals, red gentian, zedoary, pimpinella, calamus aromaticus, and arum. Of barks and rinds, those of canella alba, sassafras, citrons, Seville and China oranges, &c. Of spices, pepper, ginger, cloves, cinnamon, cardamums, and mace. All these will be found occasionally useful, but the best of all corroboratives, according to the new system of medicine, are air, exercise, and fresh animal food; which last, when the stomach is too weak to digest it in a solid form, should be given in the form of beef tea or veal or chicken broth.

STOND, *n. s.* For stand. Post; station. Obsolete.

On the other side, the assieged castle's ward
Their stedfast *stonds* did mightily maintain. *Spenser.*

There be not *stonds* nor restiveness in a man's nature; but the wheels of his mind keep way with the wheels of his fortune. *Bacon's Essays.*

STONE, *n. s., adj.,* & *v. a.* Saxon *stan;* Gothic *stain;* Belgic *steen;* Swedish *sten;* Teut. *stein.* A body insipid, hard, not ductile or malleable, nor soluble in water.— Woodward. A piece of building stone; a monument; a gem; a calculous secretion; the disease arising therefrom; the case of certain seeds; testicle; a weight (for which a stone was formerly used); a state of insensibility: 'to leave no stone unturned' is to do all we can to produce an effect: stone, adjective, is made of stone: to stone, to pelt; beat; kill with stones; also to harden: a stonecrop is a kind of tree: a stone-cutter, one whose trade is to hew or cut stones: stonefruit, that which contains a stone: stonehorse, a horse not castrated: stonepit a quarry: stonepitch, hard inspissated pitch; the other noun substantives and the adjectives correspond.

STONE'CROP, *n. s.*
STONE'CUTTER,
STONE'FRUIT,
STONE'HORSE,
STONE'PIT,
STONE'PITCH,
STONE'WORK,
STONINESS,
STONY, *adj.*

These people be almost ready to *stone* me.
Exod. xvii. 4.

Now let the *stony* dart of senseless cold
Pierce to my heart and pass through every side.
Spenser.

The *stony* hardness of too many patrons' hearts, not touched with any feeling in this case. *Hooker.*

Eight yards of uneven ground is threescore and ten miles a-foot with me, and the *stony* hearted villains know it. *Shakspeare.*

Oh perjured woman! thou dost *stone* my heart;
And mak'st me call what I intend to do
A murder, which I thought a sacrifice. *Id. Othello.*

I thought I saw
Wedges of gold, great anchors, heaps of pearl,
Inestimable *stones,* unvalued jewels.
Id. Richard III.

With love's light wings did I o'erperch these walls;
For *stony* limits cannot hold love out.
Id. Romeo and Juliet

Present her at the leet,
Because she bought *stone* jugs, and no sealed quarts.
Shakspeare.

What need you be so boisterous rough?
I will not struggle, I will stand *stone* still.
Id. King John.

The Egyptian mummies are reported to be as hard as *stonepitch.* *Bacon's Natural History.*

To make fruits without core or *stone* is a curiosity.
Bacon.

The English used the *stones* to reinforce the pier.
Hayward.

Five sharp smooth *stones* from the next brook he chose,
And fits them to his sling. *Cowley.*

He hath some *stonyness* at the bottom. *Hammond.*

Nor slept the winds
Within their *stony* caves, but rushed abroad
From the four hinges of the world, and fell
On the vext wilderness, whose tallest pines,
Though rooted deep as high and sturdiest oaks,
Bowed their stiff necks, loaden with stormy blasts,
Or torn up sheer. *Milton's Paradise Regained.*

From the *stony* Mænalus
Bring your flocks, and live with us. *Milton.*

And there lies Whacum by my side,
Stone dead, and in his own blood dyed. *Hudibras.*

Women, that *left no stone unturned*
In which the cause might be concerned,
Brought in their childrens' spoons and whistles,
To purchase swords, carbines, and pistols. *Id.*

We gathered ripe apricocks and ripe plums upon one tree, from which we expect some other sorts of *stonefruit.* *Boyle.*

A specifick remedy for preventing of the *stone*, I take to be the constant use of alehoof-ale. *Temple.*

He crimes invented, *left unturned no stone*
To make my guilt appear, and hide his own.
Dryden.

As in spires he stood, he turned to *stone*;
The *stony* snake retained the figure still his own.
Id.

She had got a trick of holding her breath, and lying at her length for *stone* dead. *L'Estrange.*

Small gravel or *stoniness* is found therein.
Mortimer.

They make two walls with flat *stones*, and fill the space with earth, and so they continue the *stonework.*
Id.

Where there is most arable land, *stonehorses* or geldings are more necessary. *Id. Husbandry.*

Stonecrop tree is a beautiful tree, but not common.
Mortimer.

Relentless time, destroying power,
Whom *stone* and brass obey. *Parnel.*

There is one found in a *stonepit.* *Woodward.*

They suppose these bodies to be only water petrified, or converted into these sparry or *stony* icicles.
Id.

A gentleman supposed his difficulty in urining proceeded from the *stone.* *Wiseman's Surgery.*

A *stonecutter's* man had the vesiculæ of his lungs so stuffed with dust, that, in cutting, the knife went as if through a heap of sand.
Derham's Physico-Theology.

Crucifixion was a punishment unknown to the Jewish laws, among whom the *stoning* to death was the punishment for blasphemy. *Stephens's Sermons.*

The name Hexton owes its original to the *stoniness* of the place. *Hearne.*

Should some relenting eye
Glance on the *stone* where our cold reliques lie.
Pope.

I have not yet forgot myself to *stone.* *Id.*

The cottagers, having taken a country-dance together, had been all out, and stood *stone* still with amazement. *Id.*

My prosecutor provided me a monument at the *stonecutter's* and would have erected it in the parish church. *Swift.*

Indifference clad in wisdom's guise,
All fortitude of mind supplies;
For how can *stony* bowels melt,
In those who never pity felt? *Id.*

In the next place there are they who are described as having received the seed in a *stony* soil, or on a rock under a very shallow bed of earth: such, I mean, who having heard the message of pardon, life, and glory, which the word of the gospel brings, immediately receive it with a transport of joy—but, as they have no root of deep conviction and real love to holiness in themselves, they have no true impression of the power of it on their hearts.
Doddridge on Matt. xiii.

Stone (Edmund), a distinguished self-taught mathematician, was born in Scotland; but neither the place nor time of his birth are well known; but it is said on the authority of Chevalier Ramsay, author of the Travels of Cyrus, that he was son of a gardener of the duke of Argyle. At eighteen years of age his acquired merits were discovered by the duke, who drew him out of his obscurity, and provided him with an employment which left him plenty of time to apply himself to the sciences. Mr. Stone was author and translator of several useful works; viz. 1. A New Mathematical Dictionary, in 1 vol. 8vo., first printed in 1726. 2. Fluxions, in 1 vol. 8vo., 1730. The Direct Method is a translation from the French, of Hospital's Analyse des Infiniments Petits; and the Inverse Method was supplied by Stone himself. 3. The Elements of Euclid, in 2 vols. 8vo., 1731; with an account of the life and writings of Euclid, and a defence of his elements against modern objectors; with other smaller works. Stone was F. R. S., and had inserted in the Philosophical Transactions (vol. xli. p. 218) an 'Account of two species of lines of the third order, not mentioned by Sir Isaac Newton or Mr. Stirling.'

A letter from the chevalier de Ramsay, author of the Travels of Cyrus, in a letter to father Castel, a jesuit at Paris, and published in the Memoires de Trevoux, gives the following interesting particulars of Mr. Stone's early life:—'True genius overcomes all the disadvantages of birth, fortune, and education; of which Mr. Stone is a rare example. Born a son of a gardener of the duke of Argyle, he arrived at eight years of age before he learnt to read. By chance a servant having taught young Stone the letters of the alphabet, there needed nothing more to discover and expand his genius. He applied himself to study, and he arrived at the knowledge of the most sublime geometry and analysis without a master, without a conductor, without any other guide than pure genius.

'At eighteen years of age he had made these considerable advances without being known, and without knowing himself the prodigies of his acquisitions. The duke of Argyle, who joined to his military talents a general knowledge of every science that adorns the mind of a man of

his rank, walking one day in his garden, saw lying on the grass a Latin copy of Sir Isaac Newton's celebrated Principia. He called some one to him to take and carry it back to his library. Our young gardener told him that the book belonged to him. 'To you?' replied the duke. 'Do you understand geometry, Latin, Newton?' 'I know a little of them,' replied the young man, with an air of simplicity arising from a profound ignorance of his own knowledge and talents. The duke was surprised; and, having a taste for the sciences, he entered into conversation with the young mathematician: he asked him several questions, and was astonished at the force, the accuracy, and the candor of his answers. 'But how,' said the duke, 'came you by the knowledge of all these things?' Stone replied, 'a servant taught me, ten years since, to read: does one need to know any thing more than the twenty-four letters in order to learn every thing else that one wishes?' The duke's curiosity redoubled—he sat down upon a bank, and requested a detail of all his proceedings in becoming so learned. 'I first learned to read,' said Stone: 'the masons were then at work upon your house: I went near them one day, and I saw that the architect used a rule, compasses, and that he made calculations. I enquired what might be the meaning and use of these things; and I was informed that there was a science called arithmetic: I purchased a book of arithmetic and I learned it.—I was told there was another science called geometry: I bought the books, and I learned geometry. By reading I found that there were good books in these two sciences in Latin: I bought a Dictionary, and I learned Latin. I understood also that there were good books of the same kind in French: I bought a dictionary, and I learned French. And this, my lord, is what I have done: it seems to me that we may learn every thing when we know the twenty-four letters of the alphabet.'

'This account charmed the duke. He drew this wonderful genius out of his obscurity; and he provided him with an employment which left him plenty of time to apply himself to the sciences. He discovered in him also the same genius for music, for painting, for architecture, for all the sciences which depend on calculations and proportions. 'I have seen Mr. Stone. He is a man of great simplicity. He is at present sensible of his own knowledge: but he is not puffed up with it. He is possessed with a pure and disinterested love for the mathematics; though he is not solicitous to pass for a mathematician: vanity having no part in the great labor he sustains to excel in that science. He despises fortune also; and he has solicited me twenty times to request the duke to give him less employment, which may not be worth the half of that he now has, in order to be more retired, and less taken off from his favorite studies. He discovers sometimes, by methods of his own, truths which others have discovered before him. He is charmed to find on these occasions that he is not a first inventor, and that others have made a greater progress than he thought. Far from being a plagiary, he attributes ingenious solutions, which he gives to certain problems, to the hints he has found in others, although the connexion is but very distant,' &c.

Stone (Jerome), the son of a reputable seaman, was born in the parish of Scoonie, in Fife. His father died abroad when he was but three years of age, and his mother, with her young family, was left in very narrow circumstances. Jerome having got the ordinary school education, reading English, writing, and arithmetic, commenced travelling chapman. But he soon converted his stock of buckles, garters, &c., into books, and for some years went through the country, and attended the fairs as an itinerant bookseller. Formed by nature for literature, he possessed a peculiar talent for acquiring languages with amazing facility. He taught himself Hebrew and Greek, and, by the aid of Mr Turcan, the parish schoolmaster, acquired some knowledge of Latin. Some time afterwards he was encouraged to prosecute his studies at the university of St. Andrew's. An unexampled proficiency in every branch of literature recommended him to the esteem of the professors; and an uncommon fund of wit and pleasantry rendered him the favorite of all his fellow students. About this period some very humorous poetical pieces of his composition were published in the Scots Magazine. Before he had finished his third session of St. Andrew's, on an application to the college by the master of the school of Dunkeld for an usher, Mr. Stone was recommended as the best qualified for that office; and about two or three years after, the master being removed to Perth, Mr. Stone, by the favor of the duke of Atholl, who had conceived a high opinion of his abilities, was appointed his successor. Having, with his usual assiduity and success, acquired a complete knowledge of the Gaelic language, he collected a number of ancient poems, the production of Irish or Scottish bards. Some of these were translated into English verse, before Mr. Macpherson published his translations from Ossian. He died while he was writing and preparing for the press a treatise entitled, An Enquiry into the Original of the Nation and Language of the Ancient Scots, with Conjectures about the Primitive State of the Celtic and other European Nations. In this treatise he proves that the Scots drew their original, as well as their language, from the ancient Gauls. A fever put an end to his life, his labors, and his usefulness, in 1757, the thirtieth year of his age. He left in MS. a much esteemed and well known allegory, entitled The Immortality of Authors, which has been published and often reprinted since his death.

Stone (John), a celebrated English painter, in the reigns of Charles I. and II. He studied under Cross, and spent thirty-seven years abroad, where he acquired several languages, being a man of learning as well as a good painter. He died at London, August 24th, 1653.

Stone, a market-town and parish in Pirehill hundred, Stafford, seven miles north of Stafford, and 141 north-west from London, on the banks of the Trent. Besides the advantages of the river Trent, it has a canal navigation, communicating with most of the principal towns in the adjacent counties, by which its commercial im

portance has been greatly increased. Considerable quantities of shoes are made in this town, and here is a patent roller-pump manufactory, which employs many hands. The town is chiefly formed of one tolerably good street. The church is a noble structure, with a square, but low, tower. Here is a charity and free grammar-school.

Stone, in merchandise, denotes a certain weight for weighing commodities. A stone of beef at London is eight pounds: in Herefordshire twelve pounds; in the north sixteen pounds. A stone of glass is five pounds; of wax eight pounds. A stone of wool (by stat. 11 Hen. VII.) is to weigh fourteen pounds; yet in some places it is more, in others less: as in Gloucestershire fifteen pounds; in Herefordshire twelve pounds. Among horse-coursers a stone is the weight of fourteen pounds. The reason of the name is obvious. Weights at first were generally made of stone. See Deut. xxv. 13, where the word אבן, translated weight, signifies a stone.

Stone, Pudding. See Callander, and Mineralogy.

Stone, Rocking, or Logan, a stone of a prodigious size, so exactly poised that it would rock or shake with the smallest force. Of these stones the ancients give us some account. Pliny says that at Harpasa, a town of Asia, there was a rock of such a wonderful nature that if touched with the finger it would shake, but could not be moved from its place with the whole force of the body. Ptolemy Hephæstion mentions a gygonian stone near the ocean, which was agitated when struck by the stalk of an asphodel, but could not ber emoved by a great exertion of force. The word gygonius seems to be Celtic; for gwingog signifies motitans, the rocking stone. Many rocking stones are to be found in different parts of this island; some natural, others artificial, or placed in their position by human art. In the parish of St. Leven, Cornwall, there is a promontory called Castle Treryn. On the western side of the middle group, near the top, lies a very large stone, so evenly poised that any hand may move it from one side to another; yet it is so fixed on its base that no lever nor any mechanical force can remove it from its present situation. It is called the Logan stone, and is at such a height from the ground that no person can believe that it was raised to its present position by art. But there are other rocking stones, which are so shaped and so situated that there can be no doubt but they were erected by human strength. Of this kind Borlase thinks the great Quoit or Karn-lehau, in the parish of Tywidnek, to be. It is thirty-nine feet in circumference, and four feet thick at a medium, and stands on a single pedestal. There is also a remarkable stone of the same kind in the island of St. Agnes in Scilly. The under rock is ten feet six inches high, forty-seven feet round the middle, and touches the ground with no more than half its base. The upper rock rests on one point only, and is so nicely balanced that two or three men with a pole can move it. It is eight feet six inches high, and forty-seven feet in circumfereuce. On the top there is a basin hollowed out, three feet eleven inches in diameter at a medium, but wider at the brim, and three feet deep. From the globular shape of this upper stone it is highly probable that it was rounded by human art, and perhaps even placed on its pedestal by human strength. In Stithney parish, near Helston, in Cornwall, stood the famous logan, or rocking stone, commonly called Men Amber, q. d. men an bar, or the top-stone. It was eleven feet by six, and four high, and so nicely poised on another stone that a little child could move it, and all travellers who came this way desired to see it. But Shrubsal, Cromwell's governor of Pendennis, with much ado caused it to be undermined, to the great grief of the country. There are some marks of the tool on it; and, by its quadrangular shape, it was probably dedicated to Mercury. There is a rocking stone in Perthshire, near Balvaird Castle, in the Ochil hills, on the estate of Mr. Murray of Conland. That the rocking stones are monuments erected by the Druids cannot be doubted; but tradition has not informed us for what purpose they were intended. Mr. Toland thinks that the Druids made the people believe that they alone could move them, and that by a miracle; and that by this pretended miracle they condemned or acquitted the accused, and brought criminals to confess what could not otherwise be extorted from them. How far this conjecture is right, we shall leave to those who are deeply versed in the knowledge of antiquities to determine.

Stone, Sonorous, a kind of stone remarkable for emitting an agreeable sound when struck, and much used in China for making musical instruments, which they call king. The various kinds of sonorous stones known in China differ considerably from one another in beauty, and in the strength and duration of their tone; and what is very surprising is, that this difference cannot be discovered either by the different degrees of their hardness, weight, or fineness of grain, or by any other qualities which might be supposed to determine it. Some stones are found remarkably hard which are very sonorous; and others exceedingly soft which have an excellent tone; some extremely heavy emit a very sweet sound; and there are others as light as pumice stone which have also an agreeable sound. It appears that the Romans were formerly acquainted with a sonorous stone of the class of hiang-che. Pliny (says the abbé du Bos, in his Reflections on Poetry and Painting, when speaking of curious stones) observes that the stone called chalcophonas, or brazen sound, is black; and that, according to the etymology of its name, it sends forth a sound much resembling that of brass when it is struck. The passage of Pliny is as follows: Chalcophonas nigra est; sed elisa æris tinnitum reddit. Some sonorous stones were at length sent into France, and the late duke de Chaulnes examined them with particular attention. From the duke's observations there is reason to believe that the stones of which the king are formed are nothing else but a black kind of marble, the constituent parts of which are the same as those of the marble of Europe, but that some difference in their organisation renders them more or less sonorous.

Stone Dike, in agriculture, is that sort of

dike or mound which is formed with stone and earth. These dikes should consist of a double face to two-thirds of their height, and the other third be of single stones, built up in an open form and manner, so as to hang firmly on each other. They are made in the Highland sheep districts, where this manner of forming them is much had recourse to, five or five feet and a half high from the surface of the ground. A dike thus built, when well executed, and filled with through-bands, bids defiance, it is said, to most kinds of animals, none of which are fond of venturing over it; whereas a green sod on the top of a double-faced wall invites the sheep to attempt clearing it, which they not unfrequently do with facility. These dikes are equally durable and cheap; even more so than the turf or sod covered or coped stone-walls, while they are greatly more effectual. They are the most proper for confining of sheep; and, on farms purely of this kind, are perhaps the best sort of contrivance for restraining them of any yet known. They have different names in different sheep districts.

Stone Indians, a tribe of Indians inhabiting the south of Fire Fort, or Assiniboin River, in North America. Their number is estimated by Mackenzie at 450 warriors. They have great numbers of horses, which are generally brought from the Spanish settlements in Mexico. These are employed as beasts of burden, and also in the chase of the buffalo. The former are not considered as being of much value, as they may be purchased for a gun which costs twenty guineas in Great Britain. Many of the hunters, however, cost more than ten times this price. Of these useful animals no care whatever is taken; for, when they are no longer employed, they are turned loose to provide for themselves.

Stones, Mill. In small corn-mills, where only one pair of stones is in use, they are, it is said, roughed on the surface, to enable them to tear, bruise, and reduce the grain, by the use of a small hand-pick. Stones, thus prepared and dressed, serve well for making of oatmeal, which is best and most relished when rough, and large in the grain; but they are not capable of grinding barley or peas to that fineness of flour which is necessary for some uses. It is requisite to have a separate pair of stones for this purpose, which are dressed on the surface, with a small chisel, in grooves running in from the circumference to the centre, as in the stones of wheat-mills; the edges of these grooves clip the grain like scissars, and there is no interstice through which any of the grain can escape, until it is reduced to the required fineness of meal which is proper.

Stone Pickers are persons employed in picking stones from off the ground. In order to prevent the loss of time in filling and emptying the baskets, and that of having recourse to the team, the use of one horse and a light cart is advised, which attending seven or eight women, boys, and girls, may run over forty acres in about four days. It is advised by Mr. A. Young that constantly in a dry season an opportunity should be taken to stone-pick the grass and clover fields intended for mowing. In this work, no stones are, he says, however, to be taken, but such as would impede the scythe. It is often the case, he adds, that the pickers, who generally like this work, will over-pick if they are not attended to, and propose to pick fields which are not to be mown; but this is on no account to be permitted, if the stones be not much wanted. It has been often remarked, and is a known fact, that too much stone-picking has done a very sensible mischief, in many cases where picked by authority of parliament for turnpike roads. And Mr. Macro, of Suffolk, ascertained it experimentally.

Stone Pitch, or rather Pitch Stone. See Mineralogy.

Stone Ware, or Stone-Ware, as it is often absurdly compounded, a species of pottery so called from its hardness. See Delft, Porcelain, and Pottery. Clay is a principal ingredient in pottery of all kinds which has the property of hardening in the fire, and of receiving and preserving any form into which it is moulded. One kind of clay resists the most violent action of the fire after being hardened to a certain degree, but is incapable of receiving a sufficient degree of hardness and solidity. A second kind assumes a hardness resembling that of flint, and such a compactness that vessels made of it have a glossy appearance in their fracture resembling porcelain. These two species owe their peculiar properties of resisting heat without melting, to sand, chalk, gypsum, or ferruginous earth, which they contain. A third species of clay begins to harden with a moderate fire, and melts entirely with a strong fire. It is of the second species that stone ware is made. The most famous manufactory of stone ware, as well as of other kinds of pottery, is at Burslem in Staffordshire. This can be traced with certainty at least two centuries back; but of its first introduction no tradition remains. In 1686, as we learn from Dr. Plot's Natural History of Staffordshire, only the coarse yellow, red, black, and mottled wares, were made in this country; and the only materials employed for them appear to have been the different colored clays which are found in the neighbourhood, and which form some of the measures or strata of the coal mines. These coarse clays made the body of the ware, and the glaze was produced by powdered lead-ore, sprinkled on the pieces before firing, with the addition of a little manganese for some particular colors. The quantity of goods manufactured was at that time so inconsiderable that the chief sale of them, Plot says, was 'to poor cratemen, who carried them on their backs all over the country.' About 1690 two ingenious artisans from Germany, of the name of Ellers, settled near Burslem, and carried on a small work for a little time. They brought into this country the method of glazing stone ware, by casting salt into the kiln while it is hot, and some other improvements of less importance; but, finding they could not get their secrets kept, they left the place rather in disgust. From this time various kinds of stone ware, glazed by the fumes of salt in the manner above mentioned, were added to the wares before made. The white kind, which afterwards became, and for many succeeding

years continued, the staple branch of pottery, is said to have owed its origin to the following accident:—A potter, Mr. Astbury, travelling to London, perceived something amiss with one of his horse's eyes. An ostler at Dunstable said he could soon cure him, and for that purpose put a common black flint stone into the fire. The potter observing it, when taken out, to be of a fine white, immediately conceived the idea of improving his ware by the addition of this material to the whitest clay he could procure: accordingly he sent home a quantity of the flint stones of that country, where they are plentiful among the chalk, and, by mixing them with tobacco-pipe clay, produced a white stone ware much superior to any that had been seen before. Some of the other potters soon discovered the source of this superiority, and did not fail to follow his example. For a long time they pounded the flint stones in private rooms by manual labor in mortars; but many of the poor workmen suffered severly from the dust of the flint getting into their lungs, and producing dreadful coughs, consumptions, and other pulmonary disorders. These disasters, and the increased demand for the flint powder, induced them to try to grind it by mills of various constructions: and this method, being found both effectual and safe, has continued in practice ever since. With these improvements, in the beginning of the eighteenth century, various articles were produced for tea and coffee equipages. Soon after attempts were made to furnish the dinner table also; and, before the middle of the century, utensils for the table were manufactured in quantity, as well for exportation as home consumption. But the salt glaze, the only one then in use for this purpose, is in its own nature so imperfect, and the potters, from an injudicious competition among themselves for cheapness rather than excellence, had been so inattentive to elegance of form and neatness of workmanship, that this ware was rejected from the tables of persons of rank; and about 1760 a white ware, much more beautiful and better glazed than ours, began to be imported in considerable quantities from France. This inundation of a foreign manufacture, so much superior to any of our own, must have had very bad effects upon the potteries of this kingdom, if a new one, still more to the public taste, had not appeared soon after. In 1763 Mr. Josiah Wedgwood, who had already introduced several improvements into this art, invented a species of earthen ware for the table quite new in its appearance, covered with a rich and brilliant glaze, bearing sudden alternations of heat and cold, manufactured with ease and expedition, and consequently cheap, and having every requisite for the purpose intended. To this new manufacture the queen was pleased to give her name and patronage, commanding it to be called Queen's ware, and honoring the inventor by appointing him her majesty's potter. The common clay of the country is used for the ordinary sorts; the finer kinds are made of clay from Devonshire and Dorsetshire, chiefly from Biddeford; but the flints from the Thames are all brought rough by sea, either to Liverpool or Hull, and and so by Burton. There is no conjecture formed of the original reason of fixing the manufacture in this spot, except for the convenience of plenty of coal, which abounds under all the country.

Stones, *mode of moving*, under this head it may be adviseable to point out the mode of employing the largest and most massive which has been conveyed from its earth-bound bed. We allude to the base of the statue erected to the memory of the emperor Peter, at St. Petersburg. It is represented in our Plate as it was removed by a series of friction balls, and motion communicated by the agency of pulleys, giving a mechanical advantage of sixteen to one pound of power employed. When the stone reached the sea-side, it was suspended between two large vessels which had been cut down for the occasion.

Stones, in the old system of mineralogy, were defined bodies which are insipid, not ductile nor inflammable, nor soluble in water. But as this is the definition given of earths, by chemists and naturalists, we must refer the reader to the article Mineralogy, for a view of the classification of stones. Here we will only make a few observations concerning their natural history.

Some philosophers say that stones are vegetables; that they grow and increase in size like a plant. This theory, we believe, was first offered to the world by M. Tournefort, in 1702, after returning from his travels in the east. It was founded on a curious fact. In surveying the labyrinth of Crete he observed that the names which visitors had engraved upon the rock were not formed of hollow but of prominent letters, like basso relievos. He supposes that these letters were at first hollowed out by knives; that the hollows have since been filled up by the growth of the stone; and hence he concludes that stones vegetate. Allowing the supposition to be true that they were at first hollow, we reply it is only a single fact, and that it is altogether unphilosophical to deduce a general system from a single fact. But this protuberancy of the characters is very improperly called vegetation; for it is not produced by a process in any respect like vegetation. Vegetation supposes vessels containing fluids and growth by expansion; but who ever heard of vessels in a stone, of fluids moving in them, or of the different parts expanding and swelling like the branch or trunk of a tree? Even the fact which Tournefort mentions proves nothing. He does not pretend to say that the rock itself is increasing, but only that a few small hollows are filled with new stony matter, which rises a little above the surrounding surface of the rock. This matter evidently has been once liquid, and at length has congealed in the channel into which it had run. But is not this easily explained by a common process, the formation of stalactites? When water charged with calcareous matter is exposed to the action of air, the water evaporates, and leaves the calcareous earth behind, which hardens and becomes like a stone. Having thus examined the principal fact upon which M. Tournefort founds his theory, it is unnecessary to follow him through the rest of his subject. Upon the whole we conclude that no such theory as this, that stones are vegetables, can be drawn from the supposed fact respecting the labyrinth.

Stones, in mythology, were objects of religious worship among the ancients. They were unhewn shapeless masses, called by Sanchoniathon Bætilia. See Bætylos. Pausanias speaks of the statues of Hercules and of Cupid as merely such masses of stone. He adds that there were seen, even in one place, thirty square stones, which had the names of so many divinities.

STONEHAVEN, or Stonehive, a sea-port town in Kincardineshire, in the parish of Dunnottar, Scotland, situate on the coast where the Cowie and Carron unite their waters as they flow into the sea; about fifteen miles south by west of Aberdeen, and twenty-two north by east of Montrose. It is composed of an old and new town, the former lying on the south bank of the Carron, adjacent to the harbour, and consisting of two considerable streets; the other on a peninsula formed by the Carron and Cowie. This last is laid out upon a regular plan, having broad streets and a square in the centre. The harbour is a natural basin, sheltered on the south-east by a high rock which runs out into the sea, and on the north-east by a quay, very convenient for unloading goods, but is neither very capacious nor safe. It derives its principal support from the sheriff's-court of the county, which has its seat here. Of late the brown linen manufacture has been introduced, and the commerce of the place is rapidly increasing. Stonehaven is a burgh of barony, of which the jurisdiction is by charter vested in magistrates.

STONEHENGE, a celebrated monument of antiquity, stands in the middle of a flat area near the summit of a hill six miles from Salisbury. It is enclosed by a circular double bank and ditch nearly thirty feet broad, after crossing which we ascend thirty yards before we reach the work. The whole fabric consisted of two circles and two ovals. The outer circle is about 108 feet diameter, consisting when entire of sixty stones, thirty uprights and thirty imposts, of which remain only twenty-four uprights, seventeen standing and seven down, three feet and a half asunder, and eight imposts. Eleven uprights have their five imposts on them by the grand entrance. These stones are from thirteen to twenty feet high. The lesser circle is somewhat more than eight feet from the inside of the outer one, and consisted of forty lesser stones (the highest six feet), of which only nineteen remain, and only eleven standing: the walk between these two circles is 300 feet in circumference. The Adytum or Cell is an oval formed of ten stones (from sixteen to twenty-two feet high,) in pairs, with imposts, which Dr. Stukeley calls trilithons, and above thirty feet high, rising in height as they go round, and each pair separate, and not connected as the outer pair; the highest eight feet. Within these are nineteen more smaller single stones, of which only six are standing. Three of the five trilithons at the west end fell flat westward, levelling also in their descent a stone of the second circle that stood in the line of their precipitation, on the third of January 1797. At the upper end of the Adytum is the altar, a large slab of blue coarse marble, twenty inches thick, sixteen feet long, and four broad; pressed down by the weight of the vast stones that have fallen upon it. The whole number of stones, uprights, imposts, and altar, is exactly 140. The stones are far from being artificial, but were most probably brought from those called the grey weathers on Marlborough Downs fifteen or sixteen miles off; and if tried with a tool they appear of the same hardness, grain, and color, generally reddish. The heads of oxen, deer, and other beasts, have been found on digging in and about Stonehenge; and human bones in the circumjacent barrows. There are three entrances from the plain to this structure, the most considerable of which is from the north-east, and at each of them were raised on the outside of the trench two huge stones with two smaller within parallel to them. It has been long a dispute among the learned, by what nation, and for what purpose, these enormous stones were collected and arranged. The first account of this structure we meet with is in Geoffroy of Monmouth; who in the reign of King Stephen, wrote the history of the Britons in Latin. He tells us that it was erected by the counsel of Merlin the British enchanter, at the command of Aurelius Ambrosius the British king, in memory of 460 Britons who were murdered by Hengist the Saxon. The next account is that of Polydore Virgil, who says that the Britons erected this as a sepulchral monument of Aurelius Ambrosius. Others suppose it to have been a sepulchral monument of Boadicea the famous British queen. Inigo Jones is of opinion that it was a Roman temple; from a stone sixteen feet long, and four broad, placed in an exact position to the east altar-fashion. Mr. Charlton attributed it to the Danes, who were two years masters of Wiltshire; a tin tablet, on which were some unknown characters, supposed to be Punic, was digged up near it in the reign of Henry VIII. but is lost. Its common name, Stonehenge, is Saxon, and signifies a stone gallows, to which those stones, having transverse imposts, bear some resemblance. It is also called in Welsh choir gour, or the giant's dance. Mr. Grose thinks that Dr. Stukeley has completely proved this structure to have been a British temple in which the Druids officiated. He supposes it to have been the metropolitan temple of Great Britain, and translates the words choir gour, the great choir or temple. Mr. Bryant is of opinion that it was erected by a c lony of Cuthites probably before the time of the Druids; because it was usual with them to place one vast stone upon another for a religious memorial; and these they often placed so equably that a breath of wind would sometimes make them vibrate. Of such stones one remains in the pile of Stonehenge. The ancients distinguished stones erected with a religious view, by the name of amber; by which was signified any thing solar and divine. The Grecians called them πετραι αμβροσιαι, petræ ambrosiæ. Stonehenge, according to Mr. Bryant, is composed of these amber stones: hence the next town is denominated Ambresbury; not from a Roman Ambrosius, but from the ambrosiæ petræ, in whose vicinity it stood. Some of these were rocking stones; and there was a wonderful monument of this sort near Penzance in Cornwall, which still retains the name of main-amber, or the sacred stones. Such a one is mentioned by

Appollonius Rhodius, supposed to have been raised in the time of the Argonauts, in the island Tenos, as the monument of the two-winged sons of Boreas, slain by Hercules; and there are others in China and other countries.

Sir. R. C. Hoare, in 1812, observes: 'It is a melancholy consideration that at a period when the sciences are progressively advancing, and when newly discovered manuscripts are continually drawn forth from their cloistered retreats to throw a light on the ancient records of our country, it is mortifying, I say, that the history of so celebrated a monument as Stonehenge should still remain veiled in obscurity. The monks may boldly assert that Merlin and only Merlin was the founder of our temple; and we cannot contradict, though we may disbelieve. The revolution of ages frequently illustrates history, and brings many important facts to light; but here all is darkness and uncertainty; we may admire, we may conjecture; but we are doomed to remain in ignorance and obscurity.'

Mr. Davies, the learned author of Celtic Researches, and of the Mythology, &c., of the British Druids, enters more profoundly, perhaps, than any other author into the question in the latter work respecting the origin and appropriation of Stonehenge. He supposes that this structure, and Silbury-hill, are two of the three works alluded to in a Welsh Triad, as constituting the greatest labors of the island of Britain, i. e. lifting the stone of Ketti; building the work of Emrys; and piling the mount of the assemblies. That Stonehenge is really a Druidical structure, the same learned writer farther remarks, 'is evident from the language in which it was described, and the great veneration in which it was held by the primitive bards, those immediate descendants and avowed disciples of the British Druids. As the great sanctuary of the dominion, or metropolitan temple of our heathen ancestors, so complex in its plan, and constructed upon such a multitude of astronomical calculations, we find it was not exclusively dedicated to the sun, the moon, saturn, or any other individual object of superstition; but it was a kind of Pantheon, in which all the Arkite and Sabian divinities of British theology were supposed to have been present; for we perceive Noe and Hu, the deified patriarch; Elphin and Rheiddin, the sun; Eseye, Isis; Ked, Ceres, with the cell of her sacred fire; Llywy, Proserpine; Gwydien, Hermes; Budd, Victory; and several others.' As to the precise date of Stonehenge, Mr. Davies offers nothing definitive; but remarks that it was most likely of later origin than the introduction of the Helio-Arkite superstition, which is traditionally said to have been of foreign origin, and to have come into England by the way of Cornwall, and, therefore, probably from the tin merchants. He also remarks 'that it was a monument of venerable antiquity in the days of Hengist, and that its peculiar sanctity influenced the selection of the spot for the place of conference between the British and Saxon princes,' p. 385, &c. Mr. Davies farther mentions a passage in the Greek historian Diodorus Siculus, describing a round temple dedicated to Apollo, and concludes this to have been most likely our monument of Stonehenge. The substance of the Grecian author is: 'Among the writers of antiquity, Hecatœus and some others relate that there is an island in the ocean, opposite to Celtic Gaul, and not inferior in size to Sicily, lying towards the north, and inhabited by Hyperborei, who are so called because they live more remote from the north wind. The soil is excellent and fertile; and the harvest is made twice in the same year. Tradition says that Latona was born here, and therefore Apollo is worshipped above any other deity; to him is also dedicated a remarkable temple of a round form, &c.'

Mr. Cunnington, in his History of Ancient Wiltshire, fol. 1812, grounds a new supposition on the difference in quality and size between the stones of the great circle and interior row, and those of the smaller ones: and hence supposes that Stonehenge was erected at different periods. He also supposes that the larger stones, with their imposts, constituted the old, or original work; and that the small stones of the second circle, and those of the inner range, were raised at a later period, as 'they add nothing to the grandeur of the temple.' To exemplify this opinion, Sir Richard Hoare has given a bird's-eye view of the structure, thus divested of the smaller stones. Unfortunately for the theorist, this system is not warranted by any example among the numerous Druidical circles of Great Britain; but, on the contrary, it will be more consistent with these, and with the practices of remote ages, to conclude that the second circle of small, rough, unhewn stones, with another circle immediately within the ditch, and some other members, now destroyed, formed the original, pristine temple.

'It may be naturally expected,' says Sir Richard Hoare, in his Ancient Wiltshire, 'that, after quoting the various descriptions of others respecting Stonehenge, I should give some opinions of my own. This I shall do with diffidence, and lament that the history of this celebrated 'wonder of the west' will most probably ever remain unknown. I cannot for a moment hesitate in declaring it to be neither Roman, Saxon, nor Danish. We learn from the Holy Scriptures that the earliest memorials were of stone; and we find to this day single, double, and triple upright stones, as well as numerous circles dispersed about our dominions: we then find some attempts at architecture in the cromlech and kistvaen, in both of which we see immense stones laid incumbent upon others that are upright: whether these gave the idea of the imposts at Stonehenge, or vice versâ, will be a difficult matter to determine; at all events, I consider Stonehenge of a much more modern date than Abury, where there are no imposts, and no marks of working on the stones; but in the former we perceive a regular plan, a great deal of symmetry and great knowledge in mathematics. We know, also, that many stone monuments exist on the continent, and in that part of it whence our island probably received its earliest population, viz. Gallia-Celtica. The most remarkable of these monuments, and such as must excite curiosity in the highest degree, is situated in the hamlet of Carnac, near Vannes and Auray, on

the western coast of Bretagne, and in the department of Morbihan, in France. M. Cambray, in his Monumens Celtiques, has given a very detailed and animated description of this interesting relic of antiquity. He tells us that some detached stones on the hills and sand-banks announce the approach to this grand theatre, which consists of an immense number of rude unhewn stones (amounting to four thousand, or more), standing in an upright position, on a sandy plain, near the sea-coast. They are ranged in eleven straight lines, which lines are separated from each other by a space of thirty or thirty-three feet, and the distance from one stone to another varies from twelve to fifteen feet. The highest of these stones measures twenty-two feet out of the ground; the width varies; one of them is twenty-two feet high, twelve feet wide, and six feet thick; and many of them are moveable: these stones present the most singular aspect; they stand alone on an extensive plain, attended only by the sand that supports them, and the vault of heaven that surrounds them; not an inscription to explain, nor an analogy to inform; the men whom you call, the traveller whom you interrogate, gaze at it, and either turn away their head, or recount follies. They recall to our memory those times which neither our calculation nor our history can ever attain. I have before stated my opinion, that our earliest inhabitants were Celts, who naturally introduced with them their own buildings, customs, rites, and religious ceremonies; and to them I attribute the erection of Stonehenge, and the greater part of the sepulchral memorials that still continue to render its environs so truly interesting to the antiquary and historian.

The general title of Druidical has been given to all these stone monuments, and some of my readers may be surprised that I have not adopted it. That the Druids existed in our island at a very early period, and officiated as priests, there can be no doubt; but, as the learned Mr. Bryant, in his Mythology, observes, 'under the sanction of their names, we shelter ourselves whenever we are ignorant and bewildered.' And Mr. Borlase, with equal justness, remarks 'that the work of Stonehenge must have been that of a great and powerful nation, not of a limited community of priests; the grandeur of the design, the distance of the materials, the tediousness with which all such massive works are necessarily attended, all show that such designs were the fruits of peace and religion.' We are ourselves much inclined to think, with an able writer in the Edinburgh Review of 1806, that these Druidical temples, and especially this of Stonehenge, served the purpose (perhaps additionally to that of places of worship) of rude observatories.

STONEHOUSE (Sir James), a pious English physician and divine, born in Berkshire, in 1715. He was educated at St. John's College, Oxford, where he took his degree of M. D., and afterwards settled at Northampton. There he became intimate with Dr. Doddridge, Mr. Hervey, and other eminent divines. About 1762 he entered into orders, and was appointed lecturer of All-Saints, Bristol, and minister of Great and Little Chevere1, Wilts. He succeeded to the family title and estate in 1792; but died in 1795, aged eighty. He was admired as a man and a preacher. He published Friendly Advice to a Patient, and other religious tracts.

Stoneplover, or Stone curlew. See Charadrius.

Stony Point, a post on the right bank of the Hudson, in the state of New York. In 1779 it was taken by the British, but recovered soon after by the Americans; and the whole garrison, consisting of 600 men, with their commanding officer, lieutenant-colonel Johnson, made prisoners of war.

Stonykirk, or Stephen-kirk, a parish in Wigton-shire, composed of the united parishes of Stonykirk, Clashank, and Toscarton, on the west coast of the bay of Luce, six miles from Port-Patrick. Within this parish are four mills for dressing flax, and an extensive bleach-field. Here is a considerable fishery for cod, salmon, and mackarel. Here is also a chalybeate spring; and in a cave, near the bay Float, called the Good Wife's Cave, is a very remarkable echo.

STOOD. The *pret.* of To Stand, which see.

Adam, at the news,
Heart-struck with chilling gripe of sorrow *stood*.
Milton.

STOOL, *n. s.* } Sax. ȝtol; Goth. *stol;*
Stool'ball, *n. s.* } Belg. *stoel;* Teut. *stuhl.* A low seat without a back: evacuations by purgatives: for the stool of repentance, see below: stoolballs is a game.

Thou fearful fool,
Why takest not of the same fruit of gold?
Ne sittest down on that same silver *stool*,
To rest thy weary person in the shadow cold?
Spenser.

There be medicines that move *stools*, and not urine, some other urine, and not *stools*: those that purge by *stool* are such as enter not at all, or little, into the mesentery veins; but either at the first are not digestible by the stomach, and therefore move immediately downwards to the guts, or else are afterwards rejected by the mesentery veins, and so turn likewise downwards to the guts. *Bacon's Natural History.*

Unequal and unreasonable judgments of things brings many a great man to the *stool of repentance*.
L'Estrange.

Now which were wise, and which were fools?
Poor Alma sits between two *stools*;
The more she reads, the more perplext. *Prior.*

While Betty dances on the green,
And Susan is at *stoolball* seen. *Id.*

The peristaltick motion, or repeated changes of contraction and dilatation, is not in the lower guts, else one would have a continual needing of going to *stool*. *Arbuthnot on Aliments.*

If a chair be defined a seat for a single person, with a back belonging to it, then a *stool* is a seat for a single person without a back. *Watts's Logick.*

Stool of Repentance, or cutty stool, in the kirks of Scotland, is somewhat analogous to the pillory. It is elevated above the congregation. In some places there may be a seat in it; but it is generally without, and the person stands therein who has been guilty of fornication, for three Sundays, in the forenoon; and, after sermon, the beadle is called upon by name and surname, the beadle or kirk-officer, bringing the offender, if refractory, forwards to his post; and then the preacher

proceeds to admonition. Here too are set to public view adulterers; only these are habited in a coarse canvas, analogous to a hairy or monastic vest, with a hood to it, which they call sack, or sackcloth, and that every Sunday throughout a year, or longer.

Stool, in mining, is used when the miners leave off digging deeper, and work in the ends forward. The end before them is called the stool.

Stool, in ship-building, the name of the supporters of the poop and top lanterns.

STOOP, *v. n.* & *n. s.* } Sax. ꝑtupian; Swed.
Stoop'ingly, *adv.* } *stupa;* Belg. *stuypen.*
To bend down; bend forward; lout; yield; submit: the act of stooping; degradation: and (Sax. ꝑtoppa) a vessel of liquor: the adverb corresponds.

They, whose authority is required unto the satisfying of your demand, do think it both dangerous to admit such concourse of divided minds; and unmeet that their laws, which, being once solemnly established, are to exact obedience of all men, and to constrain thereunto, should so far *stoop* as to hold themselves in suspense from taking any effect upon you, till some disputer can persuade you to be obedient. *Hooker.*

Come, lieutenant, I have a *stoop* of wine; and here without are a brace of gallants that would fain have a measure to the health of Othello. *Shakspeare.*

I am the son of Henry the Fifth,
Who made the dauphin and the French to *stoop.*
Id.

Like unto the boughs of this tree, he bended downward, and *stooped* towards the earth. *Raleigh.*

Where men of great wealth *stoop* to husbandry, it multiplieth riches exceedingly. *Bacon.*

Nani was noted to tread softly, to walk *stoopingly*, and raise himself from benches with laborious gesture. *Wotton.*

There is nothing more in me. Sir, but may be squeezed out without racking, only a *stoop* or two of wine. *Denham.*

Cow'ring low
With blandishment, each bird *stooped* on his wing.
Milton.

Death, his death-wound shall then receive,
And *stoop* inglorious. *Id.*

Satan ready now
To *stoop* with wearied wings and willing feet,
On the bare outside of this world. *Id.*

Now will I wander through the air,
Mount, make a *stoop* at every fair. *Waller.*

He that condescended so far, and *stooped* so low, to invite and to bring us to heaven, will not refuse us a gracious reception there. *Boyle's Seraphick Love.*

When Pelopidas and Ismenias were sent to Artaxerxes, Pelopidas did nothing unworthy; but Ismenias let fall his ring to the ground, and, *stooping* for that, was thought to make his adoration. *Stillingfleet.*

Can any loyal subject see
With patience such a *stoop* from sovereignty?
An ocean poured upon a narrow brook? *Dryden.*

Mighty in her ships stood Carthage long,
And swept the riches of the world from far;
Yet *stooped* to Rome, less wealthy, but more strong.
Id.

Twelve swans behold in beauteous order move,
And *stoop* with closing pinions from above. *Id.*

An eagle made a *stoop* at him in the middle of his exaltation, and carried him away. *L'Estrange.*

A caldron of fat beef, and *stoop* of ale,
On the huzzaing mob shall more prevail,
Than if you give them with the nicest art,
Ragousts of peacocks' brains, or filbert tart. *King.*

These are arts, my prince,
In which your Zama does not *stoop* to Rome.
Addison.

Stooping, in falconry, is when a hawk, being upon her wings at the height of her pitch, bends down violently to take the fowl.

STOP, *v. a., v. n.,* & *n. s.* } French *estouper;*
Stop'cock, *n. s.* } Italian *stoppare;*
Stop'page, } Belg. *stoppen;* Danish *stoppe.*
Stop'ple. } To hinder; interrupt; suspend; repress; suppress; close; encumber; regulate musical strings by the finger: as a verb neuter, to cease progress: as a noun substantive, cessation; hinderance; repression; obstacle; impediment; a point in typography; an instrument to regulate musical sounds; act of applying such stops: a stopcock is a pipe supplied with a cock: stoppage, the act of stopping: stopple is the stop of a bottle or hole.

Smite every fenced city, *stop* all wells of water, and mar land with stones. 2 *Kings*, iii. 19.

They pulled away the shoulder, and *stopped* their ears, that they should not hear. *Zech.* vii. 11.

As the truth of Christ is in me, no man shall *stop* me of this boasting. 2 *Cor.* xi. 10.

Encroachments are made by degrees from one step to another; and the best time to *stop* is at the beginning. *Lesley.*

The proud Duessa, full of wrathful spight
And fierce disdain to be affronted so,
Inforced her purple beast with all her might,
That *stop* out of the way to overthrow. *Spenser.*

In weak and tender minds, we little know what misery this strict opinion would breed, besides the *stops* it would make in the whole course of all men's lives and actions. *Hooker.*

You would play upon me, you would seem to know my *stops;* you would pluck out the heart of my mystery. *Shakspeare.*

Blest are those,
Whose blood and judgment are so well commingled
That they are not a pipe for fortune's finger
To sound what *stop* she please. *Id. Hamlet.*

Thought's the slave of time, and life time's fool;
And time, that makes survey of all the world,
Must have a *stop.* *Shakspeare.*

Friend, 'tis the duke's pleasure,
Whose disposition all the world well knows
Will not be rubbed nor *stopped.* *Id. King Lear.*

Some strange commotion
Is in his brain; he bites his lip, and starts;
Stops on a sudden, looks upon the ground,
Then lays his finger on his temple; straight
Springs out into fast gait, then *stops* again.
Id. Henry VIII.

Look you to the guard to-night;
Let's teach ourselves that honourable *stop,*
Not to outsport discretion. *Shakspeare.*

The further a string is strained, the less a superstraining goeth to a note; for it requireth good winding of a string before it will make any note at all: and in the *stops* of lutes, the higher they go, the less distance is between the frets. *Bacon.*

In instruments of strings, if you *stop* a string high, whereby it hath less scope to tremble, the sound is more treble, but yet more dead.
Bacon's Natural History.

His majesty *stopped* a leak that did much harm. *Bacon.*

Stoppings and suffocations are dangerous in the body. *Id.*

Bottles swinged, or carried in a wheel-barrow upon rough ground, fill not full, but leave some air; for, if the liquor come close to the *stopple*, it cannot flower. *Id.*

They first raised an army with this design, to *stop* my mouth, or force my consent. *King Charles.*

Even the iron-pointed pen,
That notes the tragick dooms of men,
Wet with tears stilled from the eyes
Of the flinty destinies,
Would have learned a softer style,
And have been ashamed to spoil
His life's sweet story by the haste
Of a cruel *stop* ill-placed. *Crashaw.*

On indeed they went: but O! not far;
A fatal *stop* traversed their head-long course. *Daniel.*

Th' organ-sound a time survives the *stop*,
Before it doth the dying note give up. *Id. Civil War.*

The marigold, whose courtier's face
Ecchoes the sun, and doth unlace
Her at his rise, at his full *stop*
Packs and shuts up her gaudy shop. *Cleaveland.*

Mountains of ice that *stop* th' imagined way. *Milton.*

The harp
Had work, and rested not; the solemn pipe,
And dulcimer, all organs of sweet *stop*. *Id.*

These gates are not sufficient for the communication between the walled city and its suburbs, as daily appears by the *stops* and embarasses of coaches near both these gates. *Graunt.*

If they should open a war, they foresee the consumption France must fall into by the *stop* of their wine and salts, wholly taken off by our two nations. *Temple.*

My praise the Fabii claim,
And thou, great hero, greatest of thy name,
Ordained in war to save the sinking state,
And, by delays to put a *stop* to fate. *Dryden's Æneid.*

Almon falls,
Pierced with an arrow from the distant war:
Fixed in his throat the flying weapon stood,
And *stopped* his breath, and drank his vital blood. *Dryden.*

A lion, ranging for his prey, made a *stop* on a sudden at a hideous yelling noise which startled him. *L'Estrange.*

Brokers hinder trade, by making the circuit which the money goes larger, and in that circuit more *stops*, so that the returns must necessarily be slower and scantier. *Locke.*

When men pursue their thoughts of space, they *stop* at the confines of body, as if space were there at an end. *Id.*

There were no shuts or *stopples* made for the ears, that any loud or sharp noise might awaken it, as also a soft and gentle murmur provoke it to sleep. *Ray on the Creation.*

No man could spit from him without it, but would drivel like some paralytick or fool; the tongue being as a *stopcock* to the air, till upon its removal the spittle is driven away. *Grew's Cosmologia.*

Every bold sinner, when about to engage in the commission of any known sin, should arrest his confidence, and *stop* the execution of his purpose with this question: Do I believe that God has denounced death to such a practice, or do I not? *South.*

Blessed be that God, who cast rubs, *stops*, and hindrances in my way, when I was attempting the commission of such a sin. *Id.*

A variety of strings may be observed on their harps, and of *stops* on their tibiæ; which shews the little foundation that such writers have gone upon, who, from a short passage in a classick author, have determined the precise shape of the ancient musical instruments, with the exact number of their pipes, strings, and *stops*. *Addison on Italy.*

Female zeal, though proceeding from so good a principle, if we may believe the French historians, often put a *stop* to the proceedings of their kings, which might have ended in a reformation. *Addison.*

Occult qualities put a *stop* to the improvement of natural philosophy, and therefore have been rejected. *Newton's Opticks.*

So melancholy a prospect should inspire us with zeal to oppose some *stop* to the rising torrent, and check this overflowing of ungodliness. *Rogers.*

If the rude throng pour on with furious pace,
And hap to break thee from a friend's embrace,
Stop short, nor struggle through. *Gay.*

The *stoppoge* of a cough or spitting increases phlegm in the stomach. *Floyer on the Humours.*

Celsus gives a precept about bleeding, that when the blood is good, which is to be judged by the colour, that immediately the vein should be *stopped*. *Arbuthnot.*

The effects are a *stoppage* of circulation by too great a weight upon the heart, and suffocation. *Id.*

STOPPERS, in a ship, certain short pieces of rope, which are usually knotted at one or both ends, according to the purpose for which they are designed. They are either used to suspend any heavy body, or to retain a cable shroud, &c., in a fixed position. Thus the anchors, when first hoisted up from the ground, are hung to the cat-head by a stopper attached to the latter, which, passing through the anchor ring, is afterwards fastened to the timber head; and the same rope serves to fasten it on the bow at sea; or to suspend it by the ring which is to be sunk from the ship to the bottom. The stoppers of the cable have a large knot and a laniard at one end, and are fastened to a ring-bolt in the deck by the other. They are attached to the cable by the laniard, which is fastened securely round both by several turns passed behind the knot, or about the neck of the stopper; by which means the cable is restrained from running out of the ship when she rides at anchor. The stoppers of the shroud have a knot and a laniard at each end. They are only used when the shrouds are cut asunder in battle, or disabled by tempestuous weather; at which time they are lashed, in the same manner as those of the cables, to the separated part of the shroud, which are thereby reunited, so as to be fit for immediate service. This, however, is only a temporary expedient.

STORACE (Stephano), an eminent composer of dramatic music, was the son of an Italian performer on the bass viol, long settled in London where he was born in 1763. Early displaying strong musical talent, he was sent by his father to Italy, that he might enjoy every opportunity of cultivation, and his progress was so rapid that at the very commencement of his career he produced his celebrated finale to the first act of the Pirates, and some of his very best compositions. On his return to England he resided at Bath, till the friendship of Mr. Michael Kelly pro-

cured him the appointment of composer to Drury Lane theatre. Here he remained, with daily increasing reputation, till a violent attack of gout in the head carried him off, in 1796, in the flower of his age. His compositions are remarkable for their spirit, and his melodies have not often been excelled. His productions are the music to The Doctor and Apothecary, a farce, 1788; Haunted Tower, opera, 1789; No Song no Supper, farce, 1790; Siege of Belgrade, opera, 1791; Cave of Trophonius, musical interlude, 1791; Pirates, and Dido, operas, 1792; Prize, and Glorious First of June, musical entertainments; Cherokee, and Lodoiska, operas, 1794; Three and the Deuce, comic drama, 1795; My Grandmother, farce; Iron Chest, musical play; and Mahmoud, an opera, 1796.

STORACE (Anna Selina), sister to the above, an excellent comic actress and accomplished singer, was a pupil of Sacchini; and after singing at Florence, Vienna, &c., from 1780 to 1787, with reputation, came to London, and soon rose to be a favorite in her profession, a station which she maintained till her decease in the neighbourhood of London in 1814.

STORAX, LIQUID. See LIQUIDAMBAR. Liquid storax is a resinous juice obtained from a tree called Liquidambar Straciflua, a native of Virginia and Mexico, lately naturalised in Britain. The juice called liquidambar exudes from incisions made in the trunk, and the liquid storax is obtained by boiling the bark or branches in water. Two sorts of liquid storax are distinguished by authors; one the purer part of the resinous matter that rises to the surface in boiling, separated by a strainer, of the consistence of honey, tenacious like turpentine, of a reddish or ash brown color, moderately transparent, of an acrid unctuous taste, and a fragrant smell, faintly resembling that of the solid storax, but somewhat disagreeable; the other the more impure part, which remains on the strainer, is not transparent, in smell and taste is much weaker, and contains a considerable proportion of the substance of the bark. What is most commonly met with under this name in the shops is of a weak smell and a gray color, and is supposed to be an artificial composition. Liquid storax has been employed chiefly in external applications, but it is at present almost wholly in disuse.

STO'RAXTREE, *n. s.* Lat. *styrax*. A plant; a resinous and odoriferous gum.

I yielded a pleasant odour like the best myrrh, as galbanum, and sweet *storax*. *Ecclus* xxiv. 15.

STORE, *n. s.*, *v. a.*, & *adj.* } Goth. Swed. Dan.
STOREHOUSE. } and Sax. *stor*, all signify large, great. The Teutonic dialects nearer to English seem not to have retained this word. Large number; large quantity; plenty; a stock accumulated; hoard; magazine: to furnish; replenish; stock; lay up; hoard: Bacon uses it for hoarded; laid up: a store-house is a magazine; granary; depository; a great mass reposited.

Joseph opened all the *storehouses*, and sold unto the Egyptians. *Genesis* xli. 56.

Is not this laid up in *store* with me, and sealed up among my treasures? *Deuteronomy* xxxii. 34.

They greatly joyed merry tales to feign,
Of which a *storehouse* did with her remain.
Faerie Queene.

Some were of opinion that it were best to stay where they were, until more aid and *store* of victuals were come; but others said the enemy were but barely *stored* with victuals, and therefore could not long hold out. *Knolles's History.*

By us it is willingly confessed that the scripture of God is a *storehouse* abounding with inestimable treasures of wisdom and knowledge, in many kinds over and above things in this kind barely necessary. *Hooker.*

Suffer us to famish, and their *storehouses* crammed with grain! *Shakspeare. Coriolanus.*

The ships are fraught with *store* of victuals, and good quantity of treasure. *Bacon.*

What floods of treasure have flowed into Europe by that action, so that the cause of Christendom is raised since twenty times told: of this treasure the gold was accumulate and *store* treasure; but the silver is still growing. *Id. Holy War.*

Let the main part of the corn be a common stock, laid in and *stored* up, and then delivered out in proportion. *Bacon.*

To these high powers a *storehouse* doth pertain,
Where they all arts and general reasons lay;
Which in the soul, even after death, remain,
And no Lethean flood can wash away. *Davies.*

Wise Plato said the world with men was *stored*,
That succour each to other might afford. *Denham.*

None yet, but *store* hereafter from the earth
Up hither like aërial vapours flew,
Of all things transitory and vain, when sin
With vanity had filled the works of men. *Milton.*
Sulphurous and nitrous foam,
Concocted and adjusted, they reduced
To blackest grain, and into *store* conveyed. *Id.*

My heart hath been a *storehouse* long of things
And sayings laid up, portending strange events. *Id.*

One having *stored* a pond of four acres with carps, tench, and other fish, and only put in two small pikes, at seven years' end, upon the draught, not one fish was left, but the two pikes grown to an excessive bigness. *Hale.*

As many different sounds as can be made by single articulations, so many letters there are in the *storehouse* of nature. *Holder.*

Jove, grant me length of life, and years good *store*
Heap on my bended back. *Dryden's Juvenal.*

We lived supine amidst our flowing *store*,
We slept securely, and we dreamt of more. *Dryden.*

The mind reflects on its own operations about the ideas got by sensation, and thereby *stores* itself with a new set of ideas, which I call ideas of reflection. *Locke.*

The image of God was resplendant in man's practical understanding, that *storehouse* of the soul, in which are treasured up the rules of action and the seeds of morality. *South.*

Thee, goddess, thee, Britannia's isle adores;
How has she oft exhausted all her *stores!*
How oft in fields of death thy presence sought,
Nor thinks the mighty prize too dearly bought! *Addison.*

Her face with thousand beauties blest;
Her mind with thousand virtues *stored*;
Her power with boundless joy confest,
Her person only not adored. *Prior.*

To *store* the vessel let the care be mine
With water from the rocks, and rosy wine,
And life-sustaining bread. *Pope's Odyssey.*

STOREKEEPER, a person entrusted with the care of the stores in the magazines, such as the provisions, forage, &c. During a war, storekeepers receive these articles from contractors, and deliver them out to the troops. They have several clerks under them, appointed to different departments of provisions, hay, straw, oats, &c. The storekeepers belonging to the ordnance have charge of all the king's stores, belonging both to land and sea-service. The government storekeeper-general is an appointment of recent date, which has been given to John Trotter, esq.

STORESHIP. See Ship.

Stores, Military, are provisions, forage, arms, clothing, ammunition, &c. Officers, storekeepers, or commissaries, who are convicted of embezzling or misapplying any military stores, are to make good the damage, forfeit £100, and be cashiered. See Mutiny Act, sect. 65.

Stores, Medical, on board transports. Certain articles of diet, which are put on board each transport, are so called. These are to be considered as intended solely for the use of the sick, or convalescent; they are to remain in the charge of the master of the transport, and only to be issued upon demand in writing, made by the surgeon from time to time, as he shall judge proper; or, when there is no surgeon, upon demand of the commanding officer. And the surgeon or commanding officer is to give the master, at the end of the voyage, a certificate that his demands for the said medical stores have been made only upon proper occasions, and have not been expended for any other use than that of the sick or convalescent.

STORK, *n. s.* Sax. ȝtopc; Belg. *stork;* Gr. *ȝopγη*. A bird of passage, famous for the regularity of its departure.

Stork, in ornithology. See Ardea.

Stork (Abraham), a celebrated Dutch painter, famed for sea-pieces and sea-ports. In these his figures were small; but so numerous, varied, and accurate, as to afford a great fund of entertainment. He died in 1708. His brother was a landscape painter, but not equal to Abraham.

STORM, *n. s.* & *v. n.* } Welsh, *ystorm;* Sax.
Storm'y, *adj.* } ȝtopm; Goth. Swed. Dan. and Belg. *storm*; Ital. *stormo*. A tempest; a commotion of the elements; hence any violent assault, commotion, or calamity; to storm is, to attack by open force; to raise a tempest; to rage; fume: stormy is, tempestous; violent; passionate.

O turn thy rudder hitherward a while,
Here may thy *storm*-beat vessel safely ride. *Spenser.*

So now he *storms* with many a sturdy stoure,
So now his blustering blast each coast doth scoure.
Id.

We hear this fearful tempest sin,
Yet seek no shelter to avoid the *storm*. *Shakspeare.*

Them she upstays, mindless the while
Herself, though fairest unsupported flower,
From her best prop so far, and *storm* so nigh.
Milton.

To Storm, in military matters, to make a violent assault on any fortified place or works. At the siege of Louisbourg, in the year 1758, the following anecdote occurred; and, as it shows the superiority of true generalship over brutal courage, we recommend it to the perusal of every officer, and to the imitation of every general who may have the lives of his fellow-subjects entrusted to his judgment. The celebrated general Wolfe, always brave, always eager to put forth the energies of his nature, proposed to general Amherst, who commanded the besieging army, that the place should be stormed. The general asked his friend Wolfe, how many lives he thought it might cost? the latter said, about 300; and he then asked how long he thought it might hold out against a blockade? Not above three days. Well, then, let us wait three days, and save our men. The place surrendered on the second day.

STORMING Party, a select body of men, consisting generally of the grenadiers, who first enter the breach, &c.

STORNOWEY, a harbour and port of the custom-house in Ross-shire, island of Lewis, Scotland. It has a post-office and regular packet, which sails every week with the mail and passengers for the mainland. The houses in the town are in general well built; and, besides a neat and commodious custom-house, here is a town-house, an assembly-room, an elegant church, and two good school-houses.

STORTHING, the Norwegian *diet* (from *stor*, great, and *thing*, assembly). The citizens qualified to vote, choose electors, who, from among themselves or their constituents, select the representatives, whose number is not to be under seventy-five, nor above one hundred. A member of the *storthing* must be thirty years old; must have resided ten years in the realm; must hold no office, civil or military; must not be attached to the court, nor receive a pension. Generally the *storthing* is held every third year, at the beginning of February, in the capital, Christiania. After the *storthing* is opened by the king or his deputy, it chooses one fourth part of its members to form the *logthing;* the other three fourths form the *odelsthing*. Each *thing* holds its sessions separately, and with open doors; and the debates are published, unless a resolution to the contrary be passed. The *storthing* is authorized to make and abolish laws; to impose taxes; open loans; see that the finances are properly administered; grant the civil list, &c. The government protocols, and all public papers, including treaties with foreign powers, must be laid before them, the secret articles only excepted, and these must not be contrary to the public ones; it may summon any body before it, except the king and viceroy; and it confers naturalization. Laws are proposed in the *odelsthing*, by its members, or by a counsellor of state: if they pass there, they go to the *logthing*. The king is to sign the bills, or to decline so doing. If a bill, twice rejected by the king, is adopted without alteration by a third regular *storthing*, it becomes a law, even without the king's sanction. In this manner nobility was abolished in Norway.

STO'RY, *n. s* & *v. a.* } Sax. ȝtœp; Belg.
Sto'ried, *adj.* } *storie;* Ital. *storia;* Gr.
Sto'ryteller, *n. s.* } *ιȝopία*; Lat. *historia.*

A history, particularly a short history; tale; an idle or trifling tale; account: as a verb active, to tell in history; relate: storied is furnished or adorned with stories: storyteller, a narrator of tales; generally used in condemnation or contempt.

How worthy he is, I will leave to appear hereafter, rather than *story* him in his own hearing. *Shakspeare. Cymbeline.*

These flaws and starts would well become
A woman's *story* at a winter's fire,
Authorised by her grandame. *Id. Macbeth.*

The fable of the dividing of the world between the three sons of Saturn arose from the true *story* of the dividing of the earth between the three brethren, the sons of Noah. *Raleigh.*

Matters of fact, concerning times, places, persons, actions, which depend upon *story*, and the relation of others, these things are not capable of being proved by such scientifical principles. *Wilkins.*

It is *storied* of the brazen Colossus, in the island of Rhodes, that it was seventy cubits high; the thumbs of it being so big that no man could grasp one of them with both his arms. *Id.*

This scene had some bold Greek or British bard
Beheld of old, what *stories* had we heard
Of fairies, satyrs, and the nymphs their dames,
Their feasts, their revels, and their am'rous flames! *Denham.*

And *storied* windows richly dight,
Casting a dim religious light. *Milton.*

'Tis not vain or fabulous
What the sage poets, taught by the' heavenly muse,
Storied of old in high immortal verse,
Of dire chimeras and enchanted isles,
And rifted rocks whose entrance leads to hell. *Id.*

Thee I have heard relating what was done
Ere my remembrance: now hear me relate
My *story*, which perhaps thou hast not heard. *Id.*

The four great monarchies make the subject of ancient *story*, and are related by the Greek and Latin authors. *Temple.*

In such a satire all would seek a share,
And every fool will fancy he is there;
Old *storytellers* too must pine and die,
To see their antiquated wit laid by;
Like her who missed her name in a lampoon,
And grieved to find herself decayed so soon. *Dryden.*

Governments that once made such a noise, as founded upon the deepest counsels and the strongest force, yet by some slight miscarriage, which let in ruin upon them, are now so utterly extinct that nothing remains of them but a name; nor are there the least traces of them to be found, but only in *story*. *South.*

In the road between Bern and Seleurre, a monument erected by the republick of Bern tells us the *story* of an Englishman not to be met with in any of our own writers. *Addison.*

Some greedy minion or imperious wife
The trophied arches, *storied* halls, invade. *Pope.*

Recite them, nor in erring pity fear
To wound with *storied* griefs the filial ear. *Id.*

My maid left on the table one of her *story* books, which I found full of strange impertinence, of poor servants who came to be ladies. *Swift.*

Company will be no longer pestered with dull, dry, tedious *storytellers*. *Id. Polite Conversation.*

Story, *n. s.* & *v. a.* Sax. ȝtoȝ, place. A floor; a flight of rooms: to range in floors, or one under another.

Avoid enormous heights of seven *stories*, and the contrary fault of low distended fronts. *Wotton.*

Because all the parts of an undisturbed fluid are of equal gravity, or gradually placed or *storied* according to the difference of it, any concretion that can be supposed to be naturally and mechanically made in such a fluid, must have a like structure of its several parts; that is, either be all over of a similar gravity, or have the more ponderous parts nearer to its basis. *Bentley's Sermons.*

Sonnets or elegies to Chloris
Might raise a house about two *stories*;
A lyrick ode would slate; a catch
Would tile; an epigram would thatch. *Swift.*

STOTHARD (Charles Alfred), a modern artist and antiquary of great talent, son of Thomas Stothard, R. A., was born July 5th, 1789. His paintings are remarkable for the faithful delineation which they exhibit of ancient costume: his drawings of the effigies of various members of the house of Plantagenet, taken from the abbey of Fontevraud, are equally curious and accurate; and it is satisfactory to reflect that his efforts not only succeeded in preserving copies of these relics, but mainly contributed to save the originals from destruction. In 1810 appeared his celebrated picture of the death of Richard II., and in the same year the first number of his Monumental Effigies of Great Britain, the tenth number of which was preparing for publication, when, by a melancholy accident, he was brought to an untimely end. In 1816 he visited France, and commenced at the instance of the Antiquarian Society his elaborate drawings from the celebrated tapestry of Bayeux; which he afterwards, in a memoir addressed to the society, proved from internal evidence to be contemporary with the commonly received era of its production, the period succeeding the Norman conquest. This little essay is to be found in the nineteenth volume of the Archaiologia. In July 1819 he was elected a fellow of the Antiquarian Society; and in the same year made a series of drawings from the paintings then lately discovered on the walls of the painted chamber in the house of lords. Being engaged to make some illustrations for Mr. Lyson's Magna Britannia, he set out for that purpose on a tour through Devonshire, and was employed in the act of tracing the stained glass in a window over the altar of the parish church of Bere Ferrers, in that county, when the ladder on which he was standing giving way, he was precipitated to the earth, and, his head striking against the monument of a knight in the chancel, his life was instantaneously terminated by a concussion of the brain. This fatal accident took place on the 28th of May, 1821, in the thirty-fourth year of his age. He left behind him several manuscripts and unpublished drawings, especially a work on ancient seals, which he had begun, and materials for a work illustrative of the age of Elizabeth. He lies buried in the church which was the scene of his catastrophe.

STOVE, *n. s.* Sax. ȝtoȝoa; Isl. *stoo*, a fireplace; Fr. *estuve*; Belg. *stove*.

For December, January, and the latter part of November, take such things as are green all winter; orange trees, lemon trees, and myrtles, if they be *stoved*; and sweet marjoram warm set. *Bacon.*

Fishermen, who make holes in the ice to dig up such fish with their nets as resort thither for breath-

ing, light on swallows congealed in clods of a slimy substance, and, carrying them home to their *stoves*, the warmth recovereth them to life and flight.

Carew's Survey of Cornwall.

Stoves, which could autumn of cold winter make;
Fountains in autumn to bring winter back.

Beaum. Psyche.

If the season prove exceeding piercing, in your great house kindle some charcoals; and, when they have done smoaking, put them into a hole sunk a little into the floor, about the middle of it. This is the safest *stove*. *Evelyn.*

The most proper place for unction is a *stove*.

Wiseman.

The heat which arises out of the lesser spiracles brings forth nitre and sulphur; some of which it affixes to the tops and sides of the grottos, which are usually so hot as to serve for natural *stoves* or sweating-vaults. *Woodward.*

Stoves. Without pretending to explain the physical connexion of heat and light, we may observe that heat, as well as light, is communicated to distant bodies in an instant by radiation. A person passing hastily by the door of a glass-house feels the glow of heat in the very moment he sees the dazzling light of the furnace mouth, and it is interrupted by merely screening his face with his hand. In this way is an apartment partly warmed by an open fire; and we avoid the oppressive heat by sitting where the fire is not seen, or by interposing a screen. We are apt to connect this so strongly in the imagination with the light emitted by the fire, that we attribute the heat to the immediate action of the light. But this opinion is shown to be gratuitous by a curious experiment made before the Royal Society by Dr. Hooke, and afterwards, with more care and accurate examination, by Mr. Scheele. They found that by bringing a plate of the most transparent glass briskly between the fire and one's face, the heat is immediately intercepted without any sensible diminution of the light. Scheele, by a very pretty investigation, discovered that the glass made that separation, and did it both in refraction and reflection; for he found that, when the light of the same fire was collected into a focus by means of a polished metal concave speculum, a thermometer placed there was instantly affected. But, if we employ a glass speculum foiled in the usual manner with quicksilver, of the same diameter and focal distance, and of equally brilliant reflection, there is hardly any sensible heat produced in the focus, and the thermometer must remain there for a very long while before it is sensibly affected. When we repeated this curious experiment, we found that, after the glass has remained a long while in this position, whether transmitting or reflecting the light, it loses in a great measure its power of intercepting the heat. By varying this observation, in many of its circumstances, we think ourselves entitled to conclude that the glass absorbs the heat which it intercepts, and is very quickly heated by the absorption. While it rises in its own temperature, it intercepts the heat powerfully; but when it is, as it were, saturated, attracting no more than what it immediately imparts to the air in corporeal contact with it, the heat passes freely through along with the light. If the glass be held so near the fire that the surrounding air is very much heated, no sensible interruption of heat is perceived after the glass is thus saturated. We found the check more quickly sensible than the thermometer of this instantaneous radiation of the heat which accompanies the light, or is separated from it in this experiment. It is a very instructive experiment in the physiology of heat. The accompaniment of light is not demonstrably necessary. We are certain that heat may be imparted without any sensible light, in a manner which we can hardly suppose any thing but radiation. If a piece of very hot iron be placed a little without the principal focus of a metallic concave speculum, and a very sensible air thermometer be placed in its conjugate focus, it will instantly show an elevation of temperature, although the iron is quite imperceptible to an eye which has even been a long while in the dark. No such rise of temperature is observed if the thermometer be placed a little to one side of the focus of the speculum; therefore the phenomenon is precisely similar to the radiation of light. We are obliged therefore to acknowledge that the heat is radiated in this experiment in the same way that light is in the common optical experiments. Although this is the most usual way that we in this country employ fuel for warming our apartments, it is by no means the only way in which the heat diffused from this fuel may be imparted to distant bodies. It is not even the most effectual method; it is diffused also by immediate communication to bodies in contact. The air in immediate contact with the burning fuel is heated, and imparts some of its heat to the air lying beyond it, and this is partly shared with the air which is still further off; and this diffusion, by communication in contactu, goes on till the remote air contiguous to the walls, the floor, the ceiling, the furniture, the company, all get a share of it, in proportion to their attractions and their capacities. And as the air is thus continually supplied, and continually gives out heat, the walls, &c., become gradually warmer, and the room becomes comfortable and pleasant. But no great proportion of the heat actually acquired by the room is communicated in this way. This diffusion by contact is but slow, especially in air which is very dry; so slow, indeed, that the air in the immediate neighbourhood of the fuel is hurried up the chimney before it has time to impart any of the heat received in contact. We know that the time employed in diffusing itself in this way, through stagnant air, to any moderate distance, is very considerable. We imagine therefore that the heat communicated to our rooms by an open fire is chiefly by radiation, but in a way something different from what we mentioned before. We imagine that, as the piece of glass in Dr. Hooke's experiment absorbs the heat, so the whole mass of air which fills the room intercepts the radiated heat in every part of the room where the fire is seen, and is as it were saturated with it throughout, and ready to impart it to every body immersed in it. We cannot otherwise account for the equability of the heat in the different parts of the room. Mere radiation on the solid bodies would warm them in the inverse duplicate ratio of their

distances from the fire; and diffusion by contact, if compatible with the rapid current up the chimney, would heat the room still more unequably. But, because all parts of the air of the room absorb radiated heat, what is saturated at a higher temperature, being nearer to the fire, rises to the ceiling, spreads outwards along the ceiling, and has its place supplied by the air which is thus pushed towards the fire from the places which are not directly illuminated. Far different is the method of warming the room by a stove. Here the radiation, if any, is very feeble or scanty; and, if a passage were allowed up the chimney for the warmed air, it would be quickly carried off. This is well known to the English who reside in the cold climates of St. Petersburgh, Archangel, &c. They love the exhilarating flutter of an open fire, and often have one in their parlour; but this, so far from warming the room during the extreme cold weather, obliges them to heat their stoves more frequently, and even abstracts the heat from a whole suite of apartments. But all passages this way are shut up when we warm a room by stoves. The air immediately contiguous to the stove is heated by contact, and this heat is gradually, though slowly, diffused through the whole room. The diffusion would however be very slow indeed, were it not for the great expansibility of air by heat. But the air surrounding the stove quickly expands and rises to the ceiling, while the neighbouring air slides in to supply the place, nay is even pushed in by the air which goes outwards aloft. Thus the whole air is soon mixed, and the room acquires almost an equal temperature throughout.

The warming by stoves must therefore be managed upon very different principles from those adopted in the employment of open fires. The general principle is, 1. To employ the fuel in the most effectual manner for heating the external part of the stove, which is immediately efficient in warming the contiguous air; and, 2. To keep in the room the air already warmed, at least as much as is consistent with wholesomeness and cleanliness. The first purpose is accomplished by conducting the flue of the furnace round its external parts, or, in short, by making every part of the flue external. Of all forms, that of a long pipe, returned backwards and forwards, up and down (provided only that the place of its last discharge be considerably higher than its entry from the fire-place), would be the most effectual. A very small stove constructed in this way, the whole being enclosed in a handsome case of polished iron plate, pierced and cut into elegant foliage like the cock of a watch, so that the odd looking pipes were completely concealed, though only three feet long, one foot thick, and six feet high, warmed a very lofty room of twenty-four feet by eighteen, and consumed less than half the fuel of a stove of the more usual make, which did not so fully warm a smaller chamber. It would occupy a volume to describe the immense variety of stoves which ingenuity or architectonic taste has constructed. We shall content ourselves with giving a specimen of the two chief classes into which they may be distinguished. The air of a room may be equally warmed, either by applying it to the surface of a small stove made very hot, or to the surface of a much larger stove more moderately heated. The first kind is chiefly used in Holland, Flanders, and the milder climates of Germany and Poland. The last are universally used in the frozen climates of Russia and Sweden. The first are generally made of cast iron, and the last of brick-work, covered with glazed tiles or stucco.

The ancients are supposed to have used stoves which concealed the fire, but few traces remain of the manner in which they warmed their habitations. It is imagined they lighted the fire in a large tube in the middle of a room, of which the roof was open, and that the other apartments were warmed by portable braziers. In Seneca's time they began to construct tubes in the walls to convey the heat into the upper apartments, the fire-places being placed below. It appears, however, that this was the origin of flues for smoke, and even of stoves; the situation and proportions of which have successively undergone various changes according to the localities, the wants of the inhabitants, &c. The custom of heating apartments by fires placed under arches or vaults seems to be very ancient: but this was confined to palaces and other edifices on a large scale; and the vestiges that have been discovered among ancient ruins sufficiently point out their destination.

The northern Chinese have a method of warming the ground-floor which resembles the ancient plan. The floors are made of tiles a foot square and two inches thick; their corners being supported by bricks set on end, that are a foot long and four inches square; the tiles, too, join into each other by ridges and hollows along the sides under the whole floor, which on one side of the house has an opening into the air, where a fire is made; and it has a funnel rising from the other side to carry off the smoke. The fuel is a sulphurous pit-coal, the smell of which in the room is thus avoided, while the floor and room are well warmed.

Keslar of Frankfort, whose work, entitled 'Epargne-bois,' &c. (the Wood-saver, &c.), appeared, in French, in 1619, is the oldest writer who has any useful ideas on the subject of stoves. He formed eight chambers, one above another, through which the smoke was to pass before it entered the chimney. He also brought air directly from without into the ash-pan to feed the fire; and there was another aperture to draw air from the apartment for the same purpose. Savot, in the 'Architecture Française des Batimens particuliers' (i. e. Architecture of Private Houses), printed in 1625, gave some advice relative to the best method of constructing chimneys with scarcely any other object than to prevent their smoking.

In 1686 M. Dalesme suggested the idea of a stove without smoke, which he called furnus acapnos. Here the smoke is forced to descend into the fire-place where it is consumed. Dr. Franklin afterwards executed a very complete stove on that principle, and spoke of it, in 1773, as a mere curiosity or philosophical experiment.

The machine in question consisted of a tube of iron plate, such as is used for the flue of a Ger-

man stove. This was bent at right angles, and the part which was horizontal was about two feet in length, and joined to the rest of the tube which ascended vertically. At the opposite end of the horizontal part the furnace was made: it consisted of a cylindrical tube of plate-iron erected upon the horizontal tube near the end, and provided with a grating, upon which the fuel was placed; and the grate prevented the fuel falling down into the horizontal tube. To light this stove some clear burning charcoal was put into the large short tube or furnace, and supported on the grate. As soon as the tubes grew warm, the air within them would ascend in the perpendicular tube or chimney and go out at the top of it: fresh air must enter into the horizontal tube through the furnace. In this course it must descend through the burning fuel, and becoming heated by the burning coals, through which it has passed, would rise more forcibly in the longer tube in proportion to its degree of heat, or rarefaction, and the length of that tube. Such a machine is a kind of inverted siphon; and as the greater weight of water in the longer leg of the common siphon, in descending, is accompanied by an ascent of the same fluid in the shorter; so in this inverted siphon the greater quantity of levity of air in the longer leg, in rising, is accompanied by the descent of air in the shorter. The things to be burned being laid on the hot coals contained in the furnace, the smoke must descend through those coals and be converted into flame, which, after destroying the offensive smell, comes out at the end of the longer tube as mere heated transparent gas or vapor. Whoever would repeat this experiment must take care that the part of the short tube is quite full of burning coals, so that no part of the smoke may descend and pass by them without going through them and being converted into flame; and that the longer tube is so heated that the current of ascending hot air will be established in it before the things to be burnt are laid on the coals, otherwise there will be disappointment.

There is a German book, entitled Vulcanus Famulans, by Joh. George Leutmann, P. D., printed at Wirtemburg in 1723, which describes, among a great variety of other stoves, one which seems to have been formed on the same principle. It was probably taken from the hint thereby given. The construction is as nearly as possible the same, except in the proportion of the parts, the furnace being made in the form of a basin or vase, having the grate in the bottom.

Gauger, the author of La Méchanique du Feu, &c., printed at Paris in 1709, was the person to whom we are indebted for the first complete system of experiments on the circulation of heat by means of air-holes affording warm air; as also the manner of making one fire warm several rooms to send off the heat in elliptic curves. We here find a description of a chimney, with the back, the hearth, and the jambs, of hollow iron, to heat the air that is to enter the room: but it does not appear that this work produced much effect.

In 1745 Dr. Franklin published an account of the new stoves of Pennsylvania; the advantages of which he compares with those of the stoves of Germany and Holland and the chimney of Gauger. In 1785 the doctor published the description of another stove which has the flame reversed, that is, it passes downwards through the fuel. The appearance of this stove is that of a vase of cast iron, with its pedestal; and this is mounted upon the top or lid of an air-box standing upon the hearth of the fire-place, and built close in a niche in the stone-work: but the vase being wholly detached from the back of the niche has a very neat appearance. The top of the vase turns back upon a hinge, so as to open like a lid, to put in the fuel; and the opening is covered by a brass frame which allows the air to enter. The bottom of the vase has in it an opening, of about two inches diameter, which leads through the stem or foot of the vase into a hollow iron box, forming the pedestal. At the bottom of this pedestal is a grating in the lid or top of the air-box upon which the vase stands. The air-box is divided by four partitions, between which the smoke passes and re-passes horizontally in a waving direction until it escapes into the chimney. Thus the smoke and flame, immediately after it has descended through the grate in the top of the air-box, passes backwards towards the chimney between the two middle partitions; but, as it cannot enter into the chimney at that part, it turns round the ends of those partitions and returns in two currents towards the front of the box; then returns again round the end of other partitions, and goes back into the chimney, which is behind, or rather at the sides of the niche in which the vase stands. The front plate of the air-box is made to slide in a groove, in two pieces, which meet together in the front like folding-doors; and these pieces being slided back expose the spaces between the partitions, which, as before-mentioned, act as winding flues for the smoke to circulate in, and give out its heat through the metal of the air-box. In the space between the two middle partitions, and into which the smoke first descends, a drawer is fitted to receive the ashes or cinders which may fall through the grate in the top of the air-box, and it can be readily withdrawn to clear it out. There is likewise a small grate at the lower part of the vase, upon which the fuel contained in the vase will rest. When this fuel is lighted, the flame and smoke will draw downward, and, descending through the grate, will pass through the hole in the bottom of the vase into the hollow pedestal, and through the grate in the top of the air-box: it then passes horizontally in the space between the two middle partitions of the air-box, and proceeds in the same direction towards the back of the chimney; there dividing, one part of it turns to the right and passes round the farther end of the middle partition; then coming forwards it turns round the near end of the outside partition; then moving backwards it arrives at the opening into the bottom of one of the upright corner funnels behind the niche, through which it ascends into the chimney, thus heating that half of the box and that side of the niche. The other part of the divided flame passes to the left, round the far end of the middle partition, round the near end of the outside partition, and so into and up the other corner funnel; thus heating the other half

of the box, and the other side of the niche. The vase itself, and the box, will also be very hot; and the air surrounding them being heated, and rising, as it cannot get into the chimney, it spreads in the room; colder air succeeding is warmed in its turn, rises and spreads, till by the continual circulation the whole is warmed. If there is occasion to make the fire when the chimney does not draw it must not be begun in the vase, but in one or more of the passages of the lower air-box; first withdrawing the sliding front of the air-box, and covering the mouth of the vase. After the chimney has drawn some time with the fire thus low, and begins to be a little warm, those passages may be closed and another fire kindled in the hollow pedestal, leaving its sliding shutter a little open; and when it is found that the chimney, being warmed, draws forcibly, that passage may be shut, and the vase opened, to make the fire there, as above directed. The chimney, well warmed by the first day's fire, will continue to draw constantly all winter, if the fire is made daily.

To avoid the inconvenience of smoke, the grate must be cleared before beginning to light a fire. If it is found clogged with cinders and ashes, the grate must be lifted up with the tongs to let them fall upon the grate in the top of the air-box: the ashes will go through it into the drawer, and the cinders may be raked off through a sliding door in the pedestal, and returned into the vase when they are to be burnt. Care must be taken that all the sliding-plates are in their places, and closely shut, that no air may enter the stove but through the round opening at the top of the vase; and, to avoid the inconvenience of dust from the ashes, let the ash-drawer be taken out of the room to be emptied. The passages should be cleaned or raked out when the draught of the air is strong inwards; and the ashes must be put carefully into the ash-box whilst it remains in its place. If it be required to prevent the fire burning in the absence of the proprietor, it may be done by removing the brass frame from the top of the vase, and covering the passage or opening into the top of the vase with a round tin-plate, which will prevent the entry of more air than barely sufficient to keep a few of the coals alive. When the fire is wanted, though some hours afterwards, by taking off the tin-plate and admitting the air the fire will soon be recovered. The effect of this machine is to burn not only the coals, but all the smoke of them; so that while the fire is burning, if the top of the chimney is observed, no smoke will be seen issuing, nor any thing but clear warm air, which, as usual, makes the bodies seen through it appear waving. But it must not be imagined from this that it can be a cure for bad or smoky chimneys, much less that, as it burns the smoke, it may be used in a room that has no chimney. It is only by the help of a good chimney, and the higher the better, that it produces its effect at all.

It is certain that heated clean iron yields no offensive smell: whatever smell of that kind is perceived where there are iron stoves, proceeds, therefore, from some foulness burning or fuming on their surface; they should, therefore, never be spit upon or greased, nor should any dust be suffered to lie upon them. The advantages of the reversed flame in stoves are very considerable. The chimney does not grow foul, nor ever need sweeping; for, as no smoke enters it, so no soot can form in it. The air heated over common fires instantly quits the room and goes up the chimney with the smoke; but, in the stove, it is obliged to descend in flame, and pass through the long winding horizontal passages, communicating its heat to a body of iron-plate, which, having thus time to receive the heat, communicates the same to the air of the room, and thereby warms it to a greater degree. The whole of the fuel is consumed by being turned into flame, and the benefit of its heat is obtained; whereas, in common chimneys, a great part goes away in smoke, which may be seen as it rises, but it affords no rays of warmth. Some idea may be formed of the quantity of fuel thus wasted in smoke, by reflecting on the mass of soot that a few weeks' firing will lodge against the sides of the chimney; and yet this is formed only of those particles of the column of smoke which happen to touch the sides in its ascent. How much more must have passed off in the air? And we know that this soot is still fuel, for it will burn and flame as such; and, when hard caked together, is indeed very like and almost as solid as the coal from which it proceeds. The destruction of fuel goes on nearly in the same quantity in smoke as in flame, but there is no comparison in the difference of heat given. When fresh coals are first put on a fire a considerable body of smoke arises. This smoke is, for a long time, too cold to take flame; but, if a burning candle is plunged into it, the candle, instead of inflaming the smoke, will instantly be itself extinguished. Smoke must have a certain degree of heat to be inflammable. As soon as it has acquired that degree, the approach of a candle will inflame the whole body, and the difference of the heat which it gives will be very sensible. A still easier experiment may be made with a candle itself. Hold your hand near the side of its flame, and observe the heat it gives; then blow it out, the hand remaining in the same place, and observe what heat may be given by the smoke that rises from the still burning snuff; you will find it very little; and yet that smoke has in it the substance of so much flame, and will instantly produce it if you hold another candle above it so as to kindle it. Now the smoke from the fresh coals, laid on this stove, instead of ascending and leaving the fire, while too cold to burn, being obliged to descend through the burning coals, receives among them that degree of heat which converts it into flame; and the heat of that flame is communicated to the air of the room, as above explained.

Franklin's stove is very ingenious, and has been much used in France, where the management of coal fires, however, is but little understood. He completed the stove just described in 1771, and used it in London during three winters. While he was in France he contrived another grate for burning pit-coals, which has the same property of burning the smoke, and at the same time the fire is exposed in a grate. The grate is a short cylinder, with its axis placed horizo tally, and the end turned towards the

apartment; one of its circular ends being made with bars, and the other is a back-plate. it is one foot (French) in diameter, and eight inches deep or long between the bars and the back: the sides and back are of plate iron, the sides having holes of half an inch diameter, and three or four inches distant from each other, to let in air for enlivening the fire: the back is without holes, and the sides do not meet at either the top or bottom by eight inches: and this square space is filled with grates of small bars, crossing from front to back to let in air below, and let out the smoke or flame above. The three middle bars of the front grate, that is, the circular end, are fixed; the upper and lower may be taken out and put in at pleasure, when hot, with a pair of pincers. The whole of this cylindrical grate turns upon pivots fixed in the opposite sides, across the centre of it: the pivots are supported by a crotchet, the stem of which is an inverted conical tube five inches deep, which fits as many inches upon a pin, which is fixed upright in a cast iron plate that lies upon the hearth. In the middle of the top and bottom grates are fixed small upright pieces, about an inch high, which, as the whole is turned on its pivots, stop it when the grate is perpendicular. By this means the grate can be inverted by turning it over upon its pivots; but, as that will present the back-plate to the apartment, it requires to be turned half round horizontally upon the conical pin to bring the front bars to the room. In making the first fire in the morning, with this grate, there is nothing particular to be observed: it is made as in other grates, the coals being put into the cylindrical grate above, after taking out the upper bar, which must be replaced when they are in. The round figure of the front bars filled with fire, when thoroughly kindled, is agreeable: it represents the great giver of warmth to our system. As it burns down it leaves a vacancy above, which must be filled with fresh coals, the upper bar is to be taken out, and fresh coals thrown in, the bar being afterwards replaced. The fresh coals, while the grate continues in the same position, will throw up, as usual, a body of thick smoke; but every one accustomed to coal fires in common grates must have observed that pieces of fresh coal stuck in below among the red coals have their smoke so heated as that it becomes flame as fast as it is produced, which flame rises among the coals, and enlivens the appearance of the fire. Here, then, is the use of this swivel-grate: by a push with the tongs or poker it can be turned over on its pivots till it is inverted, and the front bars face the back of the chimney; then turn it gently round on its vertical socket or axis till it again faces the room, whereby all the fresh coals will be found under the live ones, and the greater part of the smoke arising from the fresh coals will, in its passage through the live ones, be heated so as to be converted into flame. By this means much more heat is obtained from them, and the red coals are longer preserved from consuming. This construction, though not so complete a consumer of all the smoke as the vase, is yet fitter for common use, and very advantageous; it gives also a full sight of the fire always, a pleasing object which we have not in the other. It may with a touch be turned more or less from any one of the company that desires to have less of its heat, or presented full to one just come out of the cold; and, when the front bars of the grate are supported in a horizontal position, a tea-kettle may be boiled on them.

Notwithstanding the advantages of Dr. Franklin's construction of a stove, the expense and trouble of it, and the difficulty of procuring workmen who understood the manner of executing it, have prevented the general use of it. Mr. James Sharp, with a view of obviating these objections and difficulties, has proposed several improvements, for which he has obtained his majesty's patent. According to the method which he proposes, they are easily accommodated to any rooms, where communications can be had with the external air; both to those which have, and those which have not chimneys: so that not only small rooms, but the largest halls, libraries, or churches, may be warmed in a more effectual manner than had ever been done before, and the greatest degree of heat produced from a given quantity of fuel. Mr. Sharp, by adding funnels to the top, renders these stoves fit for any chimney, and, by lengthening the funnel, to any place without a chimney. By the hollow base with which his stove-grates are furnished, he is able to apply them with much greater effect to the external air, without any addition of brick-work; and by the alterations in the air-box, a much greater quantity of warm air is introduced than it was possible to introduce in their former state. If a stove of this kind is to be placed in a common fire place, a hole must be made through the back of the chimney, or through the hearth, to communicate with the external air; and this hole should be made as large as possible, and in a descending position, so that the outward air may ascend towards the stove. The hollow base of the stove must be placed against this hole, so as to cover it completely; and the bottom of the base must be fitted so close to the earth, and pointed with lime or putty, that the air may not pass. Upon the stove there must be put a few feet of iron funnel to reach above the breast of the chimney; and the chimney enclosed by iron plates, so constructed and placed in a square or oblong iron frame that they may be easily removed when the chimney wants sweeping. By this construction the warm air introduced by the stove will be carried into the room, which would otherwise pass up the chimney and be lost. But if the stove is to be fixed in a room where there is no chimney, it may be placed in any part of it where communication may be had with the outward air; and nothing more is necessary than a sufficient length of funnel to carry it through the roof, or wall, or window, or into any other chimney that may be convenient. If the fire-place be too small for the stove, the chimney may be closed by the aforementioned frame and plates, and the stove stand before the fire-place, and the smoke be carried off, by the help of a circular elbow, into the chimney above the mantle-piece. Many of these stoves, it is said, have been lately put up in order to cure smoky chimnies, and have always succeeded. For further

particulars see Sharp's Account of the Air-Stove Grates, &c.

In the north of Europe the inhabitants have long been accustomed to the use of stoves in which the fire is shut up, and gives out its heat to a draught or current of air which is made to pass through proper openings in the stove, and when sufficiently warmed enters into the apartment. The smoke arising from the fuel is made to pass through a circuitous passage of flues, by which means the greatest part of the heat is absorbed. Stoves on this principle are known in England, but are very seldom used, except for warming of halls, staircases, and passages, in grand houses, as the English are not contented to feel the air warm unless they see the fire. In Russia, Sweden, and other northern countries, they are indispensably necessary. A common fire-place has too large an opening, and if care be not taken to supply it continually with wood, &c., the heat it produces is hardly sensible, because it follows the current of the air, and is carried off by the smoke. These stoves, on the contrary, retain the heat a much longer time; and as their external parts, and also their flues, are very thin, they communicate their heat very readily, so that with a small quantity of wood they warm an apartment much more than the fire of a common fire-place would do with six times the quantity. For it was not sufficient that the inhabitants of these severe climates should discover the most simple means of keeping up in their houses a comfortable degree of heat, it was also necessary that this should be done with the least possible expense of fuel. The stoves which they employ perfectly fulfil the above-mentioned intentions; they are also susceptible of every kind of ornament. The more surface we give to a stove constructed in this manner, the more the heat is increased; consequently we must not be surprised to find that this kind of stove sometimes occupies the whole height of an apartment, its width and depth being proportioned to its height.

The construction of these stoves is simple: they consist of four, five, or more small chambers built one above another: the lower one is for the fire which burns in it, and the smoke rising from it enters into the chamber immediately above, then into the third, and from that to the fourth. The passages or holes through which the smoke enters into one chamber from that beneath, are in all cases made at the corner of the chamber opposite to the passage at which the smoke will pass out from the same chamber to the next above it. By this means the smoke is obliged to pass through the whole of the chamber, and has the greatest chance of transmitting its heat. A fire lighted in one of these stoves early in the morning, and with a small quantity of fuel, retains a strong heat during the whole day. The door of the fire-place is only opened to put in wood, and remains afterwards constantly shut. The wood lies upon a grate, consequently it is not buried in and stifled by the ashes. The ash-hole is spacious, and one or two feet in height, according to the capacity of the stove. Two doors are placed at the extremities of the ash-hole, and the current of air is very considerable, by which the smoke is carried up with great force, and the wood burns very briskly. Stoves of this kind may be advantageously placed in halls, at the bottom of staircases, and in the anti-chambers of great houses: they may also, by proportioning their size to that of the rooms for which they are intended, be made use of in the houses of private persons. To this it may perhaps be objected that the heat produced from these stoves is unwholesome, because they deprive the air of its moisture; and that the air, by being made too dry, loses its elasticity, in consequence of which respiration becomes difficult and laborious. These objections would appear of great weight if we had not the example of the Russians, the Swedes, the Danes, the Germans, and in short of all the inhabitants of the north of Europe, to show that those who are habituated to such stoves do not find them unwholesome. If others should be sensible of inconveniencies from the dryness of the air in the apartment, it may be easily removed by the very simple expedient of placing upon the stove a vessel of glass or earthenware which has a large surface and is very shallow: this, being filled with water, will insensibly evaporate, and restore to the air that moisture of which the heat of the stove has deprived it: the air will then recover its elasticity. If orange trees are exposed to the heat of such a stove, and the fire is not properly regulated, the plants grow yellow and lose their leaves, especially if the air is not changed, which in winter is not very conveniently done; but, if a vessel of water be placed upon the stove, the evaporation of the water will preserve the trees.

In a memoir of M. Guyton in the Annales de Chimie, he has explained the construction of the stoves employed in Sweden, and recommends the adoption of one constructed on the same principle for general use in France. This memoir is translated in the Repertory of Arts, first series, vol. xvi.

The construction of the stove there recommended may be improved, to adapt it to our use in England, where pit-coal is used: but the following principles which the author lays down are very useful as guides in making all kinds of stoves for warming apartments. 1. Heat is produced only in proportion to the volume of air consumed by the fuel. 2. The quantity of heat produced is greatest (the quantity and quality of the fuel being the same) when the combustion is complete. 3. The combustion is the more complete in proportion as the fuliginous part is longer retained in channels where it may undergo a second combustion. 4. The only useful heat is that sent out into and retained in the space intended to be heated. The temperature of that space will be higher in proportion as the current which must be renewed from without to support the combustion is less enabled to take up in its passage the heat produced.

The following inferences evidently arise:—1. The fire-place ought to be insulated from all bodies that are rapid conductors of heat. All the heat that goes out of the apartment is absolutely lost, unless intentionally directed into another apartment. 2. Heat being produced only by combustion, and combustion being sustained

only by a current of air, the current should be brought in by channels where the needful rapidity may be preserved without being too distant from the space to be warmed, so that the heat it there deposits may be gradually accumulated in the whole of the insulated furnace, in order afterwards to flow out of it slowly, according to the laws of the equilibrium of that fluid. 3. The wood being so far consumed as to give no more smoke, it is advantageous to close the mouth of these channels, in order to retain there the heat that would otherwise be carried off through the upper flue by the continuance of a current of fresh air, necessarily of a low temperature. 4. Lastly; it follows from these maxims that, all things being equal, a higher temperature will be obtained and supported during a much longer time by forming, in the internal parts of the stove, or under the hearth of a chimney, and in their vicinity, tubes in which the air that comes from without may be warmed before it enters the apartment, to serve the purpose of combustion, or replace that which has been consumed. These have been called bouches de chaleur (mouths or apertures of heat); because, instead of contemplating their principal use and intention, it is commonly imagined that they are only made in order to give by their issues a more rapid current to the heat produced. Nor is this idea absolutely devoid of foundation, since the air that issues from them has only changed its temperature, by carrying off a portion of the heat that would have remained in the interior. Those, however, who would proscribe them, as opposing the most important object, which is the retaining of the heat as long as possible, do not consider that they may be closed, and all communication with the external air cut off by a simple slide, and therefore it is easy to derive from them every possible advantage without any inconvenience. And we may add that in small apartments, or such as are accurately closed, they are often indispensably requisite, if we could avoid being exposed to currents of cold air. Dr. Franklin very justly quotes a Chinese proverb to this effect: 'Shun a current of air from a narrow passage as you would the point of an arrow.'

The Swedish or Russian stoves, having chambers for the reception of the flame and smoke, are little known in this country: but those which are in common use in the halls and vestibules of our great houses are French stoves. They differ from the others in having a very great length of small flues or winding passages, through which the smoke passes, and communicates its heat to the air, which circulates in similar passages, until it becomes warmed, and makes its exit through the mouths into the apartment. This method is not so simple as the small chambers or apartments of the Russian stoves, nor is it so good in the long run; because the passages are very liable to become clogged with soot; and, even before they are so clogged as to intercept the passage of the smoke, the transmission of the heat is much impaired, because the interior surfaces of the flues, becoming coated with soot, do not conduct the heat so rapidly, and in consequence a great part will still pass out into the chimney. Also these flues with small passages require a stronger draught in the chimney, to make the air pass through the passages, than when chambers are used. The *Holland* iron stove, which has a flue proceeding from the top, the fire place and ash-pit being closed by small iron doors opening into the room, comes next to be considered. It is frequently made of iron-plate, and is most commonly called a German stove. Its conveniencies are, that it makes a room warm all over; for, the chimney being wholly closed, except the flue of the stove, very little air is required to supply that, and therefore not much rushes in at crevices, or at the door when it is opened. Little fuel serves, the heat being nearly all saved; for it radiates almost equally from the four sides, and the bottom and top, into the room, and presently warms the air around it, which being rarefied rises to the ceiling, and its place is supplied by the lower air of the room, which flows gradually towards the stove, and is there warmed and rises in its turn, so that there is a continual circulation, till all the air in the room is warmed. The air, too, is gradually changed by the stove doors being in the room, through which part of it is continually passing, and that makes these stoves more wholesome, or at least more pleasant, than the German stoves, next to be spoken of. But they have the inconvenience that there is no sight of the fire, which is in itself a pleasant thing, nor can any other use be conveniently made of the fire but that of warming the room.

The true *German* stove is made like a box, one side wanting, and that side is built against the wall of the room. It is composed of five iron plates screwed together, and fixed so as that the fuel can be put into it from another room, or from the outside of the house. It is a kind of oven reversed, its mouth being without and body within the room that is to be warmed by it. This invention certainly warms a room very speedily and thoroughly with little fuel: no quantity of cold air comes in at any crevice, because there is no discharge of air which it might supply, there being no passage into the stove from the room. These are its conveniencies. Its inconveniencies are, that people have not so much sight or use of the fire as in the Holland stoves, and are moreover obliged to breathe the same unchanged air continually, mixed with the breath and respiration from one another's bodies, which is very disagreeable to those who have not been accustomed to it. This may be remedied by making a small aperture into the flue, with a register to draw off the air. This kind of stove is still less in use in England than that which we have before described, and which is generally called the German stove, although it is used by the Dutch instead of the Germans.

Messrs. Strutt, in their cotton mills at Belper, in Derbyshire, have employed a kind of stove which is found to answer extremely well; it consists of what is called a cockle, that is, a square chest or vessel of iron plate, rivetted together in the manner of a boiler, and set in a furnace, so that a fire can be made withinside of

it upon a grate, and the smoke will pass off through a small passage into the flue which conducts to the chimney, the passage of which is regulated by a sliding damper. The cockle is of considerable dimensions, as much as four feet square and five feet in height, and the fire is made at the bottom of it, upon a grate of about fourteen inches by eighteen, so that the fire does not any where touch the inside of the cockle, but the heat rising up therein gives a considerable and equable heat, without rendering it so hot as to burn the air which it is intended to warm; for if that is once done the air will be rendered unpleasant. The cockle is enclosed in a casing of brick-work, which is of the same shape as the cockle, and leaves a space all round between of a few inches. This case of brick-work is again surrounded by walls of brick-work, leaving a space of about eighteen inches all round; and these walls are carried up above, to form the chimney or funnel to convey the warmed air up to the several apartments of the mill. This chimney is divided, by thin brick partitions, into as many different flues as there are floors to be warmed; and a small opening is made, with a register, from each flue into the apartment it is intended to supply. This opening is made close to the floor; and, in order to make a change of the air, ventilators are placed high up in the apartment, so as to be near the ceiling. This division of the chimney into several different flues is intended to equalise the supply of air to the several apartments, and by this means the upper apartments are equally well supplied with warm air as those below. In order to make the air pass in contact with the surface of the heated cockle, a horizontal partition is built in the space between the chimney and the brick-casing of the cockle. The level of this partition is at about one half the height of the cockle, and its effect is to divide the brick-casing of the cockle into two halves, one above the partition and the other below. The cold air is freely admitted into the lower part of the chimney beneath the partition, but cannot escape into the chimney above it, without entering into the space between the cockle and its brick-casing, through a number of small openings made in it beneath the horizontal position; and in thus passing in contact with the surface of the cockle the air becomes heated, and passes out again, through openings in the brick-casing, into the chimney above the partition. In order to make the cold air strike more forcibly against the heated surface of the cockle, a small iron tube is fitted through each of the openings in the lower part of the casing, and the ends of these tubes approach very near to the surface of the cockle. Mr. Strutt has introduced this kind of stove into the new infirmary at Derby, and in several other similar institutions it has been adopted with great success.

Mr. James Burns of Glasgow, in 1799, took out a patent for an improved stove, or fire-grate, to burn with an open fire: his stove has a very elegant appearance, and several advantages. The object of the improvement was to prevent the heat generated by combustion, and thrown out into the apartment by radiation, from being unnecessarily wasted by the draught of air for the support of the fire, as is usual in stoves or grates of the common construction; where all the air that goes to maintain the combustion is furnished from the warm air in the room, the waste of which is supplied by the exterior cold air, which comes pouring into the room at the bottoms of the doors, or by the sides of the windows, and thereby undoes a great part of the effect that otherwise would be produced by the fire. To accomplish this intention, the air that maintains the fire in the improved stoves is brought through a tube, which is called the air-tube, from the outside of the house, and may be made to pass between two of the joists (where the floors and ceilings are close enough to allow this), so as to be brought to the bottom bars of the grate, without having any communication with the interior air of the room; while, at the same time, the grate and parts connected with it are so constructed that, when the fire is not wished to be supplied with cold air from the outside of the house, the passage may be shut more or less perfectly by means of a valve, a small door, a cock, or any similar contrivance. When convenience does not admit of the air-tube being carried to the outside of the house, it may be carried to a cellar, larder, or staircase, and the same end will be gained, with this farther advantage, that such cellar, or other apartment, will be always well ventilated, and prevented from acquiring or retaining any unhealthy or disagreeable smells. The principle is to supply the fire with air from without the room or apartment, so as to prevent the warm air of the room from being drawn to the fire place and hurried up the chimney, while, at the same time, all the advantages of open grates may be enjoyed.

The form of Burns' stove is that of a vase or urn placed in the chimney place, which is made circular, to form a niche for its reception. The urn is open at top, and the sides are formed of open work or grating, with a grated bottom, forming a sufficient space to contain the fire; but the pedestal and lower part of the vase are made close, to prevent the entrance of air to the fire, except that which passes up from the air-tube through the hollow pedestal; and within this pedestal is an air-valve, which opens and shuts by a register, to regulate the entrance of the current from the open air. In the pedestal of the vase is a drawer, to receive the ashes. The niche or chimney, in which the vase is placed, has the usual opening at top to carry off the smoke. The air for the support of the fire enters from the external air, through the tube or air-pipe before described, and passes into the hollow pedestal of the vase; and, having passed through the hollow neck or stem of the vase, it finds no difficulty in passing up through the bottom of the grate, the back or side of the ash-drawer next which the aperture is being made low, to allow it to flow in freely. The grate and its internal cavity may be of any convenient form, but circular or elliptical will answer best, especially when another improvement is applied. This is a glass tale or iron work fence or screen, to prevent those dreadful accidents which so frequently occur of ladies' or chil-

dren's clothes being set on fire by sparks from the grate. Where this safe-guard fence or screen is wished to be applied, the inside of the chimney where the grate is to stand must be a semi-cylinder, or nearly so, with a lining or cover, made of metal, at such a distance from the semi-cylindrical wall or niche in which the stove is placed, as to give sufficient room for allowing the safe-guard or fence to be slid round into it, when the fire is wished to be left open to introduce fresh fuel, or when the drawer with the ashes is to be removed. The fence is a frame-work of metal, which, when filled up with glass, or with wire-work, forms a portion of a cylinder, answerable to the curvature of the space between the back of the chimney and the lining above-mentioned, made in one or two pieces, and moving in a circular groove in the hearth, which serves to conduct it into its place behind the grate, when the fire-place is wanted to be left open, as before mentioned. The top of the front of the opening (the chimney piece) projects in a circular form, or is furnished with an added projection, made of metal, and furnished with a circular groove on its under surface, of the same radius as the groove in the hearth, for the purpose of guiding the upper part of the frame of the guard. The glass with which the frame of the guard is filled may be stained or painted: complete safety is thus obtained, and, at the same time, the comfort arising from the view of a cheerful fire is not prevented by the interposition of any opaque body. But for nurseries or the like, where convenience and safety are more the objects than elegance or luxury, the frame-work may be filled up with wire-work. Instead of such grooves at top and bottom for the fence to move in, the fence itself may be furnished with a groove at its top and one at its bottom, to receive any projecting piece of metal, or other substance of a proper curvature; or its bottom groove may receive the upper edge of the fender, which, being made to a proper curve, and properly adjusted and kept in its place, will answer the same end. But whichever of these ways be followed, or whatever other method of construction (for it may easily be varied to answer circumstances), rollers or castors should be provided at the lower part of the fence, to make it move with greater ease, either to the front of the grate, or into the space between the back of the chimney and the lining above-mentioned. Where either the glass or the wire-work frame, or both of them, are meant to be applied to square or rectangular chimneys, without the trouble of giving them a semi-cylindrical form, the lining to receive the fence or fences may be introduced at the sides, or jambs, of such chimneys; or the fence may be made to rise, by means of pulleys, into the wall above the opening, or be slid sideways into the walls at the sides of the openings. Besides the advantages already pointed out as connected with them, these stoves possess also the following:—any room or apartment may be heated by their means with a much smaller quantity of fuel than by common open fires; at the same time the advantage of seeing the fire is not lost, as in close stoves; for these grates have side as well as bottom bars, which allow the radiant heat and light to be thrown out into the room, without any impediment; and, in fact, large rooms, halls, and the like, which by the usual methods can hardly be warmed, or made at all comfortable in cold weather, may, by means of these improvements, be heated as effectually as the smallest apartment; for, when their full effect is wanted to be procured, it is only necessary to keep the fence in its recess, that even that portion of heat which would be kept back by the interposed glass or wire-work may be thrown out into the room, and perform its office.

In 1804 Jowett of London obtained a patent for a similar contrivance, which he called a fire-guard stove, which is intended to prevent accidents from sparks of fire flying out. The stove itself is an open fire, and is usually made of a cylindrical form, the axis of the cylinder being vertical. One half of the cylinder which faces the apartment is made with bars at the lower part, to contain the fire, and an opening over them to feed it. The back part of the cylinder is made of cast iron plate; but, instead of the brick-work being built up close round the back, a small space is left to receive the guard. The weight of the stove or grate is supported upon a vertical iron bar, which is in the centre, or axis of the cylinder, which forms the stove, and the guard swings round upon this bar as a centre, and, being a half cylinder of wire-work, can be brought in front to enclose the fire, or it can be turned round behind the stove out of sight. The fire-guard may be fixed to any stove which will admit of two centres or pivots being placed in a perpendicular line in the back of the stove, to suspend the fire-guard, and guide its motion; and the stove must admit of grooves on either side, for the guard to pass through, as the levers will direct. The principle of the action of the fire-guard is that of being united to two centres or pivots, placed perpendicular one to the other; and it is connected to the two centres fixed to the stove by means of two lever-cranks, one end of which is fixed to the guard, and the other end of each to the centres or pivots, by which the guard swings in a rotatory motion, passing through a groove formed in the stove on either side, to swing before the fire when required, and is brought into use by means of a handle or nob, fastened to the front edge of the frame of the guard for that purpose; or instead of drawing it out with the hand, as before described, it may be brought into use by means of a spring fastened to the crank, and pressing against the cheek or back of the stove, to throw the guard forward. The same effect may be produced by means of a balance fastened to any part of the fire-guard, and working with a line or chain over pulleys fixed to the stove, or by means of the combined force of the spring and balance.

An important improvement in those fire-places for burning of coal, which are generally called register-stoves, has been lately made by Mr. John Cutler of London, for which he had a patent in 1815. The stoves constructed by him are nearly such as are known by the name of register-stoves, being made of cast iron plate

to enclose the fire-place at the back and sides, but open in front to the apartment; leaving only a passage for the smoke through a register, at the upper part of the enclosed space. Mr. Cutler's improvement consists in applying to such grates or stoves a chamber, or magazine, situated beneath the grate (or the space enclosed by grating) in which the fire is to burn. This chamber is to contain a magazine of fuel sufficient to supply the combustion for a whole day, or other required space of time: the bottom plate of the chamber is moveable; and, by means of a wheel and axle, the fuel contained in the magazine can be elevated, so as to introduce a portion of the fuel into the grate at the lower part, or from beneath; and thus, from time to time, replace the fuel which is consumed, without the trouble of occasionally throwing on coals. In order to make the fire burn, the flue or entrance to the chimney must be of such a construction as will produce the most efficient draught or current of air to pass through and across the top of the fire. This improvement, of introducing a supply of fuel into the grate from beneath, causes the fire to burn clear and with little smoke; because the smoke, or gas, which issues from the newly introduced fuel, when it is first heated, must of necessity ascend through the burning fuel, and be thereby consumed. Another improvement is to reduce the fire, or extinguish it, when it is left for the night. This is done by lowering down the whole of the fire from the grate into the chamber, or magazine, beneath the grate: the supply of air is thus interrupted, and the fire is completely enclosed in a deep chest, so that it is impossible sparks can fly out, and the fire soon becomes extinguished. The advantages of these improvements are by no means trifling. By burning the smoke the whole effect of the fuel consumed is produced; and, were this invention universally introduced into London, that pernicious sooty atmosphere in which it is hidden would be so improved as to be equally pure with that of Paris, or other continental cities, where wood alone is used for fuel. The burning of the smoke renders the sweeping of the chimneys unnecessary, and the danger of fire from the soot contained in the flue is avoided: also chimneys which throw out smoke into the room will, in almost all cases, be cured by this improvement, because the quantity of air or gas which must pass through the chimney is so small. To avoid the trouble of throwing on coals, and to have at all times a bright and cheerful fire, are matters of convenience, but are not wholly to be overlooked: and, lastly, to have the means of extinguishing the fire, when it is left for the night, is a most important improvement, when it is considered that, amongst the fires which happen every year in London, how many break out in the hours when the fires are left, and a great proportion are doubtless occasioned by fires left unextinguished. The machinery for raising up the moveable bottom of Mr. Cutler's stove is simple. The magazine chamber is composed of iron plates screwed together, and the moveable bottom is fitted to it, so as to leave as small a space round the edges as possible. A bar is fixed across, beneath the bottom plate; and the ends of this bar pass through slits, or narrow openings, in the side plates of the chamber. To the extremities of the bar the ends of two chains are attached, and the upper ends of these chains are made to wind upon the ends of a horizontal axle, which extends over the top of the stove, so as to be within the chimney, and out of sight. The axle is turned round by a face or crown-wheel, fixed upon the extremity of it, and the teeth thereof are engaged by the teeth of a small pinion, the axis of which comes through the iron work of the stove; and the end has a small square hole in it, to receive a square or key upon a small winch handle. By means of this handle, the iron axle is turned round, and winds up the chains, so as to elevate the bottom plate of the magazine, and thereby raise up a portion of fresh fuel into the lower part of the grate, where it is burned, as before mentioned; and the smoke which first issues from the coal rises through the fire, and is thereby consumed.

STOUND, *n. s.* From the verb. Sorrow; grief; mishap. Out of use. The Scots retain it.

> Begin and end the bitter baleful *stound*,
> If less than that I fear. *Spenser.*
>
> Thus we stood, as in a *stound*,
> And wet with tears, like dew, the ground. *Gay.*

STOUR, *n. s.* Sax. ꝥeopan, to disturb; Runick *stur*, a battle. Assault; incursion; tumult. Obsolete.

> And he that harrowed hell with heavy *stour*,
> The faulty souls from thence brought to his heavenly bower. *Spenser's Faerie Queene.*
>
> Love, that long since has to thy mighty powre
> Per force subdued my poor captivated heart,
> And raging now therein with restless *stowre*,
> Dost tyrannize in every weaker part. *Spenser.*

STOURBRIDGE, or STURBRIDGE, the name of a field on the banks of the Stour, near Cambridge, noted for its fair held annually on the 18th of September, under the jurisdiction of the university of Cambridge, and continuing a fortnight. But it has of late years much declined.

STOURBRIDGE, a flourishing market town and township, forming the central division of the parish of Old Swinford, in the lower division of the hundred of Halfshire, is 126 miles from London, twenty-one from Worcester, twelve from Birmingham, and seven from Kidderminster; situated at the south-western extremity of the great midland mining and manufacturing district of England, on the south bank of the river Stour, and near to the head of the Staffordshire canal, by which it enjoys a water communication with all parts of the kingdom. The appellation of Stourbridge was derived from a bridge erected over the river in the reign of Henry VIII. previous to which time the township was known by the name of Bedcote, which is still the designation of a contiguous manor. Its vicinity abounds with valuable mines of coal, iron-stone, and clay. Various branches of the iron manufactory are carried on here and in the adjacent villages, which give employment to several hundred hands. The church, or rather chapel of ease to Swinford, situate in the Rye-market, is dedicated to St. Thomas, and was built by voluntary subscription; it is not consecrated, which gives the inhabitants the privilege of electing a pastor in-

dependant of the parish rector. The other places of worship are a chapel each for the presbyterians, calvinists, methodists, Roman Catholics and Quakers. The chief market is on Friday, but on Saturday, the town is also well supplied with every necessary of life. The fairs are March 22nd and September 9th; the first continues seven days, and is a widely-noted horse fair. Population 5,090.

STOURPORT, a market town of Worcester, on the banks of the Stour, near its junction with the Severn. It is a place which owes its existence, as well as its increasing trade and prosperity, to the formation of the Trent and Severn, or Staffordshire and Worcestershire canal, which entering the latter county at Wolverley, and following the course of the Stour for about nine miles, terminates in a basin at Stourport, where it joins the Severn. This basin was begun in 1768, and finished in 1771. Previous to this there was no appearance of a town here. Population 4000. Here is an elegant iron-bridge over the Severn, consisting of one arch of 150 feet span, and fifty feet above the surface of the river. Stourport takes the lead of all other places in the kingdom as a mart for hops, apples, and perhaps for corn. Markets on Wednesday and Saturday.

STOUT, *adj.* & *n. s.* } Sax. ȣuhȣ; Belg. *stout*;
STOUT'LY, *adv.* } Goth. *stautan*, to strike.
STOUT'NESS, *n. s.* } Strong; lusty; valiant; resolute; firm: the adverb and noun substantive corresponding: stout is also a name for strong beer.

The *stout*-hearted are spoiled. *Psalm* lxxvi. 5.

His bashfulness in youth was the very true sign of his virtue and *stoutness* after.
Ascham's Schoolmaster.

When I was young,
I do remember how my father said,
A *stouter* champion never handled sword.
Shakspeare. Henry VI.

Come all to ruin, let
Thy mother rather feel thy pride, than fear
Thy dangerous *stoutness*: for I mock at death
With as *stout* heart as thou. *Id. Coriolanus.*

The lords all stand,
To clear their cause, most resolutely *stout*. *Daniel.*

Some captain of the land or fleet,
Stout of his hands, but of a soldier's wit,
Cries, I have sense to serve my turn, in store,
And he 's a rascal who pretends to more. *Dryden.*

The *stoutest* vessel to the storm gave way,
And sucked through loosened planks the rushing sea.
Id.

There virtue and *stout* honour passed the guard,
Those only friends that could not be debarred.
Bathurst.

STOW, *v. a.* } Sax. ȣtop; Belg. *stowen*,
STOW'AGE, *n. s.* } to lay up. To lay up; reposit in order, or in the proper place.

Foul thief! where hast thou *stowed* my daughter?
Shakspeare.

So gives the' adventurous merchant, when he throws
All his long-toiled-for treasure, his ship *stows*
Into the angry main. *Carew.*

I' the' holsters of the saddle-bow
Two aged pistols he did *stow*. *Hudibras.*

Some *stow* their oars, or stop the leaky sides.
Dryden.

All the patriots were beheaded, *stowed* in dungeons, or condemned to work in the mines. *Addison.*

In every vessel is *stowage* for immense treasures, when the cargo is pure bullion, or merchandise of as great a value. *Id.*

The goddess shoved the vessel from the shores,
And *stowed* within its womb the naval stores. *Pope.*

STOW (John), the industrious historian, son of Thomas Stow, merchant-tailor of St. Michael's Cornhill, in London, was born about 1525. He was bred to his father's business, which in 1560 he relinquished, devoting himself entirely to the study of our ancient historians, chronicles, annals, charters, registers, and records. Of these he made a considerable collection, travelling for that purpose to different parts of the kingdom, and transcribing such MSS. as he could not purchase. But, this profession of an antiquary being attended with no present emolument, he was obliged for subsistence to return to his trade. It happened, however, that his talents and necessities were made known to Dr. Parker archbishop of Canterbury, who, being himself an antiquary, encouraged and enabled Mr. Stow to prosecute his darling study. In those times of persecution, though Elizabeth was then upon the throne, honest John Stow did not escape danger. His collection of popish records was deemed cause of suspicion. His younger brother Thomas preferred no less than 140 articles against him before the ecclesiastical commission; but, the proof being insufficient, he was acquitted. In 1565 he first published his Summary of the Chronicles of England. About 1584 he began his Survey of London. In 1585 he was one of the two collectors for a great muster of Lime Street ward. He was principally concerned in the second edition of Hollinshed's chronicle, published in 1587. He also corrected, and twice augmented Chaucer's works, published in 1561 and in 1597 His Survey of London was first published in 1598. To these laborious works he would have added his large Chronicle, or History of England; but he lived only to publish an abstract of it, under the title of Flores Historiorum. The folio volume, which was printed after his death, with the title of Stow's Chronicle, was taken from his papers by Edmund Howes. Having thus spent his life and fortune in these laborious pursuits, king James I. granted him, in 1603, a brief, which was renewed in 1604, authorizing him to collect in churches the benefactions of his fellow citizens. He died in April 1605, aged eighty; and was buried in his parish church of St. Andrew's Undershaft, where his widow erected a decent monument to his memory. John Stow was a most indefatigable antiquarian, a faithful historian, and an honest man.

STOW, a parish in Buckingham hundred, Buckinghamshire, three miles from Buckingham, and sixty from London; chiefly noted for containing the magnificent seat, gardens, and grounds of the duke of Buckingham, the great ornament of the country. Stow was visited by the most distinguished poets and literati of the last century; and Pope, Chesterfield, Hammond, Lyttleton, Pitt, and West, were among its frequent guests.

STOW-MARKET, a market-town of Stow hundred, Suffolk, situate on he banks of the Orwell, three miles from Needham, and seventy-five N. N. E. of London. Besides the river it has a navigable canal to Ipswich. A manufacture of

sacking, ropes, &c., is carried on in this town, which has also succeeded in making tammies and various kinds of Norwich stuffs. Here is likewise a good malting trade. The church is a spacious building, having a steeple with a spire, 120 feet high, containing eight bells. Market on Thursday. Fairs, Whit-Friday, and June 29th, and a lamb fair on August 1st.

STOW-ON-THE-WOLD, a market-town and parish in Slaughter hundred, Gloucester, near the river Windrush, eleven miles S. S. E. from Campden, and seventy-seven west by north of London. It stands in a very bleak part of the country, on a high eminence; the buildings are very irregular, and the streets but indifferently paved. Its ancient church is situate on a hill, has a lofty tower, and contains several ancient monuments. Here are an hospital, free-school, and alms-houses, all well endowed. Shoes are the principal manufacture. This parish extends twelve miles in circumference, and was formerly a corporation; it is now governed by two bailiffs. Market on Thursday. Fairs, May 12th, and October 24th, which have long been noted for the quantities of hops, cheese, and sheep, annually sold here.

Stowage, in sea language, is the general disposition of the several materials contained in a ship's hold, with regard to their figure, magnitude, or solidity. In the stowage of different articles, as ballast, casks, cases, bales, and boxes, there are several general rules to be observed, according to the circumstances or qualities of those materials. The casks which contain any liquid are, according to the sea phrase, to be bung up and bilge free, i. e. closely wedged up in a horizontal position, and resting on their quarters; so that the bilges where they are thickest, being entirely free all round, cannot rub against each other by the motions of the vessel. Dry goods, or such as may be damaged by the water, or to be carefully enclosed in casks, bales, cases, or wrappers; and wedged off from the bottom and sides of the ship, as well as from the bow, masts, and pump-well. Due attention must likewise be had to their disposition with regard to each other, and to the trim and centre of gravity of the ship; so that the heaviest may always be nearest the keel, and the lightest gradually above them.

STRABO, a celebrated Greek geographer, philosopher, and historian, born at Amasia, and descended from a family settled at Gnossus in Crete. He was the disciple of Xenarchus a Peripatetic philosopher, and at length attached himself to the Stoics. He contracted a strict friendship with Cornelius Gallus, governor of Egypt, and travelled into several countries to observe the situation of places, and the customs of nations. He flourished under Augustus, and died under Tiberius about A. D. 25, in a very advanced age. He composed several works, all of which are lost, except his Geography in seventeen books; which are justly esteemed very precious remains of antiquity.

STRADA (Famianus), a very ingenious and learned Jesuit, born at Rome in 1572, where he taught rhetoric for fifteen years. He wrote several pieces upon the art of oratory, and published some orations with a view of illustrating by example what he had inculcated by precept. But his Prolusiones Academicæ and his Historia de Bello Belgico are the works which raised his reputation, and have preserved his memory. His history of the war of Flanders was published at Rome; the first decad in 1640, the second in 1647. He died in 1649, aged seventy-seven.

STRAD'DLE, *v. n.* From striddle or stride. To stand or walk with the feet removed far from each other to the right and left; to part the legs wide.

Let the man survey himself, divested of artificial charms, and he will find himself a forked *straddling* animal, with bandy legs. *Arbuthnot and Pope.*

STRADELLA (Alessandro), a Neapolitan musician and composer, one of the most celebrated writers of vocal music in the seventeenth century. His private history is romantic. While yet a youth he was employed by a Venetian nobleman to instruct his mistress, Hortensia (a girl descended of a patrician family at Rome, whom he had seduced), in the art of singing. A strong and mutual attachment between the master and pupil ensued; then an elopement; and the lovers fled to Rome. To this city they were followed by two ruffians, despatched by the Venetian to assassinate Stradella. The opportunity selected to carry this murderous design into execution was the evening after an oratorio of the intended victim's composition, in which he was both to play and sing in the church of St. John Lateran; on his return from which they determined to avail themselves of the darkness of the evening. Entering the church, during the performance, they resolved to wait quietly till its conclusion, but long before that took place, their hearts were so softened by its excellence that they found it impossible to execute their design, and, accosting him in the street, confessed their errand, and recommended him to flee to some safer asylum. He retired to Turin, where the duchess of Savoy, to whom they confessed their danger, placed the lady in the security of a convent, and retained Stradella in the palace as her chapel master. Their vindictive enemy however, enraged at their escape, sent after them two other emissaries less accessible to the charms of music, who after residing for some time in the city under a passport from the French ambassador at Venice, in the character of merchants, at length surprised Stradella walking one evening on the ramparts, and plunged their daggers into his breast. This done, they took refuge in the house of the marquis de Villars, ambassador from the court of France to that of Turin, who, insisting on his privilege, refused to give them up; and eventually, when acquainted with their real characters, allowed them to escape. In the mean time Stradella, whose wounds were not mortal, slowly recovered, and, a year having elapsed, he fancied the vengeance of his enemy had been satiated. In this supposition he was fatally deceived; for, being invited to Genoa to compose an opera in the year 1678, he set out with his wife for that city, intending to return to Turin for the carnival; but scarcely had they reached the place of their destination when a third set of assassins found

mean to enter their chamber early one morning, and, stabbing them both to the heart, effected their escape by means of a boat. Of the works of this unfortunate man, the most celebrated are John the Baptist, an oratorio written for five voices; and a serious opera, the production of which at Genoa proved so disastrous to him, entitled La Forza dell' Amor paterno.

STRAETEN (N. Vander), a celebrated Dutch painter, born in 1680. He visited London, and travelled through great part of Europe, being esteemed one of the best portrait-painters of his time. But he fell a victim at last to intemperance.

STRAG'GLE, *v. a.* & *v. n.* } A frequentative
STRAG'GLER, *n. s.* } of stray, from Ital. *stravviare*, of Lat. *extra viam*. To wander without certain direction; to rove; ramble; exuberate: be dispersed, or stand single: the noun substantive corresponding.

The last should keep the countries from passage of *stragglers* from those parts, whence they use to come forth, and oftentimes use to work much mischief. *Spenser's Ireland.*

Let's whip these *stragglers* o'er the seas again,
Lash hence these over-weening rags of France,
These famished beggars. *Shakspeare. Richard III.*

He likewise enriched poor *straggling* soldiers with great quantity. *Id. Timon.*

Having passed the Syrens, they came between Scylla and Charybdis, and the *straggling* rocks, which seemed to cast out great store of flames and smoke. *Raleigh.*

But stay; like one that thinks to bring his friend
A mile or two, and sees the journey's end,
I *straggle* on too far. *Suckling.*

They found in Burford some of the *straggling* soldiers, who out of weariness stayed behind. *Clarendon.*

Wide was his parish, not contracted close
In streets, but here and there a *straggling* house;
Yet still he was at hand. *Dryden.*

Let thy hand supply the pruning knife,
And crop luxuriant *stragglers*, nor be loth
To strip the branches of their leafy growth. *Id.*

A wolf spied out a *straggling* kid, and pursued him. *L'Estrange.*

Children, even when they endeavour their utmost, cannot keep their minds from *straggling*. *Locke.*

Trim off the small superfluous branches on each side of the hedge, that *straggle* too far out. *Mortimer's Husbandry.*

Form *straggling* mountaineers for public good,
To rank in tribes, and quit the savage wood;
Houses to build, and them contiguous make,
For cheerful neighbourhood and safety's sake. *Tate.*

His pruning hook corrects the vines,
And the loose *stragglers* to their ranks confines. *Pope.*

Bottles missing are supposed to be half stolen by *stragglers*, and the other half broken. *Swift.*

STRAHAN (William), an eminent printer, born at Edinburgh, in 1715. His father, who had a small appointment in the customs, gave his son a liberal education. He was bred a printer, and while very young went to follow his trade in London. Sober, diligent, and attentive, while his emoluments were scanty, he lived rather within than beyond his income; and though he married early, and without such a provision as prudence might have dictated, he continued to thrive, and to better his circumstances. In 1770 he purchased a share of the patent for king's printer of Mr. Eyre. He now began to purchase copyrights, and gave authors more liberal prices than had been usual. In 1755 he was elected M. P. for Malmsbury in Wiltshire, with a very illustrious colleague, the hon. C. J. Fox; and, in the succeeding parliament, for Wootton Basset, in the same county. In this station he was a useful member, and attended the house with a scrupulous punctility. His talents for business were not unnoticed by the minister. In his political connexions he was a steady supporter of that party who were turned out of administration in 1784, and lost his seat by the subsequent dissolution of parliament. He died on the 9th of July 1785, aged seventy-one. In his elevated fortune none of his former acquaintance ever accused him of neglect. He attained prosperity without envy, enjoyed wealth without pride, and dispensed bounty without ostentation.

STRAIGHT, *adj.* & *adv.* } Sax. ȝtȝac; Belg.
STRAIGHT'EN, *v. a.* } *struck*; Dan. and
STRAIGHT'NESS, *n. s.* } Scots *strak*. It is
STRAIGHT'WAY, *adv.* } observed by Ainsworth, that for not crooked we ou ht to write straight, and for narrow, strait; but for streight, which is sometimes found, there is no good authority. Not crooked; direct; hence tense; tight: as an adverb, directly; immediately. straightway is a synonyme of straight as an adverb: to straighten is, to make straight; make orderly; tighten: the noun substantive corresponding.

Let me here for ay in peace remain,
Or *straightway* on that last long voyage fare. *Spenser.*

Soon as he entered was, the door *straightway*
Did shut. *Id.*

A crooked stick is not *straightened*, except it be as far bent on the clean contrary side. *Hooker.*

Of ourselves being so apt to err, the only way which we have to *straighten* our path is, by following the rule of his will, whose footsteps naturally are right. *Id.*

Beauty made barren the swelled boast
Of him that best could speak; feature, laming
The shrine of Venus, or *straight*-pight Minerva. *Shakspeare.*

If the devil come and roar for them,
I will not send them. I will after *straight*,
And tell him so. *Id. Henry IV.*

Like to a ship, that, having 'scaped a tempest,
Is *straightway* claimed and boarded with a pirate. *Shakspeare.*

A hunter's horn and cornet is oblique; yet they have likewise *straight* horns; which, if they be of the same bore with the oblique, differ little in sound, save that the *straight* require somewhat a stronger blast. *Bacon's Natural History.*

Queen Elizabeth used to say of her instructions to great officers, that they were like to garments, *strait* at the first putting on, but did by and by wear loose enough. *Bacon.*

Those stinks which the nostrils *straight* abhor and expel are not the most pernicious. *Id. Natural History.*

Some are for masts, as fir and pine, because of their length and *straightness*. *Id.*

As soon as iron is out of the fire, it deadeth *straightways*. *Bacon.*

The sound of a bell is strong; continueth some

time after the percussion; but ceaseth *straightways* if the bell or string be touched.
Id. Natural History.

There are many several sorts of crooked lines; but there is one only which is *straight*. *Dryden.*

With chalk I first describe a circle here,
Where the ætherial spirits must appear:
Come in, come in; for here they will be *straight*;
Around, around the place I fumigate. *Id.*

I know thy generous temper well;
Fling but the appearance of dishonour on it,
It *straight* takes fire, and mounts into a blaze.
Addison.

Water and air the varied form confound;
The *straight* looks crooked, and the square grows round. *Prior.*

The sun's power being in those months greater, it then *straightways* hurries steams up into the atmosphere. *Woodward.*

When I see a *straight* staff appear crooked while half under the water, the water gives me a false idea.
Watts's Logick.

STRAIN, *v. a., v. n., & n. s.* } Fr. *estreindre;* Italian
STRAIN'ER, *n. s.* } *strignere;* Lat. *stringo.* To compress; constrain; squeeze through something; filtrate; put to the utmost strength; force in any way; distort; sprain; weaken by violence: as a verb neuter to make violent efforts; be filtered: an injury through violence; also a race; pedigree; descent; hereditary disposition (probably of Sax. ꝼeɿyan, to beget); rank; character; style; manner; tone; rate; turn: a strainer is an instrument of filtration.

The jury make no more scruple to pass against an Englishman and the queen, though it be to *strain* their oaths, than to drink milk unstrained.
Spenser's State of Ireland.

Too well I wote my humble vaine,
And how my rhimes been rugged and unkempt;
Yet as I con my cunning I will *strain*. *Spenser.*

By this we see, in a cause of religion, to how desperate adventures men will *strain* themselves for relief of their own part, having law and authority against them. *Hooker.*

Thus far I can praise him; he is of a noble *strain*,
Of approved valour. *Shakspeare.*

Amongst these sweet knaves and all this courtesy!
the *strain* of man's bred out into baboon and monkey.
Id.

Wilt thou love such a woman? what, to make thee an instrument, and play false *strains* upon thee?
Id.

Thus mine enemy fell,
And thus I set my foot on's neck;—even then
The princely blood flows in his cheek; he sweats,
Strains his young nerves, and puts himself in posture
That acts my words. *Id. Cymbeline.*

The lark sings so out of tune,
Straining harsh discords and unpleasing sharps.
Shakspeare.

You stand like greyhounds in the slips,
Straining upon the start. *Id. Henry V.*

Earth doth not *strain* water so finely as sand.
Bacon.

Such take too high a *strain* at the first, and are magnanimous more than tract of years can uphold; as was Scipio Africanus, of whom Livy saith, 'ultima primis cedebant.' *Id.*

The excrementitious moisture passeth in birds through a finer and more delicate *strainer* than it doth in beasts; for feathers pass through quills, and hair through skin. *Id.*

Cæsar thought that all sea sands had natural springs of fresh water: but it is the sea-water, because the pit filled according to the measure of the tide; and the sea-water, passing or *straining* through the sands, leaveth the saltness behind them. *Id.*

A bigger string more *strained*, and a lesser string less *strained*, may fall into the same tone. *Id.*

Because hereticks have a *strain* of madness, he applied her with some corporal chastisements, which with respite of time might happily reduce her to good order. *Hayward.*

Twelve Trojan youths, born of their noblest *strains*
I took alive; and, yet enraged, will empty all their veins
Of vital spirits. *Chapman's Iliad.*

They *strain*,
That death may not them idly find t' attend
Their certain last, but work to meet their end.
Daniel.

Intemperance and lust breed diseases, which, propagated, spoil the *strain* of a nation. *Tillotson.*

He talks and plays with Fatima, but his mirth
Is forced and *strained*: in his looks appears
A wild distracted fierceness. *Denham.*

Orpheus' self may heave his head
From golden slumber on a bed
Of heaped Elysian flowers, and hear
Such *strains* as would have won the ear
Of Pluto, to have quite set free
His half-regained Eurydice. *Milton.*

My earthly by his heavenly overpowered,
Which it had long stood under, *strained* to the height,
In that celestial colloquy sublime,
As with an object that excels the sense,
Dazzled and spent, sunk down. *Id. Paradise Lost.*

Why dost thou falsely feign,
Thyself a Sidney? from which noble *strain*
He sprung, that could so far exalt the name
Of love. *Waller.*

Credit is gained by custom, and seldom recovers a *strain*; but, if broken, is never well set again.
Temple.

Old Evander with a close embrace
Strained his departing friend, and tears o'erflowed his face. *Dryden's Æneid.*

But thou who, lately of the common *strain*,
Wert one of us, if still thou dost retain,
The same ill habits, the same follies too,
Still thou art bound to vice, and still a slave.
Dryden.

The lark and linnet sing with rival notes;
They *strain* their warbling throats
To welcome in the spring. *Id.*

It is the worst sort of good husbandry for a father not to *strain* himself a little for his son's breeding.
Locke.

Shave the goat's shaggy beard, lest thou too late
In vain shouldst seek a *strainer* to dispart
The husky terrene dregs from purer must. *Philips.*

In all pain there is a deformity by a solution of continuity, as in cutting; or a tendency to solution, as in convulsions or *strains*. *Grew.*

See they suffer death;
But in their deaths remember they are men,
Strain not the laws to make their torture grievous.
Addison.

Turn then to Pharamond and Charlemagne,
And the long heroes of the Gallic *strain*. *Prior.*

These, when condensed, the airy region pours
On the dry earth in rain or gentle showers:
The insinuating drops sink through the sand,
And pass the porous *strainers* of the land.
Blackmore.

Our words flow from us in a smooth continued stream, without those *strainings* of the voice, motions of the body, and majesty of the hand, which are so much celebrated in the orators of Greece and Rome. *Atterbury.*

The stomach and intestines are the press, and the lacteal vessels the *strainers*, to separate the pure emulsion from its feces. *Arbuthnot.*

Their aliment ought to be light; rice boiled in whey, and *strained*. *Id. on Diet.*

Your way is to wrest and *strain* some principles, maintained both by them and me, to a sense repugnant with their other known doctrines. *Waterland.*

Macrobius speaks of Hippocrates' knowledge in very lofty *strains*. *Baker.*

When the first bold vessel dared the seas,
High on the stern the Thracian raised his *strain*;
While Argo saw her kindred trees
Descend from Pelion to the main.
Pope's St. Cecilia.

Straining with too weak a wing,
We needs will write epistles to the king. *Pope.*

In our liturgy are as great *strains* of true sublime eloquence as are any where to be found in our language. *Swift.*

There can be no other meaning in this expression, however some may pretend to *strain* it. *Id.*

Prudes decayed about may tack,
Strain their necks with looking back. *Id.*

Strained to the root, the stooping forest pours
A rustling shower of yet untimely leaves. *Thomson.*

A Strain is a pain occasioned by the violent extension of some membranous or tendinous part.

Strain and Stress, in mechanics, are terms indiscriminately used to express the force which is excited in any part of a machine or structure of any kind tending to break it in that part. Thus every part of a rope is equally strained by the weight which it suspends. Every part of a pillar is equally strained by the load which it supports. A mill axle is equally twisted and strained in every part which lies between the part of the wheel actuated by the moving power, and the part which is resisted by the work to be performed. Every part of a lever or joist is differently strained by a force acting on a distant part. It is evident that we cannot make the structure fit for its purpose, unless the strength in every part be at least equal to the stress laid on, or the strain excited in that part. It is no less plain that if we are ignorant of the principles which determine this strain, both in intensity and direction, in relation to the magnitude and the situation of its remote cause, the only security we have for success is to give to every part of the assemblage such solidity that we can leave no doubt of its sufficiency. But daily experience shows us that this vague security is in many cases uncertain, if we are thus ignorant. In all cases it is slovenly, unlike an artist, attended with useless expense, and in machines is attended with a loss of power which is wasted in changing the motions of a needless load of matter. It must therefore greatly tend to the improvement of all professions occupied in the erection or employment of such structures to have a distinct notion of the strains to which their parts are exposed. Frequently, nay generally, these strains are not immediate, but arise from the action of forces on distant parts, by which the assemblage is strained, and there is a tendency to rupture in every part. This strain is induced on every part, and is there modified by fixed mechanical laws. These it is our business to learn; but our chief object in this investigation is to determine the strength of materials which it is necessary to oppose in every part to this strain; and how to oppose this strength in such a manner that it shall be exerted to the best advantage. The notions of strain and strength, therefore, hardly admit of separation; for it is even by means of the strength of the intermediate parts that the strain is propagated to, or excited in, the part under consideration. See Strength.

STRAINING is the clarification of a liquor, by passing it through a sieve or filter. The word is derived from the French estreindre; which is formed from ex, out of, and stringere, to press.

STRAIT, *adj.*, *n. s.*, & *v. a.*
Strait'en, *v. a.*
Strait'laced, *adj.*
Strait'ly, *adv*
Strait'ness, *n. s.*
} Fr. *etroit*; Italian *stretto*; Latin *strictus*. Narrow; close; difficult; strict; intimate: used, though incorrectly, for direct, not crooked. A narrow pass, or frith; distress or difficulty: to strait or straiten is to put to difficulties; make narrow; contract; confine; make tight; distress: straitlaced is laced tight by stays: the adverb and noun substantive correspond with strait adjective.

Therefore hold I *strait* all thy commandments; and all false ways I utterly abhor. *Psalms. Common Prayer.*

The city of Sidon has a secure haven, yet with something a dangerous entrance, *strained* on the north side by the sea-ruined wall of the mole. *Sandy's Journey.*

He, forgetting all former injuries, had received that naughty Plexirtus into a *strait* degree of favour; his goodness being as apt to be deceived as the other's craft was to deceive. *Sidney.*

Fugitives are not relieved by the profit of their lands in England; for there is a *straighter* order taken. *Spenser.*

Plant garrisons to command the *streights* and narrow passages. *Id.*

Those laws he *straitly* requireth to be observed without breach or blame. *Hooker.*

The Saracens brought, together with their victories, their language and religion into all that coast of Africk, even from Egypt to the *streights* of Gibraltar. *Brerewood on Language.*

If your lass
Interpretation should abuse, and call this
Your lack of love or bounty, you were *straited*
For a reply; at least, if you make care
Of happy holding her. *Shakspeare. Winter's Tale.*

If his own life answer the *straitness* of his proceeding, it shall become him well. *Shakspeare.*

He now, forsooth, takes on him to reform
Some certain edicts, and some *strait* decrees
That lay too heavy on the commonwealth. *Id.*

Proceed no *straiter* 'gainst our uncle Glo'ster,
Than from the evidence of good esteem
He be approved in practice culpable.
Id. Henry VI.

Honour travels in a *streight* so narrow,
Where one but goes abreast.
Id. Troilus and Cressida

Waters when *straitened*, as in the falls of bridges, give a roaring noise. *Bacon's Natural History.*

It is a great errour, and a narrowness or *straitness* of mind, if any man think that nations have nothing to do one with another, except there be an union in sovereignty, or a conjunction in pact. *Id. Holy War.*

The *straitness* of my conscience will not give me leave to swallow down such camels. *King Charles.*

Fretum Magellanicum, or Magellan's *straits.* *Abbot.*

The *straitening* and confining the profession of the common law, must naturally extend and enlarge the jurisdiction of the chancery. *Clarendon.*

The independent party, which abhorred all motion towards peace, were in as great *streights* as the other how to carry on their designs. *Id.*

If this be our condition, thus to dwell
In narrow circuit, *straitened* by a foe
Subtile or violent. *Milton's Paradise Lost.*

Thyself
Bred up in poverty and *streights* at home,
Lost in a desart here, and hunger-bit.
Id. Paradise Regained.

Among the Romans, the laws of the twelve tables did exclude the females from inheriting; and had many other *straitnesses* and hardships, which were successively remedied. *Hale.*

Witnesses, like watches go,
Just as they're set, too fast or slow,
And, where in conscience they're *straight* laced,
'Tis ten to one that side is cast. *Hudibras.*

Stretch them at their length,
And pull the *streightened* cords with all your strength.
Dryden.

'Tis hard with me, whatever choice I make,
I must not merit you, or must forsake:
But in this *streight* to honour I'll be true,
And leave my fortune to the gods and you. *Id.*

The landed man finds himself aggrieved by the falling of his rents, and the *streightening* of his fortune, whilst the monied man keeps up his gain. *Locke.*

Let nature have scope to fashion the body as she thinks best; we have few well-shaped that are *strait-laced*, or much tampered with. *Id. on Education.*

The *straitness* of the conveniencies of life amongst them had never reached so far as to the use of fire, till the Spaniards brought it amongst them. *Locke.*

Men, by continually striving and fighting to enlarge their bounds, and encroaching upon one another, seem to be *straitened* for want of room. *Ray.*

Kings reduced to *streights*, either by their own, or by the negligence of their predecessors, have been always involved in dark and mean intrigues. *Davenant.*

Some modern authors, observing what *straits* they have been put to in all ages to find out water enough for Noah's flood, say Noah's flood was not universal, but a national inundation. *Burnet's Theory.*

Let no man who owns a providence grow desperate under any calamity or *strait* whatsoever, but compose the anguish of his thoughts upon this one consideration, that he comprehends not those strange unaccountable methods by which providence may dispose of him. *South.*

The causes which *straiten* the British commerce, will enlarge the French. *Addison's State of the War.*

Several congregations find themselves very much *straitened;* and, if the mode increase, I wish it may not drive many ordinary women into meetings. *Id. Spectator.*

Cæsar sees
The *streights* to which you're driven, and, as he knows
Cato's high worth, is anxious for your life. *Addison.*

A bell or a cannon may be heard beyond a hill which intercepts the sight of the sounding body; and sounds are propagated as readily through crooked pipes as through *straight* ones. *Newton's Opticks.*

Whatever *straitens* the vessels, so as the channels become more narrow, must heat; therefore *strait* cloaths and cold baths heat. *Arbuthnot on Diet.*

Morality, by her false guardians drawn,
Chicane in furs, and casuistry in lawn,
Gasps, as they *straiten* at each end the cord,
And dies when Dulness gives her page the word.
Dunciad.

Ulysses made use of the pretence of natural infirmity, to conceal the *straits* he was in at that time in his thoughts. *Broome.*

They are afraid to meet her, if they have missed the church; but then they are more afraid to see her if they are laced as *strait* as they can possibly be. *Law.*

She watches their time of need and adversity, and, if she can discover that they are in great *streights* or affliction, she gives them speedy relief. *Id.*

Strait, a narrow channel or arm of the sea, shut up between lands on either side, and affording a passage out of one great sea into another. There are three kinds of straits. 1. Such as join one ocean to another. Of this kind are the straits of Magellan and Le Maire. 2. Those which join the ocean to a gulf; the straits of Gibraltar and Babelmandel are of this kind, the Mediterranean and Red Sea being only large gulfs. 3. Those which join one gulf to another; as the straits of Caffa, which join the Palus Mæotis to the Euxine or Black Sea. The passage of straits is commonly dangerous, on account of the rapidity and opposite motion of currents.

STRAKES, or Streaks, in a ship, the uniform ranges of planks on the bottom and sides of a ship, or the continuation of planks joined to the ends of each other, and reaching from the stem to the stern-post and fashion-pieces; the lowest of these, which is called the starboard streak, is let into the keel below, and into the stem and stern-post. They say, also, that a ship heels a strake, that is, hangs or inclines to one side the quantity of a whole plank's breadth.

Strakes, or Streks, in mining, are frames of boards fixed on or in the ground, where they wash and dress the small ore in a little stream of water; hence called straked ore.

STRALSUND, one of the new governments of the Prussian states, including the part of Pomerania which belonged to Sweden in 1813, along with Rugen and other islands on the coast. It is almost entirely surrounded by water, the Baltic bounding it on the north, and the Peene, the Trebel, and the Recknitz, three rivers partly navigable, on the other sides. Its area is 1400 square miles; and it is much more fertile than the rest of Pomerania, having a heavy loam or black mould, producing fine crops of corn, rye, and pulse, as well as flax and tobacco. The pastures are not favorable for the larger cattle; but the number of sheep, hogs, and above all of geese is very considerable. Inhabitants about 115,000. See Pomerania.

Stralsund, a considerable town of Pomerania, long subject to Sweden, is situated on the strait which separates the island of Rugen from

the mainland; and is accessible only by bridges. It was a fortress of importance till 1807. Its harbour is capacious and safe, admitting ships of fifteen feet draught. The houses are low, but built of brick, and remarkable for being pointed at the top: the streets narrow, and indifferently paved. There are four Protestant and one Catholic church. The other public buildings are the government-house, town-house, mint, arsenal, and governor's house. Of public institutions, the chief are the academy or gymnasium, the orphan-house, the poor-house, the lunatic hospital, and the public library. The environs are flat and sandy, and the water is raised by a hydraulic machine. The manufactures comprise woollens, linen, tobacco, soap, glass: breweries and distilleries. Stralsund was a member of the Hanseatic league, and has long been a place of trade. Of corn, its principal export, there is sometimes shipped between 30,000 and 40,000 quarters. The imports consist chiefly of colonial produce and foreign manufactures; and the building of ships and boats form a considerable branch of trade. The town has suffered much at different times by sieges, but has always recovered, in consequence chiefly of its trade. Population 12,000. Ninety miles N. N. W. of Stettin. Long. 30° 32′ E., lat. 54° 19′ N.

STRAMONIUM. See DATURA.

STRAND, *n. s.* & *v. a.* Sax. ȝȝnanɒ; Goth. and Swed. *strund;* Belg. *strande;* Isl. *strend;* Teut. *strande.* The verge of the sea, or of any water: to drive or force into shallow water.

I saw sweet beauty in her face;
Such as the daughter of Agenor had,
That made great Jove to humble him to her hand,
When with his knees he kissed the Cretan *strand.*
Shakspeare.

Tarchen's alone was lost, and *stranded* stood,
Stuck on a bank, and beaten by the flood.
Dryden's Æneid.

Some from the *stranded* vessel force their way,
Fearful of fate, they meet it in the sea;
Some, who escape the fury of the wave,
Sicken on earth, and sink into a grave. *Prior.*

Some wretched lines from this neglected hand
May find my hero on the foreign *strand,*
Warmed with new fires. *Id.*

I have seen of both those kinds from the sea, but so few that they can only be such as have strayed from their main residence, and been accidentally intercepted and *stranded* by great storms.
Woodward on Fossils.

STRANGE, *adj., interj.,* & *v. n.* Fr. *estrange;* Latin *extraneus.* STRANGE'LY, *adv.* STRANGE'NESS, *n. s.* STRAN'GER, *n. s.* & *v. a.* Foreign; of another country; odd; wonderful; irregular; new; remote; unacquainted; surprising! (an expression of wonder): to strange (an obsolete barbarism) is, to wonder; be astonished: the adverb and noun substantives correspond with the adjective: to stranger is used by Shakspeare for to estrange; alienate.

Joseph saw his brethren, but made himself *strange* unto them. *Genesis* lxii. 7.

I do not contemn the knowledge of *strange* and divers tongues. *Ascham's Schoolmaster.*

Long custom had inured them to the former kind alone, by which the latter was new and *strange* in their ears. *Hooker.*

Desire my man's abode, where I did leave him:
He's *strange* and peevish. *Shakspeare. Cymbeline.*

She makes it *strange,* but she would be best pleased
To be so angered with another letter. *Shakspeare.*

As by *strange* fortune
It came to us, I do in justice charge thee
That thou commend it *strangely* to some place,
Where chance may nurse or end it.
Id. Winter's Tale.

Will you not observe
The *strangeness* of his altered countenance?
Id. Henry VI.

I am a most poor woman, and a *stranger,*
Born out of your dominions; having here
No judge indifferent. *Id. Henry VIII.*

Strangers and foes do sunder, and not kiss.
Shakspeare.

My child is yet a *stranger* in the world,
She hath not seen the change of fourteen years.
Id.

Will you, with those infirmities she owes,
Dowered with our curse, and *strangered* with our oath,
Take her or leave her? *Id.*

Men worthier than himself
Here tend the savage *strangeness* he puts on;
And undergo, in an observing kind,
His humorous predominance.
Id. Troilus and Cressida.

If a man, for curiosity or *strangeness* sake, would make a puppet pronounce a word, let him consider the motion of the instruments of voice, and the like sounds made in inanimate bodies.
Bacon's Natural History.

It is evident, and it is one of the *strangest* secrets in sounds, that the whole sound is not in the whole air only, but is also in every small part of the air.
Id.

The natural subjects of the state should bear a sufficient proportion to the *strange* subjects that they govern. *Bacon.*

We ought to acknowledge that no nations are wholly aliens and *strangers* the one to the other. *Id.*

In this peace there was an article that no Englishman should enter into Scotland, and no Scottishman into England, without letters commendatory: this might seem a means to continue a *strangeness* between the nations; but it was done to lock in the borderers. *Id.*

As the man loves least at home to be,
That hath a sluttish house, haunted with sprites:
So she, impatient her own faults to see,
Turns from herself, and in *strange* things delights.
Davies.

A *strange* proud return you may think I make you, madam, when I tell you it is not from every body I would be thus obliged. *Suckling.*

Thus the *strange* cure to our spilt blood applied,
Sympathy to the distant wound does guide. *Cowley.*

Here passion first I felt,
Commotion *strange!* *Milton.*

He will vouchsafe
This day to be our guest: bring forth and pour
Abundance, fit to honour and receive
Our heavenly *stranger.* *Id.*

Were all the assertions of Aristotle such as theology pronounceth impieties, which we *strange* not at from one of whom a father saith, Nec Deum colui, nec curavit. *Glanville.*

His perusal of the writings of his friends and *strangers.* *Fell.*

Strange! what extremes should thus preserve the snow
High on the Alps, or in deep caves below. *Waller*

This made David to admire the law of God at that *strange* rate, and to advance the knowledge of it above all other knowledge. *Tillotson.*

How *strangely* active are the arts of peace,
Whose restless motions less than wars do cease;
Peace is not freed from labour, but from noise;
And war more force, but not more pains, employs.
Dryden.

Strange to relate! from young Iülus' head
A flambent flame arose, which gently spread
Around his brows, and on his temples fed.
Id. Æneid.

I was no *stranger* to the original: I had also studied Virgil's design, and his disposition of it. *Dryden.*

Strange! that fatherly authority should be the only original of government, and yet all mankind not know it. *Locke.*

We should carry along with us some of those virtuous qualities, which we were *strangely* careless if we did not bring from home with us. *Sprat's Sermons.*

If I will obey the gospel, no distance of place, no *strangeness* of country, can make any man a *stranger* to me. *Sprat.*

This raised greater tumults and boilings in the hearts of men, than the *strangeness* and seeming unreasonableness of all the former articles. *South.*

There is no place in Europe so much frequented by *strangers*, whether they are such as come out of curiosity, or such who are obliged to attend the court of Rome. *Addison on Italy.*

In a time of affliction, the remembrance of our good deeds will *strangely* cheer and support our spirits. *Calamy.*

Melons on beds of ice are taught to bear;
And *strangers* to the sun yet ripen here. *Granville.*

They came, and near him placed the *stranger* guest. *Pope.*

After a year's interregnum from the death of Romulus, the senate of their own authority chose a successor, and a *stranger*, merely upon the fame of his virtues. *Swift.*

It would *strangely* delight you to see with what spirit he converses, with what tenderness he reproves, with what affection he exhorts, and with what vigour he preaches. *Law.*

Thus the majestick mother of mankind,
To her own charms most amiably blind,
On the green margin innocently stood,
And gazed indulgent on the crystal flood;
Surveyed the *stranger* in the painted wave,
And, smiling, praised the beauties which she gave.
Young.

How *strangely* crowds misplace things and miscal!
Madness in one is liberty in all. *Harte.*

Strange (Sir Robert), who carried the art of engraving to so great perfection in this country, was a man of general merit. His works will perpetuate his name whilst any taste for the fine arts remains. He was born in the island of Pomona, in Orkney, 14th of July, 1721. He was descended from the Stranges or Strangs of Balcasky, in Fife, who settled in Orkney at the time of the reformation. He received his classical education at Kirkwall in Orkney, under Mr. Murdoch Mackenzie, who has rendered infinite service to his country by the accurate surveys and charts he has given of the islands of Orkney and of the British and Irish coasts. Mr. Strange was intended for the law, but soon perceived that his genius led him to drawing and engraving. For this purpose he was introduced to the late Mr. Richard Cooper at Edinburgh, the only person there who had then any taste in that line. He was bound with him as an apprentice for six years, during which time he made rapid progress. In 1747 he married Isabella, only daughter of Willian Lumisden, son of bishop Lumisden; and soon after went to Paris, where he prosecuted his studies under the celebrated Le Bas, from whom he had the first hint of the dry needle; which he afterwards greatly improved by his own genius, and which has added such superior beauties to his engravings. In 1751 he removed with his family from Edinburgh and settled at London, where he engraved several fine historical prints, which acquired him great reputation. At this period historical engraving had made little progress in Britain, and he may properly be considered as its founder. In 1760 he went to Italy, where he made many admirable drawings, several of which he afterwards engraved. These are now in the possession of lord Dundas. Every where in Italy singular marks of attention were bestowed on Mr. Strange, by great personages, and by the principal academies in that country. He was made a member of the academies of Rome, Florence, and Bologna, and professor in the royal academy at Parma. The ceiling of the Vatican library, at Rome, in which the collection of engravings are kept, is elegantly painted by Signior Rotfanelli. It represents the progress of engraving; and the portraits of the most eminent artists in that line are there introduced, among which is that of our artist. He is the only British artist on whom this honor has been conferred. In France, where he resided many years, he was made a member of the Royal Academy of Painting at Paris. King George III., ever attentive to the progress of the fine arts, as a mark of his royal approbation of the merit of Mr. Strange, conferred the honor of knighthood on him the 5th of January 1787. Sir Robert Strange was no less distinguished by his amiable moral qualities. He left fifty capital plates, which are carefully preserved in his family, engraved from pictures by the most celebrated painters of Italy. From his earliest establishment, Sir Robert preserved about eighty copies of the finest and choicest impressions of each plate he engraved; which, from length of time, have acquired a high degree of beauty. These he arranged in the order in which they were engraved. To each volume he prefixed two portraits of himself, the one an etching, the other a finished proof, from a drawing by John Baptiste Greuse. Each volume, besides a dedication to the king, contains an introduction on the progress of engraving, and critical remarks on the pictures from which his engravings are taken. These volumes were ready to be given to the public, when Sir Robert's death and consequent circumstances delayed this magnificent publication; a publication which does honor to the artist, and to the country which gave him birth. He died at London, July 5th 1792.

STRANGEA, a secondary ridge of mountains, branching off from the Hæmus chain on the south, and extending along the Black Sea to the Thracian Bosphorus. An inferior branch, called

Mount Tekis, becomes detached from this, and stretches partly in a south-west direction to the point of the Chersonesus, partly in a circular form, round the gulf of En.

STRANGER, in law, denotes a person who is not privy or party to an act. Thus a stranger to a judgment is he to whom a judgment does not belong; in which sense the word stands directly opposed to party or privy.

STRAN'GLE, *v. a.* STRAN'GLER, *n. s.* STRANGULA'TION. } Fr. *etranger;* Lat. *strangulo.* To choak; suffocate; kill by intercepting the breath; suppress: both the noun substantives corresponding.

The lion did tear in pieces enough for his whelps, and *strangled* for his lionesses, and filled his holes with prey. *Nehemiah.*

Dost thou not know that thou hast *strangled* thine husbands? *Tobit* iii. 8.

His face is black and full of blood;
His eye-balls farther out than when he lived,
Staring full ghastly, like a *strangled* man.
Shakspeare. Henry VI.

By the' clock, 'tis day;
And yet dark night *strangles* the travelling lamp:
Is 't night's predominance, or the day's shame?
Id. Macbeth.

The band that seems to tie their friendship together will be the very *strangler* of their amity.
Id. Antony and Cleopatra.

A spunge is mischievous, not in itself, for its power is harmless; but because, being received into the stomach, it swelleth, and, occasioning its continual distension, induceth a *strangulation.*
Browne's Vulgar Errours.

So heinous a crime was the sin of adultery, that our Saxon ancestors compelled the adultress to *strangle* herself; and he who debauched her was to be hanged over her grave. *Ayliffe.*

The reduction of the jaws is difficult; and, if they be not timely reduced, there happen paralysis and *strangulation.* *Wiseman.*

STRANGLES, in veterinary science. The French and other foreign writers have compared the strangles in horses to the small-pox in men; and, as the small-pox is more incident to children than to grown persons, so it has been observed, by these writers, that the strangles chiefly affect colts and young horses, when they catch inveterate colds; which is very true, for horses are seldom subject to the strangles after six years old, though Gibson speaks of some horses that he knew to have had this distemper at seven and eight, and sometimes at nine or ten, though these instances, he says, are not very common. The strangles are also said to resemble the small-pox in this, that the disease never seizes horses oftener than once; whereas many other distempers, proceeding from common causes and accidents, will return as often as there are the proper causes to produce them. But, however this be, it is probable that the strangles are a critical swelling, which, when it suppurates and breaks, discharges somewhat obnoxious to the constitutions of young horses, as they are usually rendered more healthful than they were before.

This disease begins with a swelling between the jaw-bones, sometimes pretty low among the muscles of the tongue, attended with great heat, pain, and inflammation, sometimes to such a degree that a horse is scarcely able to swallow till the tumor suppurates. Many colts have the strangles at grass, and the tumor comes to maturity and breaks, yielding a very plentiful discharge, without any other help than what nature affords; though in some cases there is very great malignity, with a purulent running at the nose, which is often dangerous. Those colts, however, that escape the strangles at grass, are liable, for the most part, to be seized when they are first taken up and put to business; and we often observe the change of diet, an alteration in the air, &c., bring on the strangles. Other causes may be, their catching cold, shedding their teeth, or whatever may induce pain, or bring on irritation at any critical time upon the throat and jaws.

When the strangles are coming upon a horse, he feels unusually hot, and sometimes very feverish, with a painful cough; some go quite off their stomachs, others are only dainty, or eat and drink with pain in chewing and swallowing. When the swelling begins on the inside of the jaw-bone, it is much longer in coming to maturity than when it begins more towards the middle. When the skin is tight and much stretched over the swelling, and that feels unusually dry and hot, the swelling will in that case be large before it breaks, and yield a plentiful discharge. When the swelling of the strangles rises between the jaw-bones, under the middle of the tongue, it is always the most favorable; but if it rises upwards among the glands, and is divided into several little tumors, it is not so kindly, but is apt to break in several places and at different times before it sinks, which renders the case more tedious and troublesome.

When the strangles begin directly in the upper part of the throat, towards the head of the wind-pipe and gullet, they hinder a horse sometimes from swallowing for several days, until the tumor grows full and large on the outside. This degree of the strangles is not altogether without danger of suffocation. The pressure made upon the head of the wind-pipe makes the horse's eye look fixed, as if he was convulsed, with his nose turned outwards, and his nostrils open for want of breath; which symptom continues till the tumor, growing ripe, breaks and runs off. But the worst and most dangerous kind of strangles is, when, at the same time that a horse is swelled under the jaws, he runs also at the nose, which Gibson attributes either to some constitutional malignity, or to bad management; and this is what some call the false or bastard strangles.

This disease seldom proves dangerous, unless the efforts of nature are interrupted. Doing much in this case, says Gibson, is worse than doing too little, for the strangles seldom need any other help than to assist suppuration, by keeping the swelling always moist with camphorated hog's lard. Some apply poultices to the strangles; but, besides the trouble of applying them, and renewing them often, they frequently prove hurtful, by being composed of materials that are too stimulating, as turpentine, &c. Besides, if the poultices be not kept close, they are apt to chill the part, and to repel rather than promote a discharge of the humors, and this often leaves a dry and obstinate cough, or endangers the horse's eyes. Another error, in the cure of the strangles

is opening the tumor before it comes to maturity, which defeats the purpose of nature; for there are found in that case callous swellings under the throat, with a gleeting ulcer, sometimes followed by a plentiful running at the nose, which, without very great care, will end in the glanders.

If the strangles begin with great pain and inflammation, as sometimes happens; if the horse's eyes be fixed, and he look convulsed; his neck much swoln, and his jaws stiff, with his nose turned outwards; it is necessary to take away a sufficient quantity of blood, to foment and apply a bran poultice to the part, covering it with a thin woollen cloth; and this should be persevered in till it comes to maturity and breaks. Sometimes the inflammation is so great as to destroy the skin that encloses the matter, by which means it falls off in pieces, like an eschar made by a caustic, and exposes the interstices of the muscles and contiguous glands. But here also nature will effect a cure, without any other help besides what has been already recommended; for the cavity is soon filled by a new growth of flesh, and covered with skin and hair, as perfect as at first. Sometimes the strangles break inwardly, and the matter is discharged chiefly by the mouth; and, when it is so, the horse's mouth may be washed once or twice a day, with equal parts of brandy and vinegar, with a spoonful of honey to each pint. This, with warm soft diet, will perfect the cure without any other help, and the swelling on the outside will soon wear off.

In some cases, where there is little swelling and inflammation, the horse will eat and drink without pain; and though there be a collection of matter, yet, when it is small, it sometimes continues long without breaking. When matter is formed in this way, and may be felt by gentle pressure with the finger, Mr. Denny advises to open the tumor with a lancet in the most depending part.

STRANRAER, or STRANRAWER, a royal burgh of considerable antiquity in Wigtonshire, at the head of the bay of Loch-Ryan, fifty miles south of Ayr, and nine and three-quarters north of Glenluce. It is the seat of a Presbytery, and the chief town of the district of the Rinns. The principal street is of considerable length: the greatest part of the houses are old, and built on no regular plan; but whole streets of elegant houses have lately been built, and a handsome town-house and prison. It is a port of the custom-house; and has some trade to the Baltic, Ireland, and England; chiefly in the exportation of grain. The cotton and linen manufactures are carried on to a considerable extent. Here is also a considerable tan-work. The harbor of Stranraer is excellent, being sheltered on all sides, and lying at the head of Loch-Eyan, which affords excellent anchorage. Stranraer is governed by a provost, two bailies, a dean of guild, and fifteen councillors; and unites with Wigton, New-Galloway, and Whithorn, in sending a member to parliament. Near the town is the old castle of Stranraer, and not far from it is the castle of Culhorn, the beautiful residence of that noble family.

STRAP, *n. s.* } Belg. *stroppe*; Ital *stroppa*.
STRAPPA'DO. } Lat. *struppus*. A narrow long slip of cloth or leather: chastisement by a strap.

These clothes are good enough to drink in, and so be those boots too; an' they be not, let them hang themselves in their own *straps*

Shakspeare. Twelfth Night.

Were I at the *strappado*, or all the racks in the world, I would not tell you on compulsion.

Shakspeare.

I found but one husband, a lively cobbler, that kicked and spurred all the while his wife was carrying him on; and had scarce passed a day without giving her the discipline of the *strap*. *Addison's Spectator.*

STRAP, among surgeons, a sort of band used to stretch out limbs in the setting of broken or disjointed bones.

STRAP, in a ship, the rope which is spliced about any block, and made with an eye to fasten it any where on occasion.

STRAPS, in the manege. The straps of a saddle are small leather straps, nailed to the bows of the saddle, with which we make the girths fast to the saddle.

STRAPPADO, or STRAPADO, is a barbarous military punishment, wherein the criminal's hands being tied behind him, he is hoisted up with a rope to the top of a long piece of wood, and let fall again almost to the ground; so that, by the weight of his body in the shock, his arms are dislocated. Sometimes he is to undergo three strappadoes or more.

STRASBURG, a large city of Alsace, France, situated at the influx of the Brusche into the Ille, and about half a mile from the Rhine. Its form is semicircular; and it is divided into several parts by canals, over which there is a number of bridges. The construction of the houses is after the German manner, Alsace having belonged to France only since the latter part of the seventeenth century, and the language and customs of the majority of the inhabitants are still German. The material employed for building is a red stone found in the quarries of the neighbourhood. The houses are lofty but heavy: of the streets, the one called La Grande rue, and a few others, are wide and straight, but the far greater part are narrow. The place d'armes is a square, surrounded with good buildings. It is frequented as a public walk; but the more extensive promenades are the Contadin, adjacent to the city walls; and the Ruptborshant, a fine meadow, divided into a number of alleys bordered with trees. The fortifications are extensive: being divided into old and new, the former only repaired by Vauban, the latter entirely constructed by him. The citadel lies towards the east. It is a regular pentagon, composed of five bastions, and as many half-moons, and with out-works extending almost to the Rhine.

The cathedral of Strasburg is justly classed among the most distinguished specimens of Gothic architecture. Its tower, 470 feet in height, is ascended by a stair of above 700 steps, and is said to be the loftiest building in the world, with the exception of the great pyramid of Egypt. It is built of hewn stone, cut with such nicety as to give it at a distance some resemblance to lace. It was upwards of a century and a half in building. Of the other churches, the only one worth notice is that of St. Thomas, containing the monument erected by Louis XV. to marshal Saxe. The town-hall, a large structure, has its façade ornamented with antique paintings. The episco-

pal palace is a good modern building, and the theatre handsome and spacious. Here are two hospitals, one for the military, the other for the lower classes, both extensive and well regulated. Here is also a foundling hospital and an orphan-house; an artillery school, cannon-foundry, and arsenal; to which may be added, a telegraph station, a monument to general Desaix, and the wooden bridge over the Rhine, of the length of 3900 feet.

Strasburg is well situated for trade, the fertile soil of Alsace furnishing the means of subsistence to manufacturers, and the Rhine connecting it with Switzerland and the Netherlands. Its articles for export consist of corn, flax, hemp, wine, spirituous liquors; also of linen, sailcoth, blankets, carpets, hardware, leather, cotton, and lace. Tobacco is a product of Alsace; and snuff is consequently an object of manufacture here. The medical school of Strasburg, after being long an academy, was constituted a university in the seventeenth century, and, though curtailed in its classes during the French revolution, was replaced on its former footing in 1803. In that year also was established a Protestant university, taught by ten professors, and comprising a classical, philosophical, and theological course. The only other Protestant university (or, as they are here termed, academies) in France is Montauban. Strasburg also contains a law school; two public libraries of old date; and a botanic garden. For boys there is here a high school, on the plan of those of Rouen, Caen, and other large towns.

Strasburg existed prior to the Christian era, having been known to the Romans by the name of Argentoratum. It early received the Reformation, and is said to have counted among its inhabitants a majority of Protestants until the latter part of the seventeenth century. Till then it had held the rank of a free city of the empire. At present the proportion of Catholics exceeds that of Protestants: the town is the see of a bishop and the residence of a prefect. This town and its vicinity has been more than once the scene of modern warfare. In 1798, when the French revolutionists were pressed by the Austrians; in the early part of the summer 1796, when the former crossed the Rhine for the invasion of Germany; and, finally, in the autumn of that year, when the French being expelled from Franconia, Kehl, with its bridge leading to Strasburg, had very nearly fallen into the hands of their opponents. In the invasions of 1814 and 1815 Strasburg escaped attack. Sixty-six miles north of Bale, seventy-five east of Nancy, and 290 east of Paris.

STRATA, in mineralogy, the several beds or layers of different matters whereof the earth is composed. See QUARRY, GEOLOGY, and MINERALOGY.

STRAT'AGEM, *n. s.* Fr. *stratageme;* Gr. στρατηγημα. An artifice; a trick by which an enemy is deceived.

Every minute now
Should be the father of some *stratagem.*
Id. Henry IV.

Rouse up your courage, call up all your counsels,
And think on all those *stratagems* which nature
Keeps ready to encounter sudden dangers.
Denham's Sophy.

Those oft are *stratagems* which errors seem;
Nor is it Homer nods, but we who dream. *Pope.*

STRATAGEMS, in the art of war, certain feints which are resorted to by able generals, &c., to cover their real designs during the operations of a campaign. Stratagems were much practised by the ancients; the moderns wage war more openly, and on the square. Frontinus has made a collection of the ancient stratagems of war. It is impossible to lay down any specific rules on this head, as every general, according to the capacity and activity of his mind, makes use of the various means and expedients which grow out of times, circumstances, and occasions. It has been asserted by some writers that all sorts of stratagems (even those which are connected with treachery) may be adopted for the accomplishment of any design. This maxim is, however, strongly combated against by those who have written upon the law of nations. Probity, in fact, and elevation of mind (which are superior to the pitiful measures of treacherous affiliation or intercourse) should always bear the ascendancy in human actions. There are stratagems which may be practised and carried on without the least deviation from honor and good faith. Many distinguished generals have had recourse to these; but none ever succeeded so well as Hannibal. Wishing to cross the river Rhone, and being in want of almost every article that was necessary to effect the passage in the presence of an enemy who was diligently watching his motions, he caused him to imagine that it was his intention to keep the ground he occupied. He ordered large fires to be lighted up in different quarters of his camp, and directed some of his troops to shout and make loud noises as if they were perfectly stationary. During this apparent state of inactivity he broke up his camp, marched along the river's side, and crossed it at a place where it was least expected he would make the attempt. Among other good qualities, which are indispensably necessary in an able general, that of knowing how to conceal a projected march, and to anticipate the motions of an enemy, is not the least important.

The army under the command of the duke of Saxe Weimar, having laid siege to Brissack in 1638, the imperialists went to the relief of that place. The duke, on receiving intelligence of their approach, instantly marched against them with a body of forces composed of Swedes and French allies. The imperialists, who had advanced by rapid marches, had gained possession of an eminence, by means of which they would have enjoyed all the advantages of local superiority, had not the count de Guébriant, who was then a lieutenant-general in the Swedish service, suggested a stratagem to dislodge the enemy. The following plan was consequently adopted, and it succeeded to the full extent of his design:—The drums and trumpets of the different corps were collected together and stationed in a neighbouring wood, so as to draw the enemy's force and attention from the quarter proposed to be carried. The imperialists being naturally led to believe, from the noise and concurrence of so many military instruments, that they were going to be attacked from that quarter, beat to arms

and left their position in complete order of battle. They had scarcely quitted the eminence before the duke of Saxe Weimar appeared in their rear, took possession of the ground which they had so imprudently abandoned, and became master of all the advantages which his enemy would otherwise have enjoyed. An interesting account of this ingenious manœuvre may be found in the History of Le Maréchal de Guébriant.

Stratagems of this description have been frequently used by the French during the late war, particularly in Italy. Stratagems, in fact, constitute one of the principal branches in the art of war. They have been practised in all ages by the most able generals, and have contributed, in a great degree, to their military reputation. Virgil, in his Æneid, book ii. says,

Dolus an virtus quis in hoste requirat.

The history of France abounds with instances in which stratagems of every kind have been successfully practised. It seems the peculiar talent of the inhabitants of that country to derive advantages from well concerted feints, &c., in war, and to secure their victories more by science than by downright hardihood. Nevertheless far be it from us to detract from the latter. Modern Frenchmen, as soldiers, seem to have acquired, or to have had awakened in them, on shore, the courage and perseverance which are so remarkably conspicuous amongst us at sea. Perhaps it is out of the natural course of things that they should ever reach the naval excellence by which this country is so singularly distinguished; and perhaps it is equally ordained that we should never be the first in military knowledge. France and England unquestionably hold between them the destinies of Europe, and of the three other quarters of the globe: France by the natural advantages of her continental position, added to a predilection for arms which is manifest throughout her population; and England by its insular situation, rendered, as it were, impregnable by an innate courage, and unrivalled aptitude at sea. Time alone, and the experience of facts, must hereafter determine how far either nation will be benefited by a deviation from the primary advantages which nature furnishes to each. For it must be acknowledged that the true element in which a Frenchman seems calculated to act is on shore, or within the guardian range of his artillery and fire-arms; and that an Englishman, though far from being wholly out of his element on land service, is thoroughly himself at sea. From the increase of our foreign possessions, but most especially from the extent of our territories in India, and the armed state of Europe, it has been found expedient to enlarge the scale of our military establishments, in proportion to the exigencies of a very desultory service abroad, and a possible necessity at home for military operations. Without, therefore, entering into the policy of either country, we shall content ourselves with observing that, as we have an army, it behoves every efficient character belonging to that army to obtain a thorough knowledge of his profession, and to study the nice shades of an art which, of all others, has principles that are fixed and immutable, under circumstances of the greatest apparent casualty. It has been wisely observed by a French writer, under the article of Stratagèmes de Guerre, that a chief, who is defeated in a general action, will sometimes attribute his failure to fortune, although it be universally acknowledged that chance, or fortune, has a very trifling share in pitched battles, while art and science regulate the different movements, and finally determine their issue. Whoever, therefore, suffers himself to be surprised by his enemy cannot be said to stand wholly exculpated from ignorance, or neglect, since it must have been in his power to have avoided the snares laid for him, by means of vigilant spies and unremitting attention. This remark appears to us not only to be generally correct, but it seems more immediately applicable to all generals that have secret service money at command. The influence of that commodity (upon which no embargo can be laid) will be felt in every garrison town, or sea-port; and those who have the management of the public purse must be dull indeed if they do not feel their way into the secret preparations of an enemy, before they hazard an attack against him. Of a deficiency on this ground we have had melancholy proofs both in Spain and Holland, particularly at Walcheren in 1809.

Besides the different stratagems, says major James, which may be used by an able general, to bring about the overthrow of the whole or part of an army, by leading it into an ambuscade, there are various ones which may be practised against a fortified place. To effect the latter purpose you may contrive to get soldiers in disguise through the gates at unguarded hours; to introduce them through subterraneous passages, or by any other means that may offer. Before any attempt of this sort is made, every part of the fortifications should be narrowly reconnoitred, and as much knowledge be obtained of the interior situation of the place as can be procured by means of good spies, or from deserters. You must, above all things, be well assured that the garrison is relaxed in duty; that the different guards are negligently attended to; that the soldiers who compose them are in the habits of drinking or gaming; that their officers neglect their rounds, or go them without system or regularity; that the gates are ill guarded, and the avenues to them ill watched; and that there are certain places, or entrances, which are not watched at all; for it is almost impossible to surprise any place that has been regularly fortified while the garrison does its duty. If it should appear practicable to surprise a town, by taking advantage of the negligence of the sentries, &c., at some particular gate, previous means must be adopted to introduce some soldiers dressed like market women, or in the garb of some religious order. You may then contrive to get a waggon or cart (seemingly loaded with hay or straw, but with soldiers concealed beneath it) so placed in the entrance of the gate that it will serve as an obstacle when it may be found necessary to shut it. In order to do this effectually, let a pin be taken out, so that the wheel comes off, or the axle-tree gets broken. The instant this is done the soldiers, who had entered the town in disguise, must

join the drivers, the men that have been concealed in the waggon will then leap out, and the whole must rush upon the port-guard. While this happens the troops that have been placed in ambush round the fortifications will advance with promptitude and firmness, and endeavour to get possession of the town before a sufficient force can be collected to repel the attack. In the year 1789 a rabble from Courtray took advantage of the carelessness of the imperial troops, who were in garrison at Gand, in Flanders, and by seizing upon the gate and port-guard brought about a temporary rebellion in the country. The author of this compilation was an eye-witness to the consequent effects of this coup de main; and he is fully persuaded that Antwerp might have been taken in 1809 by a prompt and vigorous approach. This, indeed, was done without stratagem; but the circumstance proves that, when the sentries of a fortified place are negligent in their duty, a surprise is always practicable. We are precluded, by the limits of our undertaking, from going more fully into this important branch of military science. Several treatises have been written on the subject. Among others one appeared in 1756, entitled Stratagèmes de Guerre, illustrating, from history, the various stratagems which had been practised by some of the ablest generals, during a long period of time, down to the peace of Aix-la-Chapelle. It was published by Mr. Carlet de la Rosière, an officer in the French service, and acting engineer in the isles of France and Bourbon. It contains much curious matter.

STRATARITHMOMETRY, in war, the art of drawing up an army, or any part of it, in any given geometrical figure; and of expressing the number of men contained in such a figure, as they stand in order of battle, either at hand or at any distance assigned.

STRATEGICS and Tactics. Mr. C. Malorti de Martemont, in his translation of a work entitled the Modern System of War, has defined these terms in the following manner:—'I define strategics, the science of the movements in war of two armies, out of the visual circle of each other; or, if better liked, out of cannon reach. Tactics are the science of the movements made within sight of the enemy, and within reach of his artillery. The reader may, if he pleases, prefer the reach of cannon to that of sight for the bounds within which the movements of war cease to be strategics and become tactics. But were I to decide for one of them I should adopt the reach of sight, for the following reason: that deploying columns in order of battle is an operation of tactics; yet it is generally done out of cannon reach. At Rosbach, to be sure, it was not so, but what was the consequence?' p. 87.

STRATEGUS (στρατουγος), in antiquity, an officer among the Athenians, whereof there were two chosen yearly, to command the troops of the state. Plutarch says there was one chosen from out of each tribe; but Pollux seems to say they were chosen indifferently out of the people. The people themselves made the choice, and that on the last day of the year in the Pnyx. The two strategi did not command together, but took their turns day by day, as we find from Herodotus and Cornelius Nepos. Sometimes, indeed, as when a person was found of merit vastly superior and exceedingly famed in war, the command was given to him alone: but it was ever a rule not to put any person in the office but whose estate was in Attica, and who had children, that there might be some hostages and securities for his conduct and fidelity. Constantine the Great, besides many other privileges granted to the city of Athens, honored its chief magistrate with the title of Μεγας Στρατηγος, Magnus Dux.

STRATEGY. Strategy differs materially from tactic; the latter belonging only to the mechanical movement of bodies set in motion by the former. One is, in fact, the soul, the other the mere body of military science. In a most excellent publication, entitled Idées Raisonnées sur un Systéme Général, &c., pour étudier la Science de la Guerre, &c., by Nockhern de Schorn, we find the following explanation of the term; and, as it does not exist in any of our English lexicographers, we presume the extract must be particularly gratifying to the intelligent officer. In page 198, Troisième Partie, Sixième Chapitre, Sixième table Méthodique, our author thus continues:—'We are at length got to the sixth integral part of military knowledge, which is termed stratégie, or the art of knowing how to command, and how to conduct the different operations of war: the word is derived from the Greek strategos, which signifies chief or general of the army. The term general or chief conveys the same meaning, indeed, that constitutes the word universal, and points out an officer of superior rank whose mind is well stored with military theory, and who can practically lead into active service all the different arms, or component bodies belonging to war; such as cavalry, infantry, and artillery. This definition clearly points out the impropriety of confining the terms general, lieutenant-general, and major-general, to any particular body of armed men: for what is a general whose skill consists in being able to manage a body of cavalry, or of infantry only, without knowing how to conduct others? A general, whether he be commander-in-chief, or be acting in a subordinate capacity to him, ought to know cavalry, infantry, and artillery movements, and possess all the branches of military science. Nor are these observations confined to the generals and superior officers of armies; subaltern officers should be more or less versed in the science of knowing how to conduct men into action, and to combine the different operations of war; particularly so if their natural ambition should lead them to aspire to the highest posts of military preferment.

'Strategy, or the knowledge of commanding armies, may be divided into two parts; one comprehending the higher, and the other embracing the lower branches of the art. The first embraces all that a commander-in-chief, and all that his subordinate generals, should be acquainted with; and the second (which may also be called la petite guerre, being the diminutive of the first) appertains to the staff, and to a certain proportion of subaltern officers. To be adequate to a chief command it is necessary that the person, so selected, should possess extraordinary talents, and

not only be master of all the theory of war, but likewise know, from practice and experience, every species of military operation. He should, in fact, to refer to one of our own articles (vide MIND) be gifted with a military mind.

In order to obtain all that can be obtained by study (for natural genius must supply a very large proportion) the intelligent officer will first fix upon a distinct and clear idea of the part he means to investigate. From one idea he will gradually proceed to another; and, when the whole system has thus been progressively touched upon, he will take an analytical view of the several component parts; examine them together; weigh their relative points, and then look into the different authors that have written upon this vast and complicated subject. He will peruse what relates to the first branch, or La Grande Stratégie, in the following works:—1. Les Mémoires de Montécuculi. 2. L'Esprit de Folard. 3. Art de la Guerre, par le Maréchal de Puiségur. 4. Les Rêveries du Maréchal de Saxe. 5. L'Essai sur l'Etat de la Guerre, par Turpin. 6. Les Instructions du Roi de Prusse. 7. Le Cours et le Traitè de Tactique, par Joly de Mézeroy. 8. Théorie de la Guerre, par le même. 9. Pensées sur la Tactique et la Stratégie, par M. de Sylva. 10. L'Essai Général de Tactique, par M. Guibert.

The best writings on what is called La Petite Stratégie, or the inferior branches of the art of war, are, 1. Le Premier livre du 1 tome, et le cinquième livre du 2 tome, de l'Art de la Guerre, par M. Turpin. This work has been translated by captain Otway. 2. Le Traité sur la Petite Guerre, par Grand Maison. 3. Le Partisan, par Jenny. 4. Principes sur la Petite Guerre: Ouvrage ajouté aux Instructions du Roi de Prusse. 5. La Petite Guerre, par M. le capt. Knock. 6. Sentimens d'un Officier Hessois sur l'art de conduire les détachemens à la guerre. 7. Le Chasseur à la Guerre, ou du service des troupes légères. 8. Observations sur le Service de Cavalerie à la Guerre, par le Chevalier de Shónacken.

Although these celebrated writers ought to be considered by every young officer as the oracles of his profession, he must, nevertheless, guard his mind against that fatal persuasion which might lull it into a belief that nothing more is required than to peruse and to digest their rules and regulations. When he has made himself completely master of their thoughts he must endeavour to identify himself, as it were, with the authors and the generals themselves. By this method he will probably hit upon some of those hidden truths in military science from which many secondary ones are drawn; and in contemplating the commentaries, &c., of great generals, he will discover that they knew well how to calculate dangers; to appreciate probabilities, and, by occasionally deviating from ordinary rules and prescribed principles, how to move in untrodden paths, and to obtain signal advantages where, to superficial minds, nothing but desperate hazard and destruction appeared.

STRATFIELD-SAY, a parish in Holdshott hundred, Basingstoke division, Hants, eight miles north-east of Basingstoke, and fifty-three from London. The duke of Wellington has a noble seat here, given to his grace by a vote of parliament as a national tribute for his eminent military services.

STRATFORD-ON-AVON, a market-town and parish in Barlichway hundred, Warwick. Eight miles south-west of Warwick, and ninety-four north-west from London, by Oxford; situate on the river Avon, over which is a bridge of brick and stone of fourteen arches. The town is well built, and the church, a noble building, has a lofty spire with six bells; its origin is very ancient, but many parts of it are modern. Here is also a chapel the gift of sir Hugh Clapton, in the reign of Henry VII. This place is celebrated as being the birth-place of William Shakspeare, who died in 1616, and has a neat monument in the church. The noted mulberry-tree which grew in the garden of the poet was destroyed by a successor, who having sold it to a carpenter, he ingeniously worked it into various ornaments and trinkets, many of which were bought by the corporation and distributed as compliments to different personages of renown. In September, 1769, was the first commemoration of Shakspeare's Jubilee, when an amphitheatre was erected on the plan of Ranelagh for the reception of its visitors from all parts of the kingdom. It lasted three days, during which time every species of entertainment was exhibited; such as concerts, oratorios, pageants, fireworks, illuminations, &c. In the guildhall, in which is transacted the town business, is a large room called Shakspeare's hall, adorned with two excellent paintings of Shakspeare and Garrick. It was rebuilt in 1768: over the hall is a free grammar-school. Here are also several good alms-houses. The chief trade is in corn and malt. The Avon is navigable to the Severn, and a canal lately completed opens a communication with the northern parts of the kingdom. Market on Friday. Fairs Thursday after Lady-day, May 14th, September 25th, and the Thursday se'nnight after.

STRATFORD, LONG, a hamlet in West-Ham parish, Beacontree hundred, Essex, being the first village in the county from London, and joined to Stratford-Bow by a stone bridge over the Lea, said to be the first arched stone bridge erected in England. To the south are the remains of a Cestercian monastery.

STRATFORD, STONY, a market-town situate partly in the parishes of Calverton and Wolverton, Newport hundred, Bucks, on the banks of the Ouse, over which it has a stone bridge to Old Stratford, in Norts. It is a long town, and lies six miles north-west from Fenny-Stratford, and fifty-two north-west from London. It had formerly two churches, or rather chapels of ease, but that on the east side of the road was nearly destroyed by fire in 1742, and has not since been rebuilt, but the tower is still standing; the other, dedicated to St. Giles, was rebuilt in a neat modern manner in 1777; here are meeting-houses for Baptists and other dissenters. It is supposed to have derived its name of Stony, to distinguish it from Fenny-Stratford, and from its being situate on the Watling Street Roman paved road. The only manufacture here is that of lace-making. The town has many charity-schools, and a society

for apprenticing out children. The market on Friday is well supplied with provisions, and considerable quantities of corn are sold here, forming the principle traffic and support of the place. The Fairs are August 2d, October 10th, and November 12th, for provisions, cattle, pedlary &c., and on the Friday before Old Michaelmas-day is a statute fair.

STRATIOTES, water soldier, in botany, a genus of plants belonging to the class of polyandria, and to the order of hexagynia; natural order first, palmæ. The spatha is diphyllous; the perianthium is trifid. There are three petals, and the berry is six-celled and inferior. There are three species; 1. S. acoroides; 2. S. alismoides; and 3. S. aloides, which alone is of British extraction, which is also called the water aloe, or fresh water soldier. The root consists of long fibres tufted at the ends. The leaves are thick, triangular, pointed, and prickly at the edges. The flowers are white and floating on the water, and blossom in June. This plant may be seen in slow rivers and fens.

STRATO, a philosopher of Lampsacus, disciple and successor in the school of Theophrastus, about A.A.C. 248. He applied himself with uncommon industry to the study of nature; but, after the most mature investigations, he supported that nature was inanimate, and that there was no God but nature. See Plastic Nature. He was preceptor to Ptolemy Philadelphus, who revered his abilities and learning, and rewarded his labors with unbounded liberality. He wrote different treatises, all now lost.

STRATONICE, the beautiful daughter of Demetrius Poliorcetes, and the wife, first of Seleucus Nicator, king of Syria, and afterwards of his son, Antiochus Soter, with his full consent. The circumstances of the case were extraordinary, and, if any thing could justify such an incestuous connexion, they were indeed such. Antiochus fell sick and was at the point of death, to the great grief of his father, but the cause of his illness was unknown; till Erasistratus, the physician, observing his pulse to beat high every time his step-mother came into his room, immediately guessed the cause. Upon his putting the question to him, Antiochus confessed, what he had hitherto concealed, his affection for his step-mother. Seleucus, willing to save his son and heir, yielded up his wife, and they were regularly married. And thus Stratonice became the progenitrix of that impious race of princes who afterwards so cruelly persecuted the Jews. See Jews and Syria. But, allowing for Seleucus's total ignorance of the divine law, his paternal affection and generosity in so readily yielding up his wife to save his son, appear almost an act of virtue. At least it affords a striking contrast to the conduct of a Christian prince in modern times (if a Christian we may call him, who murdered his subjects by millions for their religion), Philip II. of Spain, who, after his son prince Charles had seen and was betrothed to the princess Elizabeth of France, whose affection for him was mutual, had the monstrous barbarity to separate the lovers, to marry the princess himself, and then to murder his son, the prince, because he repined at his villany. See Philip II.

STRATONICEA, an ancient city of Asia built by Seleucus, and so named by him in honor of Stratonice. It is now called Eski-Hissar.

STRATONICI, the followers of Strato; an ancient atheistical sect. See Hydozoists.

STRATTON, a market-town in the hundred of the same name, Cornwall, seven miles W.S.W. from Holdsworthy, and 222 from London. Here is a meeting-house for Wesleyan methodists. During the civil war the famous battle of Stratton was fought near this place. Market on Tuesday. Fairs, May 19th, November 8th, and December 11th.

STRA'TUM, *n. s.* } Lat. *stratum.* A bed;
Stra'ta. } a layer: a term of philosophy: strata, the plural.

The terrestrial matter is disposed into *strata*, or layers, placed one upon another; in like manner as any earthy sediment, settling down from a fluid, will naturally be. *Woodward.*

Another was found in a perpendicular fissure of a *stratum* of stone in Langron iron-mine, Cumberland. *Id.*

With how much wisdom are the *strata* laid,
Of different weight and of a different kind,
Of sundry forms for sundry ends designed!
Blackmore.

Drilled through the sandy *stratum* every way
The waters with the sandy *stratum* rise. *Thomson.*

STRAUBING, a large town of Bavaria, on the right bank of the Danube, stands partly on a height, and is divided into Upper and Lower. It is tolerably well built, and surrounded with a wall: the bridge over the river is defended, since 1809, by a tête de pont. It is the seat of a high court of justice, has several churches and charitable institutions, a flourishing academy, and, in a convent of Ursuline nuns, an establishment for female education; with well frequented markets of corn and cattle, and a trade on the Danube. The environs are fertile, but the town has suffered much from fire. Sixty-six miles N.N.E. of Munich, and twenty-three E.S.E. of Ratisbon.

STRAW, *n. s.* } Saxon ꝑꝛeop; Belgic
Straw'berry, } *stroo;* Goth. *strao.* The
Straw'built, *adj.* } stalk on which corn grows;
Straw'colored, } any stalk; any thing of
Straw'y. } small value: strawberry

is a fruit with a straw-like stem: strawy, consisting of or abundant in straw: the compounds seem to explain themselves.

I can counterfeit the deep tragedian,
Tremble and start at wagging of a *straw,*
Intending deep suspicion.
Shakspeare. Richard III.

I will discharge it in your *strawcoloured* beard.
Shakspeare.

There the *strawy* Greeks, ripe for his edge,
Fall down before him like the mower's swath. *Id.*

Apples in hay and *straw* ripened apparently; but the apple in the *straw* more.
Bacon's Natural History.

Thy arms, thy liberty beside,
All that's on the outside of thy hide,
Are mine by military law,
Of which I will not bate one *straw.* *Hudibras.*

They on the smoothed plank,
The suburb of their *strawbuilt* citadel,
New rubbed with balm expatiate. *Milton.*

In a field of corn, blown upon by the wind, there will appear waves of a colour differing from that of the rest; the wind, by depressing some of the ears, and not others, makes the one reflect more from the lateral and *strawy* parts than the rest.
Boyle on Colours.

Content with food which nature freely bred,
On wildings and on *strawberries* they fed. *Dryden.*

'Tis not a *straw* matter whether the main cause be right or wrong. *L'Estrange.*

My new *straw* hat thus trimly lined with green
Let Peggy wear. *Gay's Pastorals.*

Strawberries, by their fragrant smell, seem to be cordial: the seeds obtained by shaking the ripe fruit in winter are an excellent remedy against the stone. The juice of *strawberries* and lemons, in spring-water, is an excellent drink in bilious fevers.
Arbuthnot on Diet.

More light he treads, more tall he seems to rise,
And struts a *straw* breadth nearer to the skies.
Tickel.

STRAWBERRY, in botany. See FRAGARIA.

STRAY, *v. n.*, *v. a.*, & *n. s.* Ital. *stravviare*, of Lat. *extra via*, to wander. To wander; rove; range beyond limits; err: to mislead: the act of erring; any erring creature or thing.

We have erred and *strayed*. *Common Prayer.*

What grace hath thee now hither brought this way?
Or doen thy feeble feet unweeting hither *stray*?
Spenser.

Nowhere can I *stray*,
Save back to England: all the world's my way.
Shakspeare.

She hath herself not only well defended,
But taken and impounded as a *stray*
The king of Scots. *Id. Henry V.*

I would not from your love make such a *stray*,
To match you where I hate. *Shakspeare.*

Hath not else his eye
Strayed his affections in unlawful love? *Id.*

My eye, descending from the hill, surveys
Where Thames among the wanton valley *strays*.
Denham.

Should I take you for a *stray*,
You must be kept a year and day. *Hudibras.*

Wand'rest thou within this lucid orb,
And *strayed* from those fair fields of light above,
Amidst this new creation want'st a guide
To reconduct thy steps? *Dryden.*

He cries out, Neighbour, hast thou seen a *stray*
Of bullocks and of heifers pass this way? *Addison.*

When he has traced his talk through all its wild rambles, let him bring home his *stray*; not like the lost sheep, with joy, but with tears of penitence.
Government of the Tongue.

STRAY, or ESTRAY, signifies any tame beast, as sheep, oxen, swine, and horses, or swans, found within a lordship, and not owned by any man; in which case, 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's of the soil where found. If the owner claims it within the year and a day, he must pay the charges of finding, keeping, and proclaiming; and he also may seize it, without telling the marks, or proving his property, which may be done at the trial if contested. If the beast stray within the year to another lordship, the first lord cannot retake it. An estray must be fed and kept, uninjured, and without labor, till it is reclaimed, or the limited time expire.

STREAK, *n. s.* & *v. a.* } Sax. ꝥꝥice; Belg.
STREAK'Y, *adj.* } *streke*; Ital. *stricia*.

A line of color different from that of the ground: sometimes written strake: to stripe: variegate; draw out in stripes: streaky is striped.

The west yet glimmers with some *streaks* of day;
Now spurs the lated traveller apace,
To gain the timely inn. *Shakspeare. Macbeth.*

All the yeanlings which were *streaked* and pied
Should fall as Jacob's hire.
Id. Merchant of Venice.

She lurks in midst of all her den, and *streaks*
From out a ghastly whirlpool all her necks;
Where, glotting round her rock, to fish she falls.
Chapman.

To morrow, ere fresh morning *streak* the east,
When first approach of light we must be risen,
And at our pleasant labour, to reform
Yon flowery arbours. *Milton.*

When the hoary head is hid in snow,
The life is in the leaf, and still between
The fits of falling snows appears the *streaky* green.
Dryden.

The night comes on, we eager to pursue
Till the last *streaks* of dying day withdrew,
And doubtful moonlight did our rage subdue. *Id.*

While the fantastic tulip strives to break
In two-fold beauty and a parted *streak*. *Prior.*

Now let us leave this earth, and lift our eye
To the large convex of yon azure sky;
Behold it like an ample curtain spread,
Now *streaked* and glowing with the morning red,
Anon at noon in flaming yellow bright,
And chusing sable for the peaceful night. *Prior.*

STREAM, *n. s.*, *v. n.*, & } Saxon ꝥꝥeam;
STREAM'ER, *n. s.* [*v. a.* } Swed. *strom*; Dan.
STREAM'Y, *adj.* } *stræm*; Belg. *stroom*.

A running water; the course of running water; a current; any thing forcibly or constantly issuing: to flow; run; issue constantly: to mark with colors in tracts: a streamer is an ensign; flag: streamy, abounding in streams; running in a current.

He brought *streams* out of the rock, and caused waters to run down like rivers. *Ps.* lxxviii. 16.

The breath of the Lord is like a *stream* of brimstone. *Isaiah.*

As plays the sun upon the glassy *stream*,
Twinkling another counterfeited beam.
Shakspeare. Henry VI.

The very *stream* of his life, and the business he hath helmed, must give him a better proclamation.
Shakspeare.

His brave fleet
With silken *streamers* the young Phœbus fanning.
Id.

Had their cables of iron chains had any great length, they had been unportable; and, being short, the ships must have sunk at an anchor in any *stream* of weather. *Raleigh.*

The herald's mantle is *streamed* with gold.
Bacon.

O could I flow like thee, and make thy *stream*
My great example, as thou art my theme!
Tho' deep yet clear, tho' gentle yet not dull,
Strong without rage, without o'erflowing full.
Denham.

Cocitus named of lamentation loud
Heard in the rueful *stream*; fierce Phlegethon,
Whose waves of torrent fire inflame with rage;
Far off from these a slow and silent *stream*,
Lethe, the river of oblivion, rolls
Her wa'try labyrinth. *Milton.*

God bad the ground be dry,
All but between those banks where rivers now
Stream, and perpetual draw their humid train. *Id.*

Thus, from one common source our *streams* divide;
Ours is the Trojan, your's the Arcadian side.
Dryden.

You, Drances, never want a *stream* of words.
Id.

The rosy morn began to rise,
And wav'd her saffron *streamer* through the skies.
Id.

It is looked upon as insolence for a man to adhere to his own opinion, against the current *stream* of antiquity. *Locke.*

The man of sense his meat devours,
But only smells the peel and flowers:
And he must be an idle dreamer,
Who leaves the pie, and gnaws the *streamer*. *Prior.*

Arcadia,
However *streamy* now, adust and dry,
Denied the goddess water: where deep Melas
And rocky Cratis flow, the chariot smoaked
Obscure with rising dust. *Id.*

The *stream* of beneficence hath, by several rivulets which have since fallen into it, wonderfully enlarged its current. *Atterbury.*

Before him flaming his enormous shield
Like the broad sun, illumined all the field;
His nodding helm emits a *streaming* ray.
Pope's Iliad.

On all sides around
Streams the black blood, and smokes upon the ground. *Pope.*

Then grateful Greece with *streaming* eyes would raise
Historick marbles to record his praise. *Id.*

From opening skies may *streaming* glories shine,
And saints embrace thee. *Id.*

STREATER (Robert), an English painter, born in 1624. He was esteemed the most universal painter England ever bred. At the restoration in 1660 he was made serjeant painter to the king. He died of the stone in 1680.

STREET, *n. s.* Sax. ſtræt; Isl. *strada*; Dan. *streede*; Belg. *straet*; Lat. *stratum*. A way; properly a paved way between rows of houses; a public place or way.

That there be no leading into captivity, and no complaining in our *streets*. *Ps.* cxliv. 14.

The *streets* are no larger than alleys. *Sandys.*

He led us through fair *streets*; and all the way we went there were gathered people on both sides, standing in a row. *Bacon.*

When night
Darkens the *streets*, then wander forth the sons
Of Belial, flown with insolence and wine;
Witness the *streets* of Sodom. *Milton.*

The Italians say the ancients always considered the situation of a building, whether it were high or low, in an open square, or in a narrow *street*, and more or less deviated from their rule of art.
Addison on Italy.

Our publick ways would be so crowded, that we should want *street*-room. *Id. Spectator.*

Let us reflect upon what we daily see practised in the world; and can we believe, if an apostle of Christ appeared in our *streets*, he would retract his caution, and command us to be conformed to the world? *Rogers's Sermons.*

When you tattle with some crony servant in the same *street*, leave your own *street*-door open. *Swift.*

STRELITZ, a city of Germany, capital of the grand duchy of Mecklenburg-Strelitz, is situated in the lordship of Stargard in the midst of lakes and marshes. It is divided into Old and New Strelitz, which form properly two towns, a mile distant from each other. Old Strelitz was formerly the ducal residence, but the palace having been burned in 1713, the duke built a new one at Glienke, a place at a little distance, and in 1733 founded a town called New Strelitz. The two came in time to be considered as one town. Old Strelitz contains 3000 inhabitants. New, a better built place, has 4000, with a distinct magistracy. The manufactures consist of woollen, linen, and, in a small degree, of tobacco. Here are also the public offices of the duchy. Fifty-seven miles north by west of Berlin.

STRENÆ (Lat.), in Roman antiquity, new year's gifts, or presents made on the first day of the year, as a happy omen, and mark of the giver's good will. This practice took place so early as the reign of Titus Tatius, king of the Sabines, and colleague of Romulus; who having received on the first day of the year a present of some sprigs of vervain, gathered in a wood consecrated to the goddess Strenia, authorised this custom to be observed afterwards, and gave to all such presents the name of Strenæ. The Romans on that day celebrated a festival in honor of Janus and Juno. See YEAR.

STRENGTH, *n. s.* & *v. a.*
STRENG'THEN, *v. a.* & *v. n.*
STRENG'THENER, *n. s.*
STRENG'THLESS, *adj.*
STRENG'THNER, *n. s.*
} Sax. ſtrengð; Teut. and Belg. *streng*; Gothic *dreing*. See STRONG. Vigor; power; force; firmness; power of resistance; security: hence mental power; animation; validity; argumentative force or prevalence; a fortification or fortress: used by Daniel for to strengthen, which signifies to make strong; increase in power or strength; confirm; establish; animate: and, as a verb neuter, to grow strong: a strengthener is that which gives strength: strengthless, weak; wanting or deprived of strength.

Charge Joshua, and encourage him, and *strengthen* him. *Deuteronomy.*

Let us rise up and build: so they *strengthened* their hands for this work. *Nehemiah* ii. 18.

They sought the *strengthening* of the heathen.
1 *Maccabees* vi.

This presupposed, it may then stand very well with *strength* and soundness of reason thus to answer.
Hooker.

Our castle's *strength*
Will laugh a siege to scorn. *Shakspeare.*
What is his *strength* by land?
Id. Antony and Cleopatra.

Let noble Warwick, Cobham, and the rest,
With powerful policy *strengthen* themselves.
Id. Henry VI.

As the wretch, whose fever-weakened joints,
Like *strengthless* hinges, buckle under life,
Impatient of his fit, breaks like a fire
Out of his keeper's arms. *Id. Henry IV.*

The rashness of talking should not only be retarded by the guard of our heart, but fenced in by certain *strengths* placed in the mouth.
Ben Jonson's Discoveries.

Edward's happy-ordered reign most fertile breeds
Plenty of mighty spirits, to *strength* his state.
Daniel.

Strength there must be either of love or war, even such contrary ways leading to the same unity.
Holyday.

Betrayed in all his *strengths*, the wood beset;
All instruments, all arts of ruin met. *Denham.*

Thou must outlive
Thy youth, thy *strength*, thy beauty, which will change
To withered, weak, and grey. *Milton.*

He thought
This inaccessible high *strength* to have seized. *Id.*

Oh men for flattery and deceit renowned!
Thus when y' are young ye learn it all like him;
Till, as your years increase, that *strengthens* too,
T' undo poor maids. *Otway's Orphan.*

Authority is by nothing so much *strengthened* and confirmed as by custom; for no man easily distrusts the things which he and all men have been bred up to. *Temple.*

Garlick is a great *strengthener* of the stomach, upon decays of appetite, or indigestion. *Id.*

This liquor must be inflammable or not, and yet subtile and pungent, which may be called spirit; or else *strengthless* or insipid, which may be named phlegm. *Boyle.*

Aristotle's large views, acuteness, and penetration of thought, and *strength* of judgment, few have equalled. *Locke.*

What they boded would be a mischief to us, you are providing shall be one of our principal *strengths*.
Sprat's Sermons.

The allies, after a successful summer, are too apt, upon the *strength* of it, to neglect their preparations for the ensuing campaign. *Addison.*

He enjoyed the greatest *strength* of good sense, and the most exquisite taste of politeness. *Id.*

We, like friendly colours, found our hearts unite,
And each from each contract new *strength* and light.
Pope.

The disease, that shall destroy at length,
Grows with his growth, and *strengthens* with his *strength*. *Id.*

If it were true that women were thus naturally vain and light, then how much more blameable is that education which seems contrived to *strengthen* and increase this folly! *Law.*

Strength, in mythology, the daughter of Pallas the giant, by the nymph Styx, and the sister of Valor and Victory.

Strength of Materials, in mechanics, is a subject of so much importance that in a nation so eminent as this for invention and ingenuity in all species of manufactures, and in particular so distinguished for its improvements in machinery of every kind, it is somewhat singular that no writer has treated it in the detail which its importance and difficulty demand. The man of science who visits our great manufactures is delighted with the ingenuity which he observes in every part, the innumerable inventions which come even from individual artisans, and the determined purpose of improvement and refinement which he sees in every workshop. Every cotton-mill appears an academy of mechanical science; and mechanical invention is spreading from these fountains over the whole kingdom. But the philosopher is mortified to see this ardent spirit so cramped by ignorance of principle, and many of these original and brilliant thoughts obscured and clogged with needless and even hurtful additions, and a complication of machinery which checks improvement even by its appearance of ingenuity. There is nothing in which this want of scientific education, this ignorance of principle, is so frequently observed, as in the injudicious proportion of the parts of machines and other mechanical structures; proportions and forms of parts in which the strength and position are no wise regulated by the strains to which they are exposed, and where repeated failures have been the only lessons.

The strength of materials arises immediately or ultimately from the cohesion of the parts of bodies. Our examination of this property of tangible matter has as yet been very partial and imperfect, and by no means enables us to apply mathematical calculations with precision and success. The various modifications of cohesion, in its different appearances of perfect softness, plasticity, ductility, elasticity, hardness, have a mighty influence on the strength of bodies, but are hardly susceptible of measurement. Their texture also, whether uniform like glass and ductile metals, crystallised or granulated like other metals and freestone, or fibrous like timber, is a circumstance no less important; yet even here, although we derive some advantage from remarking to which of these forms of aggregation a subject belongs, the aid is but small. All we can do in this want of general principles is to make experiments on every class of bodies. Accordingly, philosophers have endeavoured to instruct the public in this particular. The Royal Society of London at its very first institution made many experiments at their meetings, as may be seen in the first registers of the Society. Several individuals have added their experiments. The most numerous collection in detail is by Muschenbroek, professor of natural philosophy at Leyden. Part of it was published by himself in his Essais de Physique, in 2 vols. 4to.; but the full collection is to be found in his system of Natural Philosophy, published after his death by Lulofs, in 3 vols. 4to. This was translated from the Low Dutch into French, by Sigaud de la Fond, and published at Paris in 1760, and is a prodigious collection of physical knowledge of all kinds, and may almost suffice for a library of natural philosophy. But this collection of experiments on the cohesion of bodies is not of that value which one expects. We presume that they were carefully made and faithfully narrated; but they were made on such small specimens that the unavoidable natural inequalities of growth, or texture produced irregularities in the results, which bore too great a proportion to the whole quantities observed. We may make the same remark on the experiments of Couplet, Pitot, De la Hire, Du Hamel, and others of the French academy. In short, if we except the experiments of Buffon on the strength of timber, made at the public expense on a large scale, there is nothing to be met with from which we can obtain absolute measures which may be employed with confidence; and there is nothing in the English language, except a simple list by Emerson, which is merely a set of affirmations without any narration of circumstances, to enable us to judge of the validity of his conclusions; but the character of Mr. Emerson, as a

man of knowledge and of integrity, gives even to these assertions a considerable value. But to make use of any experiments there must be employed some general principle by which we can generalise their results. They will otherwise be only narrations of detached facts. We must have some notion of that intermedium, by the intervention of which an external force applied to one part of a lever, joist, or pillar, occasions a strain on a distant part. This can be nothing but the cohesion between the parts. It is this connecting force, which is brought into action, or, as we more shortly express it, excited. This action is modified in every part by the laws of mechanics. It is this action which is what we call the strength of that part, and its effect is the strain on the adjoining parts; and thus it is the same force, differently viewed, that constitutes both the strain and the strength. When we consider it in the light of a resistance to fracture, we call it strength: we call every thing a force, which we observe to be ever accompanied by a change of motion; or, more strictly speaking, we infer the presence and agency of a force wherever we observe the state of things in respect of motion different from what we know to be the result of the action of all the forces which we know to act on the body. Thus, when we observe a rope to prevent a body from falling, we infer a moving force inherent in the rope with as much confidence as when we observe it drag the body along the ground. The immediate action of this force is undoubtedly exerted between the immediately adjoining parts of the rope. The immediate effect is the keeping the particles of the rope together. They ought to separate by any external force drawing the ends of the rope contrarywise; and we ascribe their not doing so to a mechanical force really opposing this external force. When desired to give it a name, we name it from what we conceive to be its effect, and therefore its characteristic, and we call it cohesion. This is merely a name for the fact; but it is the same thing in all our denominations. We know nothing of the causes but in the effects; and our name for the cause is in fact the name of the effect, which is cohesion. We mean nothing else by gravitation or magnetism. What do we mean when we say that Newton understood thoroughly the nature of gravitation, of the force of gravitation; or that Franklin understood the nature of the electric force? Nothing but this: Newton considered with patient sagacity the general facts of gravitation, and has described and classed them with the utmost precision. In like manner we shall understand the nature of cohesion, when we have discovered with equal generality the laws of cohesion, or general facts which are observed in the appearances, and when we have described and classed them with equal accuracy. Let us therefore attend to the more simple and obvious phenomena of cohesion, and mark with care every circumstance of resemblance by which they may be classed. Let us receive these as the laws of cohesion characteristic of its supposed cause, the force of cohesion. We cannot pretend to enter on this vast research. The modifications are innumerable; and it would require the penetration of more than Newton to detect the circumstance of similarity amidst millions of discriminating circumstances. Yet this is the only way of discovering which are the primary facts characteristic of the force, and which the modifications. The study is immense, but is by no means desperate; and we entertain great hopes that it will ere long be successfully prosecuted; but, in our particular predicament, we must content ourselves with selecting such general laws as seem to give us the most immediate information of the circumstances that must be attended to by the mechanician in his constructions, that he may unite strength with simplicity, economy, and energy. 1st, Then, it is a matter of fact that all bodies are in a certain degree perfectly elastic; that is, when their form of bulk is changed by certain moderate compressions or distractions, it requires the continuance of the changing force to continue the body in this new state; and when the force is removed the body recovers its original form. We limit the assertion to certain moderate changes: for instance, take a lead wire one-fifteenth of an inch in diameter and ten feet long; fix one end firmly to the ceiling, and let the wire hang perpendicular; affix to the lower end an index like the hand of a watch; on some stand immediately below let there be a circle divided into degrees, with its centre corresponding to the lower point of the wire; now turn this index twice round; and thus twist the wire. When the index is let go, it will turn backward again by the wire's untwisting itself, and make almost four revolutions before it stops; after which it twists and untwists many times, the index going backwards and forwards round the circle, diminishing however its arch of twist each time, till at last it settles precisely in its original position. This may be repeated for ever. Now, in this motion, every part of the wire partakes equally of the twist. The particles are stretched, require force to keep them in their state of extension, and recover completely their original relative positions. These are all the characters of what the mechanician calls perfect elasticity. See ELASTICITY. This is a quantity quite familiar in many cases; as in glass, tempered steel, &c., but was thought incompetent to lead, which is generally considered as having little or no elasticity. But we make the assertion in the most general terms, with the limitation to moderate derangement of form. We have made the same experiment on a thread of pipe-clay, made by forcing soft clay through the small hole of a syringe by means of a screw; and we found it more elastic than the lead wire: for a thread of one-twentieth of an inch diameter and seven feet long allowed the index to make two turns, and yet completely recovered its first position. 2dly. But, if we turn the index of the lead wire four times round, and let it go again, it untwists again in the same manner, but it makes little more than four turns back again; and after many oscillations it finally stops in a position almost two revolutions removed from its original position. It has now acquired a new arrangement of parts, and this new arrangement is permanent like the former; and, what is of particular moment, it is perfectly elastic. This change is familiarly

known by the denomination of a set. The wire is said to have taken a set. When we attend minutely to the procedure of nature in this phenomenon, we find that the particles have as it were slid on each other, still cohering, and have taken a new position, in which their connecting forces are in equilibrio; and in this change of relative situation it appears the connecting forces, which maintained the particles in their first situations, were not in equilibrio in some position intermediate between that of the first and that of the last form. The force required for changing this first form augmented with the change, but only to a certain degree; and during this process the connecting forces always tended to the recovery of this first form. But, after the change of mutual position has passed a certain magnitude, the union has been partly destroyed, and the particles have been brought into new situations; that the forces which now connect each with its neighbour tend, not to the recovery of the first arrangement, but to push them farther from it, into a new situation, to which they now verge, and require force to prevent them from acquiring. The wire is now in fact again perfectly elastic; that is, the forces which now connect the particles with their new neighbours augment to a certain degree as the derangement from this new position augments. This is reasoning not from any theory. It is narrating facts on which a theory is to be founded. What we have been just now saying is evidently a description of that sensible form of tangible matter which we call ductility. It has every gradation of variety, from the softness of butter to the firmness of gold. All these bodies have some elasticity; but we say they are not perfectly elastic, because they do not completely recover their original form when it has been greatly deranged. The whole gradation may be most distinctly observed in a piece of glass or hard sealing-wax. In the ordinary form glass is perhaps the most completely elastic body that we know, and may be bent till just ready to snap, and yet completely recovers its first form, and takes no set whatever; but when heated to such a degree as just to be visible in the dark, it loses its brittleness, and becomes so tough that it cannot be broken by any blow; but it is no longer elastic, takes any set and keeps it. When more heated it becomes as plastic as clay; but in this state is remarkably distinguished from clay by a quality which we may call viscidity, which is something like elasticity, of which clay and other bodies purely plastic exhibit no appearance. This is the joint operation of strong adhesion and softness. When a rod of perfectly soft glass is suddenly stretched a little, it does not at once take the shape which it acquires after a short time. It is owing to this that, in taking the impression of a seal, if we take off the seal while the wax is yet very hot, the sharpness of the impression is destroyed immediately. Each part drawing its neighbour, and each part yielding, the prominent parts are pulled down and blunted, and the sharp hollows are pulled upwards and also blunted. The seal must be kept on till all has become not only stiff but hard. This viscidity is to be observed in all plastic bodies which are homogeneous. It is not observed in clay, because it is not homogeneous, but consists of hard particles of the argillaceous earth sticking together by their attraction for water. Something like it might be made of finely powdered glass and a clammy fluid such as turpentine. Viscidity has all degrees of softness till it degenerates to ropy fluidity like that of olive oil. When ductility and elasticity are combined, in different proportions, an immense variety of sensible modes of aggregation may be produced. Some degree of both is probably to be observed in all bodies of complex constitution; that is, which consist of particles made up of many different kinds of atoms. Such a constitution of a body must afford many situations permanent, but easily deranged. In all these changes of disposition which take place among the particles of a ductile body, the particles are at such distance that they still cohere. The body may be stretched a little; and, on removing the extending force, the body shrinks into its first form. It also resists moderate compressions; and when the compressing force is removed the body swells out again. Now the corpuscular fact here is, that the particles are acted on by attractions and repulsions, which balance each other when no external force is acting on the body, and which augment as the particles are made, by any external cause, to recede from this situation of mutual inactivity; for since force is requisite to produce either the dilatation or the compression, and to maintain it, we are obliged, by the constitution of our minds, to infer that it is opposed by a force accompanying or inherent in every particle of dilatable or compressible matter: and as this necessity of employing force to produce a change indicates the agency of these corpuscular forces, and marks their kind according as the tendencies of the particles appear to be toward each other in dilatation, or from each other in compression; so it also measures the degrees of their intensity. Should it require three times the force to produce a double compression, we must reckon the mutual repulsions triple when the compression is doubled; and so in other instances. We see from all this that the phenomena of cohesion indicate some relation between the intensity of the force of cohesion and the distance between the centres of the particles. To discover this relation is the great problem in corpuscular mechanism, as it was in the Newtonian investigation of the force of gravitation. Could we discover this law of action between the corpuscles with the same certainty and distinctness, we might with equal confidence say what will be the result of any position which we give to the particles of bodies: but this is beyond our hopes. The law of gravitation is so simple that the discovery or detection of it amid the variety of celestial phenomena required but one step; and in its own nature its possible combinations still do not greatly exceed the powers of human research. One is almost disposed to say that the Supreme Being has exhibited it to our reasoning powers as sufficient to employ with success our utmost efforts, but not so abstruse as to discourage us from the noble attempt. It seems to be otherwise with respect to cohesion. Mathematics informs us that, if it deviates sensibly from the law of gravitation, the simplest combinations will make the joint action

of several particles an almost impenetrable mystery. We must therefore content ourselves, for a long while to come, with a careful observation of the simplest cases that we can propose, and with the discovery of secondary laws of action, in which many particles combine their influence. Our readers are requested to accept of these endeavours, not so much to communicate information on this important and difficult subject, as to excite curiosity and farther experiments. Many useful deductions might be made from these premises respecting the manner of disposing and combining the strength of materials in our structures. The best form of joints, mortises, tenons, scarfs; the rules for juggling, tabling, faying, fishing, &c., practised in the delicate art of mast-making, are all founded on this doctrine: but the discussion of these would be equivalent to writing a complete treatise of carpentry. We hope that this will be executed by some intelligent mechanician; for there is nothing in our language on this subject but what is almost contemptible; yet there is no mechanic art that is more susceptible of scientific treatment. Such a treatise, if well executed, could not fail of being well received by the public in this age of mechanical improvement.

Strengtheners, or corroborants, such medicines as add to the bulk and firmness of the solids; and such are all agglutinant and astringent medicines. See Materia Medica.

STREN'UOUS, *adj* Lat. *strenuus*. Brave; bold; active; valiant; dangerously laborious.

Nations grown corrupt
Love bondage more than liberty;
Bondage with ease than *strenuous* liberty.
Milton's Agonistes.

Many can use both hands, yet will there divers remain that can *strenuously* make use of neither.
Browne's Vulgar Errours.

There was no true catholick but *strenuously* contended for it. *Waterland.*

He resolves to be *strenuous* for taking off the test, against the maxims of all wise Christian governments, which always had some established religion, leaving at best a toleration to others. *Swift to Pope.*

Writers dispute *strenuously* for the liberty of conscience, and inveigh largely against all ecclesiasticks under the name of high church. *Swift.*

STREP'EROUS, *adj.* Lat. *strepo*. Loud; noisy.

Porta conceives, because in a *streperous* eruption it riseth against fire, it doth therefore resist lightning. *Browne.*

STRESS, *n. s.* & *v. a.* Sax. ꝥꝛeꝛe, violence; or from Distress, which see. Importance; important part; weight; violence; force: to stress is to distress.

It shewed how very little *stress* is to be laid upon the precedents they bring. *Lesley.*

Stirred with pity of the *stressed* plight
Of this sad realm. *Spenser.*

By *stress* of weather driven,
At last they landed. *Dryden's Æneid.*

A body may as well lay too little as too much *stress* upon a dream; but the less we heed them the better. *L'Estrange.*

This, on which the great *stress* of the business depends, would have been made out with reasons sufficient. *Locke.*

Though the faculties of the mind are improved by exercise, yet they must not be put to a *stress* beyond their strength. *Id.*

Consider how great a *stress* he laid upon this duty, while upon earth, and how earnestly he recommended it. *Atterbury.*

STRETCH, *v. a.*, *v. n.*, & *n. s.* Sax. ꝥꝛecan; Stretch'er, *n. s.* Belgic *strecken*. To extend; spread out to a distance; elongate; expand; strain: to be extended; bear extension; push beyond the truth: as a noun substantive reach; extension; effort: struggle; utmost reach: a stretcher is any instrument of extension.

Take thy rod, and *stretch* out thine hand.
Exodus vii. 19.

The *stretching* out of his wings shall fill the breadth of thy land. *Isaiah* viii. 8.

Idolatry is a horrible sin, yet doth repentance *stretch* unto it. *Whitgifte.*

This kiss, if it durst speak,
Would *stretch* thy spirits up into the air.
Shakspeare. King Lear.

A third? a fourth?
What! will the line *stretch* out to the' crack of doom? *Shakspeare.*

His hopes enstiled
His strength, the *stretchor* of Ulysses' string,
And his steele's piercer. *Chapman.*

This to rich Ophir's rising morn is known,
And *stretched* out far to the burnt swarthy zone.
Cowley.

Leviathan on the deep
Stretched like a promontory, sleeps. *Milton.*

Eden *stretched* her line
From Auran eastward to the royal towers
Of great Seleucia, built by Grecian kings. *Id.*

Regions to which
All thy dominion, Adam, is no more
Than what this garden is to all the earth
And all the sea, from one entire globose
Stretched into longitude. *Id.*

Your dungeon *stretching* far and wide beneath.
Id.

The inner membrane, that involved the liquors of the egg, because it would *stretch* and yield, remained unbroken. *Boyle.*

He thought to swim the stormy main,
By *stretch* of arms the distant shore to gain.
Dryden's Æneid.

This fiery speech inflames his fearful friends;
They tug at every oar, and every *stretcher* bends.
Dryden.

Those put a lawful authority upon the *stretch*, to the abuse of power, under the colour of prerogative.
L'Estrange.

Disruption, as strong as they are, the bones would be in some danger of, upon a great and sudden *stretch* or contortion, if they were dry.
Ray on the Creation.

Tooth in the *stretching* course two inches with the *stretcher* only. *Moxon.*

So the *stretched* cord the shackled dancer tries.
Smith.

Upon this alarm we made incredible *stretches* towards the south, to gain the fastnesses of Preston.
Addison.

What an allay do we find to the credit of the most probable event that is reported by one who uses to *stretch!* *Government of the Tongue.*

This is the utmost *stretch* that nature can,
And all beyond is fulsome, false, and vain.
Granville.

STRETTO, in Italian music, is sometimes

used to signify that the measure is to be short and concise, and consequently quick. In this sense it stands opposed to Largo.

STRETTON, a parish of England, in Rutlandshire, nine miles north-east by east of Oakham.

STRETTON, a township of England, in Staffordshire, three miles south-west by west of Penkridge.

STREW, *v. a.* } Sometimes strow. Skinner proposes strow, and Junius writes straw. Sax. ȝrȳeapian; Gothic *strawan*; Belg. *stroyen*; Dan. *ströer*. 'Perhaps strow is best,' says Johnson, 'being that which reconciles etymology with pronunciation.' To spread by scattering, or being scattered; to scatter loosely: the noun substantive corresponding.

STREW'MENT, *n. s.*

The calf he burnt in the fire, ground it to powder, and *strawed* it upon the water, and made Israel drink of it. *Exodus.*

Synah, can I tell thee more?
And of our ladies bowre;
But little need to *strow* my store,
Suffice this hill of our. *Spenser.*

I thought thy bride bed to have decked, sweet maid!
And not have *strew'd* thy grave.
Shakspeare. Hamlet.

Her death was doubtful.—For charitable prayers,
Shards, flints, and pebbles should be thrown on her;
Yet here she is allowed her virgin chants,
Her maiden *strewments*, and the bringing home
Of bell and burial. *Id.*

Angel forms lay entranced
Thick as autumnal leaves that *strow* the brooks
In Valombrosa. *Milton's Paradise Lost.*

All the ground
With shivered armour *strown*. *Id.*

The tree in storms
The glad earth about her *strows*
With treasure from her yielding boughs. *Waller.*

Come, shepherds, come, and *strow* with leaves the plain;
Such funeral rites your Daphnis did ordain.
Dryden.

With furies and nocturnal orgies fired,
Whom e'en the savage beasts had spared, they killed,
And *strawed* his mangled limbs about the field. *Id.*

Is thine alone the seed that *strews* the plain?
The birds of heaven shall vindicate their grain.
Pope.

Possession kept the beaten road,
And gathered all his brother *strowed*. *Swift.*

STRI'Æ, *n. s.* } Lat. *striæ*. In natural history, the small channels in the shells of cockles and scallops: formed in striæ: disposition of striæ.

STRI'ATE, or

STRI'ATED, *adj.*

STRI'ATURE, *n. s.*

These effluviums fly by *striated* atoms and winding particles, as Des Cartes conceiveth; or glide by streams attracted from either pole unto the equator.
Browne's Vulgar Errours.

The salt, leisurely permitted to shoot of itself in the liquor, exposed to the open air, did shoot into more fair crystalline *striæ* than those that were gained out of the remaining part of the same liquor by a more hasty evaporation. *Boyle.*

Des Cartes imagines this earth once to have been a sun, and so the centre of a lesser vortex, whose axis still kept the same posture, by reason of the *striate* particles finding no fit pores for their passages, but only in this direction. *Ray.*

Crystal, when incorporated with the fibrous talcs, shews, if broke, a *striated* or fibrous texture, like those talcs. *Woodward.*

Parts of tuberous hæmatitæ show several varieties in the crust, *striature*, and texture of the body. *Id.*

STRIATED LEAF, among botanists, one that has a number of longitudinal furrows on its surface.

STRIATED LIMESTONE, a species or variety of indurated carbonate of lime. See MINERALOGY.

STRICK, *n. s.* Gr. στριγξ; Lat. *strix*. A bird of bad omen.

The ill-faced owl, death's dreadful messenger,
The hoarse night-raven, trump of doleful drere,
The leather-winged bat, day's enemy,
The rueful *strick*, still waiting on the bier. *Spenser.*

STRICT, *adj.* } Lat. *strictus*. Exact; accurate; rigorously nice; confined; close; tight: the adverb and noun substantive corresponding.

STRICT'LY, *adv.*

STRICT'NESS, *n. s.*

As they took the compass of their commission *stricter* or larger, so their dealings were more or less moderate. *Hooker.*

Implore her, in my voice, that she make friends
To the *strict* deputy.
Shakspeare. Measure for Measure.

These commissioners proceeded with such *strictness* and severity as did much obscure the king's mercy. *Bacon's Henry VII.*

His horse-troupes, that the vanguard had, he *strictly* did command
To ride their horses temperately. *Chapman.*

I could not grant too much, or distrust too little to men that pretended singular piety and religious *strictness*. *King Charles.*

Thou'lt fall into deception unaware,
Not keeping *strictest* watch. *Milton.*

Thy will
By nature free, not over-ruled by fate
Inextricable, or *strict* necessity. *Id.*

The god, with speedy pace,
Just thought to strain her in a *strict* embrace.
Dryden.

Charge him *strictly*
Not to proceed, but wait my farther pleasure. *Id.*

Such of them as cannot be concealed, connive at, though in the *strictness* of your judgment you cannot pardon. *Id.*

The other parts, being grosser, composed not only water, *strictly* so called, but the whole mass of liquid bodies. *Burnet.*

Who were made privy to the secrets of heaven, but such as performed his revealed will at an higher rate of *strictness* than the rest? *South.*

Vuma the rites of *strict* religion knew;
On ev'ry altar laid the incense due. *Prior.*

Though in *strictness* our Saviour might have pleaded exemption from the Jewish tribute, he exerted his divine power in a miracle to pay it. *Rogers.*

The fatal noose performed its office, and with most *strict* ligature squeezed the blood into his face.
Arbuthnot.

We feel our fibres grow *strict* or lax, according to the state of the air. *Id.*

Eusebius, who is not in *strictness* to be reckoned with the Ante Nicenes. *Waterland.*

He checks the bold design;
And rules as *strict* his laboured works confine,
As if the Stagyrite o'erlooked each line. *Pope.*

STRICTURE, *n. s.* Lat. *strictura*. A spark; stroke; touch; contraction; or closure made by contraction.

Thus have I past through all your letter, and given myself the liberty of these *strictures*, by way of reflection on all and every passage. *Hammond.*

As long as there is thirst, with a free passage by urine, and *stricture* of the vessels, so long is water safely taken. *Arbuthnot.*

STRIDE, *n. s., v. n.,* & *v. a.* Sax. ȝtȝæde. A long or wide step; a step taken with violence: to walk with such steps: pass by a step.

I'll speak between the change of man and boy,
With a reed voice, and turn two mincing steps
Into a manly *stride*. *Shakspeare. Merchant of Venice.*

The monster moved on with horrid *strides*. *Milton.*

Mars in the middle of the shining shield
Is graved, and *strides* along the liquid field. *Dryden.*

See him *stride*
Vallies wide. *Arbuthnot.*

To Jove, or to thy father Neptune, pray,
The brethren cried, and instant *strode* away. *Pope.*

Her voice theatrically loud,
And masculine her *stride*. *Swift.*

STRIDONIUM, an ancient town of Hungary, famous for being the birth-place of St. Jerome, now called Strigova.

STRID'ULOUS, *adj.* Lat. *stridulus.* Making a small noise.

It arises from a small and *stridulous* noise, which, being firmly rooted, maketh a divulsion of parts. *Browne.*

STRIFE, *n. s.* } From STRIVE, which see.
STRIFE'FUL, *adj.* } Contention; contest; discord; war: hence lawsuit; opposition of any kind: the adjective corresponding.

I and my people were at great *strife* with the children of Ammon. *Judges* xii. 2.

Some preach Christ even of envy and *strife*, and some of good will. *Phil.* i. 15.

He is proud, knowing nothing; but doating about questions and *strife* of words. 1 *Tim.* vi. 4.

The ape was *strifeful* and ambitious,
And the fox guileful and most covetous. *Spenser.*

Artificial *strife*
Lives in those touches, livelier than life. *Shakspeare.*

These acts of hateful *strife*, hateful to all,
How hast thou disturbed heaven's blessed peace! *Milton.*

'Tis this that shakes our country with alarms,
And gives up Rome a prey to Roman arms,
Produces fraud, and cruelty, and *strife*. *Addison.*

I know not what new creation may creep forth from the *strifeful* heap of things, into which, as into a second chaos, we are fallen. *Dr. Maine.*

Inheriting no *strife*,
Nor marrying discord in a noble wife. *Pope.*

Thus gods contended, noble *strife!*
Who most should ease the wants of life. *Congreve.*

STRIGELIUS (Victorinus), a learned German divine, born in Suabia, in 1524. In 1542 he went to the university of Wirtemberg to inform himself of the opinions of the Protestants. He attended the lectures of Luther and Melancthon, and became such a master of their doctrines that he soon after read lectures himself. But in 1559 he was imprisoned for opposing some of the established theological doctrines. In 1562 he was liberated, on which he went to Leipsic; where he taught divinity, logic, and ethics; and published notes on the Psalter, and other works. He died in 1569, aged only forty-five.

STRIG'MENT, *n. s.* Lat. *strigmentum*, from *stringo*, to scrape. Scraping; recrement.

Many, besides the *strigments* and sudorous adhesions from men's hands, acknowledging that nothing proceedeth from gold in its usual decoction. *Browne's Vulgar Errours.*

STRIKE, *v. a., v. n.,* & *n. s.* } *Pret.* I struck or
STRIK'ER, *n. s.* } strook; *part. pass.* struck, strucken, stricken, or strook. Sax. ȝtȝican; Teut. *streichen;* Isl. *adstrykia;* Swed. *stryka*, Dan. *stricker.* To act upon, or hit with, a blow: hence to dash; punish; afflict; stamp; note by a loud sound; lower; contract (applied particularly to sails); alarm; surprise; affect suddenly: to cause to sound by blows, taking *up*, emphatically; to forge; mint; conclude a bargain; taking the prepositions *off* and *out* as below: as a verb neuter, to make a blow or attack; collide; act by percussion; be dashed; pass with strong motion or effort; lower: 'to strike in with' is to conform; 'strike out', spread or rove: a strike is a measure of four pecks: striker, a person or thing that strikes.

Abraham and Sarah were old, and well *stricken* in age. *Genesis.*

The blood *strike* on the two side-posts. *Exodus* xii. 7.

Fearing lest they should fall into the quicksands, they *strake* sail, and so were driven. *Acts* xxvii. 17.

A bishop then must be blameless, not given to wine, no *striker*. 1 *Tim.* iii. 3.

Wing, cartnave, and bushel, peck, *strike*, ready at hand. *Tusser's Husbandry.*

He thought with his staff to have *struck* the *striker*. *Sandys.*

The cunningest mariners were so conquered by the storm, as they thought it best with *stricken* sails to yield to be governed by it. *Sidney.*

That shall I shew as sure as hound
The *stricken* deer doth challenge by the bleeding wound. *Spenser.*

Didst thou not see a bleeding hind,
Whose right haunch earst my stedfast arrows *strake?* *Id.*

The drums presently *striking up* a march, they plucked up their ensigns, and forward they go. *Knolles.*

The admiral galley, wherein the emperor was, *struck* upon a sand, and there stuck fast. *Id.*

It pleased the king
To *strike* at me upon his misconstruction,
When he tript me behind. *Shakspeare. King Lear.*

The Windsor bell hath *struck* twelve. *Shakspeare.*

How many nobles then would hold their places,
That must *strike* sail to spirits of vile sort! *Id. Henry IV.*

He that is *stricken* blind cannot forget
The precious treasure of his eyesight lost. *Shakspeare.*

Strike up the drums, and let the tongue of war
Plead for our interest, and our being here. *Id.*

The king
Is wise and virtuous, and his noble queen
Well *struck* in years; fair, and not jealous. *Id.*

Deliver Helen, and all damage else
Shall be *struck off*. *Id. Troilus and Cressida.*

Cæsar, 'tis *strucken* eight. *Shakspeare.*

I'd rather chop this hand off at a blow,
And with the other fling it at thy face,
Than bear so low a sail, to *strike* to thee. *Id.*

The court paved *striketh up* a great heat in summer, and much cold in winter. *Bacon.*

Holding a ring by a thread in a glass, tell him that holdeth it, it shall *strike* so many times against the side of the glass, and no more. *Id. Natural History.*

Parker and Vaughan, having had a controversy touching certain arms, were appointed to run some courses, when Parker was *stricken* into the mouth at the first course. *Bacon.*

Though the earl of Ulster was of greater power than any other subject in Ireland, yet was he so far *stricken* in years as that he was unable to manage the martial affairs *Davies.*

The *striker* must be dense, and in its best velocity. *Digby.*

These men are fortune's jewels, moulded bright,
Brought forth with their own fire and light;
If I her vulgar stone for either took,
Out of myself it must be *struck.* *Cowley.*

Waving wide her myrtle wand,
She *strikes* an universal peace through sea and land. *Milton.*

By expurgatory animadversions, we might *strike out* great numbers of hidden qualities; and, having once a conceded list, with more safety attempt their reasons. *Browne.*

The rest *struck* with horror stood,
To see their leader covered o'er with blood. *Waller.*

Those antique minstrels, sure, were Charles-like kings,
Cities their lutes, and subjects' hearts their strings;
On which with so divine a hand they *strook,*
Consent of motion from their breath they took. *Id.*

That conquering look,
When next beheld, like lightning *strook*
My blasted soul, and made me bow. *Id.*

To this all differing passions and interests should *strike* sail, and, like swelling streams running different courses, should yet all make haste into the sea of common safety. *Temple.*

They *strike* sail where they know they shall be mastered, and murder where they can with safety. *Dryden.*

Sign but his peace, he vows he'll ne'er again
The sacred names of fops and beaus profane:
Strike up the bargain quickly; for I swear,
As times go now, he offers very fair. *Id.*

Jack Straw at London-stone, with all his rout,
Struck not the city with so loud a shout. *Id.*

Take my caduceus!
With this the infernal ghosts I can command,
And *strike* a terror through the Stygian strand. *Id.*

So ceased the rival crew, when Purcell came,
They sung no more, or only sung his fame;
Struck dumb they all admired. *Id.*

He withered all their strength before he *strook.* *Id.*

When, by their designing leaders taught
To *strike* at power which for themselves they sought,
The vulgar, gulled into rebellion, armed,
Their blood to action by their prize was warmed. *Id.*

Now and then a glittering beam of wit and passion *strikes* through the obscurity of the poem: any of these effect a present liking, but not a lasting admiration. *Id.*

He, like a patient angler, ere he *strook,*
Would let them play awhile upon the hook. *Id.*

The memory in some men is very tenacious; but yet there seems to be a constant decay of all our ideas, even of those which are struck deepest, and in minds the most retentive. *Locke.*

Consider the red and white colors in porphyry; hinder light but from *striking* on it, and its colours vanish. *Id.*

Deep thoughts will often suspend the senses so far that about a man clocks may *strike,* and bells ring, which he takes no notice of. *Grew.*

They catch at every shadow of relief, *strike in* at a venture *with* the next companion, and, so the dead commodity be taken off, care not who be the chapman. *Norris.*

Those who, by the prerogative of their age, should frown youth into sobriety, imitate and *strike in with* them, and are really vitious that they may be thought young. *South.*

When any wilful sin stands charged on our account, it will not be *struck off* till we forsake and turn away from it. *Kettleworth.*

In this plain was the last general rendezvous of mankind; and from thence they were broken into companies, and dispersed; the several successive generations, like the waves of the sea, over-reaching one another, and *striking out* farther and farther upon the land. *Burnet's Theory.*

A mass of water would be *struck off* and separate from the rest, and tossed through the air like a flying river. *Burnet.*

Though they the lines on golden anvils beat,
It looks as if they *struck* them at a heat. *Tate.*

His virtues render our assembly awful,
They *strike* with something like religious fear. *Addison's Cato.*

Then do not *strike* him dead with a denial,
But hold him up in life. *Id.*

He immediately *struck in with* them; but described this march to the temple with so much horrour that he shivered every joint. *Id. Freeholder.*

It *struck* on a sudden into such reputation, that it scorns any longer to sculk, but owns itself publickly. *Government of the Tongue.*

Nice works of art *strike* and surprise us most upon the first view; but, the better we are acquainted with them, the less we wonder. *Atterbury.*

Some very rare coins, *struck* of a pound weight of gold and silver, Constantius sent to Chilperick. *Arbuthnot.*

Ask men's opinions: Scoto now shall tell
How trade increases, and the world goes well:
Strike off his pension by the setting sun,
And Britain, if not Europe is undone. *Pope.*

The interest of our kingdom is ready to *strike* to that of your poorest fishing towns: it is hard you will not accept our services. *Swift.*

Striking, sometimes called pithing of animals, in rural economy, is a method of suddenly slaughtering or killing them for domestic purposes, by the use of a small sharp spear-pointed knife struck in so as to divide the spinal marrow, instead of the more protracted and cruel practice of knocking them on the heads, and breaking and mashing the parts by means of the hammer-headed axe, as is generally the custom, to the great danger of the operator, and the disgust of the spectator. It is desirable, on several accounts, that this sudden mode of killing neat cattle, and other sorts of animals, by striking into and dividing this vital part, should become the common one; and especially as removing the apparent cruelty, and lessening the sufferings of them more than in the other or ordinary practice. This method, which has long been universal, in a great measure, on the continent, especially in Portugal, Spain, and some other parts, as well as in some of the West Indian islands in our possession, has, within these few years, been tried in this country, in some instances, with

complete success; and the flesh of the beasts so killed has been found equally good, if not better, than that of those slaughtered in the usual manner. All accidents and bruises are avoided, which not uncommonly take place in forcing them into a proper situation and position for receiving the stroke or blow, when they are to be knocked down and killed in that way.

It has been stated, by the writer of the Report of the Agriculture of Shropshire, that a butcher in Lincolnshire practised this mode several years ago, in consequence of the representations made to him of it by captain Clarkson of the navy, who had seen animals so slaughtered for the use of our fleet when at Jamaica: and this practice obtains pretty generally on the Lincolnshire side or bank of the Humber river, as at Barton, and several other places. Calves, sheep, pigs, and other animals, are stated to have been killed in the same manner. Still the want of due precision in the manner of performing the operation has prevented, or thrown some doubt upon its utility, especially in so far as tenderness and humanity towards the animal are concerned; for though the beast may be managed completely by this mode, yet, without sufficient correctness and exactness in its execution, it is not so certain that its sense of feeling may be wholly destroyed. Indeed the contrary would seem to be the case, from the ingenious enquiries and experimental trials of Dr. Du Gard of Shrewsbury, who has shown that, though the spinal marrow may be divided, the nerves that supply the organs of respiration and most of the senses remain uninjured. But if the division be made sufficiently high up towards the cavity of the skull, so as to separate the medullary substance above the origin of the nerves which supply the diaphragm, it would appear, from the equally ingenious and correct experiments of others, as Hunter, Home, &c., that the animals may instantly be killed in the most certain and effectual manner; and that, by performing this operation in the same way, it will be attended with constant and perfect success. It is not improbable, indeed, that an instrument might be contrived by means of a strong spring, somewhat in the manner of that used in cupping, but only with one blade, that might, on being properly applied, force itself suddenly into the brain even, and thus instantly complete the business; or the operation might probably be performed in an equally complete, convenient, and more expeditious manner, by the discharge of a small pistol, loaded in some proper way for this purpose, and suitably directed.

STRING, *n.s.* & *v.a.* STRING'ED, *adj.* STRING'HALT, *n.s.* STRING'LESS, *adj.* STRING'Y. Saxon ſtrinz; Belg. *streng*; Dan. *stringhe*; Lat. *stringo*. A slender rope or cord; any slender and flexible band; a musical chord; small fibre; any thing connected by a band; the line of a bow: 'to have two strings to one's bow,' is to have two expedients or resources: to string is to furnish with or file on a string: to tune or fit up a stringed instrument; string-halt is defined below: the adjective follows the sense of the noun substantive.

Praise him with *stringed* instruments and organs. *Psalms.*

The wicked bend their bow, they make ready their arrows upon the *string*. *Id.* xi. 2.

The *string* of his tongue loosed. *Mark* xxvii. 35.

Nothing; all is said;
His tongue is now a *stringless* instrument,
Words, life, and all, old Lancaster hath spent.
Shakspeare.

The most piteous tale, which in recounting,
His grief grew puissant, and the *strings* of life
Began to crack. *Id. King Lear.*

Duckweed putteth forth a little *string* into the water, from the bottom. *Bacon.*

Any lower bullet, hanging upon the other above it, must be conceived as if the weight of it were in that point where its *string* touches the upper.
Wilkins's Dædalus.

Thus when two brethren *strings* are set alike,
To move them both but one of them we strike.
Cowley.

Divinely warbled voice
Answering the *stringed* noise,
As all their souls in blissful rapture took. *Milton.*

No lover has that power
To enforce a desperate amour,
As he that has two *strings to 's bow*,
And burns for love and money too. *Hudibras.*

Their priests pray by their beads, having a *string* with a hundred of nutshells upon it; and the repeating of certain words with them they account meritorious. *Stillingfleet.*

Toil *strung* the nerves, and purified the blood.
Dryden.

In pulling broom up, the least *strings* left behind will grow. *Mortimer's Husbandry.*

A plain Indian fan, made of the small *stringy* parts of roots spread out in a round flat form. *Grew.*

The *string* that jars
When rudely touched, ungrateful to the sense,
With pleasure feels the master's flying fingers,
Swells into harmony, and charms the hearers.
Rowe.

I have caught two of these dark undermining vermin, and intend to make a *string* of them, in order to hang them up in one of my papers.
Addison's Spectator.

By the appearance they make in marble, there is not one *string* instrument that seems comparable to our violins. *Addison.*

Here the muse so oft her harp has *strung*,
That not a mountain rears its head unsung. *Id.*

Men of great learning or genius are too full to be exact; and therefore chuse to throw down their pearls in heaps before the reader, rather than be at the pains of *stringing* them. *Spectator.*

Round Ormond's knee thou tiest the mystick *string*,
That makes the knight companion to the king,
Prior.

By melting, expensive sweats, and an obstinate flux of the belly, the *stringy* parts of the tendons and members are left unrecruited. *Blackmore.*

Has not wise nature *strung* the legs and feet,
With firmest nerves, designed to walk the street?
Gay.

The *strung* bow points out the Cynthian queen.
Id.

Th' impetuous arrow whizzes on the wing,
Sounds the tough horn, and twangs the quiv'ring *string*. *Pope.*

Stringhalt is a sudden twitching and snatching up of the hinder leg of a horse much higher than the other, or an involuntary or convulsive motion of the muscles that extend or bend the hough.
Farrier's Dictionary.

STRIP, *v. a., v. n.,* & *n. s.* Saxon berrnire, stripped; Belgic *streopen;* Isl. *stryp,* is naked. To make naked; deprive of covering; (with *of* before the thing taken away); divest; rob; plunder; peel; take off covering; cast off: a narrow shred.

They *stript* Joseph out *of* his coat.
Gen. xxxvii. 23.

He *stript off* his cloaths. 1 *Sam.* xix. 24.

They began to *strip* her *of* her cloaths when I came in among them. *Sidney.*

The apostle, in exhorting men to contentment, although they have in this world no more than bare food and raiment, giveth us to understand that those are even the lowest of things necessary; that if we should be *stript of* all these things, without which we might possibly be, yet these must be left. *Hooker.*

His unkindness,
That *stript* her from his benediction, turned her
To foreign casualties, gave her dear rights
To his doghearted daughters: these things sting him. *Shakspeare.*

Scarce credible it is how soon they were *stript* and laid naked on the ground. *Hayward.*

Now this curious built Phæacian ship,
Returning from her convoy, I will *strip*
Of all her fleeting matter. *Chapman.*

We *strip* and divest ourselves *of* our own will, and give ourselves entirely up to the will of God. *Duppa.*

Hadst thou not committed
Notorious murder on those thirty men
At Askelon, who never did thee harm,
Then like a robber *stripp'dst* them *of* their robes. *Milton.*

If the leaves or dried stocks be *stripped* into small straws, they arise unto amber, wax, and other electrics, no other ways than those of wheat or rye. *Browne's Vulgar Errours.*

A rattling tempest through the branches went,
That *stript* them bare. *Dryden's Knight's Tale.*

He left the pillagers, to rapine bred,
Without controul to *strip* and spoil the dead. *Dryden.*

You cloath all that have no relation to you, and *strip* your master that gives you food. *L'Estrange.*

It is difficult to lead another by words into the thoughts of things, *stripped of* those specifick differences we give them. *Locke.*

Amongst men who examine not scrupulously their own ideas, and *strip* them not from the marks men use for them, but confound them with words, there must be endless disputes. *Id.*

That which lays a man open to an enemy, and that which *strips* him *of* a friend, equally attacks him in all those interests that are capable of being weakened by the one, and supported by the other. *South.*

When some fond easy fathers *strip* themselves before they lie down to their long sleep, and settle their whole estates upon their sons, has it not been seen that the father has been requited with beggary? *Id.*

One would imagine these to be the expressions of a man blessed with ease and affluence, not of one just *stript of* all those advantages, and plunged in the deepest miseries, and now sitting naked upon a dunghill. *Atterbury.*

The bride was put in form to bed;
He followed, *stript.* *Swift.*

These two apartments were hung in close mourning, and only a *strip* of bays round the other rooms. *Id.*

Logick helps us to *strip off* the outward disguise of things, and to behold and judge of them in their own nature. *Watts.*

STRIPE, *n. s.* Belg. *strepe;* Dan. *stribe.* A lineary variation of color; a streak. This seems to be the original notion of the word: a shred of different color: a weal or discoloration by a lash: hence a lash; a blow.

Gardeners may have three roots, among an hundred, that are rare, as purple and carnation of several *stripes.* *Bacon.*

A body cannot be so torn with *stripes,* as a mind with remembrance of wicked actions. *Hayward.*

To those that are yet within the reach of the *stripes* and reproofs of their own conscience, I would address that they would not seek to remove themselves from that wholesome discipline. *Decay of Piety.*

One of the most valuable trimmings of their cloaths was a long *stripe* sowed upon the garment, called latus clavus. *Arbuthnot.*

Cruelty marked him with inglorious *stripes.* *Thomson.*

STRIP'LING, *n. s.* Probably from Strip, a shred. A youth; one in the state of adolescence; a slender young man.

'Thwart the lane,
He, with two *striplings,* lads more like to run
The country base than to commit such slaughter,
Made good the passage. *Shakspeare. Cymbeline.*

Now a *stripling* cherub he appears,
Not of the prime, yet such as in his face
Youth smiled celestial. *Milton's Paradise Lost.*

Compositions on any important subjects are not matters to be wrung from poor *striplings;* like blood out of the nose, or the plucking of untimely fruit. *Id. On Education.*

As when young *striplings* whip the top for sport,
On the smooth pavement of an empty court,
The wooden engine whirls. *Dryden's Æneid.*

As every particular member of the body is nourished with a several qualified juice, so children and *striplings,* old men and young men, must have divers diets. *Arbuthnot on Aliments.*

STRIVE, *v. n. Pret.* I strove, anciently I strived; *part. pass.* striven. Sax. rrnıð; Belg. *streven;* Teut. *streben;* Fr. *estriver.* To struggle; labor; make an effort; contest; vie; emulate.

Strive for the truth unto death. *Ecclus* iv. 28.

Why dost thou *strive* against him? *Job* xxxiii. 13.

Strive with me in your prayers to God for me. *Romans* xv.

So have I *strived* to preach the gospel. *Id.* xv. 20.

Charge them that they *strive* not about words, to no profit. 2 *Timothy* ii. 14.

Many brave young minds have, through hearing the praises and eulogies of worthy men, been stirred up to affect the like commendations, and so *strive* to the like deserts. *Spenser.*

The immutability of God they *strive* unto, by working after one and the same manner. *Hooker.*

Do as adversaries do in law;
Strive mightily, but eat and drink as friends. *Shakspeare.*

Was it for this that Rome's best blood he spilt,
With so much falsehood, so much guilt?
Was it for this that his ambition *strove*
To equal Cæsar first, and after Jove? *Cowley.*

Now private pity *strove* with publick hate,
Reason with rage, and eloquence with fate. *Denham.*

Nor that sweet grove
Of Daphne by Orontes, and the inspired
Castalian spring, might with this paradise
Of Eden *strive*. *Milton.*

Thus does every wicked man that contemns God; who can save or destroy him who *strives* with his Maker? *Tillotson.*

If intestine broils alarm the hive,
For two pretenders oft for empire *strive*,
The vulgar in divided factions jar,
And murm'ring sounds proclaim the civil war.
Dryden.

This is warrantable conflict for trial of our faith; so that these *strivings* are not a contending with superior powers. *L'Estrange.*

Our blessed Lord commands you to *strive* to enter in; because many will fail, who only seek to enter. *Law.*

These thoughts he *strove* to bury in expence,
Rich meats, rich wines, and vain magnificence.
Harte.

STRIVALI (the ancient Strophades), a cluster of islands of the Ionian Sea, on the west coast of the Morea, four in number. The largest, the abode, according to the poets, of the harpies, abounds in olives and other fruit, but does not produce corn enough for its limited population. The smallest is little else than a rock, and the two others form a kind of small harbour. Twenty-six miles south of Zante.

STRIX, the owl, in ornithology, a genus belonging to the order of accipitres. The bill is hooked, but has no cere or wax; the nostrils are covered with setaceous feathers; the head is very large, as are also the ears and eyes; and the tongue is bifid. There are forty-six species; the most remarkable are, 1. S. brachyotos, the short-eared owl, is fourteen inches long; three feet broad; the head is small and hawk-like; the bill is dusky; weight fourteen ounces; the circle of feathers that immediately surrounds the eyes is black; the larger circle white, terminated with tawny and black; the feathers on the head, back, and coverts of the wings, are brown, edged with pale dull yellow; the breast and belly are of the same color, marked with a few long narrow streaks of brown pointing downwards; the quill-feathers are dusky, barred with red; the tail is of a very deep brown, adorned on each side of the shaft of the four middle feathers with a yellow circle which contains a brown spot; the tip of the tail is white. The horns of this species are very small, and each consists of only a single feather; these it can raise or depress at pleasure; and in a dead bird are with difficulty discovered. This kind is scarce; and is a solitary bird, avoiding inhabited places. This species may be called long-winged owls, the wings when closed reaching beyond the end of the tail; whereas in the common kinds they fall short of it. They are birds of passage, and have been observed to visit Lincolnshire in the beginning of October, and to retire early in the spring; so probably, as they perform their migrations with the woodcock, their summer retreat is Norway. During day, they lie hid in long old grass; when disturbed, seldom fly far, but will light, and sit looking at one, when the horns may be seen very distinctly. They do not perch on trees like other owls. They usually fly in search of prey in cloudy hazy weather. Farmers are fond of seeing these birds in the fields, as they clear them from mice. They are found frequently on the hill of Hoy in the Orkneys, where they fly about and prey by day like hawks. They are found also in Lancashire, and in New England and Newfoundland.

2. S. bubo, the great eared owl, in size is almost equal to an eagle. Irides bright yellow; head and whole body finely varied with lines, spots, and specks of black, brown, cinereous, and ferruginous. Wings long; tail short, marked with dusky bars. Legs thick, covered to the very end of the toes with a close and full down of a testaceous color. Claws great, much hooked, and dusky. They have been shot in Scotland and in Yorkshire. They inhabit inaccessible rocks and desert places; and prey on hares and feathered game. Their appearance in cities was deemed an unlucky omen; Rome itself once underwent a lustration because one of them strayed into the capitol. The ancients held them in the utmost abhorrence; and thought them, like the screech-owls, the messengers of death. Pliny styles it bubo funebris, and noctis monstrum.

3. S. Cayennensis, the spectacle owl of Cayenne, which is accurately described by Dr. Latham, is twenty-one inches in length: the upper parts of the body are of a reddish color; the lower parts of a rufous white: the head and neck are white, and not so full of feathers as those of owls generally are, and from this circumstance it appears not unlike a hawk: a large patch of dark brown surrounds each eye, giving the bird much the appearance of wearing spectacles; the legs are covered with feathers quite to the toes, and are of a yellowish color. A specimen of this curious bird may be seen in the Leverian museum.

4. S. flammea, the common white owl. The elegant plumage of this bird makes amends for the uncouthness of its form: a circle of soft white feathers surrounds the eyes. The upper part of the body, the coverts, and secondary feathers of the wings, are of a fine pale yellow: on each side of the shafts are two gray and two white spots, placed alternately; the exterior sides of the quill feathers are yellow; the interior white, marked on each side with four black spots: the lower side of the body is wholly white; the interior sides of the feathers of the tail are white; the exterior marked with some obscure dusky bars; the legs are feathered to the feet: the feet are covered with short hairs: the edge of the middle claw is serrated. The usual weight is eleven ounces; its length fourteen inches; its breadth three feet. This species is almost domestic; inhabiting, for the greatest part of the year, barns, hay lofts, and other out-houses; and are as useful in clearing those places from mice as the congenial cat: towards twilight they quit their perch, and take a regular circuit round the fields, skimming along the ground in quest of field mice, and then return to their usual residence: in the breeding season they take to the eaves of churches, holes in lofty buildings, or hollows of trees. During the time the young are in the nest, the male and female alternately sally out in quest of food, make their circuit,

beat the fields with the regularity of a spaniel, and drop instantly on their prey in the grass. They seldom stay out above five minutes; return with their prey in their claws; but as it is necessary to shift it into their bill, they always alight for that purpose on the roof, before they attempt to enter their nest. This species do not hoot, but snore and hiss in a violent manner; and, while they fly along, will often scream most tremendously. Their only food is mice. As the young of these birds keep their nest for a great length of time, and are fed even long after they can fly, many hundreds of mice will scarcely suffice to supply them with food. Owls cast up the bones, fur, or feathers of their prey, in form of small pellets, after they have devoured it, as hawks do. A gentleman, on grubbing up an old pollard ash that had been the habitation of owls for many generations, found at the bottom many bushels of this rejected stuff. Some owls, when they are satisfied, hide the remainder of their meat like dogs.

5. S. otus, the long eared owl, is found, though not frequently, in the north of England, in Cheshire, and in Wales. Mr. Hasselquist saw it alive in Cairo, and it is not unfrequent all over Egypt. Its weight, according to Dr. Latham, is nine ounces; the length fourteen inches and a half; the breadth thirty-four; the irides are of a bright yellow; the bill black; the breast and belly are of a dull yellow, marked with slender brown strokes pointing downwards; the thighs and vent-feathers of the same color, but unspotted. The back and coverts of the wing are varied with deep brown and yellow; the quill feathers of the same color, but near the ends of the outmost is a broad bar of red; the tail is marked with dusky and reddish bars, but beneath appears ash-colored; the horns or ears are about an inch long, and consist of six feathers variegated with yellow and black; the feet are feathered down to the claws.

6. S. passerina, the little owl, is very rare in England; it is sometimes found in Yorkshire, Flintshire, and also near London: in size it scarcely exceeds a thrush, though the fulness of its plumage makes it appear larger: the irides are of a light yellow; the bill of a paper color; the feathers that encircle the face are white tipt with black; the head brown, spotted with white; on the breast is a mixture of white and brown; the belly is white, marked with a few brown spots; the tail of the same color with the back; in each feather barred with white; in each adorned with circular white spots, placed opposite to one another on both sides of the shaft; the legs and feet are covered with feathers down to the claws. The Italians make use of this owl to decoy small birds to the limed twig; the method of which is exhibited in Olina's Uccelliera, p, 65. Mr. Stuart, author of the Antiquities of Athens, informed Mr. Pennant that this species of owl was very common in Attica; that they were birds of passage, and appeared there in the beginning of April in great numbers; that they bred there; and that they retired at the same time as the storks, whose arrival they a little preceded.

7. S. stridula. the tawny owl. The female of this species weighs nineteen ounces; the length is fifteen inches; the breadth two feet eight inches; the irides are dusky; the ears in this, as in all owls, very large; and their sense of hearing very exquisite. The color of this kind is sufficient to distinguish it from every other: that of the back, head, coverts of the wings, and on the scapular feathers, being a fine tawny red, elegantly spotted and powdered with the black or dusky spots of various sizes: on the coverts of the wings, and on the scapulars, are several large white spots: the coverts of the tail are tawny, and quite free from any marks: the tail is variously blotched, barred, and spotted with pale red and black; in the two middle feathers the red predominates; the breast and belly are yellowish, mixed with white, and marked with narrow black strokes pointing downwards: the legs are covered with feathers down to the toes. This is a hardier species than the Flammea; and the young will feed on any dead thing, whereas those of the white owl must have a constant supply of fresh meat. It is the strix of Aldrovandus, and what we call the screech-owl, or lich owl, to which the folly of superstition had given the power of presaging death by its cries. The ancients believed that it sucked the blood of young children: a fact some think not incredible; for Hasselquist describes a species found in Syria, which frequently in the evening flies in at the windows, and destroys the helpless infant. See *Ovid. Fast.* vi. 135.

8. S. ulula, the brown owl, agrees with the former in its marks; differing only in the colors: in this the head, wings, and back, are of a deep brown, spotted with black in the same manner as the former; the coverts of the wings and the scapulars are adorned with similar white spots; the exterior edges of the four first quill feathers in both are serrated: the breast in this is of a very pale ash color mixed with tawny, and marked with oblong jagged spots: the feet too are feathered down to the very claws: the circle round the face is ash-colored, spotted with brown. Both these species inhabit woods, where they reside the whole day: in the night they are very clamorous; and, when they hoot, their throats are inflated to the size of a hen's egg. In the dusk they approach our dwellings; and will frequently enter pigeon-houses, and make great havoc in them. They destroy numbers of little leverets, as appears by the legs frequently found in their nests. They also kill abundance of moles, and skin them with as much dexterity as a cook does a rabbit. They build in hollow trees or ruined edifices; lay four eggs, of an elliptic form, and of a whitish color.

STROGONOFF (count Alexander de), a Russian nobleman, born about the middle of the eighteenth century, received a good education, and in his youth displayed a strong taste for French literature. Several years which he passed at Paris doubtless occasioned this partiality; returning to St. Petersburg, he was nominated president of the Academy of the Fine Arts, and made a noble use of his immense riches, by giving an asylum in his palace to authors and artists, and by forming a valuable collection of paintings, medals, and engravings, and a rich li-

brary. He died at Petersburg, September 27th, 1811.

Strogonoff (count Paul), nephew of the above, entered into the army, and served in Austria in 1805, and in Prussia in 1807, when he was made adjutant major-general. He was afterwards employed against the Swedes in Finland, and against the Turks in Moldavia; and after being engaged against the French, in the campaigns of 1812 and 1813, was killed under the walls of Laon, in February 1814.

Strogonoff (baron Alexander de), born in 1772, displayed an early genius for learning and the arts, and travelled in Germany, France, and Italy. He published at Geneva, in 1809, two volumes of Letters to his Friends, written with great taste, to which were added two remarkable little pieces, entitled The History of the Chevaliers de la Vallée: and the History of Pauline Dupuis. The baron then labored under a state of blindness and debility, which did not, however, disturb the tranquillity of his mind. His death took place in September, 1815.

STROKE, *n. s.* & *v. a.* From strook, the preterite of strike. A blow; knock; hostile blow or act; sudden act of one body upon another; sudden disease; sound of a clock; touch; power; efficacy.

He, hoodwinked with kindness, least of all men knew who *stroke* him. *Sidney.*

As cannons overcharged with double cracks,
So they redoubled *strokes* upon the foe. *Shakspeare.*
What is 't o'clock?
—Upon the *stroke* of four. *Id. Richard III.*

Take this purse, thou whom the heavens' plagues
Have humbled to all *strokes*. *Id. King Lear.*
The oars were silver,
Which to the tune of flutes kept *stroke*, and made
The water which they beat to follow faster,
As amorous of their *strokes*.
Id. Antony and Cleopatra.

He entered, and won the whole kingdom of Naples, without striking a *stroke*. *Bacon.*

These having equal authority for instruction of the young prince, and well agreeing, bare equal *stroke* in divers faculties. *Hayward.*

He was taken prisoner by Surinas, lieutenant-general for the king of Parthia, who *stroke* off his head. *Hakewill.*

Perfectly opacous bodies can but reflect the incident beams; those that are diaphanous refract them too, and that refraction has such a *stroke* in the production of colours generated by the trajection of light through drops of water, that exhibit a rainbow through divers other transparent bodies. *Boyle.*

Then on the crowd he cast a furious look,
And withered all their strength before he *strook*.
Dryden.

Both were of shining steel, and wrought so pure,
As might the *strokes* of two such arms endure. *Id.*

He has a great *stroke* with the reader, when he condemns any of my poems, to make the world have a better opinion of them. *Id.*

Another in my place would take it for a notable *stroke* of good breeding, to compliment the reader. *L'Estrange.*

The subtile effluvia of the male seed have the greatest *stroke* in generation. *Ray.*

As he purchased the first success in the present war, by forcing into the service of the confederates an army that was raised against them, he will give one of the finishing *strokes* to it, and help to conclude the great work. *Addison.*

A verdict more puts me in possession of my estate; I question not but you will give it the finishing *stroke*. *Arbuthnot.*

Oh lasting as those columns may they shine!
Free as thy *stroke*, yet faultless as thy line. *Pope.*

I had a long design upon the ears of Curl; but the rogue would never allow me a fair *stroke* at them, though my penknife was ready. *Swift.*

At this one *stroke* the man looked dead in law;
His flatterers scamper, and his friends withdraw.
Harte.

Isiodore's collection was the great and bold *stroke*, which in its main parts has been discovered to be an impudent forgery. *Baker on Learning.*

Stroke, *v. a.* Sax. ꝼtpacan. To rub gently with the hand by way of kindness or endearment; to sooth.

The senior weaned his younger shall teach,
More *stroken* and made of when aught it doth aile
More gentle ye make it for yoke or the paile.
Tusser.

Thus children do the silly birds they find
With *stroaking* hurt, and too much cramming kill.
Sidney.

Thy praise or dispraise is to me alike,
One doth not *stroke* me, nor the other strike.
Ben Jonson.

He set forth a proclamation, *stroaking* the people with fair promises, and humouring them with invectives against the king and government. *Bacon.*

He dried the falling drops, and, yet more kind,
He *stroked* her cheeks. *Dryden.*

She plucked the rising flowers, and fed
The gentle beast, and fondly *stroaked* his head.
Addison.

When the big-uddered cows with patience stand,
Waiting the *strokings* of the damsel's hand. *Gay.*

Stroking, or rubbing gently with the hand, a method which has been employed by some persons for curing diseases. Mr. Greatrakes, or Greatrix, the famous Irish stroker, is said to have performed many wonderful cures. But, if they really were effected, they are most undoubtedly to be attributed to the imagination of the patient, rather than the operation of the practitioner.

STROLL, *v. n.* } Fr. *rouler*; qu. Lat. *extra*
Strol'ler, *n. s.* } and *roll*. To wander; ramble; rove; be a vagrant: the noun substantive corresponding.

'Tis she who nightly *strowls* with sauntering pace.
Gay.

She's mine, and thine, and *strolling* up and down.
Granville.

Your wine locked up, your butler *strolled* abroad.
Pope.

These mothers *stroll*, to beg sustenance for their helpless infants. *Swift.*

Two brother-hermits, saints by trade,
Disguised in tattered habits went
To a small village down in Kent;
Where, in the *stroller's* canting strain,
They begged from door to door in vain. *Id.*

The men of pleasure, who never go to church, form their ideas of the clergy from a few poor *strollers* they often observe in the streets. *Id.*

STROMATEUS, in icthyology, a genus of fishes belonging to the order of apodes. The head is compressed; the teeth are placed in the jaws and palate; the body is oval and slippery;

and the tail is forked. There are three species: 1. S. cumarca; 2. S. fiatola; 3. S. paru; according to Dr. Gmelin.

STROMBOLI, the most northerly of the Lipari islands, in the Mediterranean, belonging to Naples. Though small it produces very good wine, and the climate is mild and pleasant. The inhabitants derive their subsistence partly from fishing, partly from the cultivation of fruits. Stromboli has from time immemorial been remarkable for its volcano, the only one, perhaps, whose fires are in a state of incessant activity. Its mountain has two summits, one of great height, but the crater is on its side. The eruptions last for a few moments, but, recurring at short intervals, the flames are seen by night, at a great distance, and are of considerable service to navigators. It is called sometimes the great light-house of the Mediterranean. The matter thrown out consists of lava, ashes, and stones; and each eruption is attended with an explosive noise. Sixteen miles N. N. E. of Lipari, and thirty-four north of Melazzo, in Sicily.

STROMBUS, in natural history, a genus of vermes, belonging to the order of testacea. The animal is a limax; the shell is univalve and spiral; the opening is much dilated, and ends in a canal which turns to the left. Gmelin enumerates fifty-three species; of which only one is peculiar to Britain, viz. S. pes pelicani. The spires are ten; the lip is fingered; the point very sharp; the length two inches.

STROMOE, the largest of the Faroe Islands, is situated in the centre of the group, and is about thirty miles in length, and six in breadth. It is deeply indented by bays and creeks, some of which form good harbours, particularly that of Westmanshavn, fit for the reception of vessels of any size. The coast presents a series of sublime scenery, the rocks rising in bold cliffs, almost perpendicular to the water, and forming in many places lofty detached columns: often are they hollowed so as to form immense caverns; and in some cases they are completely perforated, and afford a passage for boats. In the interior is the mountain called Skieling Field, which rises to a perpendicular height of 3000 feet. The population of this and the neighbouring island, Nalsoe, is about 1600; subsisting, as in the other Faroe Isles, by fishing, cultivating a little corn, and rearing cattle, but depending on Denmark for annual supplies. In 1812 the number of horned cattle was 600, of sheep 9000, and of fishing-boats 150. The chief town is Thorrhaven.

STROMSTADT, a small town in West Gothland, Sweden, celebrated for its shell-fish, particularly lobsters. It lies in a hilly district, contains 1100 inhabitants, and has a good harbour. Forty-three miles N. N. W. of Uddevalla. Long. 11° 12′ E., lat. 58° 55′ 30″ N.

STROND, *n. s.* For strand. The beach; the bank of the water. Obsolete.

So looks the *strond* whereon the' imperious flood
Hath left a witnessed usurpation. *Shakspeare.*

STRONG, *adj.* Sax. ȝrpang. Vigorous; forceful; of great power or ability; ardent; eager; full; potent; valid; confirmed; cogent: the adverb corresponding: the compounds of obvious meaning.
STRONGFIST'ED,
STRONGHAND, *n. s.*
STRONG'LY, *adv.*
STRONGWATER, *n. s.*

That our oxen may be *strong* to labour.
Psalm cxliv. 14.

While there was war between the houses of Saul and David, Abner made himself *strong* for Saul.
2 *Sam.* iii. 6.

Let the foundations be *strongly* laid. *Ezra* vi. 3.

Produce your cause; bring forth your *strong* reasons. *Isaiah.*

In the days of his flesh he offered up prayers, with *strong* crying and tears. *Heb.* v. 7.

Strong meat belongeth to them that are of full age. *Hebrews.*

In process of time, an ungodly custom grown *strong* was kept as a law. *Wisdom* xiv. 16.

Better is the poor, being sound and *strong* in constitution, than a rich man afflicted in his body.
Ecclus. xxx. 14.

Though 'gan the villain wax so fierce and *strong*
That nothing may sustain his furious force,
He cast him down to ground, and all along
Drew him through dirt and mire. *Spenser.*

When their captain dieth, if the seniory should descend to his child, and an infant, another would thrust him out by *stronghand*, being then unable to defend his right. *Id.*

There is no English soul
More *stronger* to direct you than yourself,
If with the sap of reason you would quench,
Or but allay, the fire of passion.
Shakspeare. Henry VIII.

Messengers
Of *strong* prevailment in unhardened youth.
Shakspeare.

Within Troy's *strong* immures
The ravished Helen with wanton Paris sleeps. *Id.*

The *strong*-winged Mercury should fetch thee up
And set thee by Jove's side.
Id. Antony and Cleopatra.

When he was not six-and-twenty *strong*,
Sick in the world's regard, wretched and low,
My father gave him welcome to the shore.
Id. Henry IV.

All those accuse him *strongly*. *Shakspeare.*

Great Dunsinane he *strongly* fortifies. *Id.*

Her mother, ever *strong* against that match,
And firm for doctor Caius, hath appointed
That he shall shuffle her away. *Id.*

They wanting land wherewith to sustain their people, and the Tuscans having more than enough, it was their meaning to take what they needed by *stronghand*. *Raleigh.*

An army of English engaged between an army of a greater number, fresh and in vigour on the one side, and a town *strong* in fortification, and *strong* in men, on the other. *Bacon.*

The colewort is an enemy to any plant, because it draweth *strongly* the fattest juice of the earth. *Id.*

He was, at his rising from Exeter, between six and seven thousand *strong*. *Id.*

This is one of the *strongest* examples of a personation that ever was. *Id.*

In choice of committees for ripening business for the council, it is better to chuse indifferent persons than to make an indifferency by putting in those that are *strong* on both sides. *Id.*

Metals receive in readily *strongwaters*; and *strongwaters* do readily pierce into metals and stones: and some will touch upon gold that will not touch upon silver. *Id. Natural History.*

Many of their propositions savour very *strong* of the old leaven of innovations. *King Charles.*

What *strong* cries must they be that shall drown so loud a clamour of impieties! *Decay of Piety.*

The scriptures make deep and *strong* impressions on the minds of men: and whosoever denies this, as he is in point of religion atheistical, so in understanding brutish. *Corbet.*

The prince of Cambay's daily food
Is asps, and basilisk, and toad;
Which makes him have so *strong* a breath,
Each night he stinks a queen to death. *Hudibras.*

A river of so *strong* a current that it suffereth not the sea to flow up its channel. *Heylyn.*

I was *stronger* in prophecy than in criticism. *Dryden.*

Add with Cecropian thyme *strong*-scented centaury. *Id.*

The Marsian and Sabellian race,
Strong-limbed and stout. *Id.*

It is no matter how things are; so a man observe but the agreement of his own imaginations, and talk conformably, it is all truth: such castles in the air will be as *strong* holds of truth as the demonstrations of Euclid. *Locke.*

Like her sweet voice is thy harmonious song,
As high, as sweet, as easy, and as *strong*. *Smith.*

The weak, by thinking themselves *strong*, are induced to proclaim war against that which ruins them; and the *strong*, by conceiting themselves weak, are thereby rendered as useless as if they really were so. *South's Sermons.*

Those that are *strong* at sea may easily bring them to what terms they please. *Addison.*

The dazzling light
Had flashed too *strongly* on his aking sight. *Id.*

The knight is a much *stronger* tory in the country than in town, which is necessary for the keeping up his interest. *Id.*

But her own king she likens to his Thames,
Serene yet *strong*, majestick yet sedate,
Swift without violence, without terror great. *Prior.*

By mixing such powders, we are not to expect a *strong* and full white, such as is that of paper; but some dusky obscure one, such as might arise from a mixture of light and darkness, or from white and black, that is, a grey, or dun, or russet brown. *Newton's Opticks.*

The heat of a human body, as it grows more intense, makes the urine smell more *strong*. *Arbuthnot.*

John, who was pretty *strongfisted*, gave him such a squeeze as made his eyes water. *Id.*

Water impregnated with salt attenuates *strongly*. *Id.*

The *strongest* and most important texts are these which have been controverted; and for that very reason, because they are the *strongest*. *Waterland.*

In Britain's lovely isle a shining throng
War in his cause, a thousand beauties *strong*. *Tickell.*

Full on his ankle fell the ponderous stone,
Burst the *strong* nerves, and crashed the solid bone. *Pope.*

Get *strong* beer to rub your horse's heels. *Swift.*

The ruinous consequences of Wood's patent have been *strongly* represented by both houses. *Id.*

When the attention is *strongly* fixed to any subject, all that is said concerning it makes a deeper impression. *Watts.*

Strong (Joseph), an extraordinary genius, born in Carlisle. Though blind from his birth, he displayed an amazing degree of skill in mechanics. He not only made all his own wearing apparel, but constructed an organ, and played well upon it. He went to London for the express purpose of visiting Mr. Stanley, the blind organist. He also made a great number of mechanical figures and machines; and died at Carlisle in 1798.

STRONGYLE, in ancient geography, one of the Æolides in the Tyrrhene Sea, on the coast of Sicily; called also Naxos; and now called Stromboli. It has a volcano, ten miles in circumference. See Stromboli.

STRONTIA. Its basis is strontium, a metal first procured by Sir H. Davy in 1808, precisely in the same manner as barium, to which it is very analogous, but has less lustre. It appeared fixed, difficultly fusible, and not volatile. It became converted into strontia by exposure to air, and, when thrown into water, decomposed it with great violence, producing hydrogen gas, and making the water a solution of strontia. By igniting the mineral strontianite (see Heavy Spar) intensely with charcoal powder, strontia is cheaply procured. Sir H. Davy, from indirect experiments, is disposed to regard it as composed of about 86 strontium + 14 oxygen, in 100 parts; and, supposing it to be composed of a prime proportion of each constituent, the equivalent prime of strontium would be 6·143, and of strontia 7·143. But from the proportions of the constituents in the carbonate, the prime of strontia appears to be 6·4 or 6·5; and hence that of strontium will be 5·5.

A beautiful red fire, now so frequently used at the theatres, is composed of the following ingredients: forty parts dry nitrate of strontian, thirteen parts of finely powdered sulphur, five parts of chlorate of potash (hyperoxymuriate), and four parts of sulphuret of antimony. The chlorate of potash and sulphuret of antimony should be powdered separately in a mortar, and then mixed together on paper; after which they may be added to the other ingredients, previously powdered and mixed. No other kind of mixture than rubbing together on paper is required. Sometimes a little realgar is added to the sulphuret of antimony, and frequently, when the fire burns dim and badly, a very small quantity of very finely powdered charcoal or lamp-black will make it perfect.

STRONTIAN, in geography, a district of Argyllshire, in the parish of Ardnamurchan, long famous for its lead mines; but now famous for the recent discovery of a new species of earth or stone, found in it, and named from it.

Strontian, a village in the above district, erected for the accommodation of the miners.

Strontian, in mineralogy, a new species of earth lately discovered at Strontian. Dr. Kirwan says, the first information he received of it was from Dr. Crawford in 1790. In the Miners Journal for February 1791 a good description of its external appearance, with some account of its chemical properties, was published from the observations of Mr. Sulzer. Its external characters are these: its color is whitish or light green; its lustre common; its transparency intermediate between the semitransparent and opaque; its fracture striated, presenting oblong distinct concretions, somewhat uneven and bent; its hardness moderate, being easily scratched, but not scraped. It is very brittle; and its specific gravity from 3·4 to 3·644. For a farther account of its chemical qualities, see Mineralogy, and

Thom. Chem. vol. I. p. 422, &c. It is not affected by the sulphuric acid; but, when diluted, 10,000 parts of it will dissolve one of strontian. Diluted nitric acid dissolves it rapidly. The muriatic acid, whether diluted or oxydated, dissolves it in a similar manner. It has a strong resemblance to barytes, but essentially differs from it. Its specific gravity is less; it parts with its carbonic acid when urged by heat somewhat more readily, and without suffering fusion; when calcined, it imbibes moisture with vastly greater avidity, swelling and cracking with more heat and noise. Strontian dissolves much more abundantly in hot water than barytes; and the form of the crystals of these pure earths is very dissimilar. The compounds of strontian differ from those of barytes. This earth, united to nitric and muriatic acid, forms salts that suffer changes from exposure to air, which do not happen to the nitrate and muriate of barytes. They are likewise much more soluble in water, and have crystals of a peculiar figure. The combinations of strontian with acids are not, like those of barytes, decomposed by prussiate of lime or of potash. Strontian and its compounds tinge flame, which barytes does not. Lastly, these earths disagree in the order of their attractions. It is also distinguished from limestone; for it is much heavier, and retains its fixed air with more obstinacy in the fire. The incomparably greater solubility of the pure earth in hot than in cold water, and the crystalline form it assumes, sufficiently distinguish it from lime, which the disposition of the nitrate and muriate to crystallize no less tends to do. 100 parts of strontian are composed of 61·21 of earth, 30·20 of carbonic acid, and 8·59 of water.

STRONTITES, the name first given by Dr. Charles Hope to the new earth; now called strontian, from the district where it was first discovered

STROPHADES, in ancient geography, two islands in the Mediterranean, on the west coast of Peloponnesus, formerly called Plotæ; famous in the mythology for being the scene where Phineus was tormented by the Harpies; till he was delivered from them by his brothers-in-law, Calais and Zethes. The largest is five miles in circumference. Æneas's fleet stopped at them. They are now called Strivali.

STROPHE, in ancient poetry, was a certain number of verses, including a perfect sense, and making the first part of an ode.

STROPHIUS, in history partly fabulous, the son of Crisus, and king of Phocis. He married Anaxibia, the sister of Agamemnon, by whom he had Pylades, celebrated for his friendship with his cousin Orestes; who, upon the murder of Agamemnon, was taken home by Strophius, and educated with his own son. See these articles.

STROPHULUS, in medicine, a papulous eruption, peculiar to infants, and exhibiting a variety of forms, described by Dr. Willan under the titles of intertinctus, albidus, confertus, volaticus, and candidus.

1. S. intertinctus, usually called the red gum, and by the French efflorescence benigne. The papulæ characterising this affection rise sensibly above the level of the cuticle, are of a vivid red color, and commonly distinct from each other. Their number and extent varies much in different cases. They appear most constantly on the cheeks, fore-arm, and back of the hand, but are sometimes diffused over the whole body. The papulæ are, in many places, intermixed with stigmata, and often with red patches of a larger size, which do not, however, occasion any elevation of the cuticle. A child's skin thus variegated somewhat resembles a piece of red printed linen; and hence this eruption was formerly called the red gown, a term which is still retained in several counties of England, and may be found in old dictionaries. Medical writers have changed the original word for one of a similar sound, but not more significant. The strophulus intertinctus has not, in general, any tendency to become pustular, a few small pustules containing a straw-colored watery fluid occasionally appear on the back of the hand, but scarcely merit attention, as the fluid is always re-absorbed in a short time without breaking the cuticle. The eruption usually terminates in scurf, or exfoliation of the cuticle; its duration, however, is very uncertain, the papulæ and spots sometimes remain for a length of time without an obvious alteration, sometimes disappear and come out again daily; but, for the most part, one eruption of them succeeds another at longer intervals and with more regularity. This complaint occurs chiefly within the two first months of lactation. It is not always accompanied with or preceded by any disorders of the constitution, but appears occasionally in the strongest and most healthy children. Some authors connect it with aphthous ulcerations common in children, supposing the latter to be a part of the same disease diffused along the internal surfaces of the mouth and intestines. The fact however seems to be that the two affections alternate with each other; for those infants who have the papulous eruption on the skin are less liable to aphthæ; and when the aphthæ takes place to a considerable degree the skin is generally pale and free from eruption. The strophulus intertinctus is, by most writers, said to originate from an acidity, or acrimonious quality of the milk taken into a child's stomach, communicated afterwards to the blood, and stimulating the cutaneous excretories. This opinion might, without difficulty, be proved to have little foundation. The pre-disposition to the complaint may be deduced from the delicate and tender state of the skin, and from the strong determination of blood to the surface, which evidently takes place in infants. The papulous eruption is, in many cases, connected with a weak, irritable state of the alimentary canal, and consequent indigestion. For, if it be by any means suddenly repelled from the surface, diarrhea, vomiting, spasmodic affections of the bowels, and often general disturbance of the constitution succeed; but as soon as it re-appears those internal complaints are wholly suspended. Dr. Armstrong and others have particularly noted this reciprocation which makes the red gum, at times, a disease of some importance, though in its usual form it is not thought to be in any respect dangerous. On their remarks a necessary caution

is founded, not to expose infants to a stream of very cold air, nor to plunge them unseasonably in a cold bath. The most violent and even fatal symptoms have often been the consequence of such imprudent conduct.

2. S. albidus, by some termed the white gum, is merely a variety of strophulus intertinctus, but deserves some notice on account of the different appearance of its papulæ. In place of those described as characterising the red gum, there is a number of minute whitish specks, a little elevated, and sometimes, though not constantly, surrounded by a slight redness. These papulæ, when their tops are removed, do not discharge any fluid; it is, however, probable that they are originally deformed by the deposition of a fluid which afterwards concretes under the cuticle. They appear chiefly on the face, neck, and breast, and are more permanent than the papulæ of the red gum. In other respects they have the same nature and tendency, and require a similar plan of treatment. Although a distinctive name has been applied to this eruption, when occurring alone, yet it is proper to observe that in a great number of cases there are red papulæ and spots intermixed with it, which prove its connexion with the strophulus intertinctus.

3. S. confertus. An eruption of numerous papulæ, varying in their size, appears on different parts of the body in infants during dentition, and has thence been denominated the tooth rash: it is sometimes also termed the rank red gum. About the fourth or fifth month after birth an eruption of this kind usually takes place on the cheeks and sides of the nose, extending sometimes to the forehead and arms, but rarely to the trunk or body. The papulæ on the face are smaller and set more closely together than in the red gum; their color is not so vivid, but they are generally more permanent. They terminate at length with slight exfoliations of the cuticle, and often appear again in the same places a short time afterwards. The papulæ which in this complaint occasionally appear on the back or loins, are much larger, and somewhat more distant from each other, than those on the face. They are often surrounded by an extensive circle of inflammation, and a few of them contain a semi-pellucid watery fluid, which is re-absorbed when the inflammation subsides. In the seventh or eighth the strophulus confertus assumes a somewhat different form: one or two large irregular patches appear on the arms, shoulder, or neck; in which the papulæ are hard, of a considerable size, and set so close together that the whole surface is of a high red color. Most commonly the fore-arm is the seat of this eruption, the papulæ rising first on the back of the hand and gradually extending upwards along the arm. Sometimes, however, the eruption commences at the elbow, and proceeds a little upwards and downwards on the outside of the arm. It arrives at its height in about a fortnight; the papulæ then begin to fade and become flat at the top, afterwards the cuticle exfoliates from the part affected, which remains discolored, rough, and irregular, for a week or two longer.

An obstinate and very painful modification of this disease takes place, though not often, on the lower extremities. The papulæ spread from the calves of the legs to the thighs, nates, loins, and round the body as high as the navel: being very numerous and close together they produce a continuous redness over all the parts above-mentioned. The cuticle presently, however, shrivels, cracks in various places, and finally separates from the skin in large pieces. During this process a new cuticle is formed, notwithstanding which the complaint recurs in a short time and goes through the same course as before. In this manner successive eruptions take place during the course of three or four months, and perhaps do not cease till the child is one year old, or somewhat more. Children necessarily suffer great uneasiness from the heat and irritation occasioned by so extensive an eruption, yet, while they are affected with it, they often remain free from any internal or febrile complaint. This appearance should be distinguished from the intertrigo of infants, which exhibits a uniform, red, smooth, shining surface, without papulæ, and which affects only the lower part of the nates and inside of the thighs, being produced by the stimulus of the urine, &c., with which the child's clothes are almost constantly wetted. The strophulus confertus, where the child is otherwise healthy, is generally ascribed to a state of indigestion, or some feverish complaint of the mother or nurse. Dr. Willan, however, asserts that he has more frequently seen the eruption when no such cause was evident. It may with more probability be considered as one of the numerous symptoms of irritation arising from the inflamed and painful state of the gums in dentition; since it always occurs during that process, and disappears soon after the first teeth have cut the gums.

4. S. volaticus is characterised by an appearance of small circular patches, or clusters of papulæ, arising successively on different parts of the body. The number of papulæ in each cluster is from six to twelve. Both the papulæ and their interstices are of a high red color. These patches continue red with a little heat or itching for about four days, when they turn brown and begin to exfoliate. As one patch declines another appears at a small distance from it, and in this manner the complaint often spreads gradually over the face, body, and limbs, not terminating in less than three or four weeks. During that time the child has sometimes a quick pulse, a white tongue, and seems uneasy and fretful. In many cases, however, the eruption takes place without any symptoms of internal disorder. The above complaint has been by some writers denominated ignis volaticus infantum: under this title Astruc and Lorry have described one of the forms of crusta lactea, in which a successive eruption of pustules takes place on the same spot, generally about the mouth or eyes, in children of different ages, and sometimes in adults. The maculæ volaticæ infantum mentioned by Wittichius, Sennertus, and Sebizeus, agree in some respect with the strophulus volaticus; but they are described by other German authors as a species of erysipelas, or as irregular efflorescences affecting the genitals of infants, and often proving fatal. The strophulus volaticus is a complaint by

no means frequent. In most cases which have come under Dr. Willan's observation it appeared between the third and sixth month; in one instance, however, it occurred about ten days after birth, and continued three weeks, being gradually diffused from the cheeks and forehead to the scalp, afterwards to the trunk of the body and to the extremities; when the patches exfoliated, a red surface was left with slight border of detached cuticle.

5. S. candidus. In this form of strophulus the papulæ are larger than in any of the foregoing species. They have no inflammation round their base; their surface is very smooth and shining, whence they appear to be of a lighter color than the adjoining cuticle. They are diffused, at a considerable distance from each other, over the loins, shoulders, and upper part of the arms; in any other situation they are seldom found. This eruption affects infants about a year old, and most commonly succeeds some of the acute diseases to which they are liable. Dr. Willan has observed it on their recovery from a catarrhal fever, and after inflammations of the bowels or lungs. The papulæ continue hard and elevated for about a week, then gradually subside and disappear.

STROUD, a town and parish in Shamwell hundred, Kent, is separated from Rochester by the river Medway, over which it has a stone bridge of eleven arches. It is twenty-eight miles and a half east from London. The church is a handsome building, consisting of a nave and two aisles, 100 feet in length. In the south aisle is a stone chapel, the pavement of which contains several specimens of Mosaic; and the remains of an ancient mansion of the Knights'-Templars is still discernible in a farm-house now called the Temple-house, on the banks of the river. Fair, 28th of August.

Stroud, a market-town, in Bisley hundred, Gloucester, situate on an eminence near the Stroud-water, which empties itself into the Severn, ten miles south-east of Gloucester, and 102 west by north from London. Its water is celebrated for the dyeing of scarlet and other grain colors, on which account the clothing trade has been extended for upwards of twenty miles along the river, and on its banks are several fulling-mills. The Severn canal passes this town to Cirencester, and joins the Thames at Lechlade. The church is a good building, having a high spire at the west end and a tower in the middle. Here are also meeting-houses for the dissenters, an endowed free-school, and several charity-schools. Market on Friday. Fairs, May 12th and August 21st. It returns two members

STROUT, *v. a.* For Strut. To swell out; to puff out; to enlarge by affectation.

I will make a brief list of the particulars in an historical truth nowise *strouted*, nor made greater by language. *Bacon.*

STROY, *v. a.* For destroy.

Dig garden, *stroy* mallow, now may you at ease. *Tusser.*

STROZZI (Cyriacus), a Peripatetic philosopher, born at Florence, in 1504. He became professor of philosophy, and of Greek at Florence, Bologna, and Pisa; and in all these places was much esteemed. He added two books in Greek and Latin to Aristotle's Treatise De Republica; and died in 1565.

Strozzi (Titus and Hercules), father and son, two Italian poets, natives of Ferrara. They both wrote in Latin, and their poems were printed together in 8vo. at Venice, in 1513. They consist of elegies, odes, &c., in a pleasing style. Titus was born in 1422, and died in 1502, aged eighty. Hercules, his son, was killed by a rival in 1508.

STRUCK. The old preterite and participle passive of strike.

Down fell the duke, his joints dissolved asunder,
Blind with the light, and *strucken* dead with wonder. *Fairfax.*

All liquors *strucken* make round circles, and dash. *Bacon.*

Silent, and in face
Confounded, long they sat as *strucken* mute. *Milton.*

This message bear: the Trojans and their chief
Bring holy peace, and beg the king's relief;
Struck with so great a name, and all on fire,
The youth replies, whatever you require. *Dryden.*

In a regular plantation, I can place myself in its several centers, so as to view all the walks *struck* from them. *Spectator.*

Some to conceit alone their taste confine,
And glittering thoughts *struck* out at every line. *Pope.*

STRUCTURE, *n. s.* Fr. *structure;* Lat. *structura, structus.* Act or practice of building; the manner of building; building made.

Echatana her *structure* vast there shews,
And Hecatomphylos her hundred gates. *Milton.*

His son builds on, and never is content,
Till the last farthing is in *structure* spent. *Dryden.*

Several have gone about to inform them; but, for want of insight into the *structure* and constitution of the terraqueous globe, have not given satisfaction. *Woodward.*

High on a rock of ice the *structure* lay. *Pope.*
There stands a *structure* of majestick frame. *Id.*

STRUDEL (Peter), an eminent historical painter, born in the Tyrolese, in 1680. He settled at Vienna, where he adorned the palaces and churches with many fine paintings. He died in 1717.

STRUENSEE (John Frederick) was the son of a clergyman of Halle, in Saxony, and born in 1737. At an early age he manifested promising talents, and devoted himself to the study of medicine; having taken his degree of doctor in 1757 he removed to Altona, and there obtained extensive practice. Besides the acquaintance he formed with two persons, viz. count Von Ranzau Aschberg and count Brandt, connected with his subsequent fate, he acquired also, in the course of his practice, the friendship of the widow of the chief marshal of the court to Frederic V.; and thus was honored with an appointment, in 1768, to be one of the physicians of the king, whom he accompanied in his tour to Germany, France, and England. Soon after the marriage of Christian VII. with Matilda, the English princess, an open rupture succeeded a coolness that was observed to subsist between this prince and the queen. The queen-dowager availed herself of this circumstance with a view of recovering her influ

ence. On the birth of the crown-prince the misunderstanding between the queens increased; nor did the king's tour contribute to lessen his indifference towards his consort. On his return the discontent was manifested openly, and divided the nation into two parties. The most numerous party was supported by the minister and the principal officers of state; and at the head of it was count Holk, the king's favorite. The queen-dowager had her partisans at Friedensburg; and some young persons, who had neither influence nor property, took part with Matilda, and entertained hopes that, on account of her youth, beauty, and engaging manners, a reconciliation might be effected between her and the king. The young queen, however, well knowing that these friends had no experience in court intrigues, formed her own plan, and determined to make every possible effort for depriving count Holk of the royal favor, and thus of regaining the confidence of the king. Holk, for his own security, endeavoured to widen the breach between the royal pair; and, conceiving that Struensee hated the queen as much as he himself did, he persuaded his royal master to take Struensee with him whenever he visited the queen. But, contrary to Holk's expectations, the king became attached to Struensee; and the queen remarking this change became gradually familiarised to his company. The crown-prince being at this time successfully innoculated for the small-pox by Struensee, the queen informed him that, in recompense of his services, he should be entrusted with the prince's education.

Struensee was now made a counsellor of conference, with a salary of 1500 dollars, and appointed reader to the king and queen. This new favorite succeeded in his endeavours for producing a complete reconciliation between the king and his royal consort; which was followed by an indifference, on the part of the former, towards Holk. Bernstorf, the minister, became jealous of Struensee, and attempted, though unsuccessfully, to undermine the confidence reposed in him by the king and queen. Soon after, the court made a tour to Schleswic; and the heads of the different parties composed the royal suite. The queen behaved to both parties in the same courteous manner. Brandt succeeded Holk in the king's favor and confidence; but Bernstorf, though mortified by the loss of his influence over the king, declined making a voluntary resignation. His fate, however, was soon determined, and intimation was given him that his services were no longer necessary. The remaining members of government were dismissed, and the administration was formed by the friends of the queen and of Struensee. During these events, the queen-dowager remained at Friedensburg, watching their progress, and condoling with the discarded ministers. The queen at length obtained a complete triumph. The king behaved to her with the affectionate tenderness which her amiable qualities deserved; and Struensee possessed her confidence, and employed all possible means to retain it. The king, naturally of a weak mind, was secluded from society by Struensee; and Brandt was commissioned to keep him constantly occupied with amusements. The king was gratified by this mode of life; the influence of Struensee was augmented; and he at length accomplished his main object, which was that of preventing his majesty from personally transacting any business with his ministers. In process of time, or towards the close of the year 1770, a circumstance occurred which served to place unlimited power in the hands of the young queen and her ministers. Struensee neglected no means to increase his power; and, in order to retain it the more securely, he prevailed on the queen to commit to his management the whole business of the cabinet.

In consequence of this measure, the whole form of the government was new-modelled; and public business was transacted in the king's name, by those immediately around him. But Struensee's paramount power was of no long duration. His boldness, approaching to the highest degree of insolence, degenerated into timidity when any of his measures were opposed; and, though he conducted foreign affairs according to the principles of sound policy, his internal administration, perverted by avarice or ambition, did not answer the purpose intended. The various measures which he projected for the improvement of the government and country, and which our limits will not allow us to detail, excited disgust and dissatisfaction amongst persons of every rank and condition, from the highest to the lowest. Struensee, however, was indefatigable in the complicated duties of his office, and sedulously attentive to the education of the crown-prince. Two of his brothers were advanced to stations of importance; one in the new college of finance, and the other in the department of war. Brandt, Berger, the physician, and other confidential persons, remained constantly near the king's person, nor were any others, suspected to be adverse to the existing order of things, permitted to have any intercourse with him; so that his indifference to public business gradually increased, and his capacity for conducting it diminished. In July 1771 the queen was delivered of a princess; and as she knew the surmises, originating at Friedensburg, that were circulated on this occasion, she was not unapprehensive that they might serve as pretences to wrest from her the power which she had acquired. She was unfortunately dependent on Struensee, who, by the abuse of his power, had become an object of detestation. Not content with being enrolled in the list of the Spanish nobility, and being created count, he invented a new title, or that of private counsellor of the cabinet, and with this he acquired a degree of power which had never been enjoyed before by any minister of Denmark. In fact, it was this ambitious minister's aim to annihilate the royal authority; and in the circumstances then existing, and under the protection of the queen, if he had conducted himself with more prudence, he would have defeated the machinations of those who were meditating his ruin.

But a spirit of discontent now pervaded all ranks; the sailors and the soldiers complained of his conduct; and the populace joined the malcontents in their opposition and murmurs. The dissatisfaction and tumult that prevailed in-

creased Struensee's timidity: his measures were indecisive, and his situation became every day more dangerous. The British minister, actuated by a respect for the young queen, endeavoured to hasten his removal from power, and he himself wished for a release. Accordingly he offered him a sum of money to enable him to quit the country. The queen, apprehending that her enemies would get the king into their hands, and obtain possession of all the royal power, opposed this measure. A crisis, however, was approaching; and Struensee could no longer resist or control the counsels and operations of those who were hastening his downfall. Notwithstanding the measures which he adopted for insuring his own personal safety, and which were interpreted by the people into a kind of avowal of his political misconduct, every thing conspired, not only to accelerate his own ruin, but to favor the plan which had been formed against the young queen. On the morning of the 17th of January, 1772, the inhabitants of Copenhagen heard, not without astonishment and terror, that this princess, count Struensee, his brother, count Brandt, and all their friends and adherents, had been arrested in the night. At three o'clock in the morning, succeeding a ball that had been given at court the preceding evening, and after the queen had closed about one o'clock with prince Frederick, colonel Koller, an inveterate enemy of Struensee's, whose regiment was on guard at the palace, informed his officers, after having admitted them into the palace, that he had the king's orders to take the queen into custody. The officers, without requiring to see the orders, which would have defeated the whole plan, implicitly obeyed. Ranzau hurried into the king's bed-chamber, and, drawing the curtains so as to awaken him, told him, before he had time for reflection, that his life was in danger. 'What must we do?' said the alarmed king: 'shall we fly? stand by me: give me your advice.'—'Sign this,' replied Ranzau, 'it will save my sovereign and the whole royal family.' The king took hold of his pen, but let it drop as soon as he cast his eye on the name of his consort. At length he suffered himself to be persuaded; and Ranzau, supported by colonel Eichstadt, whose dragoons surrounded the palace, and some other officers, carried out the fatal order; and, in a manner the most violent and brutal, seized the person of the unfortunate Matilda, and conveyed her in a carriage to the castle of Cronenburg. Struensee's arrest was followed by the appointment of a commission for his trial; and the proceedings against him were carried on with great zeal and severity. The indictment, drawn up by the fiscal general in very intemperate language, and delivered to the court on the 21st of April, 1772, after relating the circumstances of his life and character, stated nine articles as capital charges. 'For many years before his fall,' says his biographer, who has compiled his article from a variety of original documents, and of which we have freely availed ourselves, 'Struensee had lived an avowed free-thinker. He was convinced, however, of the existence of a Supreme Being, by whom the world was created; but he considered mankind as mere machines, governed by no moral principle; looked upon a future state as an idle dream; and believed that after death a man had nothing to hope or to fear. During the first week of his imprisonment he endeavoured by these principles to compose his agitated mind; and, giving way also to the warmth of his imagination, fancied that a thousand circumstances might occur to liberate him from his dangerous situation. He was thus able, for a little time, to bear up under his misfortunes, and to assume an apparent cheerfulness; but these were merely palliatives, which losing their effect, he soon fell into a state of the most violent anguish and dismay.

A visit, however, which he received from the celebrated Dr. Munter, a clergyman of Copenhagen, who went to see him in prison on the 1st of March, 1772, laid the foundation for a change in his sentiments, which enabled him afterwards to support his sufferings with more fortitude and resignation. This worthy man discussed with him proofs of Christianity; listened to his doubts and objections, and answered them in the mildest yet most forcible manner; and at length gained so much on his heart that he gave himself up entirely to his direction. When his trial came on, his advocate, in a short written defence, endeavoured to disprove all the charges that had been brought against him, with the exception of one, which was the disrespect personally shown to the king. Of this he acknowledged himself guilty, was heartily sorry for it, and threw himself on the mercy of his offended sovereign. The court, however, which had resolved that Struensee should suffer an ignominious death, rejected all representations made in his favor, and on the 25th of April passed the following sentence:—'That after his right hand had been cut off he should be beheaded; that his body should then be quartered, and in that state publicly exposed; and that his head and hand should be affixed to a pole.' On the next day, April the 26th, Dr. Munter paid him a visit, and informed him that this sentence had in every point been confirmed by the king, and that the 28th was the day appointed for its being carried into execution. The unfortunate count heard this intelligence with the utmost composure; and declared that, in regard to the ignominious circumstances attending his doom, he was perfectly easy, as he believed in a future resurrection. He spent the intervening time in a manner becoming his situation, and suffered according to his sentence along with his friend Brandt, who had also been condemned, amidst an immense concourse of spectators.

STRUG'GLE, *v. n.* & *n. s.* Of uncertain etymology. To labor; act with effort; strive; contend: the effort, contention, or contest made.

In the time of Henry VIII. differences of religion tore the nation into two mighty factions; and, under the name of Papist and Protestant, *struggled* in her bowels with many various events. *Temple.*

Strong virtue, like strong nature, *struggles* still,
Exerts itself, and then throws off the ill. *Dryden.*

I repent, like some despairing wretch
That boldly plunges in the frightful deep,
Then pants and *struggles* with the whirling waves,
And catches every slender reed to save him. *Smith.*

No man is guilty of an act of intemperance but he might have forborne it; not without some trouble from the *strugglings* of the contrary habit, but still the thing was possible. *South.*

If men *struggle* through as many troubles to be miserable as to be happy, my readers may be persuaded to be good. *Spectator.*

When, in the division of parties, men only strove for the first place in the prince's favour, an honest man might look upon the *struggle* with indifference. *Addison.*

It began and ended without any of those unnatural *struggles* for the chair, which have disturbed the peace of this great city. *Atterbury.*

STRU'MA, *n. s.* Lat. *struma.* A glandular swelling; the king's evil.

A glandulous consumption, such as does not affect the lungs with a rupture of its vessels, and coughing up blood, is produced by *strumous* or scrophulous humours. *Blackmore.*

A gentlewoman had a *struma* about the instep, very hard and deep about the tendons. *Wiseman's Surgery.*

How to treat them when *strumous*, scirrhous, or cancerous. *Wiseman.*

STRUMFIA, in botany, a genus of plants belonging to the class of syngenesia, and to the order of monogamia: CAL. quinquedentate and superior: COR. pentapetalous: and the berry monospermous. There is only one species; viz. S. maritima.

STRUM'PET, *n. s.* & *v. a.* Of doubtful original. *Stropo* vieux mot palliardise: Lat. *stuprum.* A whore; prostitute: to debauch.

If we two be one, and thou play false,
I do digest the poison of thy flesh,
Being *strumpeted* by the contagion. *Shakspeare.*

How like a younker or a prodigal
The skarfed bark puts from her native bay,
Hugged and embraced by the *strumpet* wind!
How like a prodigal doth she return,
Lean, rent, and beggared by the *strumpet* wind! *Id.*

If to preserve this vessel for my lord
From any other foul unlawful touch,
Be not to be a *strumpet*, I am none. *Id. Othello.*

Common fame is as false and impudent as a common *strumpet.* *L'Estrange.*

Honour had his due;
Before the holy priest my vows were tied;
So came I not a *strumpet* but a bride. *Dryden.*

STRUT, *v. n.* & *n. s.* Teut. *strotzen*, of Goth. *trotna.* To walk with affected dignity; swell; play the fop or dandy: the noun substantive corresponding.

Adore our errours, laugh at's while we *strut*
To our confusion. *Shakspeare. Antony and Cleopatra.*

Does he not hold up his head, and *strut* in his gait? *Shakspeare.*

Though thou *strut* and paint,
Yet art thou both shrunk up and old. *Ben Jonson.*

The false syren
Struts on the waves, and shows the brute below. *Dryden.*

We will be with you ere the crowing cock
Salutes the light, and *struts* before his feathered flock. *Id.*

The goats with *strutting* dugs shall homeward speed. *Id.*

The power appeased, with winds sufficed the sail,
The bellying canvass *strutted* with the gale. *Id.*

As thy *strutting* bags with money rise,
The love of gain is of an equal size. *Id.*

STRUTT (Joseph), artist and antiquary, was born in 1749, at Springfield in Essex, where his father was a miller. In 1764 he was articled to W. Wynn Ryland engraver, and in 1770 obtained the gold and silver medals of the Royal Academy. Uniting the study of antiquities with his art, he published in 1773 his first work, entitled The Regal and Ecclesiastical Antiquities of England, 4to., which contained representations of all the English monarchs from Edward the Confessor to Henry VIII. This was followed by Horda Angel Cynnan, or a complete view of the manners, customs, arms, habits, &c., of the English, from the arrival of the Saxons to the times of Henry VIII., &c., 1774, 1775, and 1776, 3 vols. with 157 plates. In 1777 and 1778 he published A Chronicle of England, which he meant to extend to six volumes, but dropped the design for want of encouragement. His Biographical Dictionary of Engravers appeared in 1785 and 1786, in 2 vols. In 1790 he was obliged by his health to quit the metropolis and retire into Hertfordshire, where he occupied himself in a series of plates for the Pilgrim's Progress. In 1795 he returned to London, and began to collect materials for his Complete View of the Dresses and Habits of the People of England, &c., the first volume of which appeared in 1796, and the second in 1799, 4to. In 1801 he published his last and most distinguished work, entitled the Sports and Pastimes of the People of England, with forty plates, of which a new octavo edition, with 140 plates, edited by Hone, has been lately projected. He died in London in October 1802, aged fifty-three. He left some MSS. in the possession of his son, from which have since been published his Queen Hoo Hall, a Romance, and Ancient Times, a Drama, 4 vols. 12mo.; also The Test of Guilt, or Traits of Ancient Superstition, a dramatic tale.

STRUTHIO, in natural history, a genus of birds belonging to the order of grallæ of Linné; but, according to the new classification of Dr. Latham, it forms, along with the dodo, casuarius, and rhea, a separate order, under the name of struthiones.

I. S. camelus, the ostrich, has a bill somewhat conical; the wings are so short as to be unfit for flying; the thighs and sides of the body are naked; the feet are formed for running, having two toes, one only of which is furnished with a nail. In this respect it differs entirely from the cassowary, which has three toes complete. The ostrich is without doubt the largest of all birds; it is nearly eight feet in length, and, when standing upright, from six to eight feet in height. We are told in the Gentleman's Magazine that two ostriches were shown in London in 1750, and that the male was ten feet in height, and weighed 3¼ cwt. The head and bill somewhat resemble those of a duck; and the neck may be likened to that of a swan, but that it is much longer; the legs and thighs resemble those of a hen, though the whole appearance bears a strong resemblance to that of a camel. But, though usually seven

feet high from the top of the head to the ground, from the back it is only four; so that the head and neck are above three feet long. From the top of the head to the rump, when the neck is stretched out in a right line, it is six feet long, and the tail is about a foot more. One of the wings, without the feathers, is a foot and a half; and being stretched out, with the feathers, is three feet. The plumage is much alike in all; that is, generally black and white, though some of them are said to be gray. There are no feathers on the sides, nor yet on the thighs, nor under the wings. The lower part of the neck, about half way, is covered with still smaller feathers than those on the belly and back; and those also are of different colors. All these feathers are of the same kind, and peculiar to the ostrich; for other birds have several sorts, some of which are soft and downy, and others hard and strong. Ostrich feathers are all almost as soft as down, being utterly unfit to serve the animal for flying, and still less adapted to be a proper defence against external injury. The feathers of other birds have the webs broader on one side than the other, but those of the ostrich have their shaft exactly in the middle. The upper part of the head and neck are covered with a very fine clear white hair, that shines like the bristles of a hog; and in some places there are small tufts of it, consisting of about twelve hairs, which grow from a single shaft about the thickness of a pin. At the end of each wing there is a kind of spur, almost like the quill of a porcupine. It is an inch long, hollow, and of a horny substance. There are two of these on each wing, the largest of which is at the extremity of the bone of the wing, and the other a foot lower. The neck is slender in proportion to that of other birds, from its not being furnished with feathers. The skin in this part is of a livid flesh color. The bill is short and pointed, and two inches and a half at the beginning. The external form of the eye is like that of a man, the upper eye-lid being adorned with eye-lashes, which are longer than those on the lid below. The tongue is small, very short, and composed of cartilages, ligaments, and membranes, intermixed with fleshy fibres. In some it is about an inch long, and very thick at the bottom; in others only half an inch, and a little forked at the end. The thighs are very fleshy and large, being covered with a white skin inclining to redness, and wrinkled like a net, whose meshes admit the end of the finger. Some have small feathers on the thighs; others have neither feathers nor wrinkles. The legs are covered before with large scales; the end of the foot is cloven, and has two very large toes, which are also covered with scales. These toes are of unequal sizes. The largest, which is on the inside, is seven inches long, including the claw, which is nearly three-fourths of an inch in length, and almost as broad. The other toe is but four inches long, and is without a claw. The internal parts of this animal are no less peculiar. At the top of the breast, under the skin, the fat is two inches thick; and on the fore part of the belly it is as hard as suet, and about two inches and a half thick in some places. It has two distinct stomachs. The lowermost, in its natural situation, somewhat resembles the crop in other birds; but it is considerably larger than the other stomach, and is furnished with strong muscular fibres, circular and longitudinal. The upper stomach has outwardly the shape of the stomach of a man; and upon opening is always found filled with a variety of discordant substances, hay, grass, barley, beans, bones, and stones, some of which exceed in size a pullet's egg. The kidneys are eight inches long and two broad, and differ from those of other birds in not being divided into lobes. The heart and lungs are separated by a midriff as in quadrupeds, and the parts of generation also bear a very strong resemblance. The ostrich is a native only of the torrid regions of Africa, and has long been celebrated by those who have had occasion to mention the animals of that region. Its flesh is prohibited in Scripture to be eaten; and most of the ancient writers describe it as well known. Its race is transmitted down without mixture, and it has never been known to breed out of that country which first produced it. It seems formed to live among the sandy and burning deserts of the torrid zone; and, as in some measure it owes its birth to their genial influence, so it seldom migrates into other tracts. The Arabians assert that the ostrich never drinks, and the place of its habitation confirms the assertion. In these dreary regions ostriches are seen in large flocks, like a regiment of cavalry, and have often alarmed a whole caravan. There is no desert, how barren soever, but what is capable of supplying these animals with provisions; they eat almost every thing; and these barren tracts are thus doubly grateful, as they afford both food and security. The ostrich is of all animals the most voracious. It will devour leather, glass, hair, iron, stones, or any thing. Those substances which the coats of the stomach cannot soften, pass whole: so that glass, stones, or iron, are excluded in the form in which they were devoured. In an ostrich dissected by Rauby there appeared such a quantity of heterogeneous substances, that it was wonderful how an animal could digest such an overcharge of nourishment. Valisnieri also found the first stomach filled with a quantity of incongruous substances; grass, nuts, cords, stones, glass, brass, copper, iron, tin, lead, and wood; a piece of stone was found among the rest that weighed more than a pound. He saw one of these animals that was killed by devouring a quantity of quicklime. In their native deserts, however, it is probable they live chiefly upon vegetables, where they lead an inoffensive and social life; the male, as Thevenot assures us, assorting with the female with connubial fidelity. They are said to be very much inclined to venery. They copulate like other birds by compression. They lay very large eggs, some of them being above five inches in diameter, and weighing above fifteen pounds. These eggs have a very hard shell somewhat resembling those of the crocodile, only those of the latter are less and rounder. The season for laying depends on the climate. In the north part of Africa, this season is early in July; in the south about the end of December.

These birds are very prolific, and lay generally from forty to fifty eggs at one clutch, which are as big as a child's head. It has been affirmed that the female deposits them in the sand, leaves them to be hatched by the heat of the climate, and the young to shift for themselves. But no bird has a stronger affection for her young than the ostrich, nor none watches her eggs with greater assiduity. In those hot climates, indeed, there is less necessity for the continual incubation of the female; and she often leaves her eggs, which are in no danger of being chilled by the weather; but, though she leaves them by day, she always carefully broods over them by night; and Kolben, who has seen great numbers of them at the Cape of Good Hope, affirms that they sit on their eggs like other birds, and that the male and female take this office by turns. Nor is it true that they forsake their young after they are excluded the shell. On the contrary, the young ones are not even able to walk for several days after they are hatched. During this time the old ones are very assiduous in supplying them with grass, and encounter every danger in their defence. The young, when brought forth, are of an ash color the first year, and are covered with feathers all over. But in time these feathers drop; and those parts which are covered assume a different and more becoming plumage. The beauty of a part of this plumage, particularly the long feathers that compose the wings and tail, is the chief reason that man has been so active in pursuing this harmless bird to its deserts, and hunting it with no small degree of expense and labor. The ancients used those plumes in their helmets; our military wear them in their hats; and the ladies make them an ornament in their dress Those feathers which are plucked from the animal while alive are much more valued than those taken when dead, the latter being dry, light, and subject to be worm-eaten. Besides the value of their plumage, some of the savage nations of Africa hunt them also for their flesh, which they consider as a dainty. They sometimes also breed these birds tame, to eat the young ones. Some nations have obtained the name of Struthiophagi, or ostrich eaters, from their peculiar fondness for this food; and the Romans themselves were not averse to it. The eggs of the ostrich are said to be well tasted, and extremely nourishing; but they are too scarce to be fed upon, although a single egg be a sufficient entertainment for eight men. As the spoils of the ostrich are thus valuable, man has become their most assiduous pursuer. The Arabians train up their fleetest horses to hunt the ostrich. Of all the varieties of the chase, this is said to be the most entertaining. As soon as the hunter comes within sight of his prey, he puts on his horse with a gentle gallop, so as to keep the ostrich still in sight, yet not so as to terrify him. Of all known animals, the ostrich is by far the swiftest in running: upon observing himself, therefore, pursued at a distance, he begins to run at first but gently. In this situation he resembles a man at full speed; his wings, like arms, keep working with a motion corresponding to that of his legs; and his speed would very soon snatch him from the view of his pursuers; but, instead of going off in a direct line, he takes his course in circles; while the hunters still make a small course within, relieve each other, meet him at unexpected turns, and keep him thus still followed, for two or three days together. At last, spent with fatigue and famine, and finding all power of escape impossible, he endeavours to hide himself from those enemies he cannot avoid, and covers his head in the sand or the first thicket he meets. Sometimes, however, he attempts to face his pursuers; and, though the most gentle animal in nature, when driven to desperation he defends himself with his beak, wings, and feet. Such is the force of his motion, that a man would be unable to withstand him in the shock. The Struthiophagi have another method of taking this bird; they cover themselves with an ostrich's skin, and, passing up an arm through the neck, thus counterfeit all the motions of this animal. By this artifice they approach the ostrich, which becomes an easy prey. He is sometimes also taken by dogs and nets; but the most usual way is that mentioned above. When the Arabians have thus taken an ostrich, they cut its throat; and, making a ligament below the opening, they shake the bird as one would rinse a barrel; then, taking off the ligature, there runs out from the wound in the throat a considerable quantity of blood mixed with the fat of the animal; and this is considered as one of the greatest dainties. They next flay the bird; and of the skin, which is strong and thick, sometimes make a kind of vest, which answers the purpose of a cuirass and a buckler. Others do not kill their captive, but endeavour to tame it, for the purposes of supplying those feathers which are in so great request. The inhabitants of Dara and Lybia breed up whole flocks of them, and they are tamed with very little trouble. In this domestic state, they are often ridden upon and used as horses. Moore assures us that at Jour he saw a man travelling upon an ostrich; and Adanson asserts that at the factory of Podore he had two ostriches, which were then young, the strongest of which ran swifter than the best English racer, although he carried two negroes on his back. As soon as the animal perceived itself thus loaded, it set off running with all its force, and made several circuits round the village, till at length the people were obliged to stop it by barring up the way.

II. 1. S. casuarius, the cassowary (the galeated cassowary of Dr. Latham) was first brought into Europe from Java by the Dutch about 1597. It is nearly equal in size to the ostrich, but its legs are much thicker and stronger in proportion. This conformation gives it an air of strength and force, which the fierceness and singularity of its countenance conspire to render formidable. It is five feet and a half long from the point of the bill to the extremity of the claws The legs are two feet and a half high from the belly to the end of the claws. The head and neck together are one foot and a half; and the largest toe, including the claw, is five inches long. The claw alone of the least toe is three inches and a half in length. The wing is so small that it does not appear, it being hid under the feathers of the back. In

other birds a part of the feathers serve for flight, and are different from those that serve merely for covering; but in the cassowary all the feathers are of the same kind, and outwardly of the same color. They are generally double, having two long shafts, which grow out of a short one, which is fixed in the skin. Those that are double are always of an unequal length; for some are fourteen inches long, particularly on the rump, while others are not above three. The beards that adorn the stem or shaft are about half way to the end, very long, and as thick as a horse-hair, without being subdivided into fibres. The stem or shaft is flat, shining, black, and knotted below; and from each knot there proceeds a beard; likewise the beards at the end of the large feathers are perfectly black, and towards the root of a gray tawny color; shorter, more soft, and throwing out fine fibres like down; so that nothing appears except the ends, which are hard and black; because the other part, composed of down, is quite covered. There are feathers on the head and neck; but they are so short and thinly sown that the bird's skin appears naked, except towards the hinder part of the head, where they are a little longer. The feathers which adorn the rump are extremely thick; but do not differ in other respects from the rest, excepting their being longer. The wings, when they are deprived of their feathers, are but three inches long; and the feathers are like those on other parts of the body. The ends of the wings are adorned with five prickles of different lengths and thickness, which bend like a bow; these are hollow from the roots to the very points, having only that slight substance within which all quills are known to have. The longest of these prickles is eleven inches; and it is a quarter of an inch in diameter at the root, being thicker there than towards the extremity; the point seems broken off. The part however which most distinguishes this animal is the head; which though small, like that of an ostrich, does not fail to inspire some degree of terror. It is bare of feathers, and is armed with a helmet of horny substance, that covers it from the root of the bill to near half the head backwards. This helmet is black before and yellow behind. Its substance is very hard, being formed by the elevation of the bone of the skull; and it consists of several plates, one over another, like the horn of an ox. Some suppose that this is shed every year with the feathers; but the most probable opinion is that it only exfoliates slowly like the beak. To the peculiar oddity of this natural armour may be added the color of the eye in this animal, which is a bright yellow; and the globe being, above an inch and a half in diameter, gives it an air equally fierce and extraordinary. The hole of the ear is very large and open, being only covered with small black feathers. The sides of the head, about the eye and ear, being destitute of any covering, are blue, except the middle of the lower eye-lid, which is white. The part of the bill which answers to the upper jaw in other animals is very hard at the edges above, and the extremity of it is like that of a turkey cock. The end of the lower mandible is slightly notched, and the whole is of a grayish brown, except a green spot on each side. As the beak admits a very wide opening, this contributes much to the bird's menacing appearance. The neck is of a violet-color, inclining to that of slate; and it is red behind in several places, but chiefly in the middle. About the middle of the neck before, at the rise of the large feathers, there are two processes formed by the skin, which resemble somewhat the gills of a cock, but that they are blue as well as red. The skin which covers the fore part of the breast, on which this bird leans and rests, is hard, callous, and without feathers. The thighs and legs are covered with feathers, and are extremely thick, strong, straight, and covered with scales of several shapes; but the legs are thicker a little above the foot than in any other place. The toes are likewise covered with scales, and are but three in number; for that which should be behind is wanting. The claws are of a hard solid substance, black without and white within. The internal parts are equally remarkable. The cassowary unites with the double stomach of animals that live upon vegetables the short intestines of those that live upon flesh. The intestines of the cassowary are thirteen times shorter than those of the ostrich. The heart is very small, being but an inch and a half long, and an inch broad at the base. Upon the whole it has the head of a warrior, the eye of a lion, the defence of a porcupine, and the swiftness of a courser. Thus formed for a life of hostility, for terrifying others, and for its own defence, it might be expected that the cassowary was one of the most fierce and terrible animals of the creation. But nothing is so opposite to its natural character; it never attacks others; and, instead of the bill, when attacked, it rather makes use of its legs, and kicks like a horse, or runs against its pursuer, beats him down, and treads him to the ground. The manner in which this animal moves is not less extraordinary than its appearance. Instead of going directly forward it seems to kick up behind with one leg; and then, making a bound onward with the other, it goes with such prodigious velocity that the swiftest racer would be left far behind. The voraciousness of the ostrich obtains as strongly here The cassowary swallows every thing that comes within the capacity of its gullet. The Dutch assert that it can devour not only glass, iron, and stones, but even burning coals, without testifying fear or injury. It is said, that the passage of the food through its gullet is performed so speedily, that even the eggs which it has swallowed whole pass through it unbroken. In fact, the alimentary canal of this animal, being extremely short, it may happen that many kinds of food are indigestible in its stomach, as wheat or currants are to man when swallowed whole. The cassowary's eggs are of a gray ash color, inclining to green. They are marked with a number of little tubercles of a deep green, and the shell is not very thick. The largest of these is fifteen inches round, one way, and about twelve the other. The southern parts of the East Indies seem to be the natural climate of the cassowary. His domain begins where that of the ostrich terminates. The latter has never been found beyond the Ganges; while the cassowary is never seen nearer than the islands of Banda, Sumatra, Java,

the Molucca Islands, and the corresponding parts of the continent. Yet even here this animal seems not to have multiplied in any considerable degree, as we find one of the kings of Java making a present of one of these birds to the captain of a Dutch ship, considering it as a very great rarity.

2. S. casuarius Novæ Hollandiæ, the New Holland cassowary, differs considerably from the common cassowary. It is a much larger bird, standing higher on its legs, and having the neck longer than in the common one. Total length seven feet two inches. The bill is not greatly different from that of the common cassowary; but the horny appendage or helmet on the top of the head in this species is totally wanting: the whole of the head and neck is also covered with feathers, except the throat and fore part of the neck about half way, which are not so well feathered as the rest; whereas in the common cassowary the head and neck are bare and carunculated as in the turkey. The plumage in general consists of a mixture of brown and gray, and the feathers are somewhat curled or bent at the ends in the natural state: the wings are so very short as to be totally useless for flight, and indeed are scarcely to be distinguished from the rest of the plumage, were it not for their standing out a little. The long spines which are seen in the wings of the common sort are in this not observable, nor is there any appearance of a tail. The legs are stout, formed much as in the preceding, with the addition of their being jagged or sawed the whole of their length at the back part. This bird is common in New Holland and Botany Bay. Though it cannot fly, it runs so swiftly that a greyhound can scarcely overtake it. The flesh is said in taste to resemble beef.

STRUTHIOLA, in botany, a genus of the monogynia order and tetrandria class of plants: COR. wanting: CAL. tubulous, with eight glandules at its mouth; the berry is without juice, and monospermous. There are three species, viz., 1. S. erecta; 2. S. nana; and 3. S. virgata; which are all plants of foreign extraction.

STRUTHIONES, in ornithology, struthious birds, a new order of birds, very properly classed by Dr. Latham as distinct from the grallæ, with which they were formerly classed by Linnæus. It consists of the didus, or doda (see DIDUS); the rhea, or American ostrich (see RHEA); and the ostrich and cassowary. See STRUTHIO.

STRUTHIOPHAGI, an ancient nation of Ethiopia, so called from eating ostriches. See ETHIOPIA.

STRUTHIOUS, from struthio. Of or belonging to the ostrich, or to that order of birds.

STRUVIUS (George Adam), a learned German, born at Magdeburg in 1619. He became professor of jurisprudence at Jena, and counsellor to the duke of Saxony. In 1653 he published a great work, entitled Syntagma Juris Feudalis; and in 1663 another entitled Syntagma Juris Civilis. He died in 1692 aged seventy-three.

STRUVIUS (Burchard Gotthelf), son of the preceding, was born at Weimar in 1761. He settled at Jena; followed his father's profession, and was much esteemed for his learning and integrity. He published many works, and died in 1738, aged sixty-seven.

STRY, a circle of Austrian Poland, between Hungary and the circle of Lemberg. It is one of the largest in Galicia, having a superficial extent of 3100 square miles. Its appearance differs completely in the south and north, the former consisting almost entirely of mountains, the latter of extensive plains. A single large river (the Dniester) traverses it from west to east, and then from north to south; it is intersected in various directions by smaller streams.

STRY, or STRYI, a town of Austrian Galicia, the capital of the above circle, stands on a small river of the same name, which divides here into a number of branches. It is surrounded with a wall and ditch, has a castle, a Catholic and a united Greek church, with a circular school, and 5500 inhabitants. Thirty-five miles W. N. W. of Halicz, and forty-two south of Lemberg.

STRYCHNIA, or STRYCHNINE, is an alkalin substance obtained from the bean of the strychnos ignatia by the following process:—The bean was rasped down as small as possible. It was then exposed to the action of nitric ether in a Papin's digester. The residue, thus deprived of a quantity of fatty matter, was digested in alcohol as long as that re-agent was capable of dissolving any thing. The alkoholic solutions were evaporated to dryness, and the residue redissolved in water. Caustic potassa being dropped into the solution a white crystalline precipitate fell, which was strychnia. It was purified by washing it in cold water, dissolving it in alkohol, and crystallising it. Strychnia was obtained likewise from the bean of the strychnos ignatia, by boiling the infusion of the bean with magnesia, in the same manner as Robiquet had obtained morphia from the infusion of opium.

The properties of strychnia, when in a state of purity, are as follows:—It is crystallised in very small four-sided prisms, terminated by four-sided low pyramids. It has a white color; its taste is intolerably bitter, leaving a metallic impression in the mouth. It is destitute of smell. It is not altered by exposure to the air. It is neither fusible nor volatile, except at temperatures at which it undergoes decomposition. It is charred at the temperature at which oil enters into ebullition (about 580°). When strongly heated it swells up, blackens, gives out empyreumatic oil, a little water, and ascetic acid; carbonic acid and carburetted hydrogen gases are disengaged, and a bulky charcoal remains behind. When heated with peroxide of copper it gives out only carbonic acid gas and water. It is very little soluble in cold water, 100,000 parts of that liquor dissolving only fifteen parts of strychnia; but it dissolves in 2500 times its weight of boiling water. A cold solution of strychnia in water may be diluted with 100 times its volume of that liquid, without losing its bitter taste. When strychnia is introduced into the stomach it acts with prodigious energy. A locked jaw is induced in a very short time, and the animal is speedily destroyed. Half a grain of strychnia blown into the throat of a rabbit proved fatal in five minutes, and brought on locked jaw in two minutes.

Sulphate of strychnia is a salt which crystallises in transparent cubes, soluble in less that ten

times its weight of cold water. Its taste is intensely bitter, and the strychnia is precipitated from it by all the soluble salifiable bases. It is not altered by exposure to the air.

Muriate of strychnia crystallises in very small needles, which are grouped together, and before the microscope exhibit the form of quadrangular prisms. When exposed to the air it becomes opaque. It is more soluble in water than the sulphate, has a similar taste, and acts with the same violence upon the animal economy as all the other salts of strychnia.

Phosphate of strychnia crystallises in four-sided prisms. It can only be obtained neutral by double decomposition.

Nitrate of strychnia can be obtained only by dissolving strychnia in nitric acid, diluted with a great deal of water. The saturated solution, when cautiously evaporated, yields crystals of neutral nitrate in pearly needles. This salt is much more soluble in hot than in cold water. Its taste is exceedingly bitter, and it acts with more violence upon the animal economy than pure strychnia. It seems capable of uniting with an excess of acid. When heated it becomes yellow, and undergoes decomposition. It is slightly soluble in alkohol, but it is insoluble in ether. When concentrated nitric acid is poured upon strychnia it immediately strikes an amaranthine color, followed by a shade similar to that of blood. To this color succeeds a tint of yellow, which passes afterwards into green. By this action the strychnia seems to be altered in its properties, and to be converted into a substance still capable of uniting with acids.

Carbonate of strychnia is obtained in the form of white flocks, little soluble in water, but soluble in carbonic acid. Acetic, oxalic, and tartaric acids, form with strychnia neutral salts, which are very soluble in water, and more or less capable of crystallising. They crystallise best when they contain an excess of acid. The neutral acetate is very soluble, and crystallises with difficulty.

Hydrocyanic acid dissolves strychnia, and forms with it a crystallisable salt. Strychnia combines neither with sulphur nor carbon. When boiled with iodine a solution takes place, and iodate and hydriodate of strychnia are formed. Chlorine acts upon it precisely in the same way. Strychnia, when dissolved in alkohol, has the property of precipitating the greater number of metallic oxides from their acid solutions. It is precipitated by the alkalies and alkaline earths; but the effect of the earths proper has not been tried.

STRYCHNOS, or Strychnus, in botany, a genus of the monogynia order and pentandria class of plants; natural order twenty-eighth, luridæ: cor. quinquefid: berry unilocular, with a wooden bark. The species are four; viz. 1. S. colubrina; 2. S. ignatii; 3. S. nux vomica; 4. S. potatorum; are all natives of foreign countries. See Nux Vomica.

STRYMA, an ancient town of Thrace, founded by a Thracian colony.—Herodotus vii. 109.

STRYMON, in ancient geography, a river constituting the ancient limits of Macedonia and Thrace; rising in Mount Scombrus (Aristotle), and formerly called Conozus. Authors differ as to the modern name of this river.

STRYPE (John), an English divine, descended from a German family, born at London and educated at Cambridge. He was vicar of Low Layton in Essex, and distinguished himself by his compilations of Lives and Memoirs, in which, as Dr. Birch remarks, his fidelity and industry will always give a value to his writings, however destitute they may be of the graces of style. He died in 1737, after having enjoyed his vicarage nearly sixty-eight years.

STUART (lady Arabella), daughter of Charles, earl of Lennox, the younger brother of Henry, lord Darnley, husband of queen Mary and king of Scotland. Her mother was Elizabeth, daughter of Sir William Cavendish. Lady Arabella was born in 1577, but her near relation to the royal family only involved her in trouble. About the end of queen Elizabeth's reign, the pope formed the plan of placing her on the throne of England, and marrying her to cardinal Farnese, brother to the duke of Parma. The project was approved by the French court; and after the accession of James VI. some English peers entered seriously into the scheme. But, the plot being discovered, some of the conspirators were executed. Some time after this she was privately married to the honorable William Seymour, son of the earl of Hertford; but James hearing of it committed them both prisoners to the tower. Seymour escaped from prison and got off to France. Lady Arabella accompanied him; but was taken and remanded to the tower, where she died in 1615; adding one more to the number of unfortunate royal Stuarts.

Stuart (Sir Charles), an English general, son of the marquis of Bute, was born in 1753. After having been presented at the principal European courts, he entered into the army, and was appointed aid-de-camp to the viceroy of Ireland. In 1775 he was sent to America, where he distinguished himself; and at the beginning of the late war was made a major-general, and employed in the Mediterranean. Here he made himself master of Corsica, and, after having conciliated the minds of the inhabitants towards the British government, returned home in 1796. His next service was in Portugal, whither he was sent at the beginning of 1797, at the head of an auxiliary corps of 8000 men; and not only secured the country against the hostile designs of the French directory, but also contributed to the future success of the British arms in the Peninsula. In 1798 he distinguished himself by the conquest of Minorca, which he had scarcely completed when he was summoned to the defence of Sicily, which he effectually guarded from the French. At the close of the same year he was ordered to Malta; and, after having taken the fortress of La Valette by blockade, returned to England: to his representations it was owing that the British government retained possession of that island. He died in 1801, leaving two sons.

Stuart (James Edward Francis), the eldest son of James II., by his second wife, Mary of Modena, was born in London June 10th, 1688; and was but five months old when his father was dethroned, and his mother with her infant

fled to France. He was the child with whom this unfortunate princess is said to have stood for some time in a bleak night under the shelter of Lambeth church wall, waiting for a boat. An attempt was made at the peace of Ryswick, in 1697, to insure the future restoration of this young prince to the throne of England: an attempt defeated only by the opposition of his father, as William III. had agreed to procure the recognition of the prince of Wales, as he was styled, as his successor. On the death of the ex-king, in 1701, Louis XIV. recognized his son as king of England, by the title of James III., and a proclamation in the name of the latter was addressed to the English nation; but no measures were at this time adopted in his favor. The death of William III. revived his hopes; but nothing beyond unavailing negociation took place till 1708, when a maritime expedition against Scotland was fitted out, in which the prince embarked. The armament, however, being attacked by an English fleet of superior force, returned to France without landing; and the young adventurer (who now assumed the name of the chevalier de St. George) joined the French army in Flanders, and distinguished himself at the battle of Malplaquet. In the latter part of the reign of Anne several intrigues were set on foot to secure the restoration of her brother, or his succession to the crown after her death; but on the treaty of Utrecht taking place in 1713 he was obliged to submit to a retirement from France, and when he returned to Paris resided there incognito. The regent duke of Orleans wished to maintain peace with George I.; and the British ambassador at Paris was informed of the projects of the chevalier de St. George by the abbé Strickland, one of his agents, who betrayed his confidence. When, therefore, the earl of Mar raised in Scotland the standard of the Stuarts, and proclaimed this prince under the title of James VIII.; and the latter embarking at Dunkirk, made a descent on the Scottish coasts; he soon perceived that success was hopeless, and was obliged to return to France. But that kingdom no longer yielded him an asylum, and he was forced to remove first to Avignon and then to Rome. The prince was a few years after invited to Spain, where he was well received by Philip V.; but the visit had no important influence on his affairs, and Rome again became his retreat. In 1720 he married Mary Casimira Sobieska, grand-daughter of the famous John Sobieski, king of Poland, a union not attended with domestic happiness, and a separation between the husband and wife was with difficulty prevented. He took no active part in the expedition against Scotland under his son in 1745, and died January 2d, 1766.

Stuart (Charles Edward Louis Philip Casimir), son of the preceding, known by the appellation of the young pretender, was born at Rome December 31st, 1720. In his youth he was called the count of Albany, and under that title travelled in the north of Italy, and visited Parma, Genoa, and Milan. The war which broke out between England and France, in 1740, inspired the exiled family with hopes, and excited the young prince to risk his person in a memorable attempt towards the recovery of the British throne. In June 1745 he embarked with a few followers at Nantes, and, landing on the western coast of Scotland, found himself ere long at the head of a considerable army. Having taken possession of Perth, he proclaimed his father king of England, Scotland, and Ireland, by the style of James III., and himself regent. The submission of Edinburgh, and the victory of Prestonpans, raised the hopes of his adherents, and induced them to march into England; where they proceeded as far as Derby; but disappointed in his hopes of a general insurrection, and alarmed at the approach of an English army, the prince found it necessary to return. The battle of Falkirk, which he gained in January 1746, was his last success; for he was soon after obliged to raise the siege of Stirling, and the decisive battle of Culloden, fought on the 27th of April, gave the death blow to his hopes. For several succeeding months the young pretender suffered the miseries and privations of a wretched outcast. At length he embarked on board a French vessel, and, after escaping some English cruisers, landed in safety at St. Pol de Leon in Brittany, October 10th, 1746. On the signature of the treaty of Aix-la-Chapelle, two years after his return, he found himself obliged to quit France. He then went to reside at Rome. In 1755 the French ministers, in consequence of disputes with the English government, appear to have projected a new invasion; and Charles Edward went to Nanci, and held a conference on the subject with count Lally; but, the differences between the two governments being adjusted, the design of invasion was relinquished, and the prince returned to Rome. He soon after married the young princess of Stolberg Gædern; but this union did not answer the views of any of the parties concerned in it. He had no children by his wife, whom he appears to have used in a brutal manner, which induced her at length to take refuge in a convent in Florence; and she subsequently found an asylum with her brother-in-law, the cardinal of York, at Rome. Charles Edward Stuart spent the latter part of his life at Florence, abandoned to the lowest sensual indulgences; and died in that city January 31st, 1788. He is said to have been in England in 1753, when lord Holdernesse, enquiring of George II. what should be done with him, the king said, 'Nothing; when he is tired of staying here, let him go away.' It has been also asserted that he came here again at the period of the coronation of his late majesty.

Stuart (Henry Benedict Maria Clement), cardinal of York, younger brother of the preceding, the last descendant of the royal line of the Stuarts, was born at Rome, March 20th, 1725, and, being destined for the church, the Pope bestowed on him the right to hold benefices without receiving the ecclesiastical tonsure. In 1745, when the last effort was made for the restoration of his family, he went to France, and assumed the command of troops assembled at Dunkirk; but the battle of Culloden prevented the embarkation of this armament, and prince Henry returned to Rome. He now took holy orders, and in 1747 pope Benedict XIV. raised

him to the purple: he was subsequently made chancellor of the Basilic of St. Peter, and bishop of Frescati. On the death of his brother in 1788 he assumed the title to which the family had aspired; and on that occasion caused a medal to be struck, with the inscription 'Henricus nonus, Angliæ Rex;' and on the obverse, 'Gratia Dei, non Voluntate Hominum.' Succeeding events had the singular effect of rendering the cardinal of York a dependent on the bounty of the late king of England; for, when the French conquered Italy, he was obliged to flee to Venice, and was indebted for his support to a pension from our court. In 1801 he returned to Rome, and became dean of the sacred college. His death took place in 1807.

Stuart (Gilbert), LL. D., son of George Stuart, professor of humanity at Edinburgh, was born in 1746. Having finished his classical studies in the university, he applied himself to jurisprudence, without probably intending to follow the profession of the law. For that profession he has been represented as unqualified by indolence; by a passion which at a very early period of life he displayed for general literature; or by boundless dissipation:—and all these circumstances may have contributed to make him relinquish pursuits in which he could hope to succeed only by patient perseverance and strict decorum of manners. That he did not waste his youth in idleness, is, however, evident from An Historical Dissertation concerning the Antiquity of the British Constitution, which he published before he had completed his twenty-second year, and which had so much merit as to induce the university of Edinburgh to confer upon the author, though so young a man, the degree of LL. D. After a studious interval of some years, he produced a valuable work, under the title of A View of Society in Europe, in its Progress from Rudeness to Refinement: or, enquiries concerning the History of Laws, Government, and Manners. He had read and meditated with patience on the most important monuments of the middle ages: and in this volume (which speedily reached a second edition) he aimed chiefly at the praise of originality and invention, and discovered an industry that is seldom connected with ability and discernment. About the time of the publication of the first edition of this performance, having turned his thoughts to an academical life, he asked for the professorship of public law in the university of Edinburgh. According to his own account he had been promised that place by the minister, but had the mortification to see the professorship bestowed on another, and all his hopes blasted by the influence of Dr. Robertson, whom he represented as under obligations to him. This part of the story, however, seems very incredible; as it is not easy to conceive how it ever could be in the power of Dr. Stuart to render to the learned principal any essential service. It was believed indeed by the earl of Buchan, and by others, who observed that the illiberal jealousy not unfrequent in the world of letters was probably the source of this opposition; which entirely broke the intimacy of two persons who, before that time, were understood to be on the most friendly footing with each other. Ingratitude, however, is as likely to have been the vice of Dr. Stuart as of Dr Robertson; for we have been told by a writer (Chalmers, in his Life of Ruddiman), who, at least in one instance, has completely proved what he affirms, that, 'such was Gilbert Stuart's laxity of principle as a man, that he considered ingratitude as one of the most venial sins; such was his conceit, as a writer, that he regarded no one's merits but his own; such were his disappointments, both as a writer and a man, that he allowed his peevishness to sour into malice, and indulged his malevolence till it settled in corruption.' Soon after this disappointment Dr. Stuart went to London, where he became, from 1768 to 1774, one of the writers of the Monthly Review. In 1772 Dr. Adam, rector of the high school of Edinburgh, published a Latin grammar, which he intended as an improvement of the famous Ruddiman's. Stuart attacked him in a pamphlet under the name of Bushby, and treated him with much severity. In doing this, he was probably actuated more by some personal dislike of Dr. Adam than by regard for the memory of his learned relation; for on other occasions he showed sufficiently that he had no regard to Ruddiman's honor, as a grammarian, editor, or critic. In 1774 he returned to his native city, and began the Edinburgh Magazine and Review, in which he discussed the liberty and constitution of England, and distinguished himself by an enquiry into the character of John Knox the reformer, whose principles he reprobated in the severest terms. About this time he revised and published Sullivan's Lectures on the Constitution of England. Soon after he turned his thoughts to the history of Scotland, and published Observations concerning its Public Law and Constitutional History; in which he examined with critical care the preliminary book to Dr. Robertson's History. His next work was the History of the Reformation; a book which deserves praise for the easy dignity of the narrative, and for strict impartiality. His last great work, The History of Scotland from the Establishment of the Reformation to the death of Queen Mary, which appeared in 1782, has been very generally read and admired. His purpose was to vindicate the character of the injured queen, and expose the weakness of the arguments by which Dr. Robertson had endeavoured to prove her guilty; but, though the style of this work is his own, it contains very little matter which was not furnished by Goodall and Tytler; and it is with the arms which these two writers put into his hands that Dr. Stuart vanquished his great antagonist. In 1782 he once more visited London, and engaged in the Political Herald and English Review; but, the jaundice and dropsy increasing on him, he returned by sea to his native country, where he died, in the house of his father, on the 13th of August 1786. In his person, Dr. Stuart was about the middle size and justly proportioned. His countenance was modest and expressive, sometimes glowing with sentiments of friendship, of which he was truly susceptible, and at others darting that satire and indignation at folly and vice which appear in some of his writings. He was a boon companion; and, with a constitution

that might have stood the shock of ages, he fell a premature martyr to intemperance. His talents were certainly great, and his writings are useful; but he seems to have been influenced more by passion than principle, and in his character there was not much to be imitated. Of his style in writing, see our article LANGUAGE.

STUART (James), a celebrated architect and antiquary, born in London in 1709. His father, who was a mariner, died while James was a boy, leaving a widow and four children, of whom he was the eldest, without any means of support. James, having an excellent turn for drawing, soon provided for the whole family, by painting fans. He soon after found a place for one of his sisters with his employer in the fan trade. Mean time he made astonishing exertions and acquisitions in various branches of learning. To perfect himself in drawing, he studied anatomy, geometry, the mathematical sciences in general, and at last, wishing to understand the Latin inscriptions on prints, he made himself master of that language, and soon after of the Greek, all by his own exertions without a teacher. His mother dying, after procuring places for his brother and second sister, he set out upon his travels to the continent on foot. He travelled through Holland and France to Paris, stopping occasionally at differen towns, only so long as to gain as much as would carry him forward. At length he arrived at Rome, where he attracted the attention and patronage of Sir Jacob Bouverie and Mr. Dawkins, who were astonished at his courage and perseverance. Here he also formed an intimacy with Mr. Revett the celebrated architect. Under the auspices of these gentlemen, Revett and he set out for Athens, where they remained several years, and made a number of drawings of the relics of ancient architecture. About this period, too, he engaged as chief engineer in the army of the empress queen of Hungary. When the campaign was over, he went back to Athens, and completed his drawings, which on his return to England, after fourteen years absence, he engraved and published, to the surprise and gratification of the learned world. The first volume was published in 1762, under the title of Antiquities of Athens. This work, with the fame of his travels, procured him the title of Athenian Stuart. Upon his arrival, he had been received into Mr. Dawkin's family; and lord Anson, admiring his genius and exertions, appointed him surveyor of Greenwich hospital, which he held till his death. In 1781, after studying Grecian antiquities for seventy-two years, he fell in fancy with a modern British beauty, an accomplished young lady of Sittingbourne in Kent, only in her twentieth year. Disparity of years were not objected to on the lady's part. They were married, and she bore him four children. This extraordinary genius died in 1788, aged seventy-nine; and other 2 vols. of his Antiquities of Athens have been published since his death.

STUB, *n. s.* & *v. a.* Sax. ȝreb; Belg. and Dan. *stubbe, stob;* Lat. *stipes.* A stump; a thick short stock left when the rest is cut off: to force up; extirpate.

To buy at the *stub* is the best for the buyer,
More timely provision the cheaper is fire. *Tusser.*

Dametus guided the horses so ill, that the wheel coming over a great *stub* of a tree, overturned the coach. *Sidney.*

All about old stocks and *stubs* of trees,
Whereon nor fruit nor leaf was ever seen,
Did hang upon the ragged rocky knees. *Spenser.*

Upon cutting down of an old timber tree, the *stub* hath put out sometimes a tree of another kind. *Bacon's Natural History.*

A pain he in his head piece feels,
Against a *stubbed* tree he reels,
And up went poor Hobgoblin's heels. *Drayton.*

To spight the coy nymphs,
Hang upon our *stubbed* horns
Garlands, ribbons, and fine poesies. *Ben Jonson.*

You shall have more ado to drive our dullest and laziest youth, our stocks and *stubs*, from the infinite desire of such a happy nurture, than we have now to haul our choicest wits to that asinine feast of sow thistles and brambles. *Milton.*

Prickly *stubs* instead of trees are found,
Or woods with knots and knares deformed and old;
Headless the most, and hideous to behold. *Dryden.*

His two tusks serve for fighting and feeding; by the help whereof he *stubs* up edible roots out of the ground, or tears off the bark of trees. *Grew's Museum.*

The base is surrounded with a garland of black and *stubby* bristles. *Id.*

The other tree was grieved,
Grew scrubby, dried a-top, was stunted;
So the next parson *stubbed* and burnt it. *Swift.*

STUBBE (Henry), an English writer of uncommon talents, born at Partney in Lincolnshire, 28th February 1631. His father was a minister of the church of England, but turning Baptist was ejected and went with his family to Ireland. But the rebellion breaking out, in 1641, the mother returned to England with her son, and settling in London, where she maintained herself by sewing, sent Henry to Westminster school. The boy's talents were soon observed by Dr. Busby, the master, who recommended him to Sir Henry Vane, and these two patronised him, and supplied him with money, books, &c., to complete his education. In 1649 he was elected student of Christ Church, Oxford; and in 1657 was made under keeper of the Bodleian library; but was ejected upon the restoration, having made himself obnoxious by his publications on the other side. He then went to Stratford-upon-Avon, where he practised physic. In 1661 he went to Jamaica, with the title of king's physician; but, the climate disagreeing with him, he returned; and engaged in a violent controversy with the Royal Society. After various other literary controversies, and publishing many books, which are now no longer read, he was drowned on crossing a river, July 12th 1676.

STUBBS (George), an ingenious English writer, who was rector of Granville, in Dorsetshire. He wrote many of the best papers in the Freethinker, in 1718, in conjunction with Ambrose Philips, and others. He also published A New Adventure of Telemachus; 2. A Dialogue on Beauty between Socrates and Aspasio, in the manner of Socrates; and, 3. A Translation of Madam Sevigne's Letters, the first that ever appeared in English, and much in the spirit of the original.

STUBBS (George), was born in 1724 at La-

verpool, where, in early life, he was distinguished by his anatomical pursuits. At the age of thirty he went to Rome for improvement, and on his return settled in the metropolis. In 1766 he published the Anatomy of the Horse; all the plates of which were drawn and engraved by himself. As a painter of animals, particularly the race courser, he was not excelled by any of his contemporaries, and his pictures of the Lion and Horse, and the Lion and Stag, were deservedly applauded. Mr. Stubbs was also the inventor of a species of painting landscapes on large plates of enamel; and he published several prints, chiefly of animals. At the time of his death he was employed on a work entitled a Comparative Anatomical Exposition of the Structure of the Human Body, with that of a Tiger and Common Fowl. He was a man of such muscular strength that he has more than once carried a dead horse on his back up two pair of stairs to his dissecting room on the attic floor. He was an associate of the Royal Academy, and died in 1806.

STUB'BLE, *n. s* Fr. *estouble*; Lat. *stipula*. The stalks of corn left in the field by the reaper.

This suggested
At some time, when his soaring insolence
Shall reach the people, will be the fire
To kindle their dry *stubble*, and their blaze
Shall darken him for ever. *Shakspeare.*

You, by thus much seene,
Know by the *stubble* what the corne hath beene.
Chapman.

If a small red flower in the *stubble* fields, called the wincopipe, open in the morning, be sure of a fair day. *Bacon.*

His succeeding years afford him little more than the *stubble* of his own harvest. *Dryden.*

After the first crop is off, they plow in the wheat *stubble*. *Mortimer's Husbandry.*

Thrice happy Dick employed in threshing *stubble*,
Thy toil is lessened, and thy profits double. *Swift.*

STUB'BORN, *adj.* STUB'BORNLY, *adv.* STUB'BORNNESS, *n. s.* } Derived by Minshew from stoutborn; referred by Junius to στιβαρὸς; and deduced better by Mr. Lye from stub, perhaps from stub-horn.—Johnson. There is a Belgic *styvern*, of the same meaning. Obstinate; inflexible; stiff; contumacious; hardy; firm: the adverb and noun substantive corresponding.

The queene is obstinate,
Stubborn to justice, apt t' accuse it, and
Disdainful to be tried by 't.
Shakspeare. Henry VIII.

Stubbornly he did repugn the truth,
About a certain question in the law.
Id. Henry VI.

He chose a course least subject to envy, between stiff *stubbornness* and filthy flattery. *Hayward.*

Then stood he neere the doore, and proud to draw
The *stubborne* bow, thrice tried, and thrice gave law.
Chapman.

He believed he had so humbled the garrison that they would be no longer so *stubborn*. *Clarendon.*

I'll not flatter this tempestuous king,
But work his *stubborn* soul a nobler way. *Dryden.*

Take a plant of *stubborn* oak,
And labour him with many a sturdy stroke. *Id.*

Patriots, in peace, assert the people's right,
With noble *stubborness* resisting might. *Id.*

Stubbornness, and an obstinate disobedience must be mastered with blows. *Locke.*

All this is to be had only from the epistles themselves, with *stubborn* attention, and more than common application. *Id.*

He wilfully neglects his book, and *stubbornly* refuses any thing he can do. *Id.*

Patience under torturing pain,
Where *stubborn* stoicks would complain. *Swift.*

STUC'CO, *n. s.* Ital. *stucco*; Fr. *stuc*. A kind of fine plaster for walls.

Palladian walls, Venetian doors,
Grotesco roofs, and *stucco* floors. *Pope.*

STUCCO, in building, is a composition of white marble pulverised, and mixed with plaster of lime; and the whole, being sifted and wrought up with water, is used like common plaster: this is called by Pliny marmoratum opus, and albarium opus.

A patent has been granted to Mr. B. Higgins for inventing a new kind of stucco, or water cement, more firm and durable than any heretofore. Its composition, as extracted from the specification signed by himself, is as follows:—'Drift-sand, quarry, or pit-sand, which consists chiefly of hard quartose flat-faced grains with sharp angles; which is the freest, or may be easily freed by washing, from clay, salts, and calcareous, gypseous, or other grains less hard and durable than quartz; which contains the smallest quantity of pyrites or heavy metallic matter inseparable by washing; and which suffers the smallest diminution of its bulk in washing in the following manner—is to be preferred before any other. And where a coarse and fine sand of this kind, and corresponding in the size of their grains with the coarse and fine sands hereafter described, cannot be easily procured, let such sand of the foregoing quality be chosen as may be sorted and cleansed in the following manner: Let the sand be sifted, in streaming clear water, through a sieve which will give passage to all such grains as do not exceed one-sixteenth of an inch in diameter; and let the stream of water and the sifting be regulated so that all the sand, which is much finer than the Lynn-sand commonly used in the London glass-houses, together with clay and every other matter specifically lighter than sand, may be washed away with the stream, whilst the purer and coarser sand, which passes through the sieve, subsides in a convenient receptacle, and whilst the coarse rubbish and rubble remain on the sieve to be rejected. Let the sand which thus subsides in the receptacle be washed in clean streaming water through a finer sieve, so as to be further cleansed and sorted into two parcels; a coarser, which will remain in the sieve, which is to give passage to such grains of sand only as are less than one-thirtieth of an inch in diameter, and which is to be saved apart under the name of coarse sand; and a finer, which will pass through the sieve and subside in the water, and which is to be saved apart under the name of fine sand. Let the coarse and the fine sand be dried separately, either in the sun or on a clean iron plate, set on a convenient surface, in the manner of a sand-heat, and stirred continually till dried, else it will be discolored. Let lime be chosen, which is stone-lime, which heats the most in slaking, slakes the quickest when duly watered. is the

freshest made and closest kept; dissolves in distilled vinegar with the least effervescence, and leaves the smallest residue insoluble, and in this residue the smallest quantity of clay, gypsum, or martial matter. Let fourteen pounds of the lime thus chosen be put in a brass-wired sieve; let the sieve be finer than either of the foregoing; let the lime be slaked by plunging it in a butt filled with soft water; raising it out quickly, and suffering it to heat and fume; by repeating this plunging and raising alternately, and agitating the lime, until it be made to pass through the sieve into the water; let the part of the lime which does not easily pass through the sieve be rejected; let fresh portions of the lime be thus used until as many ounces of lime have passed through the sieve as there are quarts of water in the butt. Let the water thus impregnated stand in the butt closely covered until it becomes clear; and through wooden cocks, placed at different heights in the butt, let the clear liquor be drawn off as fast and as low as the lime subsides for use. This clear liquor I call the cementing liquor. The freer the water is from saline matter the better will be the cementing liquor made with it. Let fifty-six pounds of the chosen lime be slaked, by gradually sprinkling on it, and especially on the unslaked pieces, the cementing liquor, in a close clean place. Let the slaked part be immediately sifted through the last-mentioned fine brass-wired sieve: let the lime which passes be used instantly, or kept in air-tight vessels, and let the part of the lime which does not pass through the sieve be rejected. This finer richer part of the lime which passes through the sieve I call purified lime. Let bone ash be prepared in the usual manner, by grinding the whitest burnt bones, but let it be sifted, to be much finer than the bone ash commonly sold for making cupels. The most eligible materials for making my cement being thus prepared, take fifty-six pounds of the coarse sand and forty-two pounds of the fine sand; mix them on a large plank of hard wood placed horizontally; then spread the sand so that it may stand to the height of six inches, with a flat surface on the plank; wet it with the cementing liquor, and let any superfluous quantity of the liquor, which the sand in the condition described cannot retain, flow away off the plank. To the wettest sand add fourteen pounds of the purified lime in several successive portions, mixing and beating them up together in the mean time with the instruments generally used in making fine mortar: then add fourteen pounds of the bone ash in successive portions, mixing and beating them all together. The quicker and the more perfectly these materials are mixed and beaten together, and the sooner the cement thus formed is used, the better it will be. This I call the water cement coarse grained, which is to be applied in building, pointing, plastering, stuccoing, or other work, as mortar and stucco now are; with this difference chiefly, that as this cement is shorter than mortar or common stucco, and dries sooner, it ought to be worked expeditiously in all cases; and in stuccoing it ought to be laid on by sliding the trowel upwards on it; that the materials used along with this cement in building, or the ground on which it is to be laid in stuccoing, ought to be well wetted with the cementing liquor, in the instant of laying on the cement, and that the cementing liquor is to be used when it is necessary to moisten the cement, or when a liquid is required to facilitate the floating of the cement. When such cement is required to be of a finer texture, take ninety-eight pounds of the fine sand, wet it with the cementing liquor, and mix it with the purified lime and the bone ash in the quantities and in the manner above described; with this difference only, that fifteen pounds of lime, or thereabouts, are to be used instead of fourteen pounds, if the greater part of the sand be as fine as Lynn sand. This I call water cement fine grained. It is to be used in giving the last coating, or the finish, to any work intended to imitate the finer grained stones or stucco. But it may be applied to all the uses of the water cement coarse grained, and in the same manner. When for any of the foregoing purposes of pointing, building, &c., such a cement is required much cheaper and coarser grained, then much coarser clean sand than the foregoing coarse sand, or well washed fine rubble, is to be provided. Of this coarse sand or rubble take fifty-six pounds, of the foregoing coarse sand twenty-eight pounds, and of the fine sand fourteen pounds; and after mixing these, and wetting them with the cementing liquor in the foregoing manner, add fourteen pounds or somewhat less of the purified lime, and then fourteen pounds or somewhat less of the bone ash, mixing them together as above. When my cement is required to be white, white sand, white lime, and the whitest bone ash are to be chosen. Gray sand, and gray bone ash formed of half burnt bones, are to be chosen to make the cement gray; and any other color of the cement is obtained either by choosing colored sand, or by the admixture of the necessary quantity of colored talc in powder, or of colored vitreous or metallic powders, or other durable coloring ingredients commonly used in paint. To the end that such a water cement as I have described may be made as useful as it is possible in all circumstances; and that no person may imagine that my claim and right under these letters patent may be eluded by divers variations, which may be made in the foregoing process without producing any notable defect in the cement; and to the end that the principles of this art, as well as the art itself of making my cement, may be gathered from this specification and perpetuated to the public; I shall add the following observations: This my water cement, whether the coarse or fine grained, is applicable in forming artificial stone, by making alternate layers of the cement and of flint, hard stone, or brick, in moulds of the figure of the intended stone, and by exposing the masses so formed to the open air to harden: but they must not be exposed to rain till they are as hard as Portland stone. When such cement is required for water fences, two-thirds of the prescribed quantity of bone ashes are to be omitted; and in the place thereof an equal measure of powdered terras is to be used; and, if the sand employed be not of the coarsest sort, more terras must be added, so that the terras shall be by weight one-sixth part

of the weight of the sand. When such a cement is required of the finest grain, or in a fluid form, so that it may be applied with a brush, flint powder, or the powder of any quartose or hard earthy substance, may be used in the place of sand; but in a quantity smaller, as the flint or other powder is finer; so that the flint-powder, or other such powder, shall not be more than six times the weight of the lime, nor less than four times its weight. The greater the quantity of lime within these limits, the more will the cement be liable to crack by quick drying, and vice versâ. Where such sand as I prefer cannot be conveniently procured, or where the sand cannot be conveniently washed and sorted, that sand which most resembles the mixture of coarse and fine sand above prescribed may be used as I have directed, provided due attention is paid to the quantity of the lime, which is to be greater as the quantity is finer, and vice versâ. Sea sand well washed will answer. Where sand cannot be easily procured, any durable stony body, or baked earth grossly powdered, and sorted nearly to the sizes above prescribed for sand, may be used in the place of sand, measure for measure, but not weight for weight, unless such gross powder be as heavy specifically as sand. Sand may be cleansed from every softer, lighter, and less durable matter, and from that part of the sand which is too fine, by various methods, preferable, in certain circumstances, to that which I have described. Water may be found naturally free from fixable gas, selenite, or clay; such water may, without any notable inconvenience, be used in the place of the cementing liquor; and water approaching this state will not require so much lime as I have ordered to make the cementing liquor; and a cementing liquor sufficiently useful may be made by various methods of mixing lime and water in the described proportions, or nearly so. When stone lime cannot be procured, chalk lime or shell lime, which best resembles stone lime, in the characters above written of lime, may be used in the manner described, except that fourteen pounds and a half of chalk lime will be required in the place of fourteen pounds of stone lime. The proportion of lime which I have prescribed above may be increased without inconvenience, when the cement or stucco is to be applied where it is not liable to dry quickly; and in the contrary circumstance this proportion may be diminished; and the defect of lime in quantity or quality may be very advantageously supplied by causing a considerable quantity of the cementing liquor to soak into the work, in successive portions, and at distant intervals of time, so that the calcareous matter of the cementing liquor, and the matter attracted from the open air, may fill and strengthen the work. The powder of almost every well dried or burnt animal substance may be used instead of bone ash; and several earthy powders, especially the micaceous and the metallic; and the elixated ashes of divers vegetables whose earth will not burn to lime; and the ashes of mineral fuel, which are of the calcareous kind, but will not burn to lime, will answer the ends of bone ash in some degree. The quantity of bone ash described may be lessened without injuring the cement, in those circumstances especially which admit the quantity of lime to be lessened, and in those wherein the cement is not liable to dry quickly. And the art of remedying the defects of lime may be advantageously practised to supply the deficiency of bone ash, especially in building, and in making artificial stone with this cement.'

In the Transactions of the Society for the Encouragement of Arts, Commerce, &c., for 1811, we find the following, invented by H. B. Way, esq., of Bridport, strongly recommended, and apparently not without just reason: one part chalk lime, and three-parts fine sand collected on the sea-shore, near Bridport Harbour, the whole mixed up to a proper consistence with strong lime-water. Both the lime and sand should be finely sifted; and, when used as stucco, the first coat to be laid on half the thickness of a crown-piece; let it remain two days, then with a painter's brush wash it over with strong lime-water, and lay on the second coat of the same thickness. The cost of this is indeed very low; it is thus calculated by Mr. Way as his own expense:—

	s.	d.
One sack and a quarter of lime, at 2*s.* 6*d.*	3	1½
Two men and one boy, two days each, fetching and mixing up materials, and laying on; men 2*s.* 3*d.* per day, boy 10*d.* per day, and one pint of ale each per day, 12*d.*	11	10½
	15	0

The space of wall covered with these materials amounted to twenty-five square yards; which is not more than 7½*d.* per yard. It was the outside wall of the inventor's house which was covered with this stucco, in a situation greatly exposed to the spray of the sea and bad weather; yet he adds, though writing five years after its application, that by means of this stucco his house is perfectly free from damp, and the plaster still remains compact and durable.

It is highly probable that the above stucco may, for many years to come, answer very well for the situation in which it has been employed; but, where the cement is required to be harder, or is wanted to resist water, it should be combined with a portion of some metallic oxide, as iron or lead, which give it a firmness equal to that of freestone: and hence the advantage of employing tarras or puzzolane in the composition of stuccoes or mortars for this purpose; this singular material being nothing more than a kind of ferruginous clay, or clay combined and intermixed with iron oxide, baked and calcined by the force of volcanic fire, and hence reduced to the form of a light, porous, friable mineral. It is usually obtained from the neighbourhood of Puteoli, and is thrown forth from the craters of Vesuvius. The only preparation it undergoes is that of pounding and sifting, by which it is comminuted to a coarse powder, after which it is beaten up into a due degree of consistency with a certain portion of lime, sometimes with and sometimes without sand. This kind of cement is of considerable antiquity: it was commonly em-

ployed by the Romans along the skirts of the bay of Baiæ, the most fashionable watering-place of this celebrated people, during their most luxurious era, in constructing the walls of their summer villas, which were often erected immediately on the shore. It was employed by Mr. Smeaton in building the Eddystone light-house, in the proportion of equal parts of puzzolane, and slaked Aberthaw lime, and is well known to have answered his fullest expectation. For works less exposed, however, as locks and basons for canals, the proportion of puzzolane may be diminished; and the cement employed on such occasions, and with great success, is the following: slaked Aberthaw lime two bushels, puzzolane one bushel, clean sand three bushels; the whole being beaten well together with the proper quantity of water so as to yield 4·67 cubic feet of stucco. It is in consequence of the property we have just ascribed to metallic oxides, of giving solidification to stuccoes, that the scales detached by hammering red-hot iron, and which are to be easily procured at the forges and blacksmiths' shops, are found so advantageous in compositions of this kind. Mr. Smeaton found by repeated experiments that these pounded and sifted, and incorporated with lime, produce a cement equal to puzzolane combined with lime in the same proportion. This material, he perceived also, renders common mortar capable of setting under water. Roasted iron-ore was found to answer the same purpose.

Coincidently with these facts Mr. Kirwan observes that Zimmerman mixed one part filings of iron, and three parts sand, and sprinkled, or rather covered them with water, and let them stand six months, at the end of which period he found the vessel burnt by the expansion of the oxygenated iron, and the sand so firmly compacted that the mass thus formed could not be broken but by a chisel and hammer.—Henckel, Origine des Pierres, p. 405 in note. And that this induration may and does take place at great depths in the sea is evidently proved by the observations of Kinman (Mem. Stockh. 1780, related by Gadd), that an iron anchor long deposited in the sea had hardened into stone all the sand, clay, and shells which surrounded it, to a pretty considerable distance; and is further confirmed by a similar observation of Mr. Edward King, Phil. Trans. 1779, p. 35, that a violent storm having laid bare part of the wreck of a man of war, that had been stranded thirty-three years before, several masses, consisting of iron, ropes, and balls, were found covered over with a hard substance, which, upon examination, appeared to be sand concreted and hardened into a kind of stone; that which concreted round the rope retained the impression of that part of the ring to which the rope was fastened, in the same manner as the impressions of extraneous fossils are often found in various strata. Also round the iron handle of a brass cannon, that remained in the sea a much longer time, a much harder incrustation of sand was found, enclosing cockles, mussels, limpets, oysters, &c., all so firmly fixed, and converted into a substance so hard, that it required as much force to break them as to break the substance of any hard rock.'—Geol. Essays

A very valuable and curious preservation stucco was invented about fifty years ago by Mr Bachalier of Paris, which was capable of being used in a very liquid state, so as not to injure the finest and most delicate sculpture, which, indeed, it was the direct object of this composition to protect. In this the metallic oxide seems to have been lead, and one of the principal ingredients the caseous part of cheese, so frequently used in our own country as an ingredient in cement for uniting broken pieces of glass and china. This stucco-composition of Mr. Bachalier has of late years been esteemed of so much value in France that a committee of the first French chemists, Berthollet, Chaptal, Vauquelin, Le Briton, and Gayton-Merveau, have been appointed by the Imperial Institute to examine into its component parts, of whose report we shall offer the following abridgment:—'It was in 1755 that Mr. Bachalier, struck with the speedy alteration of the stones employed in the principal buildings at Paris, and the inconveniencies of the process employed from time to time to renew their surfaces, proposed to the superintendant of the royal buildings to try a preservative stucco. Accordingly three pillars in the court of the Louvre were coated with this stucco for half their length, two facing the south, the other the west. These were still remarkable in July last for the uniformity of their tint, strongly distinguished from the dull gray and earthy aspect of the contiguous parts: but, as the alterations made in completing the Louvre would necessarily destroy every trace of this experiment, the Institute appointed a committee to enquire concerning it before it should be too late. In company with Mr. Fontaine, architect of the Louvre, the gentlemen abovementioned examined the pillars, and found that the stucco applied formed a coat too thin to injure the finishing of the most delicate sculpture; that it retained a uniform color even in the parts exposed to the action of the wind, rain, and sun; that rubbing it with the hand made no impression on it; and that, if one of the three pillars exhibited a reddish yellow tint, there could be no doubt, from its appearance in other respects, that this was owing to some coloring matter added intentionally. It could not be found on enquiry that Mr. Bachalier had consigned his process to writing, and the following was the best account his son could give of it from memory. 'Its basis consists of the sifted powder of oyster-shells, previously washed and calcined to whiteness, mixed with the butyraceous and caseous part of milk. My father used the common cheese known by the name of fromage à la pie (skimmed milk cheese). He first separated all the wheyey part by pressure, and then left it some time exposed to the air to dissolve or soften. In this state he mixed with it a quantity of calcined oyster-shells in fine powder. When this mixture was brayed on a stone, the cheese softened, and formed a very smooth and whitish liquid paste. To make the stucco he diluted this with a solution of alum in water; the quantity of water being proportioned according to the thickness of the coat intended to be applied.'

'Mr. Bachalier could say nothing of the proportions of the ingredients; he only added that

his father having thought of employing this composition undiluted to cover leaves of paper, from which writing was easily effaced by a wet sponge, he observed that the oyster-shell powder was taken at random, and added to the cheese till it had acquired the consistency of a paste capable of being spread on paper. The committee having obtained from Mr. Bachalier a few leaves of paper covered with thin paste, found, from the very deep black immediately given it by the hydrosulphuret of potash, that it contained a considerable quantity of oxide of lead, the presence of which there was no reason to suspect in the preservative stucco, so that they could not be considered as the same. It remained therefore to analyse the stucco, which was done by Mr. Vauquelin; though, as a very small quantity only could be obtained by scraping the pillars, it did not admit of repeated trials. The results of his analysis gave

Carbonate of lime	63
Sulphate of lime	7·73
Carbonate of lead	6
Oxide of iron, about	4
Silex	2
Water	20
Organic matter, an indeterminate quantity.	
	102·73

The surplus of 2·73 Mr. Vauquelin ascribes either to the matter not having been dried to the same degree, or to the escape of a little carbonic acid during the calcination. The presence of animal matter was sought for, but not a particle could be separated. The smell it emitted during calcination no way resembled that of animal matters; on the contrary it had the pungent sharpness of vegetable substances. On being exposed to the action of heat in a retort, however, a clear and almost colorless liquid came over, from which potash expelled a very evident ammoniacal vapor. This indicates that some animal substance entered into the composition, but that in time it was decomposed, and left only an ammoniacal salt. The brownish color it acquired in the fire also proves that some animal matter still remained in it, though altered in its nature, since it neither emitted the smell proper to such substances, nor yielded any perceptible quantity of oil. Lastly, this matter yielded no appreciable quantity of alumine, so that it may be presumed no alum was employed in the composition.

'Mr. Bachalier having some of the paper that had been prepared by his father, the coating of this was analysed, and the result indicated that

Quicklime	56·66
Calcined gypsum	23·34
Ceruse or carbonate of lead	20

had entered into its composition.

'On these proportions more dependence can be placed than on the former, since it was impossible to detach the plaster from the pillars without some of the substance of the stone itself. That the caseous part of the milk is the proper vehicle for the powders we learn from the positive testimony of Mr. Bachalier, the son; and its utility is confirmed by the experiments of Mr. D'Arcet published some years ago. Of the efficacy of Mr. Bachalier's composition there can be no doubt, as we have irrefragable and still existing testimony of it; nor would it be difficult to estimate this beforehand, when we consider the causes that produce the gradual decay of the finest buildings in this capital, and the means of guarding against them. Hard and fine grained calcareous stone, susceptible of a greater or less degree of polish, is not liable to this alteration. It is therefore owing to the nature of the stone commonly employed, which is of a loose and unequal texture, filled with cavities, and found by analysis to contain ten or twelve per cent. of silex, and frequently three or four of oxide of iron. The difference of the stones from the quarries near Paris is evident from the tables of Mr. Rondelet, in his Treatise on the Art of Building; where we see, for example, that what is called the grignard of Passy is of the specific gravity of 2·462, and supports a weight of 6750 kil.; while the lambourde of St. Germain has only 1·560 specific gravity and is crushed by a weight of 921 kil. The prices of these two kinds of stone differ too in the proportion of twenty-six to ten.

'It is not at all strange that the little spider called by Linnæus senoculata, the cellar spider of Geoffroy, should find on the surface of this stone a convenient situation to shelter itself, deposit its eggs, and spread the nets in which it awaits its prey. Its web extends circularly round the cavity that serves as its den, forming round spots of three or four centimes (an inch or an inch and a half) radius. It is not thirty years since the hotel des monnoies was built, and I have counted no fewer than sixty-eight of these dark gray spots on one of the pillars of the vestibule. Similar ones are found not only on the stone, but on the coatings of plaster, and on the walls covered with common stucco. It is particularly in the joints and angles that the insect begins to fix itself. I have seen several on walls, the stucco of which had been coated afresh within less than seven years. These spots at length form a continued coat, retaining the sloughs of these insects, the remains of those on which they feed, and the dust raised by the wind, so that lichens soon take root in them. If it be asked, how is this to be prevented? the answer is easy. By a composition that resists water, will adhere to the stone so as not to scale off, has a sufficient degree of consistency to stop the pores accurately, is liquid enough to be spread as a wash, and uniformly to ice over, as it were, all the saliant and indented parts without thickening the angles or blunting the edges, and lastly which gives to the assemblage of coarse grains the smooth surface of polishable stones, in which it appears these insects cannot nestle. And this we think may be expected from Mr. Bachalier's stucco. Meantime I must observe, that, in the present state of our chemical knowledge, other means of fulfilling these conditions may be pointed out. We know, for instance, that phosphate of lime is one of the most fixed combinations: it would be sufficient, therefore, to wash over the stone with phosphoric acid more or less diluted, or with phosphate of lime, lead, magnesia, &c., held in solution by an

excess of their acid, to give it a sort of covering that would render it as unalterable as the stone of Logozan in Estramadura. It is equally known that sulphate of barytes resists all agents in the humid way; and we might certainly coat the stone with this earthy salt, by first impregnating it with a solution of sulphate of iron, zinc, magnesia, alumine, &c., and immediately washing it over with barytes water. The insolubility of oxalates and tartrates of lime, and the adhesion they contract by deposition even on polished substances, suggest processes for washes not less solid, as the acids added to these salts to render them temporarily soluble, saturating themselves with their base from the substance of the stone itself, would not fail to connect together all the grains, fill up their intervals, and completely close the pores. Trials made with a view to ascertain the justice of this reasoning have confirmed the expectation of a successful result; since on the most porous stones they have produced a surface on which the eye could see no appearance of coating, but which, being rubbed with wet black cloth till the cloth showed signs of wear, was not in the least soiled by it. Preparations of this kind, however, would be much more expensive than Bachalier's stucco, so that their use must be restricted to the preservation of sculpture of extreme delicacy.

'For farther satisfaction trials have been made with different kinds of stone, and stucco made in imitation of Bachalier's. These have given rise to the following observations. 1. All the compositions in which alum water was employed soiled the fingers, and were washed off by water. 2. The cheese that acquires the greatest consistency with dry substances is that which is almost entirely deprived of the butyraceous and wheyey parts. M. D'Arcet, in the paper already quoted, had remarked that these were more detrimental than useful, that painting with milk would not resist water, and that the cheese called fromage à la pie might be used after it had grown dry, though less advantageously than when fresh made and well drained. 3. A mixture of this cheese with lime simply forms a paste that adheres but slightly even to coarse grained stone, and not at all to paper. 4. Calcined gypsum, which in a small dose facilitates the union of the lime and cheese, renders the paste hard and clotty if it be used in too large proportion. 5. It had appeared that whiting, which is used in paper hangings, might be admitted into the preparation: but it was found that if this earthy substance, which in a process described by M. D'Arcet is carried to twenty times the weight of the lime, may be used with success for inside work, it would make too thick a coat, and would not adhere so strongly to the stone. 6. The addition of a very little ochre, or red oxyde of iron, to this preparation, will give it such a tint as may be wished, without altering its properties. The proportion of cheese must depend in some measure on the state in which it is, and cannot be determined precisely but by the condition of making a soft paste. A fourth of the weight of the solid matters appears to be a sufficient quantity of cheese fresh from the press.

'The quantity of lime to be used at once being determined on, it is to be slaked in as little water as possible, but enough to make it pass through a sieve not very fine, in order to separate the parts that will not slake. This is to be triturated with the cheese to the consistence of a soft, smooth, and coherent paste. To this are to be added the calcined gypsum and the white lead, which must not be adulterated with chalk, and by farther grinding on the stone with a little water the whole is to be reduced to a pap, rather thick than fluid. Lastly, it is to be diluted with common water the moment of using it, which is to be done with a painter's or varnisher's brush.'

Dr. Shaw informs us in his Travels (p. 286), that the cement or mortar used in Barbary, which is apparently of the same consistence and composition with those of the ancients, is made in the following manner: they take two parts of wood-ashes, three of lime, and one of fine sand, which, after being well sifted and mixed together, they beat for three days and nights incessantly with wooden mallets, sprinkling them alternately and at proper times with a little oil and water, till they become of a due consistence. This composition, he adds, is chiefly used in their arches, cisterns, and terraces; but the pipes of their aqueducts are joined, by beating tow and lime together with oil only, without any mixture of water. Both these compositions quickly assume the hardness of stone, and suffer no water to pervade them: and will, therefore, answer the purpose of stucco.

STUCK. The *pret.* and *part. pass.* of Stick, which see: also, as a noun substantive, a thrust.

I had a pass with rapier, scabbard and all: and he gives me the *stuck* in with such a mortal motion, that it is inevitable. *Shakspeare. Twelfth Night.*

What more infamous brands have records *stuck* upon any, than those who used the best parts for the worst ends? *Decay of Piety.*

The partners of their crime will learn obedience,
When they look up and see their fellow-traitors
Stuck on a fork, and black'ning in the sun.
Addison.

STUD, *n. s.* & *v. a.* Sax. ȝtuȝu; Goth. *stud.* A post or stake; nail or knob: hence a stand for horses; and a collection of horses.—Junius. To furnish with, or adorn with studs.

Thy horses shall be trapped,
Their harness *studded* all with gold and pearl.
Shakspeare.

A belt of straw, and ivy buds,
With coral clasps, and amber *studs.* *Raleigh.*

Handles were to add,
For which he now was making *studs.*
Chapman's Iliad.

Crystal and myrrhine cups, embossed with gems
And *studs* of pearl. *Milton's Paradise Regained.*

In the *studs* of Ireland, where care is taken, we see horses bred of excellent shape, vigour, and size. *Temple.*

A silver *studded* ax, alike bestowed.
Dryden's Æneid.

STUDDING Sails, certain light sails extended, in moderate and steady breezes, beyond the skirts of the principal sails, where they appear as wings upon the yard-arms.

STUDLY (John), an English poet, who flourished in the reign of queen Elizabeth. He was educated at Westminster, and afterwards

studied at Trinity College, Cambridge. He translated several of Seneca's tragedies; but was killed at the siege of Breda, where he had a command under prince Maurice, in 1587.

STUD'Y, *n. s., v n.*, & STU'DENT, *n. s.* [*v. a.* STUD'IED, *adj.* STUD'IER, *n. s.* STU'DIOUS, *adj.* STU'DIOUSLY, *adv.* Fr. *estude;* Latin *studium.* Application of mind to learning; attention; meditation; subject of attention; apartment appropriated to literary employment: to think with close application; endeavour: apply the mind to: a student and studier signify one who closely applies to study: studied and studious, given to books; learned; attentive to; careful (taking *of*): the adverb corresponding.

Study to be quiet, and do your own business. 1 *Thess.* iv. 11.

Get me a taper in my *study*, Lucius. *Shakspeare. Julius Cæsar.*

Keep a gamester from dice, and a good *student* from his book. *Id. Merry Wives of Windsor.*

What can happen
To me above this wretchedness? All your *studies*
Make me a curse like this? *Id. Henry VIII.*

He hath *studied* her will, and translated her out of honesty into English. *Id. Merry Wives.*

He died
As one that had been *studied* in his death,
To throw away the dearest thing he owed,
As 'twere a careless trifle. *Shakspeare.*

I'm well *studied* for a liberal thanks
Which I do owe you. *Id. Antony and Cleopatra.*

You could, for a need, *study* a speech of some dozen lines, which I would set down. *Id. Hamlet.*

The king of Castile, a little confused, and in a *study*, said, That can I not do with my honour. *Bacon's Henry VII.*

It will be fit that some man, reasonably *studied* in the law, go as chancellor. *Bacon.*

Studies serve for delight in privateness and retiring, for ornament in discourse, and for ability in the judgment and disposition of business. *Id. Essays.*

Let all *studies* and libraries be towards the east. *Wotton.*

Without *study* this art is not attained, nor fit to be attained. *Holyday.*

Some servants of the king visited the lodgings of the accused members, and sealed up their *studies* and trunks. *Clarendon.*

Nothing lovelier can be found
In woman, than to *study* household good. *Milton.*

Just men they seemed, and all their *study* bent
To worship God aright, and know his works. *Id.*

Let my due feet never fail
To walk the *studious* cloister's pale. *Id.*

Divines must become *studious* of pious and venerable antiquity. *White.*

During the whole time of his abode in the university, Hammond generally spent thirteen hours of the day in *study*. *Fell.*

STUFF, *n. s., v. a.*, & STUFF'ING, *n. s.* [*v. n.* Fr. *estoffe;* Dan., Belg., and Teut. *stoff.* Any matter or body; materials; furniture; essences; that which fills any thing; a medicine: to stuff is to thrust into; to fill to repletion; cause to swell out: as a verb neuter, to feed gluttonously: stuffing is that by which a thing is filled.

Let Phidias have rude and obstinate *stuff* to carve: though his art do that it should, his work will lack that beauty which otherwise in fitter matter it might have had. *Hooker.*

She went for parsley to *stuff* a rabbet. *Shakspeare.*

These gloves the count sent me; they are an excellent perfume.
—I am *stuft*, cousin, I cannot smell. *Id.*

I will be the man that shall make you great.—I cannot perceive how, unless you give me your doublet, and *stuff* me out with straw. *Id. Henry IV.*

Thy verse swells with *stuff* so fine and smooth,
That thou art even natural in thine art. *Id. Timon.*

Such *stuff* as madmen
Tongue and brain not. *Shakspeare.*

When we've *stuffed*
These pipes, and these conveyances of blood,
With wine and feeding, we have suppler souls. *Id.*

I did compound for her
A certain *stuff*, which being ta'en would seize
The present power of life. *Id. Cymbeline.*

Grief fills the room up of my absent child,
Lies in his bed, walks up and down with me,
Stuffs out his vacant garments with his form. *Shakspeare.*

Put roses into a glass with a narrow mouth, *stuffing* them close together, but without bruising, and they retain smell and colour fresh a year. *Bacon's Natural History.*

The workman on his *stuff* his skill doth shew,
And yet the *stuff* gives not the man his skill. *Davies.*

Each thing beheld did yeeld
Our admiration: shelves with cheeses heapt;
Sheds *stuft* with lambs and goats, distinctly kept. *Chapman.*

He took away locks, and gave away the king's *stuff*. *Hayward.*

It is not usual among the best patterns to *stuff* the report of particular lives with matter of public record. *Wotton.*

Groaning waggons loaded high
With *stuff*. *Cowley's Davideis.*

Those accusations are *stuffed* with odious generals, that the proofs seldom make good. *Clarendon.*

Of brick, and of that *stuff*, they cast to build
A city and tower. *Milton.*

Rome was a farrago out of the neighbouring nations; and Greece, though one monarchy under Alexander, yet the people, that were the *stuffing* and materials thereof, existed before. *Hale.*

Degrading prose explains his meaning ill,
And shews the *stuff*, and not the workman's skill. *Roscommon*

Please not thyself the flattering crowd to hear;
'Tis fulsome *stuff* to feed thy itching ear. *Dryden's Persius.*

Officious Baucis lays
Two cushions, *stuffed* with straw, the seat to raise. *Id.*

What have we more to do than to *stuff* our guts with these figs? *L'Estrange.*

Pierce an hole near the inner edge, because the triangle hath there most substance of *stuff*. *Moxon's Mechanical Exercises.*

Arrach leaves are very good in pottage and *stuffings*. *Mortimer.*

This crook drew hazel-boughs adown,
And *stuffed* her apron wide with nuts so brown. *Gay.*

For thee I dim these eyes, and *stuff* this head
With all such reading as was never read. *Pope.*

To-morrow will be time enough
To hear such mortifying *stuff*. *Swift.*

STUHL-WEISSENBURG, a county of West Hungary, between the counties of Vesz-

prim and Pest, from which last it is separated by the Danube. Its territorial extent is 1600 square miles. Except in the north, where it has a few hills, it is in general level and has several lakes and marshes. Besides the Danube, flowing along its eastern boundary, it is watered by the Sarvitz, formed into a canal for a considerable part of its course. The principal products are wheat, wine, and tobacco. Population 120,000.

STUHL-WEISSENBURG, or SZEPES-FFJARVAR, a town of the south-west of Hungary, the capital of a palatinate, and a bishop's see, was built by king Stephen in the eleventh century, and was, during five centuries, the place where the kings of Hungary were crowned and interred. It was called on that account Alba Regalis; three large moles or causeways proceeded from it; and between these were churches, houses, and gardens, the whole forming extensive suburbs. The removal of the court, and the misfortunes occasioned by repeated sieges, have greatly altered it; though it still contains several respectable buildings. It was formerly traversed by several canals, but these having been neglected are choked up, and the waters have formed marshes. At present it has about 13,000 inhabitants, with a gymnasium and barracks for soldiers; its fortifications were demolished in 1702. The inhabitants are either Catholics, or of the Greek church. Here are some woollen manufactures, and in the neighbourhood a saltpetre work. Thirty-six miles south-west of Buda.

STUKELY (Dr. William), a celebrated antiquarian, descended from an ancient family in Lincolnshire, was born in Holbeach in 1687, and educated in Bennet College, Cambridge. While an under-graduate, he indulged a propensity to drawing; but made physic his principal study, and first began to practise at Boston. In 1717 he removed to London, where, on the recommendation of Dr. Mead, he was soon after elected F. R. S. He was one of the first who revived that of the Antiquarians in 1718, and was their secretary for many years during his residence in town. In 1729 he took holy orders by the encouragement of archbishop Wake; and was soon after presented by lord chancellor King with the living of All Saints in Stamford. In 1741 he became one of the founders of the Egyptian Society, which brought him acquainted with the benevolent duke of Montague, one of the members; who prevailed on him to leave Stamford, and presented him to the living of St. George the Martyr, Queen Square. He died of the palsy, in 1765. His Dissertation on the Spleen was well received; as was also his Itinerarium Curiosum, the first fruit of his juvenile excursions. His great learning, and profound researches into the remains of antiquity, enabled him to publish many elaborate and curious works: his friends called him the arch-druid of his age. His discourses, entitled Palæographia Sacra, on the vegetable creation, show him a botanist, philosopher, and divine.

STUM, *n. s.* & *v. a.* Swed. *stum*, supposed to be contracted from Lat. *mustum*. Wine unfermented; must; new or newly fermented wine: to stum is to renew wine by fresh fermentation.

Let our wines without mixture or *stum* be all fine,
Or call up the master, and break his dull noddle.
Ben Jonson.

Drink every letter on 't in *stum*,
And make it brisk champaigne become. *Hudibras.*

An unctuous clammy vapour, that arises from the *stum* of grapes when they lie mashed in the vat, puts out a light when dipped into it. *Addison on Italy.*

Vapid wines are put upon the lees of noble wines to give them spirit, and we *stum* our wines to renew their spirits. *Floyer.*

STUM, in the wine trade, denotes the unfermented juice of the grape after it has been several times racked off and separated from its sediment. The casks are for this purpose well matched or fumigated with brimstone every time, to prevent the liquor from fermenting, as it would otherwise readily do, and become wine. See MUST.

STUM'BLE, *v. n.*, *v. a.*, & *n. s.* STUM'BLER, *n. s.* STUM'BLINGBLOCK, STUM'BLINGSTONE. This word Junius derives from stump, and says the original meaning is to strike, or trip, against a stump. I rather think it comes from tumble.—Johnson. See TUMBLE. To trip in walking; slip; err; strike against or upon by chance: to make to boggle: a blunder or failure: the noun substantive and compounds corresponding.

The way of the wicked is as darkness; they know not at what they *stumble*. *Proverbs* iv. 19.

He that loveth his brother abideth in the light, and there is none occasion of *stumbling* in him.
1 *John* ii. 10.

We preach Christ crucified, unto the Jews a *stumblingblock*, and unto the Greeks foolishness.
1 *Corinthians* i. 23.

What man art thou, that thus bescreened in night,
So *stumblest* on my counsel?
Shakspeare. Romeo and Juliet

As we paced along
Upon the giddy footing of the hatches,
Methought that Glester *stumbled*; and in falling
Struck me, that sought to stay him, overboard.
Shakspeare.

Be sweet to all: is thy complexion sour?
Then keep such company, make them thy allay;
Get a sharp wife, a servant that will lower:
A *stumbler stumbles* least in rugged way. *Herbert.*

Such terms amused them all,
And *stumbled* many. *Milton's Paradise Lost.*

If one illiterate man was *stumbled*, 'twas likely others of his form would be so too. *Fell.*

One *stumble* is enough to deface the character of an honourable life. *L'Estrange.*

One thing more *stumbles* me in the very foundation of this hypothesis. *Locke.*

STUMP, *n. s.* STUMP'Y, *adj.* Swed. and Dan. *stumpe*; Blg. *stompe*. The part of any solid body remaining after the rest is taken away. See STUB. The adjective corresponds.

He struck so strongly, that the knotty sting
Of his huge tail he quite in sunder cleft;
Five joints thereof he hewed, and but the *stump* him left.
Spenser.

Your colt's tooth is not cast yet.—Not while I have a *stump*. *Shakspeare.*

He through the bushes scrambles;
A *stump* doth trip him in his pace,
Down comes poor Hob upon his face
Amongst the briers and brambles. *Drayton.*

Who, 'cause they 're wasted to the *stumps*,
Are represented best by rumps. *Hudibras.*
Against a *stump* his tusks the monster grinds,
And in the sharpened edge new vigour finds.
Dryden.

A poor ass, now wore out to the *stumps*, fell down under his load. *L'Estrange.*

A tongue might have some resemblance to the *stump* of a feather. *Grew's Musæum.*

They burn the stubble, which, being so *stumpy*, they seldom plow in. *Mortimer.*

A coach-horse snapt off the end of his finger, and I dressed the *stump* with common digestive.
Wiseman's Surgery.

Worn to the *stump* in the service of the maids, 'tis thrown out of doors, or condemned to kindle a fire.
Swift.

STUN, *v. a.* Sax. ſtunan, of ȝeſtun, noise, Fr. *etonner*. To confound or dizzy with noise; or with a blow.

An universal hubbub wild
Of *stunning* sounds, and voices all confused,
Assaults his ear. *Milton.*

Still shall I hear, and never quit the score,
Stunned with hoarse Codrus' Theseid o'er and o'er.
Dryden.

One hung a pole-ax at his saddle-bow,
And one a heavy mace to *stun* the foe. *Id.*

Too strong a noise *stuns* the ear, and one too weak does not act upon the organ. *Cheyne.*

The Britons, once a savage kind,
Descendents of the barbarous Huns,
With limbs robust, and voice that *stuns*,
You taught to modulate their tongues,
And speak without the help of lungs. *Swift.*

STUNG. The *pret.* and *part. pass.* of sting.

To both these sisters have I sworn my love:
Each jealous of the other, as the *stung*
Are of the adder. *Shakspeare. King Lear.*

With envy *stung*, they view each other's deeds;
The fragrant work with diligence proceeds.
Dryden's Æneid.

STUNT, *v. a.* Isl. *stunta*. To hinder from growth.

Though this usage *stunted* the girl in her growth, it gave her a hardy constitution; she had life and spirit. *Arbuthnot.*

The tree
Grew scrubby, dried a-top, and *stunted*;
And the next parson stubbed and burnt it. *Swift.*

STUPE, *n. s.* Lat. *stupa*. Cloth or flax dipped in warm medicaments, and applied to a hurt or sore.

A fomentation was by some pretender to surgery applied with coarse woollen *stupes*, one of which was bound upon his leg. *Wiseman's Surgery.*

STUPEFAC'TION, *n. s.* } Fr. *stupefaction*;
STUPEFAC'TIVE, *adj.* } Lat. *stupefactus*.
Insensibility; dulness; stupidity; sluggishness of mind: causing such a state of mind; narcotic.

It is a gentle fomentation, and hath a very little mixture of some *stupefactive*.
Bacon's Natural History.

All resistance of the dictates of conscience brings a hardness and *stupefaction* upon it. *South.*

She sent to every child
From impudence, or *stupefaction* mild;
And straight succeeded, leaving shame no room,
Cibberian forehead, or Cimmerian gloom. *Pope.*

STUPEN'DOUS, *adj.* Lat. *stupendus*. Wonderful; amazing; astonishing.

All those *stupendous* acts deservedly are the subject of a history excellently written in Latin by a learned prelate. *Clarendon.*

Great joy was at their meeting, and at sight
Of that *stupendous* bridge his joy increased. *Milton.*

Portents and prodigies their souls amazed;
But most when this *stupendous* pile was raised.
Dryden.

Mortals, fly this cursed detested race;
A hundred of the same *stupendous* size,
A hundred Cyclops, live among the hills.
Addison.

STU'PID, *adj.* } Fr. *stupide*; Lat. *stupidus*.
STUPID'ITY, *n. s.* } Dull; wanting sensibility
STU'PIDLY, *adv.* } or apprehension; heavy; sluggish of understanding: the noun substantive and adjective corresponding.

That space the evil one abstracted stood
From his own evil, and for the time remained
Stupidly good. *Milton's Paradise Lost.*

O that men should be so *stupid* grown
As to forsake the living God! *Milton.*

Men, boys, and women, *stupid* with surprise,
Where'er she passes fix their wond'ring eyes.
Dryden.

Shadwel alone, of all my sons, is he
Who stands confirmed in full *stupidity*. *Id.*

On the shield there were engraven maps of countries, which Ajax could not comprehend, but looked on as *stupidly* as his fellow-beast the lion. *Id.*

With wild surprise
A moment *stupid*, motionless, he stood. *Thomson.*

STUPIDITY. The Greek word μωροτης corresponds most with our English word stupidity or foolishness, when used to express that state of mind in which the intellects are defective. The immediate causes are said to be, a deficiency of vital heat, or a defect in the brain. Stupid children sometimes become sprightly youths; but, if stupidity continues to the age of puberty, it is hardly ever removed. If stupidity follows upon a violent passion, an injury done to the head, or other evident cause, and if it continues long, it becomes incurable. But the stupidity which consists in a loss of memory, and succeeds a lethargy spontaneously, ceases when the lethargy is cured.

STU'PIFY, *v. a.* Lat. *stupefacio*. To make stupid; deprive of sensibility; to dull.

Those
Will *stupify* and dull the sense a while.
Shakspeare. Cymbeline.

It is not malleable; but yet is not fluent, but *stupified*. *Bacon.*

Pounce it into the quicksilver, and so proceed to the *stupifying*. *Id.*

Consider whether that method, used to quiet some consciences, does not *stupefy* more. *Decay of Piety.*

Envy, like a cold poison, benumbs and *stupefies*: and, conscious of its own impotence, folds its arms in despair. *Collier.*

STU'POR, *n. s.* Fr. *stupeur*; Lat. *stupor*. Suspension or diminution of sensibility.

A pungent pain in the region of the kidneys, a *stupor* or dull pain in the thigh, and colick, are symptoms of an inflammation of the kidneys.
Arbuthnot on Diet.

STUPRA'TION, *n. s.* Lat. *stupratio*, from *stupro*. Rape; violation.

Stupration must not be drawn into practice.
Browne.

STURBRIDGE, a post-town of Worcester county, Massachusetts, eighteen miles south-west of Worcester, and fifty-eight south-west of Boston. It is watered by the Quinebaug, and the turnpike from Worcester to Hartford passes through the town.

STUR'DY, *adj.* Fr. *estourdi.* Hardy; stout; brutal; stiff; obstinate. It is always used with some disagreeable idea of coarseness or rudeness.

The ill-apparelled knight now had gotten the reputation of some *sturdy* lout, he had so well defended himself. *Sidney.*

Then withdraw
From Cambridge, thy old nurse; and, as the rest,
Here toughly chew and *sturdily* digest
The' immense vast volumes of our common law.
Donne.

He was not of any delicate contexture, his limbs rather *sturdy* than dainty. *Wotton.*

Sturdiest oaks
Bowed their stiff necks, loaden with stormy blasts,
Or torn up sheer. *Milton's Paradise Regained.*

This must be done, and I would fain see
Mortal so *sturdy* as to gainsay. *Hudibras.*

Awed by that house, accustomed to command,
The *sturdy* kerns in due subjection stand,
Nor bear the reins in any foreign hand. *Dryden.*

A *sturdy* hardened sinner shall advance to the utmost pitch of impiety with less reluctance than he took the first steps, whilst his conscience was yet vigilant and tender. *Atterbury.*

STURDY, a disease in sheep of much importance. There are two varieties of it, stated by Dr. Duncan, jun., in his useful paper on it, in the third volume of the Transactions of the Highland Society of Scotland; the appearances in each of which are as follow:—When a sheep is attacked with the first of these varieties of the sturdy, it ceases, it is said, to improve, becomes dull, is apt to loiter behind, and separates from the flock. It does not walk straight forward, but often deflects on one side, or dozes round in a circle. The eyes glare steadily in its head, and seem enlarged, from the pupil being round instead of oval, which in healthy sheep is always the case in the day time. Its vision is impaired, and it does not see any object which approaches until it be very near, when it starts away, and runs furiously without any aim. When caught, it is remarkably stupid on being again liberated. In dry weather, it follows eagerly to that quarter from which the wind blows. It has a great reluctance at passing water, as burns or brooks, and cannot easily get through them, but mostly frequents places where it can hear the sound of water. Some time after these appearances have presented themselves, in the course of perhaps about three weeks, there appears and is found, on examining the head, by pressing on it with the thumbs, a remarkable degree of softness at one part of it, where the skull seems to be wanting. But in a few instances no softness is to be discovered in any period of the disease, but in either case, if not relieved by a proper operation, the animal loses the power of standing, and dies perfectly emaciated. The continuance of this sort or variety of the disease extends or lasts from two months to a year, as the circumstances of the particular case may be. The second or latter of these varieties is, however, much more rapid in its progress, in which, in addition to some of the above appearances, a great degree of stupor comes on in a few days, which is followed by total blindness, and no softness is ever to be found in any part of the skull or bones of the head.

The appearances on opening the head, in the first of the above varieties, are an oval or round bag, which is found lying between the brain and the skull, quite unconnected with any of the surrounding parts, generally situated between or beneath the horns. These bags vary much in size, being sometimes no larger than a plum, while at others they are as big as a goose's egg. They are filled with a clear fluid like water, sometimes intermixed with a thin crust, when it is of a glutinous or slimy nature. Within, or in the skins of these bags, are seen, according to some, many little white bodies, nits, or the ova of insects. These are thus described by Mr. W. Hog, which, though in some measure hypothetical, display an accuracy of observation. He is induced to believe, from two or three recent cases and observations, that the dissolution of the brain, &c., is occasioned by numbers of animalculæ, which have been noticed to be swimming loosely in the liquor. They resemble ants' eggs, both in shape and color, but are somewhat shorter. However, as all the animals upon which he made the observation had been dead for some time, so these puny inhabitants of the brain were also dead; but if they had been living and organised animals, which he has no doubt they were, there would be multitudes of so diminutive a size, as to be quite imperceptible to the naked eye; and he is fully convinced that if the disease was minutely observed in all its stages by microscopical examination, whatever its beginning was, its progress would be, by the activity of these animalculæ, increasing both in number and size. In proportion as the disease advances, the bag increases in size, and by its pressure causes the brain to decrease, while the skull immediately over the bag becomes soft and disappears, so that nothing intervenes between it and the integuments of the head. Sometimes, but only in those cases where no attempt has been made to cure or remove it, there are many small bags, unconnected with each other, distributed through the brain or cerebral parts.

In the second sort or variety of the disease, the water is not contained in a bag, but within the substance of the brain, in certain cavities termed its ventricles, and sometimes in the hinder parts, where it joins with the spinal marrow, in which case it is thought to be quite incurable. Hard substances or excrescences growing out from the inside of the skull, and blows upon the head, occasionally produce all the appearances of real sturdy; but in these cases no water is to be found in the parts. The cause of the appearances in this disease is therefore unquestionably pressure on the brain, whether it arise from accidental contusion; from a bony excrescence, as in false sturdy; or from a collection of water, as in the legitimate varieties of it, as seen above. What, however, gives rise to these collections of water, is not by any means

so well ascertained. Inflammation of the brain probably precedes its effusion in the latter variety of the disease; but the generation of the hydatids, or water-bags, in the former sort or variety, is not at all understood. The disease is not contagious; neither is it peculiar to any soil. It generally affects sheep of the hog kind in the beginning months of the spring and summer, and is commonly ascribed to exposure to tempestuous weather, without sufficient shelter.

In regard to the cure of the disease, as the natural termination of it is invariably fatal, unless those rare recoveries which are sometimes the consequence of accidental blows on the head, that probably rupture the bags, be excepted; and more especially as the mutton in this disease is good, the sooner an attempt is made to relieve the animal by the proper operation, the better; for want of which relief, although it is extremely simple, and not unfrequently successful, thousands of sheep are suffered to perish through carelessness or ignorance. The cure in these cases may be attempted in three different ways, as by tapping, trepanning, and wiring. Where the bag is seated any where in the crown of the head, some suppose that the most ready and the gentlest method is to tap it in the place where the skull is soft, and to let the water run out. This is most commonly performed by means of an awl, or large corking pin, though an instrument with a small tube in it, termed a trocar in surgery, might be easily contrived and formed, which would drain it off in a more complete manner. By this operation, if the instrument be not pushed too far, the animal is nothing the worse, it is said, whether it recover or not. But, what is very remarkable, this plan is not, it is said, successful on all farms alike, of which many instances are known. An old shepherd has often been heard to remark that, in the course of thirty years' experience, not one sheep out of twenty which he had tapped on his own farm had died, while it was very rare that he could cure any on some of the neighbouring ones. He constantly performs it with a corking pin. Others assert that, in their neighbourhoods, more sheep have been cured by this operation than by any other, in performing which the sheep is advised to be laid on its back, and the pin to be inserted in an oblique manner; if water follow, the cure is said to be certain; but, even though it should not follow, provided the bag be pricked into, it is often successful in removing the disease. In the mode of cure by means of trepanning and extracting the bag or cyst, the description of which is accurately given below, there are several circumstances to be carefully attended to.

The animal being properly secured, and the head placed in the most convenient position, the part to be cut being uppermost, the skin is to be divided by an incision an inch and a half in length, crossed by another of the same length at right angles to it. The skull, which is quite soft, is then to be cautiously divided in the same manner, until the bag with the fluid in it appear clear at the bottom of the incision, which it commonly does. The soft skull is now to be turned back, or a bit cut out of it, so as to render the bag completely evident. It should then be taken hold of by a pair of blunt forceps, and be gently moved backwards and forwards, to loosen it from its connexions, which are generally very slender. This may also be done by means of a crow's quill, or any blunt pointed instrument, carried frequently round it. The nose of the animal is now to be held, so as to restrain its breath, which may force the bag from its situation. The operator is to continue moving and pulling it, stopping the breathing of the sheep at intervals, until it is quite extracted. The skin after this is to be laid neatly down again, and a cloth spread with tar placed and tied over the wound above the dry lint, which is folded and laid on it, to prevent either cold in the spring, or flies in the summer, from injuring it. This is to be allowed to remain for two days, when the dressings may be changed, and a bit of cloth spread with hog's lard, fresh butter, tar, or some other ointment, applied on the wound. The dressings should be changed every second day for ten days or a fortnight, after which time, in ordinary cases, it will require no more attention, being generally healed up. The skull grows over it in about a month, and then becomes of its usual hardness; and the animal is equally healthy, as if no disease had previously existed. It is said that the senses return after the operation in a few hours, and that the next day the sheep seems to be quite relieved.

When, in consequence of rashness or inattention, the bag containing the fluid has been ruptured, which sometimes happens, it is very difficult, and in many cases impossible, to extract the sac. The best practice, in this situation of things, is, it is said, to place the animal in such a position as that all the fluid may run out and be discharged; washing the wound with spirits, and trying to extract, if possible, the remains of the sac, then dressing it with a mixture of tar and basilicon, or either separately, then turn the animal, which has now lost its stupid appearance, into a good pasture. The damps and cold of nights should be avoided, as they tend to produce inflammation, which very soon destroys the animal. In this case, the admission of the external air, and the irritating dressings, cause the sides of the sac to adhere: this, however, is not always the case, it is said, as after a week or two the appearances of the disease have been known to return, after the alleviation which the operation constantly produced. When this happens, it is almost impossible to extract the bladder or bag entire, on account of the inflammation, from the cutting, causing strong adhesion. In this case the bag may be opened, and a little spirits of port wine injected by means of a syringe, which has been known, in more than one case, to prevent a return of the symptoms. This operation should not, where possible, be performed in hot or very warm weather, as maggots are extremely apt to breed in the wound. In frost, too, inflammation is liable to be produced, which may also at that time render it improper. In these cases, the sheep should be fattened for the butcher as soon as possible.

The operation of wiring is described in this manner by Mr. Hog. In case the skull should feel soft in the forehead, then the operation must be performed by thrusting a stiff sharpened wire up each nostril, until it stop against the upper part of the skull. If this mode of cure were not well authenticated, by daily experience and observation, it might, it is said, appear a very severe and dangerous operation or practice, as the wire goes quite through the brain in two different places; yet a far greater number of sheep are cured in this way than by any other. The above person has cured many both ways, he says, and killed a part too; but those which he killed were generally with the wire, because, if the other fail of producing the desired effect, the wire is constantly applied to as a last resource; and many have been seen cured by it which were apparently past all means of recovery. By some of these means, properly made use of, this disease will be found to be mostly capable of being removed.

STUR'GEON, *n. s.* Lat. *sturio, tursio.* A sea-fish.

It is part of the scutellated bone of a *sturgeon*, being flat, of a porous or cellular constitution on one side, the cells being worn down and smooth on the other. *Woodward.*

Sturgeon, Sturio. See Accipenser. The sturgeon is supposed to be the Ονισκος of Dorion, as quoted by Athenæus, who says, its mouth is always open, and that it conceals itself in the hot months. Hence it must be of a cold nature; which is confirmed by the description given of the European species, by Mr. Forster, in his Essay on the Volga. He says, they are scarcely ever found in that river in spring or summer, but abound in vast numbers in autumn and winter, when they crowd up the river, from the sea, and are taken in great numbers. The ancients were also acquainted with the huso, another species, which affords ichthyocolla, or isinglass.

STURMIUS (James), a learned German, born at Strasburg in 1489. He rendered the most important services to his country, by contributing greatly to the reformation of religion at Strasburg; to the erection of a college there, and to his friend Sleidan's History of the Reformation in Germany. See Sleidan. He also served his country essentially as an ambassador to different foreign courts, and as a deputy to the diets of the empire. This learned reformer died at Strasburg, October 30th, 1553.

Sturmius (John), a learned philologer and rhetorician, born at Sleidan near Cologne in 1507; in the same town, and within a year of the celebrated J. Sleidan, along with whom he was educated. He afterwards studied with the sons of count de Manderscheid, whose receiver his father was: and next at Liege in the college of St. Jerome, and then went to Louvain in 1524; where he spent five years, three in learning and two in teaching. He set up a printing press with Rudger Rescius, professor of the Greek tongue, and printed several Greek authors. He went to Paris in 1529, where he was highly esteemed, and read public lectures on the Greek and Latin writers, and on logic. He married, and kept a great number of boarders; but, as he inclined to the new opinions, he was more than once in danger; and therefore he removed to Strasburg in 1537, to a place offered him by the magistrates. In 1538 he opened a school, which became famous, and was by Maximilian II. made a university in 1566. He was well skilled in literature, wrote Latin with great purity, and was a good teacher. He was often entrusted with deputations in Germany and foreign countries, and discharged these employments with great honor. He showed extreme charity to the refugees on account of religion: he not only assisted them by his advice and recommendations, but he even impoverished himself for them. He died in 1589, in his eighty-second year, after he had been for some time blind. He published many books; the principal of which are, 1. Partitiones Dialecticæ; 2. De Educatione Principum; 3. De Nobilitate Anglicana; 4. Linguæ Latinæ Resolvendæ Ratio; 5. Excellent Notes on Aristotle's and Hermogenes's Rhetoric, &c.

Sturmius (John), a native of Mechlin, and physician and professor of mathematics at Louvain, also wrote several learned works.

Sturmius (John Christopher), another learned German, born at Hippolstein, in 1635. He became professor of philosophy and mathematics at Altdorf. He published a translation of Archimedes into German; A Complete Course of Mathematics; and several Philosophical Treatises. He died at Altdorf, in 1703.

STURNUS, the starling, a genus of birds belonging to the order of passeres. The beak is subulated, depressed, and somewhat blunt; the superior mandible is entire, and somewhat open at the edges; the nostrils are marginated above; and the tongue is sharp and emarginated. There are fifteen species according to Dr. Latham; viz. 1. S. Capensis; 2. carunculatus; 3. cellaris; 4. dauricus; 5. gallinaceus; 6. junceti; 7. loyca; 8. ludovicianus; 9. Mexicanus; 10. militaris; 11. moritanicus; 12. olivaceus; 13. sericeus; 14. viridis; and,

15. S. vulgaris, the common starling, or stare, the only species that is indigenous. The weight of the male is about three ounces, that of the female rather less; the length of the male is about eight inches and three-quarters: the bill is brown or yellow, but in old birds generally yellow. The whole plumage is black, very resplendent, with changeable blue, purple, and copper: each feather marked with a pale yellow spot. The lesser coverts are edged with yellow, and slightly glossed with green. The quill feathers and tail dusky; the former edged with yellow on the exterior side; the last with dirty white. The legs of a reddish brown. They breed in hollow trees, eaves of houses, towers, ruins, cliffs, and often in high rocks over the sea, such as that of the Isle of Wight. The female lays four or five eggs, of a pale greenish ash-color; and makes its nest of straw, small fibres of roots, and the like. In winter, stares assemble in vast flocks: they collect in myriads in the fens of Lincolnshire, and do great damage to the fen-men, by roosting on the reeds, and breaking them down by their weight; for reeds are the thatch of the country, and are laid up in harvest

with great care. These birds feed on worms and insects; and they will get into pigeon-houses for the sake of the eggs. Their flesh is so bitter as to be scarcely eatable. They follow oxen and other large cattle in the meadows, attracted by the insects which flutter round them. They live seven or eight years, or even longer, in the domestic state. The wild ones cannot be decoyed by the call, because they regard not the scream of the owl. A method has been discovered of taking entire families, by fixing to the walls and the trees where they lodge pots of earthenware of a convenient form, which the birds often prefer to place their nests in. Many are also caught by the gin and draw-net. In some parts of Italy it is common to employ tame weasels to drag them out of their nests. The stare can be taught to speak French, German, Latin, Greek, &c., and to pronounce phrases of some length. Its pliant throat accommodates itself to every inflection and every accent. It can readily articulate the letter R, and acquires a sort of warbling which is much superior to its native song. These birds are spread through an extensive range in the ancient continent. They are found in Sweden, Germany, France, Italy, the Isle of Malta, the Cape of Good Hope, and are every where nearly the same; whereas those American birds which have been called stares present a great diversity of appearance.

STUT, or STUT'TER, *v.n.* } Teut. and
STUT'TER, or STUT'TERER, *n. s.* } Belg. *stotteren.* To speak with hesitation; stammer: one who stammers in his speech.

Divers *stut*: the cause is the refrigeration of the tongue, whereby it is less apt to move; and therefore naturals *stut*. *Bacon.*

Many *stutters* are very cholerick, choler inducing a dryness in the tongue. *Id. Natural History.*

STUTTGARD, the capital of the kingdom of Wirtemberg, stands on the river Nisselbach, in a valley, and is only two miles from the Neckar, over which there is a fine bridge. It is divided into four parts, the Town Proper, two suburbs adjacent to each other, and the separate suburb called Esslingen. The Town Proper is badly built, the streets being narrow, and the houses of wood. The suburbs, being less antique, are somewhat better, particularly that of Esslingen, in which are the royal palace, gymnasium, barracks, &c. The palace is a noble structure, and has an extensive park: its interior contains a good collection of paintings and statues; around are several public establishments, a spacious opera house, a theatre, museum, garden, and an academy for painting, sculpture, and architecture. The royal library is said to contain 100,000 volumes, among which is a unique collection of bibles. The gymnasium has an observatory, and a good collection of mathematical instruments. The town has also a public library; and though it can boast of no handsome streets, except King Street, adjoining the palace, it has several pleasant walks. Its public buildings are an old palace, now used for government offices, a mint, town-house, great church, and the royal stables. Stuttgard is surrounded by a wall and ditch, but is a place of no strength; and though repeatedly entered by the armies on both sides, between the years 1796 and 1815, it escaped those calamities which pressed so severely on it in the wars of the sixteenth and seventeeth centuries. The manufactures are on a small scale; and consist of leather, hats, cotton, silk, plated goods, and snuff. The expenditure of the court and nobility forms the chief support of the town. Provisions are abundant and reasonable, the surrounding country being equally fertile and beautiful. Thirty-seven miles E. S. E. of Carlsruhe, and 116 W. N. W. of Munich.

STY, *n. s.* & *v. a.* Sax. ꝑtiȝe; Swed. *stia.* A cabin to keep hogs in; any place of filthy character: to shut up in a sty.

Tell Richmond,
That in the *sty* of this most bloody boar
My son George Stanly is franked up in hold.
Shakspeare. Richard III.

Here you *sty* me
In this hard rock, while you do keep from me
The rest of the island. *Id. Tempest.*

They all their friends and native home forget,
To roll with pleasure in a sensual *sty*. *Milton.*

With what ease
Mightest thou expel this monster from his throne,
Now made a *sty*. *Id. Paradise Regained.*

May thy black pigs lie warm in little *sty*,
And have no thought to grieve them till they die!
King.

When her hogs had missed their way,
Th' untoward creatures to the *sty* I drove,
And whistled all the way. *Gay.*

STY'GIAN, *adj.* Lat. *stygius.* Hellish; infernal; pertaining to Styx, one of the poetical rivers of hell.

At that so sudden blaze the *Stygian* throng
Bent their aspect. *Milton.*

STYGIAN LAKE, or RIVER. See STYX.

STYLE, *n. s.* & *v. a.* Lat. *stylus.* Manner of writing with regard to language; mode of speech; mode of painting; title; appellation; a graver: the stalk of a flower, see below: to style is, to term; call.

No *style* is held for base, where love well named is. *Sidney.*

Happy
That can translate the stubbornness of fortune
Into so quiet and so sweet a *style*. *Shakspeare.*

Ford's a knave, and I will aggravate his *stile*; thou shalt know him for knave and cuckold. *Id.*

The king gave them in his commission the *style* and appellation which belonged to them.
Clarendon.

Fortune's gifts, my actions
May *stile* their own rewards. *Denham's Sophy.*

Placing two *stiles* or needles of the same steel, touched with the same loadstone, when the one is removed but half a span, the other would stand like Hercules's pillars. *Browne.*

Their beauty I will rather leave to poets than venture upon so tender and nice a subject with my severer *style*. *More.*

O virgin! or what other name you bear
Above that *style*, O more than mortal fair!
Let not an humble suppliant sue in vain.
Dryden's Æneid

While his thoughts the lingering day beguile,
To gentle Arcite let us turn our *style*. *Dryden.*

Whoever backs his tenets with authorities, thinks

he ought to carry the cause, and is ready to *stile* it impudence in any one who shall stand out. *Locke.*

Style is the middle prominent part of the flower of a plant, which adheres to the fruit or seed: 'tis usually slender and long, whence it has its name. *Quincy.*

Let some lord but own the happy lines,
How the wit brightens, how the *style* refines! *Pope.*

Propitious hear our prayer,
Whether the *style* of Titan please thee more,
Whose purple rays the Achæmenes adore.
Id. Statius.

Proper words in proper places make the true definition of a *style.* *Swift.*

The great *stile* stands alone, and does not require, perhaps does not as well admit, any addition from inferior beauties. The ornamental *stile* also possesses its own peculiar merit: however, though the union of the two may make a sort of composite *stile,* yet that *stile* is likely to be more imperfect than either of those which go to its composition. *Reynolds.*

Style is a word of various significations, originally deduced from stylos, a kind of bodkin wherewith the ancients wrote on plates of lead, or on wax, &c., and which is still used to write on ivory leaves, and paper prepared for that purpose, &c.

Style, in language, is the peculiar manner in which a man expresses his conceptions. It is a picture of the ideas which rise in his mind, and of the order in which they are there produced. The qualities of a good style may be ranked under two heads; perspicuity and ornament. Perspicuity ought to be essentially connected with every kind of writing; and, to attain it, attention must be paid, first to single words and phrases, and then to the construction of sentences. With respect to words and phrases, it requires these three qualities; purity, propriety, and precision. With regard to sentences, it requires a clear arrangement of the words and unity in the sense; to which, if strength and harmony be added, the style will become ornamented. One of the most important directions to be observed, by him who wishes to form a good style, is to acquire clear and precise ideas on the subject concerning which he is to write or speak. To this must be added frequency of composition, and an acquaintance with the style of the best authors. A servile imitation, however, of any author is carefully to be avoided; for he who copies can hardly avoid copying faults as well as beauties. A style cannot be proper unless it be adapted to the subject, and likewise to the capacity of our hearers, if we are to speak in public. A simple, clear, and unadorned style, such as that of Swift, is fittest for intricate disquisition; a style elegant as Addison's, or impetuous like Johnson's, is most proper for fixing the attention on truths, which, though known, are much neglected. We must not be inattentive to the ornaments of style, if we wish that our labors should be read and admired: but he is a contemptible writer who looks not beyond the dress of language, who lays not the chief stress upon his matter, and who does not regard ornament as a secondary and inferior recommendation. For further observations on the different kinds of style, see Language, Oratory, and Simplicity. The earl of Buchan in his Life of Fletcher, while he celebrates the style of that great patriot, pays no compliment to the orators of the present age: 'Fletcher' says his lordship, 'was by far the most nervous and correct speaker in the parliament of Scotland; for he drew his style from the pure models of antiquity, and not from the grosser practical oratory of his contemporaries; so that his speeches and his language will bear a comparison with the best speeches of the reign of queen Anne, the Augustan age of Great Britain, far superior to the meretricious, inflated, metaphorical style of our modern orators.'

Style, in botany. See Botany, Index.

Style, in dialing, denotes the gnomon or cock of a dial raised on the plane thereof to project a shadow.

Style, in jurisprudence, the particular form or manner of proceeding in each court of jurisdiction, agreeable to the rules and orders established therein: thus we say the style of the court of Rome, of chancery, of parliament, of the privy-council, &c.

Style, in music, denotes a peculiar manner of singing, playing, or composing; being properly the manner that each person has of playing, singing, or teaching; which is very different, both in respect of different geniuses, of countries, nations, and of the different matters, places, times, subjects, passions, expressions, &c. Thus we say, the style of Palestrina, of Lully, of Corelli, of Handel, &c.; the style of the Italians, French, Spaniards, &c.

Style, New, in chronology, the Gregorian method of computation.

Style, Old, the Julian method of computing time.

STYLEPHORUS Chordatus, a genus of fishes belonging to the order of apodes. This very curious genus was discovered by Dr. Shaw, who read a description of it before the Linnæan Society in 1788. The eyes are fixed on cylindrical pillars which lie close together. The rostrum, or narrow part which is terminated by the mouth, is connected to the back part of the head by a flexible leathery duplicature, which permits it either to be extended in such a manner that the mouth points directly upwards, or to fall back so as to be received into a sort of case, formed by the upper part of the head. There are three pairs of branchiæ situate under the throat. The pectoral fins are small; the dorsal fin runs from the head to within about an inch and a half of the tail; the caudal fin is short, and is furnished with five remarkable spines. The body is extremely long, and compressed very much, and gradually diminishes as it approaches the tail, which terminates in a process or string of an enormous length, and finishes in a very fine point. This string, or caudal process, seems to be strengthened throughout its whole length, or at least as far as the eye can trace it, by a sort of double fibre or internal part. The stylephorus chordatus is a native of the West Indian Sea. It was taken between the islands of Cuba and Martinico, near a small cluster of little islands about nine leagues from shore, and was seen swimming near the surface. The whole length of this uncommon animal, from the head to the

extremity of the caudal process, is about thirty-two inches, of which the process itself measures twenty-two.

STYLET, a small dangerous kind of poniard, which may be concealed in the hand, chiefly used in treacherous assassinations. The blade is usually triangular, and so small that the wound it makes is almost imperceptible. See STILETTO.

STYLITES, or STILITES, pillar saints, a kind of solitaries, who stood motionless upon the tops of pillars. They were totally suppressed in the twelfth century. The tops of these columns were only three feet in diameter, and were defended by a rail, that reached almost to the girdle, somewhat resembling a pulpit. There was no lying down in it. The faquirs, or devout people of the east, imitate this extraordinary and most absurd kind of life to this day.

STYLOCERALOIDES, STYLOGLOSSUS, STYLOHYOIDÆUS, STYLOIDES, STYLOPHARYNGÆUS, the names of different muscles in the human body. See ANATOMY.

STYLOSANTHES, in botany, a genus of the decandria order, belonging to the diadelphia class of plants; and in the natural method ranking under the thirty-second order, papilionaceæ. The calyx is tubulated, very long, having the corolla attached to it. The legumen or pod biarticulated and hooked. Of these there are two species, both natives of Jamaica, viz. 1. S. procumbens, the hedysarum procumbens of Linnæus: a figure of which may be seen in Sloane's Natural History of Jamaica.

2. S. viscosa, the trifolium of Browne; a figure of which is also given by Sloane.

STYPTERIA, a name given by the Greeks to a species of ALUM. Under the article alum which the ingenious Dr. Thomson ranks as the thirteenth of the sulphates, in his System of Chemistry, vol. ii. p. 272, he has the following remarks on this substance: 'The στυπτηρια of the Greeks, and the alumen of the Romans, was a native substance, which appears to have been nearly related to green vitriol, or sulphate of iron; and which consequently was very different from what we at present denominate alum.' 'From the researches of professor Beckman, it appears that we owe the discovery of alum to the Asiatics; but at what period, or by what means the discovery was made is unknown.' 'The composition of alum has been but lately understood with accuracy. It has been long known that one of its ingredients is sulphuric acid; and the experiments of Geoffroy, Hellot, Pott, Margraff, and Macquier, prove incontestibly that alumina is another. But sulphuric acid and alumina are incapable of forming alum. Manufacturers knew that the addition of a quantity of potass, or of ammonia, or of some substance containing these alkalies, is almost always necessary; and it was proved that, in every case in which such additions are unnecessary, the earth from which the alum is obtained, contained already a quantity of potass. Various conjectures were made about the part which potass acts in this case; but Chaptal and Vauquelin appear to have been the first chemists who ascertained, by decisive experiments, that alum is a triple salt, composed of sulphuric acid, alumina, and potass, or ammonia, united together. As alum contains an excess of acid, it belongs to the class of super-sulphates.' See SUPERSULPHATE.

STYP'TIC, *adj.* } Fr. *styptique*; Gr. στυπτικος. Often, though erroneously, written stiptick
STYP'TICAL,
STYPTI'CITY, *n. s.*

The same as astringent; but generally expressing the most efficacious sort of astringents: the power of staunching blood.

There is a poor sour *stiptick* salt diffused through the earth, which, passing a concoction in plants, becometh milder. *Browne.*

In an effusion of blood, having dossils ready dipt in the royal *stiptick*, we applied them. *Wiseman's Surgery.*

Catharticks of mercurials precipitate the viscidities by their *stypticity*, and mix with all animal acids. *Floyer.*

Fruits of trees and shrubs contain phlegm, oil, and an essential salt, by which they are sharp, sweet, sour, or *styptick*. *Arbuthnot on Aliments.*

STYPTICS, in pharmacy, medicines which, by their astringency, stop hæmorrhages, &c. See MATERIA MEDICA.

STYRAX, the storax tree, in botany, a genus of plants belonging to the class of decandria, and to the order of monogynia; and in the natural system ranging under the eighteenth order, bicornes. There are four species, viz. 1. S. benzoinum is described by Dr. Dryander in the Philosophical Transactions for 1787, p. 308, &c. It has been characterised by oblong acuminated leaves, which are downy underneath, and nearly of the length of the racemi. The botanical character of this tree was mistaken by modern botanists, till Dr. Dryander ascertained it to be a styrax. Benzoin was long supposed to be the produce of a species of laurus. Linnæus detected this error: but he committed another; for he tells us that it is furnished by a shrub which, in the country where it grows, is called croton bezoe; and afterwards, in his Supplementum Plantanum, describes the same plant a second time under the name of terminalia benzoin. This tree, which is a native of Sumatra, is deemed in six years of sufficient age for affording the benzoin, or when its trunk acquires about seven or eight inches in diameter; the bark is then cut through longitudinally, or somewhat obliquely, at the origin of the principal lower branches, from which the drug exudes in a liquid state, and by exposure to the sun and air soon concretes, when it is scraped off from the bark with a knife or chisel. The quantity of benzoin which one tree affords never exceeds three pounds, nor are the trees found to sustain the effects of these annual incisions longer than ten or twelve years. The benzoin which issues first from the wounded bark is the purest, being soft, extremely fragrant, and very white; that which is less esteemed is of a brownish color, very hard, and mixed with various impurities, which it acquires during its long continuance upon the trees. Eschelskron distinguishes benzoin into three kinds, viz. camayan poeti, or white benjamin, which, upon being melted in a bladder by the heat of the sun, appears marked with red streaks or veins. Camayan bamatta is less white than the former, and often spotted with white circles called eyes, from the number of which its goodness is estimated: it likewise melts by the heat

of the sun. Camayan itam, or black benjamin, which requires to be melted in hot water from its preservation in bladders. In Arabia, Persia, and other parts of the east, the coarser kinds of benjamin are consumed for fumigating and perfuming the temples, and for destroying insects. The benzoin which we find here in the shops is in large brittle masses, composed partly of white, partly of yellowish or light brown, and often also of darker colored pieces: that which is clearest, and contains the most white matter, called by authors benzoe amygdaloides, is accounted the best. This resin has very little taste, impressing on the palate only a slight sweetness: its smell, especially when rubbed or heated, is extremely fragrant and agreeable. It totally dissolves in rectified spirit (the impurities excepted, which are generally in a very small quantity), into a deep yellowish red liquor, and in this state discovers a degree of warmth and pungency, as well as sweetness. It imparts, by digestion, to water also a considerable share of its fragrance, and a slight pungency: the filtered liquor, gently exhaled, leaves not a resinous or mucilaginous extract, but a crystalline matter, seemingly of a saline nature, amounting to one-tenth or one-eighth of the weight of the benzoin. Exposed to the fire in proper vessels, it yields a quantity of a white saline concrete, called stores benzoes, of an acidulous taste and grateful odor, soluble in rectified spirit, and in water by the assistance of heat. The principal use of this fragrant resin is in perfumes, and as a cosmetic; for which last purpose, a solution of it in spirit of wine is mixed with so much water as is sufficient to render it milky, as twenty times its quantity or more. It promises, however, to be applicable to other uses, and to approach in virtue, as in fragrance, to storax and balsam of Tolu. It is said to be of great service in disorders of the breast, for resolving obstructions of the pulmonary vessels, and promoting expectoration: in which intentions the flowers are sometimes given, from three or four grains to fifteen. The white powder, precipitated by water from solutions of the benzoin in spirit, has been employed by some as similar and superior to the flowers, but appears to be little other than the pure benzoin in substance; it is not the saline, but the resinous matter of the benzoin, that is most disposed to be precipitated from spirit by water. The flowers, snuffed up the nose, are said to be a powerful errhine.

2. S. grandefolium; 3. S. levigatum; these are mentioned by Aiton, in his Hortus Kewensis, or Garden of Kew.

4. S. officinale, the officinal storax, is the only species mentioned by Linnæus. It usually rises above twenty feet high; it sends off many strong branches, which are covered with a roughish bark of a gray color; the leaves are broad, elliptical, entire, somewhat pointed; on the upper surface smooth, and of a light green color; on the under surface covered with a whitish down; they are placed alternately, and stand upon short footstalks; the flowers are large, white, and disposed in clusters upon short peduncles, which terminate the branches; the corolla is monopetalous, funnel-shaped, divided at the limb into five lance-shaped segments; the filaments are ten, placed in a regular circle, and seem to adhere towards the base; the antheræ are erect and oblong; the germen is oval, and supports a slender style, with a simple stigma: the fruit is a pulpy pericarpium, which contains one or two nuts of an oval compressed figure. The resinous drug called storax issues in a fluid state from incisions made in the trunk or branches of the tree. Two sorts of this resin have been commonly distinguished in the shops. 1. Storax in the tear is scarcely, if ever, found in separate tears, but in masses, sometimes composed of whitish and pale reddish-brown tears, and sometimes of a uniform reddish-yellow or brownish appearance; unctuous and soft like wax, and free from visible impurities. This is supposed to be the sort which the ancients received from Pamphylia in reeds or canes, and which was thence named calamita. 2. Common storax: in large masses, considerably lighter and less compact than the former, and having a large admixture of woody matter like saw-dust. This appears to be the kind intended by the London College, as they direct their styrax calamita to be purified, for medicinal use, by softening it with boiling water and pressing it out from the feces betwixt warm iron plates, a process which the first sort does not stand in need of. And indeed there is rarely any other than this impure storax to be met with in the shops. Storax, with some of the ancients, was a familiar remedy as a resolvent, and particularly used in catarrhal complaints, coughs, asthmas, menstrual obstructions, &c.; and from its affinity to the balsams it was also prescribed in ulcerations of the lungs, and other states of pulmonary consumptions. And our pharmacopœias formerly directed the pilulæ estyrace; but this odoriferous drug has now no place in any of the officinal compounds; and, though a medicine which might seem to promise some efficacy in nervous debilities, yet by modern practitioners it is almost totally disregarded. See Liquidambar and Storax.

STYRIA, a considerable province of the Austrian empire, situated between Austria Proper and Illyria, or extending from 45° 54 to 47° 50′ N. lat. Its form would be nearly square, did it comprise Carinthia, a province situated to the south-west. Its extent is computed at 8500 square miles; its population, which, without being dense, is less thinly scattered than that of the northern part of Britain, is about 840,000. Its divisions are into Upper Styria towards the north, and Lower Styria towards the south. The former is subdivided into the circles of Judenburg and Bruck; the latter into those of Gratz, Marburg, and Cilley.

Upper Styria is mountainous, being in a great measure a continuation of a branch of the Alps, which, after extending eastward through Switzerland, Tyrol, and Saltzburg, enter Styria at its western boundary, and continue their direction throughout its whole extent. This range rises in various parts to the height of 7000, 8000, and 9000 feet, presenting several points covered with perpetual snow. A number of ramifications extend into Lower Styria, but become gradually lower as they remove from the main chain, till they

present only small elevations, on the sides of which the vine is cultivated. The plains, however, even here, are not extensive, if we except that of Pettau, along the banks of the Drave.

In the elevated districts, natural excavations sometimes of great extent are found; and some naturalists have imagined that one or two mountains presented volcanic appearances. The rivers are numerous, but seldom navigable: the principal are the Enns, the Muhr, the Drave, and the Save. The climate presents great discrepancies, arising from the greater or less elevation of the soil. In Upper Styria the air is elastic, pure, and cold: winter begins in November, and the snow lies on the hills till May. In Lower Styria the climate is more temperate; but, though the air is in general of great purity, endemic fevers prevail, and the constitutional imbecility or idiocy called Cretinism is very common. The quantity of rain is less than might be expected, not exceeding fifteen inches in the year. The soil of Styria is, with the exception of the higher mountains, fertile, and produces wheat, barley, oats, rye, and, in the warmer situations, maize. The potato, though introduced so lately as the middle of the eighteenth century, is now general. Agriculture is extremely backward, though irrigation is practised extensively.

Styria has long been remarkable for the care bestowed on its cattle. They are of middle size, but well shaped, and are driven in summer to the highest parts of the mountains, where, after passing the warm season, they return to the plains. In sheep, at least in the improvement of wool, the Styrians have not yet succeeded, and their horses are chiefly for draught. Poultry is abundant.

Styria produces coal, and several mines of it are wrought; but it is at present not much used in mines and forges. Almost all the metals are found in Styria: gold, silver, and copper, hardly defray the expense of mining; lead is less scarce; but the great produce is iron. The mountain of Erzberg, situated in the north of Styria, was well known to the Romans. Instead of veins and strata, it presents a solid mass of ore, which has been wrought without intermission for eleven centuries; and, although nearly 13,000 tons of pure iron have been obtained annually from it for years, it hardly appears diminished, and the restriction in the quantity made arises chiefly from the limited supply of fuel. At the small town of Turroch is a mine producing the celebrated Prescian steel, used by the Romans for sword blades. The other mines, though less rich, are not inconsiderable; and the total annual produce of iron in Styria is from 16,000 to 20,000 tons. Salt is yet more abundant, particularly at Aussee, from which almost any quantity might be produced, were the demand greater. Cobalt, arsenic, and molybdena, occur in Styria; and zinc, antimony, and bismuth, rarely.

The manufactures of Styria are of course principally derived from the mines. The country contains in all 200 forges, and about thirty manufacturing establishments, in which it is computed that 300,000 sickles, and a still larger quantity of scythes, are made annually Next to these in importance are the copper forges, and various preparations of sulphate of iron, alum, saltpetre, earthenware, gunpowder, and sulphur. The flax raised in this country is made into coarse linen, or exported unwrought: the women are much employed in the fields. The exports consist of metals, corn, wine, flax, clover seed, cattle; the imports comprise woollens, linens, silks, tobacco, oil, and groceries.

The Styrians have the hospitality and frankness of an agricultural people, but are as yet very imperfectly educated; the great majority are Roman Catholics; but the Protestants enjoy a full, and the Jews a limited toleration. In regard to government, the Styrians have a parliament under the name of States, composed of four orders, the higher clergy, the nobility, the deputies from the landholders, and the deputies from the towns.

Pliny and Strabo considered the inhabitants as descended from the Boii and Taurisci. They are described as altogether uncivilised, and as harassing the adjoining provinces by their incursions, till the reign of Tiberius (A. D. 8), when Styria was subdued, and included in the province of Noricum. During the period of its remaining in the Roman hands, considerable improvements took place, towns being built at the more important stations, tillage diffused, and in the fourth century Christianity introduced. But Styria was almost as unfortunate in the repeated invasions of the barbarians as the adjoining provinces of Illyria and Pannonia. History records an invasion of southern Germany by the Magyars, the conquerors of Hungary, and their expulsion from the limits of the empire by Otho I. in 933: the reconquered territory was divided into a number of principalities, one of which, called the county of Steyr, rose by gradual and successive augmentations to its present extent. In 1172 it was annexed to Austria, and has since been governed either by the sovereign of that country, or by a member of his family.

STY'THY, *v. a.* See STITHY. To forge on an anvil.

By the forge that *stythied* Mars his helm,
I'll kill thee every where, yea, o'er and o'er.
Shakspeare.

STYX, in mythology, a celebrated river of hell, round which it flows nine times. The gods held the waters of the Styx in such veneration that to swear by them was reckoned an oath altogether inviolable. If any of the gods had perjured themselves, Jupiter obliged them to drink the waters of the Styx, which lulled them for one whole year into a senseless stupidity, for the nine following years they were deprived of the ambrosia and the nectar of the gods, and, after the expiration of the years of their punishment, they were restored to the assembly of the deities, and to all their original privileges. It is said that this veneration was shown to the Styx because it received its name from the nymph Styx, who with her three daughters assisted Jupiter in his war against the Titans. Styx was a river which it was necessary for departed shades to pass before they could enter the infernal regions; and it was the office of Charon to ferry them

over in a boat which was kept for that purpose. The ghosts of those who had not been honored with the rites of sepulture were obliged to wander 100 years before Charon could admit them into his boat to convey them before the judges of Hades. Mythological writers have said that the Greeks learned it from the Egyptians, which is indeed probable enough; that the Egyptians framed both this and some other fables relating to the dead, from certain customs peculiar to their country; that in particular there was, not far from Memphis, a famous burying-place, to which the dead bodies were conveyed in a boat across the lake Acherusia; and that Charon was a boatman who had long officiated in that service. The learned Dr. Blackwell says, in his Life of Homer, that, in the old Egyptian language, Charoni signified ferryman.

STYX, a sea nymph, daughter of Oceanus and Tellus. She married the giant Pallas, son of Crius and Eurybia, by whom she had three daughters, all goddesses, Victory, Strength, and Valor. She and her daughters assisted Jupiter against the giants; and she gave name to the infernal river by which the gods swore.

SUANES, SUANETI, SUANI, or SOANES, a people of Asia, who inhabit one of the four divisions of Imeritia. They are chiefly employed in agriculture and rearing cattle. Major Rennell supposes them to be the descendants of a people of the same name and country, mentioned by Strabo. They were then a numerous and powerful nation, governed by a king and national council of 300. They collected gold in their rivers, washed down from the mountains, by sinking sheep-skins in them, with the wool uppermost; whence Strabo derives the origin of the fable of the Golden Fleece. See ARGO, ARGONAUTS, COLCHIS, and MINGRELIA.

SUARDONES, an ancient nation of Germany. Tacitus de Germ. 40.

SUARES, or SUAREZ (Francis), a Spanish Jesuit, born in Grenada, 5th of January, 1548. He was professor of theology at Alcala, Salamanca, Rome, and Coimbra in Portugal. He died at Lisbon in 1617, with great ease and resignation. His memory was astonishing: he could repeat the whole of his voluminous works by heart. His writings fill twenty-three folio volumes, mostly on theological and moral subjects. His Treatise of Laws has been reprinted in this country. His defence of the Catholic Faith against the errors of England was written at the request of pope Paul V. This book was publicly burnt at London by order of James I.

SUA'SIVE, *adj.* Lat. *suadeo.* Having power to persuade.

It had the passions in perfect subjection; and though its command over them was but *suasive* and political, yet it had the force of coaction, and despotical. *South.*

SUA'VITY, *n. s.* Fr. *suavité;* Lat. *suavitas.* Sweetness to the senses.

She desired them for rarity, pulchritude, and *suavity.* *Browne.*

SUBACID, *adj.* Lat. *sub* and *acidus.* Sour in a small degree.

The juice of the stem is like the chyle in the animal body, not sufficiently concocted by circulation and is commonly *subacid* in all plants.
Arbuthnot on Aliments.

SUBAC'RID, *adj.* Sub and acrid. Sharp and pungent in a small degree.

The green choler of a cow tasted sweet, bitter, *subacrid,* or a little pungent, and turned syrup of violets green. *Floyer.*

SUBACT', *v. a.* Lat. *subactus.* To reduce; to subdue.

Tangible bodies have no pleasure in the consort of air, but endeavour to *subact* it into a more dense body. *Bacon.*

There are of concoction two periods: the one assimilation, or absolute conversion and *subaction;* the other maturation: whereof the former is most conspicuous in living creatures, in which there is an absolute conversion and assimilation of the nourishment into the body. *Id. Natural History.*

SUBAH, the general name of the viceroyships, or greater governments, into which the Mogul empire was divided, consisting of several provinces.

SUBAHDAR, the viceroy, lord-lieutenant, or governor, holding a subah; the same as nabob or nazim. Also the black commander of a company of seapoys.

SUBAHDAREE, or SUBAUSHIP, the jurisdiction of subahdar; the same with nizamut.

SUBALTERN, *adj.* Fr. *subalterne.* Inferior; subordinate; that which in different respects is both superior and inferior.

Love's *subalterns,* a duteous band,
Like watchmen round their chief appear;
Each had his lanthorn in his hand,
And Venus, masked, brought up the rear. *Prior.*

One, while a *subaltern* officer, was every day complaining against the pride of colonels towards their officers, yet, after he received his commission for a regiment, he confessed the spirit of colonelship was coming fast upon him, and it daily increased to his death. *Swift.*

This sort of universal ideas, which may either be considered as a genus or species, is called *subaltern.*
Watts.

SUBALTERN (Fr. officiers subalternes), subaltern officers. This word is used among the French, as with us, to signify all officers of a certain inferior degree, viz. les subalternes, the subalterns. All officers under the rank of major, technically considered, are subalterns; captains of troops and companies, in an effective battalion, under arms, are in a subaltern station, and subject to the word of command given by one person; hence subaltern,—from the Latin sub and alter—in the same manner that lieutenants, cornets, and ensigns, are under the control of captains of troops or companies.

SUBBEA'DLE, *n. s.* Sub and beadle. An under beadle.

They ought not to execute those precepts by simple messengers, or *subbeadles,* but in their own persons.
Ayliffe.

SUBBULGUR, a town in the Mahratta territories, in the province of Agra, situated sixty-five miles south-west from the city of Agra, is surrounded by a high stone wall, in good repair, with a number of bastions; but the artillery is very insufficient. One side of the fort stands on the edge of a deep precipice. Between Sub-

bulghur and Bejighur, to the south, the country is tolerably well cultivated.

Also a town in the province of Delhi, on the east side of the Ganges, twelve miles south from Hurdwar. There is here an extensive line of fortification enclosing the town, but which exhibits little more than naked walls falling to decay. Much of the ground within the fort is under cultivation.

SUBCELESTIAL, *adj.* Sub and celestial. Placed beneath the heavens.

The most refined glories of *subcelestial* excellencies are but more faint resemblances of these. *Glanville.*

SUBCLA'VIAN, *adj.* Lat. *sub* and *clavus.* *Subclavian* is applied to any thing under the armpit or shoulder, whether artery, nerve, vein, or muscle. *Quincy.*

The chyle first mixeth with the blood in the *subclavian* vein, and enters with it into the heart, where it is very imperfectly mixed, there being no mechanism nor fermentation to convert it into blood, which is effected by the lungs. *Arbuthnot.*

SUBCLAVIAN ARTERIES. See ANATOMY.

SUBCLAVIUS. See ANATOMY.

SUBCONSTELLA'TION, *n. s.* Sub and constellation. A subordinate or secondary constellation.

As to the picture of the seven stars, if thereby he meant the Pleiades, or *subconstellation* upon the back of Taurus, with what congruity they are described, in a clear night an ordinary eye may discover. *Browne's Vulgar Errours.*

SUBCONTRAC'TED, *part. adj.* Sub and contracted. Contracted after a former contract.

Your claim,
I bar it in the interest of my wife,
'Tis she is *subcontracted* to this lord,
And I her husband contradict your banes.
Shakspeare. King Lear.

SUBCON'TRARY, *adj.* Sub and contrary. Contrary in an inferior degree.

If two particular propositions differ in quality, they are contraries: as, some vine is a tree; some vine is not a tree. These may be both true together, but they can never be both false. *Watts.*

SUBCONTRARY POSITION, in geometry, is when two equiangular triangles are so placed as to have one common angle at the vertex, and yet their bases not parallel; consequently the angles at the bases are equal, but on the contrary sides.

SUBDEA'CON, *n. s.* Lat. *subdiaconus.*

In the Romish church they have a *subdeacon*, who is the deacon's servant. *Ayliffe's Parergon.*

SUBDEACON, an inferior minister, who anciently attended the altar, prepared the sacred vessels, delivered them to the deacons in time of divine service, attended the doors of the church during communion service, went on the bishop's embassies with his letters or messages to foreign churches, and was invested with the first of the holy orders. They were so subordinate to the superior rulers of the church that, by a canon of the council of Laodicea, they were forbidden to sit in the presence of a deacon without his leave. According to the canons, a person must be twenty-two years of age to be promoted to the order of subdeacon. See DEACON.

SUBDEAN', *n. s.* Lat. *subdecanus.* The vicegerent of a dean.

Whenever the dean and chapter confirm any act, that such confirmation may be valid, the dean must join in person, and not in the person of a deputy or *subdean* only. *Ayliffe.*

SUBDELEGATE; appointed to act under another, or one who is so.

SUBDERISO'RIOUS, *adj.* Lat. *sub* and *derisor.* Scoffing or ridiculing with tenderness and delicacy. Not used.

The *subderisorius* mirth is far from giving any offence to us: it is rather a pleasant condiment of our conversation. *More.*

SUBDIVER'SIFY, *v. a.* Sub and diversify. To diversify again what is already diversified.

The same wool one man felts into a hat, another weaves it into cloth, another into arras; and these variously *subdiversified* according to the fancy of the artificer. *Hale.*

SUBDIVIDE', *v. a.* } Fr. *subdiviser.* Sub
SUBDIVI'SION, *n. s.* } and divide. To divide a part into yet more parts: the noun substantive corresponding.

When Brutus and Cassius were overthrown, soon after Antonius and Octavianus brake and *subdivided.* *Browne.*

The glad father glories in his child,
When he can *subdivide* a fraction. *Roscommon.*

When the progenies of Cham amd Japhet swarmed into colonies, and those colonies were *subdivided* in many others, in time their descendants lost the primitive rights of divine worship, retaining only the notion of one deity. *Dryden.*

In the decimal table the *subdivisions* of the cubit, as span, palm, and digit, are deduced from the shorter cubit. *Arbuthnot.*

When any of the parts of any idea are farther divided, in order to a clear explication of the whole, this is called a *subdivision*; as when a year is divided into months, each month into days, and each day into hours, which may be farther *subdivided* into minutes and seconds. *Watts's Logick.*

SUB'DOLOUS, *adj.* Lat. *subdolus.* Cunning; subtle; sly.

In his own case he might have thought it a *subdulous* evasion; a forced succession wholly nugatory on the footing of worldly success. *Whyte's Poems, Notes.*

SUBDOMINANT, in music, a name given by M. Rameau to the fourth note of the tone, which of consequence is the same interval from the tonic when descending as the dominant in rising. This denomination arises from the affinity which this author finds by inversion between the minor mode of the subdominant and the major mode of the tonic. See DOMINANT and MUSIC.

SUBDUCE', *v. a.* } Lat. *subduco, subductus.*
SUBDUCT', } To withdraw; take away;
SUBDUC'TION, *n. s* } subtract: the noun substantive corresponding.

Or nature failed in me, and left some part
Not proof enough such object to sustain;
Or, from my side *subducting*, took perhaps
More than enough. *Milton's Paradise Lost.*

Take the other operation of arithmetick, subduction: if out of that supposed infinite multitude of antecedent generations we should *subduce* ten, the residue must be less by ten than it was before, and yet still the quotient must be infinite. *Hale.*

Possibly the Divine beneficence *subducting* that influence which it communicated from the time of their

first creation, they were kept in a state of immortality till that moment of the *subduction*.
Id. Origin of Mankind.

SUBDUE', *v. a.* } Lat. *subdo*, or *subjugo*.
SUBDUE'MENT, *n. s.* } To crush; oppress; overpower; sink; conquer;
SUBDU'ER. } tame: the noun substantives corresponding.

Be fruitful and replenish the earth, and *subdue* it.
Gen. i. 28.

Them that rose up against me hast thou *subdued* under me. 2 *Sam.* xxii. 40.

Great god of might, that reigneth in the mind,
And all the body to thy best dost frame:
Victor of gods, *subduer* of mankind,
That dost the lions and fell tygers tame,
Who can express the glory of thy might? *Spenser.*

Nothing could have *subdued* nature
To such a lowness, but his unkind daughters.
Shakspeare.

As hot as Perseus, spur thy Phrygian steed,
Bravely despising forfeits and *subduements*. *Id.*

Augustus Cæsar *subdued* Egypt to the Roman empire. *Peacham.*

Nor 'st unwholesome to *subdue* the land
By often exercise; and, where before
You broke the earth, again to plow. *May's Virgil.*

If aught were worthy to *subdue*
The soul of man. *Milton.*

Their curious eye
Discerns their great *subduer's* awful mien
And corresponding features fair. *Philips.*

The Romans made those times the standard of their wit, when they *subdued* the world. *Sprat.*

Figs are great *subduers* of acrimony, useful in hoarseness and coughs, and extremely emollient.
Arbuthnot.

SUB'DUPLE, *adj.* } Fr. *subduple*; Lat. *sub*
SUBDU'PLICATE, *n. s.* } and *duplus*. Containing one part of two.

As one of these under pulleys doth abate half of that heaviness which the weight hath in itself, and cause the power to be in a *subduple* proportion unto it, so two of them do abate half of that which remains, and cause a subquadruple proportion, and three a subsextuple. *Wilkins's Mathematical Magick.*

The motion generated by the forces, in the whole passage of the body or thing through that space, shall be in a *subduplicate* proportion of the forces.
Newton's Opticks.

SUBDUPLE RATIO is, when any number or quantity is contained in another twice. Thus three is said to be subduple of six, as six is duple of three. See RATIO.

SUBDUPLICATE RATIO of any two quantities is the ratio of their square roots.

SUBER, the cork-tree. See QUERCUS.

SUBERAS, or SUBERAT, from suber, the cork-tree. A salt formed by the combination of the suberic acid, or acid of cork, with different bases. 'These salts,' says Dr. Thomson in his System of Chemistry, vol. iii. p. 434, 'have been described with a good deal of detail, by Bouillon la Grange. They have in general a bitter taste, and are decomposed by heat.' The doctor describes seven species, viz., 1. 'S. of alumina. This salt does not crystallise. When its solution is evaporated by a moderate heat, in a wide vessel, the salt obtained is of a yellow color, transparent, having a styptic taste, and leaving an impression of bitterness on the tongue. When too much heat is employed it melts and blackens. It reddens the tincture of turnsole, and attracts moisture from the air. Before the blow-pipe it swells up, the acid is volatilised and decomposed, and nothing remains but the alumina.

2. 'S. of ammonia crystallises in parallelopipeds. Its taste is saltish and leaves an impression of bitterness. It reddens vegetable blues. It is very soluble in water. It attracts moisture from the air. When placed upon burning coals it loses its water of crystallisation, and swells up; and before the blow-pipe it evaporates entirely. It is decomposed by the aluminous and magnesian salts.

3. 'S. of barytes does not crystallise. Heat makes it swell up and melts it. It is scarcely soluble in water except there be an excess of acid. It is decomposed by most of the salts, except the barytic salts and the fluat of lime.

4. 'S. of lime does not crystallise. It is perfectly white; it has a saltish taste; it does not redden the tincture of turnsole. It is very sparingly soluble in water, except when hot; and, as the solution cools, most of the salt precipitates again. When placed upon burning coals it swells up, the acid is decomposed, and there remains only the lime in the state of powder. It is decomposed by 1. Muriate of alumina: 2. Carbonates of potash and soda: 3. Fluate of magnesia: 4. Phosphates of alumina and soda: 5. Borate of potass: 6. All the metallic solutions.

5. 'S. of magnesia is in the form of a powder; it reddens the tincture of turnsole. It has a bitter taste; it is soluble in water, and attracts some moisture when exposed to the air. When heated it swells up and melts: before the blow-pipe the acid is decomposed, and the magnesia remains in a state of purity. It is decomposed by 1. Muriate and phosphate of alumina: 2. Nitrates of lime and alumina: 3. Borate of potass: 4. Fluate of soda.

6. 'S. of potass ought to be formed by means of crystallised carbonat of potass. It crystallises in prisms having four unequal sides. It has a bitter saltish taste, and it reddens vegetable blues. It is very soluble in water. Caloric melts it, and at last volatilises the acid. It is decomposed by most of the metallic salts, and by sulphate of alumina, muriate of alumina and of lime; nitrate of alumina and of lime; and phosphate of alumina.

7. 'S. of soda does not crystallise. It reddens the tincture of turnsole. Its taste is slightly bitter. It is very soluble in water and in alcohol. It attracts moisture from the air. Caloric produces the same effect on it that it does on suberat of potass, No. 6. It is decomposed by the calcareous, aluminous, and magnesian salts.'

SUBERIC, from Lat. suber, the cork-tree. Of or belonging to cork, or the cork-tree; consisting of the essence of cork.

SUBERIC ACID, or the acid of cork, one of the many new acids recently discovered by the ingenuity of modern chemists. 'Cork,' says Dr. Thomson, in his System of Chemistry, ii. 140, 'a substance too well known to require any description, is the bark of a tree which bears the same name. By means of nitric acid Brugnatelli converted it into an acid, which has been called the suberic acid, from suber.' 'Several chemists affirmed that this acid was the oxalic, because it possesses several properties in

common with it. These assertions induced Bouillon La Grange to undertake a set of experiments on suberic acid. These experiments, which have been published in the twenty-third volume of the Annales de Chimie, completely establish the peculiar nature of suberic acid, by showing that it possesses properties different from those of any other acid. Suberic acid may be formed by pouring six parts of nitric acid of the specific gravity 1·261 on one part of cork grated down, or simply broken down into small pieces, and distilling the mixture with a gentle heat as long as red vapors continue to escape. As the distillation advances, a yellow matter like wax appears on the surface of the liquid. While the matter contained in the retort is hot, it is to be poured into a glass vessel, placed upon a sand-bath over a gentle fire, and constantly stirred with a glass rod. By these means it becomes gradually thick. As soon as white vapors, exciting a tickling in the throat, begin to disengage themselves, the vessel is removed from the bath, and the mass continually stirred till it is almost cold. By these means an orange-colored mass is obtained of the consistence of honey, of a strong and sharp odor while hot, but having a peculiar aromatic smell when cold. On this mass twice its weight of boiling-water is to be poured, and heat applied till it becomes liquid; and then that part of it which is insoluble in water is to be separated by filtration. The filtered liquor becomes muddy; on cooling it deposits a powdery sediment, and a thin pellicle forms on its surface. The sediment is to be separated by filtration, and the liquor reduced to a dry mass by evaporating in a gentle heat. This mass is suberic acid. It is still a little colored, owing to some accidental mixture; from which it may be purified, either by saturating it with potass, and precipitating it by an acid, or by boiling it with charcoal powder. Suberic acid thus obtained is not crystallisable, but, when precipitated from potass by an acid, it assumes the form of a powder; when obtained by evaporation, it forms thin irregular pellicles. Its taste is acid and slightly bitter; and, when dissolved in a small quantity of boiling water, it acts upon the throat, and excites coughing. It reddens vegetable blues; and, when dropped into a solution of indigo in sulphuric acid (the liquid blue of this country), it changes the color of the solution and renders it green. Water at 60° or even 70° dissolves only one 57·6th part of its weight of suberic acid; and if the acid be very pure only one 144th part: boiling water on the contrary dissolves half its weight of it. When exposed to the air it attracts moisture, especially if it be impure. When exposed to the light of day, it becomes at last brown; and this effect is produced much sooner by the direct rays of the sun. When heated in a matrass the acid sublimes, and the inside of the glass is surrounded with zones of different colors. If the sublimation be stopped at the proper time, the acid is obtained on the sides of the vessel in small points formed of concentric circles. When exposed to the heat of the blow-pipe, on a spoon of platinum, it first melts, then becomes pulverulent, and at last sublimes entirely, with a smell resembling that of cebacic acid. It is not altered by oxygen gas: the other acids do not dissolve it completely. Alcohol devolves an aromatic odor, and an ether may be obtained by means of this acid. It converts the blue color of nitrate of copper into a green; the sulphate of copper into a green; green sulphate of iron to a deep yellow; and sulphate of zinc to a golden yellow. It has no action either on platinum, gold, or nickel; but it oxidates silver, mercury, lead, tin, iron, bismuth, arsenic, cobalt, zinc, antimony, manganese, and molybdenum. With alkalies, earths, and metallic oxides, it forms compounds named suberats.' See SUBERAT. Its affinities are as follows:—barytes, potass, soda, lime, ammonia, magnesia, alumina.

M. Chevreuil obtained the suberic acid by mere digestion of the nitric acid on grated cork, without distillation, and purified it by washing with cold water. Twelve parts of cork may be made to yield one of acid. When pure, it is white and pulverulent, having a feeble taste, and little action on litmus. It is soluble in eighty parts of water at 55° 30′ Fahrenheit, and in thirty-eight parts at 140°. It is much more soluble in alcohol, from which water throws down a portion of the suberic acid. It occasions a white precipitate when poured into acetate of lead, nitrates of lead, mercury, and silver, muriate of tin, and protosulphate of iron. It affords no precipitate with solutions of copper or zinc. The suberates of potassa, soda, and ammonia, are very soluble. The two latter may be readily crystallised. Those of barytes, lime, magnesia, and alumina, are of sparing solubility.

SUBJA'CENT, *adj.* SUB'JECT, *v. a., adj., & n. s.* SUBJEC'TION, *n. s.* SUBJEC'TIVE, *adj.* } Lat. *subjacens, subjectus.* Lying under: to put under; to reduce to submission; enslave; expose; make liable, subservient, or accountable: as an adjective, placed under; liable; obnoxious; being that on which an action operates: the noun substantives correspond: subjective, relating to the subject.

How hard it is now for him to frame himself to *subjection*, that, having once set before his eyes the hope of a kingdom, hath found encouragement.
Spenser.

Because the *subjection* of the body to the will is by natural necessity, the *subjection* of the will unto God voluntary, we therefore stand in need of direction after what sort our wills and desires may be rightly conformed to his. *Hooker.*

I live on bread like you, feel want like you,
Taste grief, need friends, like you: *subjected* thus,
How can you say to me I am a king?
Shakspeare. Richard II.

Now spurs the lated traveller apace
To gain the timely inn, and near approaches
The *subject* of our watch. *Id. Macbeth.*

Every *subject's* duty is the king's,
But every *subject's* soul is his own. *Id. Henry V.*

The' eastern tower,
Whose height commands, as *subject*, all the vale
To see the fight. *Id. Troilus and Cressida.*

Most *subject* is the fattest soil to weeds;
And he, the noble image of my youth,
Is overspread with them. *Shakspeare.*

Anger is certainly a kind of baseness, as it appears well in the weakness of those *subjects* in whom it reigns, children, women, old folks, sick folks.
Bacon

Those I call *subjects* which are governed by the ordinary laws and magistrates of the sovereign. *Davies.*

Here he would have us fix our thoughts; nor are they too dry a *subject* for our contemplation. *Decay of Piety.*

We must understand and confess a king to be a father, a *subject* to be a son; and therefore honour to be by nature most due from the natural *subject* to the natural king. *Holyday.*

The angel
Led them direct, and down the cliff as fast
To the *subjected* plain. *Milton.*
He *subjected* to man's service angel wings. *Id.*
Both in *subjection* now to sensual appetite. *Id.*

After the conquest of the kingdom, and *subjection* of the rebels, enquiry was made who there were hat, fighting against the king, had saved themselves by flight. *Hale.*

I will not venture on so nice a *subject* with my severe style. *More.*

Christ, since his incarnation, has been *subject* to the Father; and will be so also, in his human capacity, after he has delivered up his mediatorial kingdom. *Waterland.*

Think not, young warriors, your diminished name
Shall lose of lustre, by *subjecting* rage
To cool the dictates of experienced age. *Dryden.*

I see thee, in that fatal hour,
Subjected to the victor's cruel power,
Led hence a slave. *Id.*

All human things are *subject* to decay,
And, when fate summons, monarchs must obey. *Id.*

Were *subjects* so but only by their choice,
And not from birth did forced dominion take,
Our prince alone would have the public voice. *Id.*

I enter into the *subject* matter of my discourse. *Id.*

The blind will always be led by those that see, or fall into the ditch: and he is the most *subjected*, the most enslaved, who is so in his understanding. *Locke.*

God is not bound to *subject* his ways of operation to the scrutiny of our thoughts, and confine himself to do nothing but what we must comprehend. *Id.*

Esau was never *subject* to Jacob, but founded a distinct people and government, and was himself prince over them. *Id.*

Heroick kings whose high perfections have made them awful to their *subjects*, can struggle with and subdue the corruption of the times. *Davenant.*

If the vessels yield, it *subjects* the person to all the inconveniencies of an erroneous circulation. *Arbuthnot.*

The superficial parts of mountains are washed away by rains and borne down upon the *subjacent* plains. *Woodward.*

The medal bears each form and name,
In one short view, *subjected* to our eye,
Gods, emperors, heroes, sages, beauties lie. *Pope.*

My real design is that of publishing your praises to the world; not upon the *subject* of your noble birth. *Swift.*

The *subject* must obey his prince, because God commands it, human laws require it. *Id.*

The *subject* of a proposition is that concerning which any thing is affirmed or denied. *Watts's Logick.*

Certainty, according to the schools, is distinguished into objective and *subjective*; objective is when the proposition is certainly true in itself, and *subjective*, when we are certain of the truth of it. *Watts.*

SUBINFEUDATION, in English law, was where the inferior lords, in imitation of their superiors, began to carve out and grant to others minuter estates than their own, to be held of themselves; and were so proceeding downwards in infinitum, till the superior lords observed that by this method of subinfeudation they lost all their feudal profits, of wardships, marriages, and escheats, which fell into the hands of these mesne or middle lords, who were the immediate superiors of the terre-tenant, or him who occupied the land. This occasioned the statute of Westm. 3, or quia emptores, 18 Ewd. I., to be made; which directs that, upon all sales or feoffments of lands, the feoffee shall hold the same, not of his immediate feoffer, but of the chief lord of the fee of whom such feoffer himself held it. And hence it is held that all manors existing at this day must have existed by immemorial prescription; or at least ever since the 18 Edw. I. when the statute of quia emptores was made.

SUBINGRES'SION, *n. s.* Lat. *sub* and *ingressus*. Secret entrance.

The pressure of the ambient air is strengthened upon the accession of the air sucked out; which forceth the neighbouring air to a violent *subingression* of its parts. *Boyle.*

SUBJOIN', *v. a.* Fr. *sub* and *joindre*: Lat. *subjungo*. To add at the end; to add afterwards.

He makes an excuse from ignorance, the only thing that could take away the fault; namely, that he knew not that he was the high-priest, and *subjoins* a reason. *South.*

SUBITO, in the Italian music, is used to signify that a thing is to be performed quickly and hastily: thus we meet with volti subito, turn over the leaf quickly.

SUB'JUGATE, *v. a.* Fr. *subjuguer*; Lat. *subjugo*. To conquer; subdue; bring under dominion by force.

This was the condition of the learned part of the world, after their *subjugation* by the Turks. *Hale.*

O favorite virgin, that hast warmed the breast,
Whose sovereign dictates *subjugate* the cast! *Prior.*

He *subjugated* a king, and called him his vassal. *Baker.*

SUBJUNC'TION, *n. s.* } Lat. *subjungo*. The
SUBJUNC'TIVE, *adj.* } state of being subjoined; the act of subjoining: subjoined to something else.

The verb undergoes in Greek a different formation; and in dependence upon, or *subjunction* to, some other verb. *Clarke.*

The verb undergoes a different formation, to signify the same intention as the indicative, yet not absolutely, but relatively to some other verb, which is called the *subjunctive* mood. *Id.*

SUBJUNCTIVE, or SUBJUNCTIVE MOOD, in grammar. See GRAMMAR.

SUBLAPSA'RIAN, *adj.* } Lat. *sub* and
SUBLAP'SARY. } *lapsus*. Done after the fall of man.

The degree of reprobation, according to the *sublapsarian* doctrine, being nothing else but a mere preterition or non-election of some persons whom God left as he found involved in the guilt of the first Adam's transgression, without any actual per-

sonal sin of their own, when he withdrew some others as guilty as they. *Hammond.*

SUBLAPSARIANS, or INFRALAPSARIANS. See SUPRALAPSARIANS.

SUBLEYRAS (Peter), an eminent French painter born in Languedoc, in 1699. He excelled in history and portraits: and was much patronised by the king and nobility, as well as by foreigners. He painted a grand piece for St. Peter's church at Rome; and died in 1749, aged fifty.

SUBLI'MABLENESS, *n. s.* SUB'LIMATE, *v. a., n. s.,* & *adj.* SUBLIMA'TION, *n. s.* SUBLIME', *adj., n. s., v. a.,* & *v. n.* SUBLIME'LY, *adv.* SUBLIM'ITY, *n. s.* — Lat. *sublimis.* Quality of admitting to be sublimated, or raised by the force of fire: sublimate is also used for to raise; exalt; generally: but the noun substantive and adjective are only used chemically: sublimation is defined below: sublime is, high in place; excellent style or sentiment; mien or manner: as a noun substantive, a grand or lofty style: to sublime, synonymous with to sublimate: sublimely is, loftily; grandly: the noun substantive that follows corresponding.

As religion looketh upon him who in majesty and power is infinite, as we ought we account not of it, unless we esteem it even according to that very height of excellency which our hearts conceive, when divine *sublimity* itself is rightly considered. *Hooker.*

In respect of God's incomprehensible *sublimity* and purity, this is also true, that God is neither a mind nor a spirit like other spirits, nor a light such as can be discerned. *Raleigh.*

Enquire the manner of *subliming*, and what metals endure *subliming*, and what body the *sublimate* makes. *Bacon.*

Separation is wrought by weight, in the settlement of liquors, by heat, by precipitation, or *sublimation*; that is, a calling of the several parts up or down, which is a kind of attraction. *Id. Natural History.*

She turns
Bodies to spirits, by *sublimation* strange. *Davies.*

And as his actions rose, so raise they still their vein
In words, whose weight best suits a *sublimated* strain. *Drayton.*

Study our manuscripts, those myriads
Of letters, which have passed 'twixt thee and me:
Thence write our annals, and in them lessons be
To all, whom love's *subliming* fire invades. *Donne.*

He was *sublime*, and almost tumorous, in his looks and gestures. *Wotton.*

Not only the gross and illiterate souls, but the most aërial and *sublimated*, are rather the more proper fuel for an immaterial fire. *Decay of Piety.*

The precepts of Christianity are so excellent and refined, and so apt to cleanse and *sublimate* the more gross and corrupt, as shews flesh and blood never revealed it. *Id.*

Although thy trunk be neither large nor strong,
Nor can thy head, not helped itself *sublime*,
Yet, like a serpent, a tall tree can climb. *Denham.*

They sum'd their pens, and soaring the' air *sublime*
With clang despised the ground. *Milton.*

My earthly strained to the height
In that celestial colloquy *sublime*. *Id.*

Their hearts were jocund and *sublime*,
Drunk with idolatry, drunk with wine. *Id.*

His fair large front and eye *sublime* declared
Absolute rule. *Id.*

Flowers, and then fruit,
Man's nourishment, by gradual scale *sublimed*,
To vital spirits aspire. *Id.*

The fancies of most are moved by the inward springs of the corporeal machine, which, even in the most *sublimed* intellectuals, is dangerously influential. *Glanville.*

He obtained another concrete as to taste and smell, and easy *sublimableness*, as common sal ammoniack. *Boyle.*

Sublime on these a tower of steel is reared,
And dire Tisiphone there keeps the ward. *Dryden.*

Can it be, that souls *sublime*
Return to visit our terrestrial clime?
And that the generous mind, released by death,
Can covet lazy limbs? *Id.*

Art, being strengthened by the knowledge of things, may pass into nature by slow degrees, and so be *sublimed* into a pure genius, which is capable of distinguishing betwixt the beauties of nature and that which is low in her. *Id. Dufresnoy.*

Shall he pretend to religious attainments who is defective and short in moral, which are but the rudiments and first draught of religion, as religion is the perfection, refinement, and *sublimation* of morality? *South.*

In English lays, and all *sublimely* great,
Thy Homer charms with all his ancient heat. *Parnell.*

The *sublime* rises from the nobleness of thoughts, the magnificence of the words, or the harmonious and lively turn of the phrase; the perfect *sublime* arises from all three together. *Addison.*

Milton's distinguishing excellence lies in the *sublimity* of his thoughts, in the greatness of which he triumphs over all the poets, modern and ancient, Homer only excepted. *Id.*

Easy in stile thy work, in sense *sublime*. *Prior.*

Sublimation differs very little from distillation, excepting that in distillation only the fluid parts of bodies are raised, but in this the solid and dry; and that the matter to be distilled may be either solid or fluid, but *sublimation* is only concerned about solid substances. There is also another difference, namely, that rarefaction, which is of very great use in distillation, has hardly any room in *sublimation*; for the substances which are to be *sublimed*, being solid, are incapable of rarefaction; and so it is only impulse that can raise them. *Quincy.*

The particles of mercury, uniting with the acid particles of spirit of salt, compose mercury *sublimate* and, with the particles of sulphur, cinnabar. *Newton's Opticks.*

Since oil of sulphur per campanam is of the same nature with oil of vitriol, may it not be inferred that sulphur is a mixture of volatile and fixed parts, so strongly cohering by attraction as to ascend together by *sublimation*? *Id.*

The particles of sal ammoniack in *sublimation* carry up the particles of antimony, which will not *sublime* alone. *Id.*

This salt is fixed in a gentle fire, and *sublimes* in a great one. *Arbuthnot on Aliments.*

Longinus strengthens all his laws,
And is himself the great *sublime* he draws. *Pope.*

Meanly they seek the blessing to confine,
And force that sun but on a part to shine;
Which not alone the southern wit *sublimes*,
But ripens spirits in cold northern climes.

Fustian's so *sublimely* bad,
It is not poetry, but prose run mad.

SUBLIMATE, a chemical preparation, consisting

of quicksilver united with the muriatic acid. See Chemistry and Pharmacy.

Sublimate, Corrosive. Bichloride of mercury.

SUBLIMATION is a process by which volatile substances are raised by heat, and again condensed in the solid form. This operation is founded on the same principles as distillation, and its rules are the same, as it is nothing but a dry distillation. Therefore all that has been said on the article Distillation is applicable here, especially in those cases where sublimation is employed to separate volatile substances from others which are fixed or less volatile.

Sublimation is also used in other cases; for instance, to combine volatile matters together, as in the operation of the sublimates of mercury; or to collect some volatile substances, as sulphur, the acid of borax, and all the preparations called flowers. The apparatus for sublimation is simple. A matrass or small alembic is generally sufficient for the sublimation of small quantities of matter. But the vessels, and the method of managing the fire, vary according to the nature of the matters which are to be sublimed, and according to the form which is to be given to the sublimate.

The beauty of some sublimates consists in their being composed of very fine, light parts, such as almost all those called flowers; as flowers of sulphur, of benzoin, and others of this kind. When the matters to be sublimed are at the same time volatile, a high cucurbit, to which is adapted a capital, and even several capitals placed one upon another, are employed. The sublimation is performed in a sand-bath, with only the precise degree of heat requisite to raise the substance which is to be sublimed, and the capitals are to be guarded as much as possible from heat. The height of the cucurbit and of the capital seems well contrived to accomplish this intention.

When, along with the dry matter which is to be collected in these sublimations, a certain quantity of some liquor is raised, as happens in the sublimation of acid of borax, and in the rectification of volatile concrete alkali, which is a kind of sublimation, a passage and a receiver for these liquors must be provided. This is conveniently done by using the ordinary capital of the alembic, furnished with a beak and a receiver.

Some sublimates are required to be in masses as solid and compact as their natures allow. Of this number are camphor, muriate of ammonia, and all the sublimates of mercury. The properest vessels for these sublimations are bottles or matrasses, which are to be sunk more or less deeply in sand, according to the volatility and gravity of the matters that are to be sublimed. In this manner of subliming, the substances, having quitted the bottom of the vessel, adhere to its upper part, and, as this part is low and near the fire, they there suffer a degree of heat sufficient to give them a kind of fusion. The art, therefore, of conducting these sublimations consists in applying such a degree of heat, or in so disposing the sand (that is, making it cover more or less the matrass), that the heat in the upper part of the matrass shall be sufficient to make the sublimate adhere to the glass, and to give it such a degree of fusion as is necessary to render it compact; but at the same time this heat must not be so great as to force the sublimate through the neck of the matrass, and dissipate it. These conditions are not easily to be attained, especially in great works. Many substances may be reduced into flowers, and sublimed, which require for this purpose a very great heat, with the access of free air and even the contact of coals, and therefore cannot be sublimed in close vessels. Such are most soots or flowers of metals, and even some saline substances. When these sublimates are required, the matters from which they are to be separated must be placed among burning coals in open air; and the flowers are collected in the chimney of the furnace in which the operation is performed. The tutty, calamine, or pompholix, collected in the upper part of furnaces in which ore are smelted, are sublimates of this kind.

SUBLIMATORY (from sublimation). Of or belonging to sublimation, or to the art of subliming.

Sublimatory Vessels. See Chemistry, Index.

Sublimity, in style. See Language, Oratory, and Simplicity.

SUBLIN'GUAL, *adj.* Fr. *sublingual*; Lat. *sub* and *lingua*. Placed under the tongue.

Those subliming humours should be intercepted, before they mount to the head by *sublingual* pills.
Harvey.

Sublingual Artery or Sublingual Glands. See Anatomy.

SUBLU'NAR, *adj.* } Fr. *sublunaire*; Lat.
Sub'lunary. } *sub* and *luna*. Situated beneath the moon; earthly; terrestrial; of this world.

Dull *sublunary* lovers! love,
Whose soul is sense, cannot admit
Of absence, 'cause it doth remove
The thing which elemented it. *Donne.*

Through seas of knowledge we our course advance,
Discovering still new worlds of ignorance;
And these discoveries make us all confess
That *sublunary* science is but guess. *Denham.*

Night measured, with her shadowy cone,
Half way up hill this vast *sublunar* vault. *Milton.*

The celestial bodies above the moon, being not subject to chance, remain in perpetual order, while all things *sublunary* are subject to change.
Dryden's Dufresnoy.

Ovid had warned her to beware
Of strolling gods, whose usual trade is,
Under pretence of taking air,
To pick up *sublunary* ladies. *Swift*

The fair philosopher to Rowley flies,
Where in a box the whole creation lies;
She sees the planets in their turns advance,
And scorns, Poitier, this *sublunary* dance. *Young.*

SUBMARINE', *adj.* Lat. *sub* and *mare* Lying or acting under the sea.

This contrivance may seem difficult, because these *submarine* navigators will want winds and tides for motion, and the sight of the heavens for direction.
Wilkins

Not only the herbaceous and woody *submarine* plants, but also the lithophata, affect this manner of growing, as I observed in corals.
Ray on the Creation.

SUBMERGE', *v. a.* } Fr. *submerger*; Lat.
SUBMER'SION, *n. s.* } *submergo.* To drown; to put under water: act or state of drowning.

So half my Egypt was *submerged*, and made
A cistern for scaled snakes.
Shakspeare. Antony and Cleopatra.

The great Atlantick island is mentioned in Plato's Timæus, almost contiguous to the western parts of Spain and Africa, yet wholly swallowed up by that ocean; which, if true, might afford a passage from Africa to America by land before that *submersion.*
Hale's Origin of Mankind.

SUBMIN'ISTER, *v. a.* } Lat. *subministro.*
SUBMIN'ISTRATE. } To supply; to afford. A word not much in use.

Nothing *subministrates* apter matter to be converted into pestilent seminaries than steams of nasty folks.
Harvey.

Some things have been discovered, not only by the industry of mankind, but even the inferior animals have *subministered* unto man the invention of many things, natural, artificial, and medicinal.
Hale's Origin of Mankind.

Passions, as fire and water, are good servants, but bad masters, and *subminister* to the best and worst purposes. *L'Estrange.*

SUBMISS', *adj.* } Lat. *submissus.* Humble; submissive; obsequious: submissive is the more common adjective of the same meaning: all the derivatives correspond.
SUBMIS'SION, *n. s.*
SUBMIS'SIVE, *adj.*
SUBMIS'SIVELY, *adv.*
SUBMIS'SIVENESS, *n. s.*
SUBMISS'LY, *adv.*

Submission, dauphin! 'tis a mere French word;
We English warriors wot not what it means.
Shakspeare.

Be not as extreme in *submission* as in offence. *Id.*

On what *submissive* message art thou sent? *Id.*

King James, mollified by the bishop's *submiss* and eloquent letters, wrote back, that though he were in part moved by his letters, yet he should not be fully satisfied except he spake with him.
Bacon's Henry VII.

If thou dost sin in wine and wantonness,
Boast not thereof, nor make thy shame thy glory;
Frailty gets pardon by *submissiveness*,
But he that boasts shuts that out of his story;
He makes flat war with God, and doth defy,
With his poor clod of earth, the spacious sky.
Herbert.

Humility consists not in wearing mean cloaths, and going softly and *submissly*, but in mean opinion of thyself. *Taylor.*

Rejoicing, but with awe,
In adoration at his feet I fell
Submiss: he reared me. *Milton.*

Her at his feet *submissive* in distress
He thus with peaceful words upraised. *Id.*

No duty in religion is more justly required by God Almighty, than a perfect *submission* to his will in all things. *Temple.*

The goddess,
Soft in her tone, *submissively* replies.
Dryden's Æneid.

Sudden from the golden throne
With a *submissive* step I hasted down;
The glowing garland from my hair I took,
Love in my heart, obedience in my look. *Prior.*

But speech even there *submissively* withdraws
From rights of subjects, and the poor man's cause;
Then pompous silence reigns, and stills the noisy laws. *Pope.*

Great prince, by that *submission* you'll gain more
Than e'er your haughty courage won before.
Halifax.

SUBMIT', *v. a.* & *v. n.* Fr. *soumettre*; Lat. *submitto.* To let down; sink; subject: be subject.

Return to thy mistress, and *submit* thyself under her hands. *Genesis* xvi. 9.

To thy husband's will
Thine shall *submit*: he over thee shall rule. *Milton.*

Will ye *submit* your neck and chuse to bend
The supple knee? *Id.*

Sometimes the hill *submits* itself a while
In small descents, which do its height beguile;
And sometimes mounts, but so as billows play,
Whose rise not hinders but makes short our way.
Dryden.

Our religion requires from us not only to forego pleasure, but to *submit* to pain, disgrace, and even death. *Rogers.*

Whether the condition of the clergy be able to bear a heavy burden is *submitted* to the house.
Swift.

SUBMONTORIUM, an ancient town of Germany, in Vindelicia: now called Augsburg.

SUBMULTIPLE, in geometry &c., coincides with an aliquot part.

SUBMULTIPLE RATIO is that between the quantity contained and the quantity containing. Thus the ratio of 3 to 21 is submultiple. In both cases submultiple is the reverse of multiple: 21, e. gr. being a multiple of 3, and the ratio of 21 to 3 a multiple ratio.

SUBNORMAL (Latin, sub and norma, a rule). Belonging to that point in the axis of a curvilinear space which is intersected by a perpendicular to a tangent drawn from any given point in the curve.

SUBNORMAL, the perpendicular to the tangent of a curve intercepting the axis.

SUBOC'TAVE, *adj.* } Lat. *sub* and *octavus*,
SUBOC'TUPLE. } and octuple. Containing one part of eight.

As one of these under pulleys abates half of that heaviness of the weight, and causes the power to be in a subduple proportion: so two of them abate half of that which remains, and cause a subquadruple proportion, three a sextuple, four a *suboctuple.*
Wilkins's Mathematical Magick.

Had they erected the cube of a foot for their principal concave, and geometrically taken its *suboctave*, the congius, from the cube of half a foot, they would have divided the congius into eight parts, each of which would have been regularly the cube of a quarter foot, their well-known palm: this is the course taken for our gallon, which has the pint for its *suboctave.* *Arbuthnot on Coins.*

SUBOR'DINACY, *n. s.* } Lat. *sub* and *ordinatus.* The state of being subject; series of subordination: inferior in order, nature, dignity, or power: to make so: the adverb and noun substantive corresponding.
SUBOR'DINACY.
SUBOR'DINATE, *adj.* & *v. a.*
SUBOR'DINATELY, *adv.*
SUBORDINA'TION, *n. s.*

The two armies were assigned to the leading of two generals, rather courtiers than martial men, yet assisted with *subordinate* commanders of great experience. *Bacon.*

If I have *subordinated* picture and sculpture to architecture, as their mistress, so there are other inferior arts *subordinate* to them. *Wotton.*

It being the highest step of ill, to which all others *subordinately* tend, one would think it could be capable of no improvement. *Decay of Piety.*

The natural creatures having a local *subordination*, the rational having a political, and sometimes a sacred. *Holyday.*

His next *subordinate*
Awakening, thus to him in secret spake. *Milton.*

The *subordinancy* of the government changing hands so often, makes an unsteadiness in the pursuit of the public interests. *Temple.*

Nor can a council national decide,
But with *subordination* to her guide. *Dryden.*

It was *subordinate*, not enslaved, to the understanding; not as a servant to a master, but as a queen to her king, who acknowledges a subjection, yet retains a majesty. *South.*

Whether dark presages of the night proceed from any latent power of the soul during her abstraction, or from any operation of *subordinate* spirits, has been a dispute. *Addison.*

Pursuing the imagination through all its extravagancies is no improper method of correcting, and bringing it to act in *subordinacy* to reason. *Spectator.*

These carry such plain characters of disagreement or affinity, that the several kinds and *subordinate* species of each are easily distinguished. *Woodward.*

If we would suppose a ministry, where every single person was of distinguished piety, and all great officers of state and law diligent in chusing persons who in their several *subordinations* would be obliged to follow the examples of their superiors, the empire of irreligion would be soon destroyed. *Swift.*

SUBORDINARIES. See Heraldry.

SUBORN', *v. a.* } Fr. *suborner;* Lat.
Subornation, *n. s.* } *suborno.* To procure privately; procure by secret collusion, or indirectly: the noun substantive corresponding.

Thomas earl of Desmond was through false *subornation* of the queen of Edward IV. brought to his death at Tredah most unjustly. *Spenser on Ireland.*

His judges were the self-same men by whom his accusers were *suborned.* *Hooker.*

Fond wretch! thou knowest not what thou speakest,
Or else thou art *suborned* against his honour
In hateful practice. *Shakspeare.*

You set the crown
Upon the head of this forgetful man,
And for his sake wear the detested blot
Of murderous *subornation.* *Id. Henry IV.*

Reason may meet
Some specious object, by the foe *suborned,*
And fall into deception. *Milton.*

His artful bosom heaves dissembled sighs;
And tears *suborned* fall dropping from his eyes.
Prior.

Behold
Those who by lingering sickness lose their breath,
And those who by despair *suborn* their death.
Dryden.

The fear of punishment in this life will preserve men from few vices, since some of the blackest often prove the surest steps to favour; such as ingratitude, hypocrisy, treachery, and *subornation.* *Swift.*

Subornation, in English law, a secret, underhand, preparing, instructing, or bringing in a false witness; and hence subornation of perjury is the preparing or corrupt alluring to perjury. The punishment for the crime was formerly death, then banishment or cutting out the tongue, afterwards forfeiture of goods; and it is now a fine and imprisonment, and never more to be received as evidence. The stat. 2 Geo. II. c. 25. superadded a power for the court to order the offender to be sent to the house of correction for a term not exceeding seven years, or be transported for the same period.

SUBPŒNA, in law, is a writ whereby common persons are called into chancery, in such cases where the common law hath provided no ordinary remedy: and the name of it proceeds from the words therein, which charge the party called to appear at the day and place assigned, sub pœna centum librarum, &c. The subpœna is the leading process in the court of equity; and by statute, when a bill is filed against any person, process of subpœna shall be taken out to oblige the defendant to appear and answer the bill, &c.

Subpœna ad testificandum, a writ or process to bring in witnesses to give their testimony. If a witness on being served with this process does not appear, the court will issue an attachment against him; or a party, plaintiff or defendant, injured by his non-attendance, may maintain an action against the witness. See Blackstone's Commentaries, vol. III. p. 369.

Subpœna in Equity, a process in equity, calling on a defendant to appear and answer to the complainant's bill. See stat. 5 Geo. II. c. 25, which enacts that where the party cannot be found to be served with a subpœna, and absconds (as is believed) to avoid being served, a day shall be appointed him to appear to the bill of the plaintiff; which is to be inserted in the London Gazette, read in the parish church where the defendant last lived, and fixed up at the Royal Exchange: and, if the defendant doth not appear upon that day, the bill shall be taken pro confesso.

SUBQUAD'RUPLE, *adj.* Sub and quadruple. Containing one part of four.

As one of these under pulleys abates half of that heaviness the weight hath in itself, and causes the power to be in a subduple proportion unto it, so two of them abate half of that which remains, and cause a *subquadruple* proportion.
Wilkins's Mathematical Magick.

SUBQUIN'TUPLE, *adj.* Sub and quintuple Containing one part of five.

If unto the lower pulley there were added another, then the power would be unto the weight in a *subquintuple* proportion
Wilkins's Mathematical Magick.

SUBROGATION, or Surrogation, in the civil law, the act of substituting a person, in the place, and entitling him to the rights of another. In its general sense, subrogation implies a succession of any kind, whether of a person to a person, or of a person to a thing. There are two kinds of subrogation: the one conventional, the other legal. Conventional subrogation is a contract whereby a creditor transfers his debt, with all appurtenances thereof, to the profit of a third person. Legal subrogation is that which the law makes in favor of a person who discharges an antecedent creditor; in which case there is a legal translation of all rights of the ancient creditor to the person of the new one.

SUBSALT, a term first used by Dr. Pearson for a salt having an excess of base beyond what is requisite for saturating the acid, as supersalt is one with an excess of the acid. The sulphate of potash is the neutral compound of sulphuric

acid and potash; subsulphate of potash a compound of the same ingredients, in which there is an excess of base; supersulphate of potash, a compound of the same acid and the same base, in which there is an excess of acid.

SUBSCRI'BE, *v. a.* & *v. n.* SUBSCRIBER, *n. s.* SUBSCRIP'TION. } Fr. *souscrire*; Lat. *subscribo*. To give consent to by underwriting the name; attest by writing; submit: give consent: both the noun substantives corresponding.

Osius, with whose hand the Nicene creed was set down, and framed for the whole Christian world to *subscribe* unto, so far yielded in the end, as even with the same hand to ratify the Arians' confession. *Hooker.*

Their particular testimony ought to be better credited than some other *subscribed* with an hundred hands. *Whitgift.*

The king gone to-night! *subscribed* his power!
Confined to exhibition! all is gone. *Shakspeare.*
Advise thee what is to be done,
And we will all *subscribe* to thy advice. *Id.*
I tax not you, you elements, with unkindness;
I never gave you kingdom, called you children;
You owe me no *subscription*. *Id. King Lear.*

The man asked, Are ye Christians? We answered we were; fearing the less because of the cross we had seen in the *subscription*. *Bacon.*

They united by *subscribing* a covenant, which they pretended to be no other than had been *subscribed* in the reign of king James, and that his majesty himself had *subscribed* it; by which imposition people of all degrees engaged themselves in it. *Clarendon.*

So spake much humbled Eve; but fate
Subscribed not: nature first gave signs, impressed
On bird, beast, air. *Milton's Paradise Lost.*

The reader sees the names of those persons by whom this letter is *subscribed*. *Addison.*

The work he plied;
Stocks and *subscriptions* pour on every side. *Pope.*

Let a pamphlet come out upon a demand in a proper juncture, every one of the party who can spare a shilling shall be a *subscriber*. *Swift.*

SUBSCRIPTION, in general, signifies the signature put at the bottom of a letter, writing, or instrument. In commerce, it is used for the share or interest which particular persons take in a public stock or a trading company, by writing their names, and the shares they require, in the books or register thereof.

SUBSCRIPTION, in the commerce of books, signifies an engagement to take a certain number of copies of a book intended to be printed, and a reciprocal obligation of the bookseller or publisher to deliver the said copies on certain terms. These subscriptions, which had their rise in England about the middle of the last century, were lately very frequent in France and Holland, and are now very common among ourselves.

SUBSCRIPTION TO ARTICLES OF FAITH is a written solemn declaration of the subscriber's assent, and is governed, according to archdeacon Paley, by the same rule of interpretation with oaths;—which rule is the 'animus imponentis.' The enquiry, therefore, concerning subscription will be, 'quis imposuit, et quo animo.' The bishop who receives the subscription, says this ingenious writer, is not the imposer, any more than the cryer of a court, who administers the oath to the jury and witnesses, is the person that imposes it; nor consequently is the private opinion or interpretation of the bishop of any signification to the subscriber, one way or other. The compilers of the thirty-nine articles are not to be considered as the imposers of subscription, any more than the framer or drawer up of a law is the person that enacts it. The legislature of the 13th Eliz. is the imposer, whose intention the subscriber is bound to satisfy. They who contend that nothing less can justify subscription to the thirty-nine articles, than the actual belief of each and every separate proposition contained in them, must suppose that the legislature expected the consent of 10,000 men, in perpetual succession, not to one controverted proposition, but to many hundreds. It is difficult to conceive how this could be expected by any, who observed the incurable diversity of human opinion upon all subjects short of demonstration. If the authors of the law did not intend this, what did they intend? Our author replies to this question that they intended to exclude from offices in the church, 1. All abettors of popery; 2. Anabaptists, who were at that time a powerful party on the continent; and, 3. The Puritans, who were hostile to an episcopal constitution; and in general the members of such leading sects or foreign establishments, as threatened to overthrow our own. Whoever, he says, finds himself comprehended within these descriptions, ought not to subscribe. For the general reasons upon which he justifies the imposition of this test on the teachers of religion, we must refer to his Moral Philosophy; where it will appear that this writer seems to intimate, that our articles of faith might be converted into articles of peace; and acknowledges that subscriptions perpetuate the proscription of sects and tenets, from which any danger has long ceased to be apprehended. The cases in which subscription to the thirty-nine articles is required are, those of clergy officiating in the church, and entitled to its preferments and emoluments, and of school-masters, of young men in the university of Oxford at the time of their matriculation; and at Cambridge all degrees in arts, law, physic, music, and divinity, are guarded by subscription, nor are any admitted to their first degree of bachelor of arts without a bonâ fide subscription, i. e. 'I, A. B., do declare that I am bonâ fide a member of the church of England as by law established.'

We must here, however, observe that the three articles contained in the thirty-sixth canon are those that are subscribed at Cambridge for a bachelor of divinity's degree, and for a doctor's in any faculty, divinity, law, or physic. They include all the thirty-nine articles, and are as follow:—1. That the king's majesty, under God, is the only supreme governor of the realm and all other his highness's dominions and countries, as well in spiritual or ecclesiastical things or causes, as temporal, and that no foreign prince, person, prelate, or potentate hath, or ought to have, any jurisdiction, ecclesiastical or spiritual, within his majesty's said realms, dominions, and countries. 2. That the book of common prayer, and of ordering of bishops, priests, and deacons, containeth nothing in it contrary to the word of

God; and that it may lawfully be used; and that he himself will use the form in the said book prescribed in public prayer, and administration of the sacraments, and no other. 3. That he alloweth the book of articles agreed upon by the archbishops, and bishops of both provinces, and the whole clergy in the convocation, holden at London in the year 1562: and that he acknowledgeth all, and every, the articles therein contained (being in number thirty-nine, besides the ratification) to be agreeable to the word of God. We whose names are underwritten do willingly, and ex animo, subscribe to the three articles before mentioned, and to all things in them contained.—Excerp. e Stat. Acad. Cantab. p. 25.

Many persons who think highly of archdeacon Paley's judgment and liberality, and some who are inclined to interpret subscription with the utmost latitude, are not satisfied with his statement of the intention with which the articles were formed, and subscription to them enjoined. The truth of the case seems to be that the compilers of the articles considered them as comprehending scriptural doctrines, generally believed at the time when they were drawn up, and which they thought no one could reasonably dispute; and that they were authoritatively enforced with a view of preventing diversity of opinion. This will appear if we take a cursory view of the manner in which they were introduced and established. Soon after the Reformation, when dissentions and separations took place among the reformed churches, particularly in Poland, Hungary, and Transylvania, and the Catholics charged these differences and dissentions upon the principles of the reformed, their leaders made attempts for vindicating themselves from the charge. Accordingly they determined to make a public declaration of their principles; they drew up public confessions, and their teachers subscribed a profession of uniformity. A diet was held at Augsburg, in the year 1530, under Charles V., and there an explicit confession, confirmed by the leaders of the several churches, received its birth. In process of time other churches followed the example, and the faith of eleven Protestant churches was comprehended in the Harmony, drawn up by the Belgic and Gallican churches, A. D. 1581. The Book of Concord among the Remonstrants in Holland, and the Corpus Confessionum, which appeared at Geneva in the year 1612, were productions of a similar kind, and formed for like purposes. In England measures of the same tendency were adopted. After Henry VIII. assumed the supremacy of the church, he proceeded, in the exercise of his newly acquired authority, to appoint six articles, ordaining, among other enactments, 'that all bishops and ministers were to believe the whole bible, the three creeds, viz. the Apostles', the Nicene, and the Athanasian, and interpret all things according to them and in the same words.' In the preface it is said, 'they are to maintain unity and concord in opinion.' In the reign of Edward VI. Cranmer and others remonstrated against these articles, and they were repealed; but forty-two articles were published 'for the avoiding of diversity of opinion, and the gaining of true consent, touching true religion. In queen Elizabeth's reign eleven articles were set out by order of the metropolitans, and the rest of the bishops, 'for the unity of doctrine, to be holden by all parsons, vicars, and curates, as well in testification of their common consent in the said doctrine, as to the stopping of the mouths of those who go about to slander the ministers of the church for diversity of judgment.' Some time after all of them were surveyed, and at length comprised within a system of thirty-nine articles. These articles were again ratified by James I., according to the form commonly prefixed to the book of articles of queen Elizabeth; in which, among other things, are these words, 'that the articles of the church of England (which have been allowed and authorised heretofore, and which our clergy have generally subscribed unto) do contain the true doctrine of the church of England, agreeable to God's word; which we do therefore ratify and confirm, requiring all our loving subjects to continue in the uniform profession thereof, and prohibiting the least difference from the said articles, &c.' It is added, after an assertion 'that we are supreme governor of the church of England,' and the recital of some other particular observations relating to these articles, 'that no man hereafter shall either print or preach to draw the article aside any way, but shall submit to it in the plain and full meaning thereof, and shall not put his own sense or comment to be the meaning of the articles, but shall take it in the literal and grammatical sense. That if any public reader in either of our universities, or any head or master of a college, or any other person respectively in either of them, shall affix any sense to any article, or shall publicly read, determine, or hold any public disputation, or suffer any such to be held either way, in either the universities or colleges respectively; or if any divine in the universities shall preach or print any thing either way, other than is already established in convocation with our royal assent; he or they the offenders shall be liable to our displeasure, and the church's censure in our commission ecclesiastical, as well as any other; and we will see there shall be due execution upon them.'

By 13 Eliz. c. 12, none shall be admitted to the order of deacon, unless he shall first subscribe to the said articles. And, by the same statute, none shall be made minister, or permitted to preach or administer the sacraments, unless he first bring to the bishop of that diocese, from men known to the bishop to be of sound religion, a testimonial of his professing the doctrine expressed in the said articles, nor unless he be able to answer and render to the ordinary an account of his faith in Latin, according to the said articles, or have special gift or ability to be a preacher; nor unless he shall first subscribe to the said articles.

By the thirty-sixth canon, no person shall be received into the ministry, nor either by institution or collation admitted to any ecclesiastical living, nor suffered to preach, catechise, or to be a lecturer or reader of divinity in either university, or in any cathedral or collegiate church, city, or market town, parish-church, chapel, or

in any other place, except he shall first subscribe to this article following: viz. 'That he alloweth the book of articles of religion agreed upon by the archbishops and bishops of both provinces, and the whole clergy in the convocation holden at London, in the year of our Lord God 1562; and that he acknowledgeth all and every the articles therein contained, being in number nine-and-thirty, besides the ratification, to be agreeable to the word of God.' And by the statute of the 13 Eliz., c. 12, no person shall be admitted to any benefice with cure, except he shall first have subscribed the said articles in the presence of the ordinary; and all admissions to benefices of any person contrary to this act, and all dispensations, qualifications, and licenses to the contrary, shall be merely void in law, as if they never were.

The 13 & 14 Car. II., c. 4, require subscription to the thirty-nine articles mentioned in the 13th Eliz. c. 12, and a declaration of unfeigned assent and consent unto, and approbation of them, under certain express penalties. It has been observed, however, that by the 13 Eliz. c. 12, subscription is enjoined to those articles which only concern the confession of the true Christian faith, and the doctrine of the sacraments; and that by 14 Car. II. the articles to be subscribed are the articles mentioned in the preceding statute: the limiting clause, therefore, being still in force, there is no act of the legislature imposing the subscription to all the thirty-nine. Such is the opinion of archdeacon Blackburne and Mr. Selden, but others are of a different opinion. We shall here merely remark that the origin of the act of uniformity under Charles II., and various clauses in the act itself, suppose the reception of the disciplinarian as well as the doctrinal and sacramental articles, and that the canons of the church do actually impose them all.

By those who are acquainted with the history of the times under consideration, and with the sentiments and character of the compilers and imposers of the articles, it must, as it has been conceived, be allowed that the notion of diversity of judgment never entered into the minds of the English reformers; they supposed that the Scriptures had but one meaning, and with an excess of confidence imagined that they were in possession of the truth. In confirmation of this it has been urged that when the Harmony of Confessions was published, among those of other reformed churches, that of the church of England appeared. So that bishop Burnet, though disposed on other occasions to a liberality of interpretation, and though he left his dying testimony against the hard injunction of subscription (Conclusion of his History, vol. ii. p. 634, fol. ed.), ingenuously confesses in his History of the Reformation (vol. ii. p. 169), that the thirty-nine articles were something more than articles of peace, and adds, 'that the men who subscribed them, when they were first set out, did either believe them to be true, or else they did grossly prevaricate.' The bishop's opinion seems to have remained unaltered; for, when his Exposition was about to be published, bishop Williams strongly recommended that they might be considered only as articles of peace. Upon which the late judge Burnet, mentioning this incident in his father's life, observes 'that there might, perhaps, be reason to wish that they had been only imposed as such; but there was nothing in our constitution to warrant an expositor in giving that sense to them.' Those who respect the opinion of these two able judges, the one of the original intention of the church, the other of the point of law, cannot consistently contend for the pacific sense of subscription. According to the intent of the first subscriptions, maintained by the bishop in his Hist. Reform. above-cited, he could no more give the subscribers of the present age the privilege of availing themselves of different grammatical terms, than he could allow them to consider the articles as articles of peace. Did not the royal declaration prefixed to them, to which we have already referred, and never invalidated by any act of the legislature, preclude a latitude of subscription? The articles were to be subscribed 'ex animo, in the literal and grammatical sense;' and, as this declaration has been continued in every succeeding reign, does it not seem to imply that uniformity is still demanded? We can easily conceive, however, that men of as great integrity as learning, may think themselves warranted in subscribing with greater latitude. Some, as we have seen, have been desirous of considering the articles as articles of peace, and not of faith: and others, again, may reconcile themselves to subscription on different principles. Some have felt the grievance, and have applied (unsuccessfully indeed) to the legislature for relief. Others, who had once subscribed, have declined preferment in the church, because they could not conscientiously renew their subscription: and others have actually surrendered their connexion with it. For a further account of the sentiments and reasonings of different writers, for and against subscription, we refer to archdeacon Blackburne's Confessional.

SUBSEPTUPLE. Lat. *sub* and *septuplus*. Containing one of seven parts.

If unto this lower pulley there were added another, then the power would be unto the weight in a subquintuple proportion; if a third, a *subseptuple*.
Wilkins.

SUB'SEQUENT, *adj.* } Fr. *subsequent*; Lat. *subsequens*. Impro-
SUB'SEQUENCE, *n. s.* } perly pronounced
SUB'SEQUENTLY, *adv.* }
long in the second syllable by Shakspeare. Following in train; not preceding: the noun substantive and adverb corresponding.

In such indexes, although small pricks
To their *subsequent* volumes, there is seen
The baby figure of the giant mass
Of things to come at large.
Shakspeare. Troilus and Cressida.

The *subsequent* words came on before the precedent vanish.
Bacon.

By this faculty we can take notice of the order of precedence and *subsequence* in which they are past.
Grew.

To men in governing most things fall out accidentally, and come not into any compliance with their preconceived ends: but they are forced to comply *subsequently*, and to strike in with things as they fall out, by postliminious after-applications of them to their purposes.
South.

Why does each consenting sign
With prudent harmony combine
In turns to move, and *subservient* appear
To gird the globe and regulate the year? *Prior.*

This article is introduced as *subsequent* to the treaty of Munster, made about 1648, when England was in the utmost confusion. *Swift.*

SUBSERVE', *v. a.* } Lat. *subservio.* To
SUBSER'VIENCE, *n. s.* } serve in subord nation;
SUBSER'VIENT, *adj.* } to serve instrumentally: the derivatives corresponding.

Not made to rule
But to *subserve* where wisdom bears command. *Milton.*

There is an immediate and apt *subservience* of the spirits to the empire of the soul. *Bacon's Origin of Man and.*

It is a greater credit to know the ways of captivating nature, and making her *subserve* our purposes, than to have learned all the intrigues of policy. *Gardner.*

Hammond had an incredible dexterity, scarce ever reading any thing which he did not make *subservient* in one kind or other. *Fell.*

Philosophers and common heathens believed one God, to whom all things are referred; but under to a God they worshipped many inferior and *subservient* gods. *Stillingfleet.*

Wicked spirits may by their cunning carry farther in a seeming confederacy or *subservience* to the designs of a good angel. *Dryden.*

The memory hath no special part of the brain devoted to its own service, but uses all those parts which *subserve* our sensations, as well as our thinking powers. *Watts.*

Sense is *subservient* unto fancy, fancy unto intellect. *Grew.*

We are not to consider the word as the body of God; he is an uniform being, void of organic members, or parts; and they are his creatures, subordinate to him, and *subservient* to his will. *Newton's Opticks.*

We cannot look upon the body, wherein appears so much fitness, use, and *subservience* to infinite functions, any otherwise than as the effect of contrivance. *Bentley.*

There is a regular subordination and *subservience* among all the parts to beneficial ends. *Cheyne's Philosophical Principles.*

Most critics, fond of some *subservient* art,
Still make the whole depend upon a part:
They talk of principles, but notions prize,
And all to one loved folly sacrifice. *Pope.*

SUBSEXTUPLE, *adj.* Lat. *sub* and *sextuplus.* Containing one part of six.

One of these under pullies abates half of that heaviness the weight hath, and causes the power to be in a subduple proportion unto it, two of them a subquadruple proportion, three a *subsextuple.* *Wilkins's Mathematical Magick.*

SUBSIDE', *v. n.* } Lat. *subsido.* To sink;
SUB'SIDENCE, *n. s.* } tend downwards. Com-
SUB'SIDENCY. } monly used of one part of a compound merging in the whole: the noun substantives corresponding.

He shook the sacred honours of his head,
With terror trembled heaven's *subsiding* hill,
And from his shaken curls ambrosial dews distill. *Dryden.*

This gradual *subsidency* of the abyss would take up a considerable time. *Burnet's Theory.*

This miscellany of bodies being determined to a *subsidence* merely by their different specific gravities, all those which had the same gravity [illegible] same time.

By the alternate motion of those [illegible] whose surfaces are by turns freed from [illegible] tact, and by a proper accidental meet again by the ingress and egress of the air the upper [illegible] they are [illegible]. *Arbuthnot.*

Now Jove suspends his golden scales in air
Weighs the men's wills against the lady's hair:
The doubtful beam long nods from side to side
At length the will mounts up, the scale *subsides.* *Pope.*

SUBSIDY, *n. s.* } Fr. *subside*; Lat. *subsidium.* And
SUBSID'IARY, *adj.* } as is given in money; assistant [illegible] aid.

Bitter substances burn the blood, and are a kind of *subsidiary* gall. *Arbuthnot.*

They advised the king to make speedy [illegible] with much alacrity granted a great sum of money. *Clarendon.*

'Tis all the subsidy the present age can [illegible]. *Dryden.*

It is a celebrated maxim of a person [illegible] of commerce should never grant [illegible] no part to the people, and the [illegible] ease under a burden they did not feel. *Swift.*

SUBSIDY, in law, [illegible] to the king by parliament for the [illegible] cessions of the subjects; and [illegible] every subject of all [illegible] value of his lands or goods [illegible] some of our statutes [illegible] customs. See TAX.

SUBSIDY, in modern European [illegible] large sum of money, then [illegible] generously thrown away by [illegible] ment to detain foreign [illegible] selves our allies, to pay them for fighting our own battles, and when they get the [illegible] ends accomplished, commonly make a separate peace with the enemy, and leave us to the [illegible] fate; nay, sometimes ungratefully join the [illegible] against us. By such subsidies Britain [illegible] gains much glory, but the public gives [illegible] allies, while her national debt still increases. See the history of Europe for the last seventy years.

SUBSIGN', *v. a.* Lat. *subsigno.* To sign under.

Neither have they seen any dead before the conquest, but *subsigned* with crosses and simple names without surnames. *Camden.*

SUBSIST, *v. n.* } Fr. *subsister*; Lat. *sub-*
SUBSIST'ENCE, *n. s.* } *sistere.* To be; have a
SUBSIST'ENT, *adj.* } existence: substantial: the means of living: inherent: substantial: the being: means of support: competent: the adjective corresponding.

The flesh and the corruption of the flesh which God, began both at the instant the making and taking to himself our flesh was not the first. So that in Christ there is no personal *subsistence* but the [illegible] that from eternity. *Hooker.*

Form we subsist, but possible to swerve. *Milton.*

We know as little how the soul is [illegible] that is, the chain of those differing substances of which it is compounded, as how it first commenced. *Glanvill.*

Such as deny spirits *subsistent* without bodies, [illegible] with difficulty affirm the separate existence of the [illegible] own. *Bacon.*

Not only the things and *subsistence*, but the very images were of some creatures existing. *Stillingfleet.*

He shone so powerfully upon me, that, like the heat of a Russian summer, he ripened the fruits of poetry in a cold climate; and gave me wherewithal to *subsist* in the long winter which succeeded. *Dryden.*

Though the general natures of these qualities are sufficiently distant from one another, yet when they come to *subsist* in particulars, and to be clothed with several accidents, then the discernment is not so easy. *South.*

His viceroy could only propose to himself a comfortable *subsistence* out of the plunder of his province. *Addison.*

These qualities are not *subsistent* in those bodies, but are operations of fancy begotten in something. *Bentley.*

The very foundation was removed, and it was a moral impossibility that the republic could *subsist* any longer. *Swift.*

SUB'STANCE, *n. s.* Fr. *substance;* Lat. *substantia.* Being; something existing; something real; the essential part; body; means of life; wealth: substantial and substantially follow these senses: substantiality is reality of existence; materiality; corporeity: substantials, essentials or essential parts: to substantiate, to make to exist; prove valid.

SUBSTAN'TIAL, *adj.*
SUBSTANTIAL'ITY, *n. s.*
SUBSTAN'TIALLY, *adv.*
SUBSTAN'TIALNESS, *n. s.*
SUBSTAN'TIALS, *n. s.*
SUBSTAN'TIATE, *v. a.*

Trials of crimes and titles of right shall be made by verdict of a jury, chosen out of the honest and most *substantial* freeholders. *Spenser on Ireland.*

He hath eaten me out of house and home, and hath put all my *substance* into that fat belly of his; but I will have some of it out again. *Shakspeare. Henry IV.*

O blessed, blessed night! I am afraid,
Being in night, all this is but a dream;
Too flattering sweet to be *substantial.* *Shakspeare.*

Shadows to-night
Have struck more terror to the soul of Richard,
Than can the *substance* of ten thousand soldiers
Armed all in proof, and led by shallow Richmond. *Id.*

When *substantialness* combineth with delightfulness, fulness with fineness, how can the language which consisteth of these sound other than most full of sweetness? *Camden's Remains.*

Since then the soul works by herself alone,
Springs not from sense, nor humours well agreeing;
Her nature is peculiar, and her own;
She is a *substance*, and a perfect being. *Davies.*

In degree of *substantialness* next above the Dorique, sustaining the third, and adorning the second story. *Wotton.*

Having so *substantially* provided for the north, they promised themselves they should end the war that summer. *Clarendon.*

It will serve our turn to comprehend the *substance*, without confining ourselves to scrupulous exactness in form. *Digby.*

If happiness be a *substantial* good,
Not framed of accidents, nor subject to them,
I erred to seek it in a blind revenge. *Denham.*

To give thee being, I lent
Out of my side to thee, nearest my heart,
Substantial life. *Milton.*

He the future evil shall no less
In apprehension than in *substance* feel. *Id.*

Substantial doors,
Cross-barred and bolted fast, fear no assaults. *Id.*

The strength of gods,
And this empyreal *substance*, cannot fail. *Id.*

What creatures there inhabit, of what mould
And *substance?* *Id.*

In him his Father shone *substantially* expressed. *Id.*

Time, as a river, hath brought down to us what is more light and superficial, while things more solid and *substantial* have been immersed. *Glanville.*

The laws of this religion would make men, if they would truly observe them, *substantially* religious towards God, chaste and temperate. *Tillotson.*

Heroic virtue did his actions guide,
And he the *substance*, not the' appearance, chose.
To rescue one such friend he took more pride,
Than to destroy whole thousands of such foes. *Dryden.*

The difference betwixt the empty vanity of ostentation, and the *substantial* ornaments of virtue. *L'Estrange.*

God is no longer to be worshipped and believed in as a God foreshewing and assuring by types, but as a God who has performed the *substance* of what he promised. *Nelson.*

The accidental of any act is said to be whatever advenes to the act itself already *substantiated.* *Ayliffe's Parergon.*

Although a custom introduced against the *substantials* of an appeal be not valid, as that it should not be appealed to a superior but to an inferior judge, yet a custom may be introduced against the accidentals of an appeal. *Id.*

The merchants, and *substantial* citizens, cannot make up more than a hundred thousand families. *Addison on the War.*

They are the best epitomes, and let you see with one cast of the eye the substance of a hundred pages. *Addison.*

Now shine these planets with *substantial* rays?
Does innate lustre gild their measured days? *Prior.*

Between the parts of opaque and coloured bodies are many spaces, either empty or replenished with mediums of other densities; as, water between the tinging corpuscles wherewith any liquor is impregnated, air between the aqueous globules that constitute clouds or mists, and for the most part spaces void of both air and water; but yet perhaps not wholly void of all *substance* between the parts of hard bodies. *Newton.*

Observations are the only sure grounds whereon to build a lasting and *substantial* philosophy. *Woodward.*

The qualities of plants are more various than those of animal *substances.* *Arbuthnot on Aliments.*

There may be a great and constant cough, with an extraordinary discharge of phlegmatick matter, while, notwithstanding, the *substance* of the lungs remains sound. *Blackmore.*

If this atheist would have his chance to be a real and *substantial* agent, he is more stupid than the vulgar. *Bentley.*

We are destroying many thousand lives, and exhausting our *substance*, but not for our own interest. *Swift.*

The sun appears flat like a plate of silver, the moon as big as the sun, and the rainbow a large *substantial* arch in the sky; all which are gross falsehoods. *Watts.*

Every being is considered as subsisting in and by itself, and then it is called a *substance*; or it subsists in and by another, and then it is called a mode or manner of being *Id.*

SUBSTANTIAL means also belonging to the nature of substance.

SUB'STANTIVE, *n. s* Fr. *substantif;* Lat. *substantivum.* A noun betokening the thing, not a quality.

He considered how sufficient and *substantive* this land was to maintain itself, without any aid of the foreigner. *Bacon.*

Claudian perpetually closes his sense at the end of a verse, commonly called golden, or two *substantives* and two adjectives, with a verb betwixt them to keep the peace. *Dryden.*

One is obliged to join many particulars in one proposition, because the repetition of the *substantive* verb would be tedious. *Arbuthnot.*

SUBSTANTIVE VERB, in grammar, a verb expressing existence; as I am; to be; to exist. The Latin has four substantive verbs; viz. Sum, fio, forem, and existo.

SUB'STITUTE, *v. a.* & *n. s.* } Fr. *substituer,*
SUBSTITU'TION, *n. s.* } Lat. *substitutus,*
from *sub* and *statuo.* To put in the place of another; one so placed: the act of substituting, or state of being substituted.

You 've taken up,
Under the counterfeited zeal of God,
The subjects of his *substitute*, my father,
And here upswarmed them. *Shakspeare. Henry IV.*

He did believe
He was the duke, from *substitution,*
And executing the' outward face of royalty,
With all prerogative. *Id. Tempest.*

Nor sal, sulphur, or mercury, can be separated from any perfect metals; for every part, so separated, may easily be reduced into perfect metal without *substitution* of that which chymists imagine to be wanting. *Bacon's Physical Remains.*

Hast thou not made me here thy *substitute,*
And these inferior far beneath me set? *Milton.*

If a swarthy tongue
Is underneath his humid palate hung,
Reject him then, and *substitute* another. *Dryden.*

In the original designs of speaking, a man can *substitute* none for them that can equally conduce to his honour. *Government of the Tongue.*

Providence delegates to the supreme magistrate the same power for the good of men, which that supreme magistrate transfers to those several *substitutes* who act under him. *Addison.*

Some few verses are inserted or *substituted* in the room of others. *Congreve.*

SUBSTRAC'TION, *n. s.* Fr. *soustraire, soustraction;* Lat. *subtraho.* The act of taking away part from the whole.

I cannot call this piece Tully's nor my own, being much altered not only by the change of the style, but by addition and *substraction.* *Denham.*

SUBSTRACTION and SUBSTRACT certainly are or ought to be obsolete. They are a vulgar and irregular spelling, totally unauthorised by the original Latin words, sub and traho. It is absurd to pretend they are derived from the French; for in that case they should be soustract, and soustraction.

SUBSTRUC'TION, *n. s.* Lat. *substructio, sub* and *struo.* Underbuilding.

To found our habitation firmly, examine the bed of earth upon which we build, and then the underfillings, or *substruction,* as the ancients call it. *Wotton's Architecture.*

SUBSTY'LAR, *adj.* Lat. *sub* and *stylus.* The substylar line is, in dialling, a right line, whereon the gnomon or style of a dial is erected at right angles with the plane.

Erect the style perpendicularly over the *substilar* line, so as to make an angle with the dial-plane equal to the elevation of the pole of your place. *Moxon's Mechanical Exercises.*

SUBSUL'TORILY, *adv.* Lat. *subsultus.* In a bounding manner; by fits; by starts.

The spirits spread even, and move not *subsultory*, for that will make the parts close and pliant. *Bacon's Natural History.*

SUBTANGENT OF A CURVE, the line that determines the intersection of a tangent with the axis, or that determines the point wherein the tangent cuts the axis prolonged. The tangent, subtangent, and semiordinate, always make a right-angled triangle.

It is a rule in all equations that, if the value of the subtangent comes out positive, the point of intersection of the tangent and axis falls on that side of the ordinate, where the vertex of the curve lines, as in the parabola and paraboloids.

If it come out negative, the point of intersection will fall on the contrary side of the ordinate, in respect of the vertex or beginning of the absciss; as in the hyperbola and hyperboliform figures. And universally, in all paraboliform and hyperboliform figures, the subtangent is equal to the exponent of the power of the ordinate multiplied into the absciss: thus, in the common parabola, whose property is $px = yy$, the subtangent is in length equal to x; the absciss multiplied by 2, the exponent of the power of yy, the square of the ordinate; that is, it is equal to twice the absciss; and, by the former rule for paraboliform figures, it must be taken above the ordinate in the axis produced.

Thus, also, in one of the cubical paraboloids, where $pxx = yyy$; the length of the subtangent will be $\frac{3}{2}$ of the absciss; and in a parabola of any kind, the general equation being $a^m x^n = + y^{m+n}$, the subtangent is $= \frac{m+n}{n} \times x$, or its ratio to the absciss, is constantly that of $m + n$ to n.

In the parabola the subtangent is double the absciss; and in the logarithmic curve, the subtangent is also a constant quantity.

SUBTEND', *v. a.* Lat. *sub* and *tendo.* To be extended under.

From Aries rightways draw a line, to end
In the same round, and let that line *subtend*
An equal triangle: now since the lines
Must three times touch the round, and meet three signs,
Where'er they meet in angles, those are trines. *Creech.*

In rectangles and triangles, the square which is made of the side that *subtendeth* the right angle, is equal to the squares which are made of the sides containing the right angle. *Browne.*

SUBTERMANS (Justus), an eminent Flemish painter, born at Antwerp, in 1597. He was famous for history and portraits. In the palace of Florence there is a celebrated painting by him, of the homage made to Ferdinand II. by the Florentine nobles. He died 1681, aged eighty-four.

SUB'TERFUGE, *n. s.* Fr. *subterfuge;* Lat. *subter* and *fugio.* A shift; an evasion; a trick.

The king cared not for *subterfuges*, but would stand envy, and appear in any thing that was to his mind. *Bacon.*

Notwithstanding all their sly *subterfuges* and studied evasions, yet the product of all their endeavours is but as the birth of the labouring mountains, wind and emptiness. *Glanville.*

Affect not little shifts and *subterfuges* to avoid the force of an argument. *Watts.*

SUBTERRA'NEAL, *adj.* SUBTERRA'NEAN, SUBTERRA'NEOUS, SUB'TERRANY, SUBTERRAN'ITY, *n. s.* Lat. *sub* and *terra;* Fr. *sous-terraine.* Subterranean or subterraneous is the word now used. Lying under the earth; placed below the surface: subterranity (obsolete) is a place under ground.

Metals are wholly *subterrany;* whereas plants are part above earth, and part under. *Bacon's Natural History.*

In *subterranies,* as the fathers of their tribes, are brimstone and mercury. *Id.*

The force
Of *subterranean* wind transports a hill
Torn from Pelorus, or the shattered side
Of thundering Ætna, whose combustible
And fueled entrails thence conceiving fire,
Sublimed with mineral fury, aid the winds. *Milton.*

We commonly consider *subterranities* not in contemplations sufficiently respective unto the creation. *Browne.*

Alteration proceeded from the change made in the neighbouring *subterraneal* parts by that great conflagration. *Boyle.*

Let my soft minutes glide obscurely on,
Like *subterraneous* streams, unheard, unknown. *Norris.*

This *subterraneous* passage was not at first designed so much for a highway as for a quarry. *Addison.*

Tell by what paths, what *subterranean* ways,
Back to the fountain's head the sea conveys
The refluent rivers. *Blackmore.*

Roused within the *subterranean* world,
The' expanding earthquake unresisted shakes
Aspiring cities. *Thomson.*

SUB'TILE, *adj.* SUB'TILELY, *adv.* SUBTIL'IATE, *v. a.* SUBTILIA'TION, *n. s.* SUBTILIZA'TION, SUB'TILIZE, *v. a.* & *v. n.* SUB'TILITY, *n. s.* SUB'TLE, *adj.* SUB'TLELY, *adv.* Fr. *subtile*; Lat. *subtilis.* Often written subtle, which signifies thin; not dense; not gross; nice; fine; piercing: hence cunning; artful; sly; deceitful: both the adverbs corresponding: subtiliate and subtilize mean to make thin; talk affectedly: the noun substantives corresponding: and subtilly with subtle, adjective.

A woman, an harlot, and *subtile* of heart. *Proverbs* vii. 10.

Finding force now faint to be,
He thought grey hairs afforded *subtilty.* *Sidney.*

Some *subtle* headed fellow will put some quirk, or devise some evasion, whereof the rest will take hold. *Spenser.*

Shall we think the *subtle*-witted French
Conj'rers and sorc'rers, that, afraid of him,
By magick verse have thus contrived his end?
Shakspeare. Henry VI.

Think you this York
Was not incensed by his *subtle* mother
To taunt and scorn you? *Id. Richard III.*

Like a bowl upon a *subtle* ground,
I've tumbled past the throw. *Id. Coriolanus.*

The constitution of the air appeareth more *subtilely* by worms in oak-apples than to the sense of man. *Bacon.*

Whatsoever is invisible, in respect of the fineness of the body, or *subtilty* of the motion, is little enquired. *Id.*

But of the clock, which in our breasts we bear,
The *subtile* motions we forget the while. *Davies.*

How shall we this union well express?
Nought ties the soul, her *subtilty* is such. *Id.*

O *subtile* love, a thousand wiles thou hast
By humble suit, by service, or by hire,
To win a maiden's hold. *Fairfax.*

The rudeness and barbarity of savage Indians know not so perfectly to hate all virtues as some men's *subtilty.* *King Charles.*

From his eyes the fleeting fair
Retired, like *subtle* smoke dissolved in air.
Dryden's Georgicks.

Intelligible discourses are spoiled by too much *subtlety* in nice divisions. *Locke.*

Chyle, being mixed with the choler and pancreatick juices, is further *subtilized,* and rendered so fluid and penetrant that the thinner and finer part easily finds way in at the streight orifices of the lacteous veins. *Ray on the Creation.*

Body cannot be vital; for, if it be, then is it so either as *subtilized* or organized, moved or endowed with life. *Grew.*

The Arabians were men of a deep and *subtle* wit. *Spratt.*

Bodies, the more of kin they are to spirit in *subtlety,* and refinement, the more spreading and self-diffusive are they. *Norris.*

Pass we the slow disease, and *subtile* pain,
Which our weak frame is destined to sustain;
The cruel stone, the cold catarrh. *Prior.*

Deny Des Cart his *subtile* matter,
You leave him neither fire nor water. *Id.*

The opakest bodies, if *subtilely* divided, as metals dissolved in acid menstruums, become perfectly transparent *Newton*

Greece did at length a learned race produce,
Who needful science mocked, and arts of use;
Mankind with idle *subtilties* embroil,
And fashion systems with romantick toil. *Blackmore.*

Fluids have their resistances proportional to their densities, so that no *subtilization,* division of parts, or refining, can alter these resistances. *Cheyne's Philosophical Principles.*

In the nice bee, what sense so *subtly* true,
From pois'nous herbs extracts the healing dew! *Pope.*

They give method, and shed *subtilty* upon their author. *Baker.*

SUBTILE, in physics, an appellation given to whatever is extremely small, fine, and delicate; such as the animal spirits, the effluvia of odorous bodies, &c., are supposed to be.

SUBTRACT', *v. a.* Lat. *subtractio.* They who derive it from the Latin write subtract; those who regard the French original substract; to withdraw part from the rest.

Reducing many things unto charge, which, by confusion, became concealed and *subtracted* from the crown. *Davies.*

What is *subtracted* or subducted out of the extent of the divine perfection, leaves still a quotient infinite. *Hale.*

The same swallow, by the *subtracting* daily of her eggs, laid nineteen successively, and then gave over. *Ray.*

SUBTRACTION, in arithmetic, the second rule, or rather operation, in arithmetic, whereby we deduct a less number from a greater, to learn their precise difference. See ARITHMETIC, Index; and ALGEBRA.

SUBTRI'PLE, *adj.* Fr. *subtriple;* Lat. *sub* and *triplus.* Containing a third, or one part of three.

The power will be in a *subtriple* proportion to the weight. *Wilkins's Mathematical Magick.*

SUBVENTA'NEOUS, *adj.* Lat. *subventaneus.* Addle; windy

Suitable unto the relation of the mares in Spain, and their *subventaneous* conceptions from the western wind. *Browne.*

SUBVERSE', *v. a.* } Latin *subversus.* To
SUBVER'SION, *n. s.* } subvert. Spenser uses
SUBVER'SIVE, *adj.* } subverst in the same sense. The noun substantive and adjective corresponding

These seek *subversion* of thy harmless life.
Shakspeare. Henry VI.

It is far more honourable to suffer, than to prosper in their ruin and *subversion.* *King Charles.*

These things refer to the opening and shutting the abyss, with the dissolution or *subversion* of the earth. *Burnet.*

Laws have been often abused, to the oppression and the *subversion* of that order they were intended to preserve. *Rogers.*

Empires *subversed,* when ruling fate has struck
The unalterable hour. *Thomson's Autumn.*

SUBVERT', *v. a.* } Fr. *subvertir;* Lat. *sub-*
SUBVER'TER, *n. s.* } *verto.* To overthrow; overturn; turn upside down; destroy: the noun substantive corresponding.

Strive not about words to no purpose but to the *subverting* of the hearers. 2 *Tim.* ii. 14.

God, by things deemed weak,
Subverts the worldly strong and worldly wise.
Milton.

O traitor! worse than Simon was to Troy;
O vile *subverter* of the Gallick reign,
More false than Gano was to Charlemaigne!
Dryden.

Trees are *subverted* or broken by high winds.
Mortimer.

They anathematize them as enemies to God, and *subverters* of souls. *Waterland.*

SUBULARIA, rough-leaved alysson, or awlwort, in botany, a genus of plants belonging to the class of tetradynamia, and order of siliculosa, and in the natural order ranging under the thirty-ninth order, siliquosæ. The silicula is entire and ovate; the valves are ovate, concave, and contrary to the partitions. The style is shorter than the silicula. There is only one species, viz.

S. aquatica, which is a native of Britain. It is about an inch high. The leaves are awl-shaped, and grow in clusters round the root. The stalk is naked, and produces four or five small white flowers growing alternately on short foot-stalks. It flowers under water, whereas most aquatic plants emerge above water at the time of flowering. The author of nature has, however, carefully prevented the tender flower from receiving any injury from the water by making the petals close and form themselves into a kind of arch. This plant grows on the borders of the Highland lakes, in Loch Tay, in Scotland, also in Wales and Ireland.

SUBUR, in ancient geography; 1. a river of Mauritania; 2. a town of Spain.

SUB'URB, *n. s.* } Lat. *suburbium.* A build-
SUBURB'AN, *adj.* } ing without the walls of a city; the outer part: inhabiting the suburbs.

There's a trim rabble let in: are all these your faithful friends of the *suburbs?*
Shakspeare. Henry VIII.

The *suburbs* of my jacket are so gone,
I have not left one skirt to sit upon. *Cleaveland.*

When our fortunes are violently changed, our spirits are unchanged, if they always stood in the *suburb* and expectation of sorrows. *Taylor.*

They on the smoothed plank,
The *suburb* of their straw-built citadel,
Expatiate. *Milton.*

Poor clinches the *suburban* muse affords,
And Panton waging harmless war with words.
Dryden.

Then weds an heiress of *suburban* mould,
Ugly as apes, but well endowed with gold. *Harte.*

SUBWORK'ER, *n. s.* Sub and worker. Underworker; subordinate helper.

He that governs well leads the blind, but he that teaches gives him eyes: and it is glorious to be a *subworker* to grace, in freeing it from some of the inconveniencies of original sin. *South.*

SUCCEDA'NEOUS, *adj.* Lat. *succedaneus.* Supplying the place of something else.

Nor is Ætius strictly to be believed when he prescribeth the stone of the otter as a *succedaneous* unto castoneum. *Browne.*

I have not discovered the menstruum: I will present a *succedaneous* experiment made with a common liquor. *Boyle.*

SUCCEED', *v. n.* & *v. a.* } French *succéder,*
SUCCEED'ER, *n. s.* } Lat. *succedo.* To follow in order; terminate an undertaking effectually: have a good effect: to follow; prosper: one who follows. See SUCCESS.

If thou deal truly, thy doings shall prosperously *succeed* to thee. *Tob.* iv. 6.

If I were now to die,
'Twere to be most happy; for I fear
My soul hath her consent so absolute,
That not another comfort like to this
Succeeds in unknown fate. *Shakspeare. Othello.*

Nature has so far imprinted it in us, that should the envy of predecessors deny the secret to *succeeders,* they yet would find it out. *Suckling.*

Workmen let it cool by degrees in such relentings of nealing heats, lest it should shiver in pieces by a violent *succeeding* of air in the room of the fire.
Digby on Bodies.

Enjoy till I return
Short pleasures; for long woes are to *succeed.*
Milton.

In that place no creature was hurtful unto man; and those destructive effects they now discover *succeeded* the curse, and came in with thorns and briars.
Browne's Vulgar Errours.

If the father left only daughters, they equally *succeeded* to him in copartnership, without prelation or preference of the elder to a double portion.
Hale.

They make one man's particular fancies, perhaps failings, confining laws to others, and convey them to their *succeeders,* who afterwards misname all unobsequiousness as presumption. *Boyle.*

Revenge *succeeds* to love, and rage to grief.
Dryden.

These dull harmless makers of lampoons are yet of dangerous example to the publick: some witty

men may *succeed* to their designs, and, mixing sense with malice, blast the reputation of the most innocent. *Id.*

'Tis almost impossible for poets to *succeed* without ambition: imagination must be raised by a desire of fame to a desire of pleasing. *Id.*

This was impossible for Virgil to imitate, because of the severity of the Roman language: Spenser endeavoured it in Shepherd's Kalendar; but neither will it *succeed* in English. *Id.*

SUCCESS', *n. s.*
SUCCESS'FUL, *adj.*
SUCCESS'FULLY, *adv.*
SUCCESS'FULNESS, *n. s.*
SUCCESS'ION,
SUCCESS'IVE, *adj.*
SUCCESS'IVELY, *adv.*
SUCCESS'IVENESS, *n. s.*
SUCCESS'LESS, *adj.*
SUCCESS'OR, *n. s.*

Fr. *succés;* Latin *successus.* The happy termination of any thing: the adjective, adverb, and noun substantive following corresponding: succession is consecutiveness; series; lineage; order of descendants: successive, following in order; inherited by succession: the adverb and noun substantive corresponding: successless, luckless; unfortunate: successor, he who succeeds.

The *succession* of Moses in prophecies. *Ecclus.* xlvi. 1.

For good *success* of his hands, he asketh ability to do of him that is most unable. *Wisdom* xiii. 19.

This king by this queen had a son of tender age, but of great expectation, brought up in the hope of themselves, and a ready acceptation of the inconstant people, as *successor* of his father's crown. *Sidney.*

All the sons of these five brethren reigned
By due *success*, and all their nephews late,
Even thrice eleven descents, the crown retained.
Spenser.

Three sons he left,
All which *successively* by turns did reign.
Faerie Queene.

St. Augustine, having reckoned up a great number of the bishops of Rome, saith, in all this order of *succession* of bishops, there is not one found a Donatist. *Hooker.*

He is too young, yet he looks *successfully.* *Shakspeare.*

Cassibelan,
And his *succession*, granted Rome a tribute.
Id. Cymbeline.

It is upon record? or else reported
Successively from age to age? *Id. Richard III.*

Countrymen,
Plead my *successive* title with your swords.
Shakspeare.

The empire being elective, and not *successive*, the emperors, in being, made profit of their own times. *Raleigh.*

These decays in Spain have been occasioned by so long a war with Holland; but most by two *successions* of inactive princes. *Bacon.*

We that measure times by first and last,
The sight of things *successively* do take,
When God on all at once his view doth cast,
And of all times doth but one instant make.
Davies.

Three with fiery courage he assails,
And each *successive* after other quails,
Still wondering whence so many kings should rise.
Daniel.

An opinion of the *successfulness* of the work is as necessary to found a purpose of undertaking it, as the authority of commands, or the persuasiveness of premises. *Hammond.*

A second colony is sent hither, but as *successless* as the first. *Heylyn.*

The fear of what was to come from an unacknowledged *successour* to the crown, clouded much of that prosperity then, which now shines in chronicle. *Clarendon.*

Perplexed and troubled at his bad *success*
The tempter stood. *Milton.*

A long *succession* must ensue;
And his next son the clouded ark of God
Shall in a glorious temple enshrine.
Id. Paradise Lost.

God hath set
Labour and rest, as day and night, to men
Successive. *Id.*

All the notion we have of duration is partly by the *successiveness* of its own operations, and partly by those external measures that it finds in motion. *Hale.*

Not Lemuel's mother with more care
Did counsel or instruct her heir;
Or teach with more *success* her son
The vices of the time to shun. *Waller.*

Every reasonable man cannot but wish me *success* in this attempt, because I undertake the proof of that which it is every man's interest that it should be true. *Tillotson.*

The hopes of thy *successless* love resign. *Dryden.*

What people is so void of common sense,
To vote *succession* from a native prince! *Id.*

The surly savage offspring disappear,
And curse the bright *successor* of the year;
Yet crafty kind with daylight can dispense. *Id.*

He observed the illustrious throng,
Their names, their fates, their conduct, and their care,
In peaceful senates and *successful* war. *Id.*

Let a cannon-bullet pass through a room, and take with it any limb of a man, it is clear that it must strike *successively* the two sides of the room, touch one part of the flesh first, and another after, and so in *succession.* *Locke.*

The Bavarian duke,
Bold champion! brandishing his Noric blade,
Best tempered steel, *successless* proved in field.
Philips.

God, by reason of his eternal indivisible nature, is by one single act of duration present to all the *successive* portions of time, and all *successively* existing in them. *South.*

They were terrible alarms to persons grown wealthy by a long and *successful* imposture, by persuading the world that men might be honest and happy, though they never mortified any corrupt appetites. *Id.*

Whether a bright *successor*, or the same. *Tate.*

Whilst malice and ingratitude confess,
They've strove for ruin long without *success.* *Garth.*

Passion unpitied, and *successless* love,
Plant daggers in my heart. *Addison's Cato*

Send the *successive* ills through ages down,
And let each weeping father tell his son. *Prior*

The early hunter
Blesses Diana's hand who leads him safe
O'er hanging cliffs; who spreads his net *successful*,
And guides the arrow through the panther's heart.
Id.

I inclined the paper to the rays very obliquely, that the most refrangible rays might be more copiously reflected than the rest, and the whiteness at length changed *successively* into blue, indigo, and violet. *Newton's Opticks.*

This is the most proper and most *successful* season to meet and attack the advancing enemy. *Blackmore.*

The rule of imitating God can never be *successfully* proposed but upon Christian principles; such as that this world is a place not of rest, but of discipline. *Atterbury.*

Military *successes*, above all others, elevate the minds of a people. *Id.*

Gas sulphuris may be given with *success* in any disease of the lungs. *Arbuthnot on Diet.*

Bleeding, when the expectoration goes on *successfully*, suppresseth it. *Id.*

The descendants of Alexander's *successors* cultivated navigation in some lesser degree. *Arbuthnot.*

We have a tradition coming down to us from our fathers; a kind of inheritance *successively* conveyed to us by the primitive saints from the apostles themselves. *Waterland.*

No such motion of the same atom can be all of it existent at once: it must needs be made gradually and *successively*, both as to place and time; seeing that body cannot at the same instant be in more places than one. *Bentley's Sermons.*

Successless all her soft caresses prove,
To banish from his breast his country's love. *Pope.*

A reformation *successfully* carried on in this great town would in time spread itself over the whole kingdom. *Swift.*

Success, or Good Success Bay, a bay on the south-east coast of Terra del Fuego, in the straits of Le Maire. On the mountains inland Mr. Banks and Dr. Solander found many new Alpine plants, unknown in Europe; but the cold was so intense that the latter had well nigh fallen a sacrifice to its severity in the midst of summer. Dr. Solander, who had more than once crossed the mountains which divide Sweden from Norway, well knew that extreme cold, especially when joined with fatigue, produces a torpor and sleepiness that are almost irresistible: he therefore conjured the company to keep moving whatever pain it might cost them, and whatever relief they might be promised by an inclination to rest. 'Whosoever sits down,' says he, 'will sleep; and whosoever sleeps will wake no more.' The Dr. himself, however, was the first who found the inclination, against which he had warned others, irresistible; and insisted upon being suffered to lie down. Mr. Banks intreated and remonstrated in vain; down he lay upon the ground, though it was covered with snow, and it was with great difficulty that his friend kept him from sleeping. Richmond also, one of the black servants, began to linger, having suffered from the cold in the same manner as the doctor. Mr. Banks, therefore, sent five of the company, among whom was Mr. Buchan, forward to get a fire ready at the first convenient place they could find, and himself and four others remained with the doctor and Richmond, whom, partly by persuasion and intreaty, and partly by force, they brought on, till they both declared they could go no farther. Mr. Banks had recourse to intreaty and expostulation, but they produced no effect. When Richmond was told that if he did not go now he would in a short time be frozen to death, he answered that he desired nothing but to lie down and die. The doctor did not so explicitly renounce his life; he said he was willing to go on, but that he must first take some sleep, though he had before told the company that to sleep was to perish. Mr. Banks and the rest found it impossible to carry them, and there being no remedy, they were suffered to sit down, being partly supported by the bushes, and in a few minutes they fell into a profound sleep. Soon after, some of the people who had been sent forward returned with the welcome news that a fire was kindled about a quarter of a mile farther on the way. Mr. Banks then endeavoured to wake Dr. Solander, and happily succeeded; but though he had not slept five minutes, he had almost lost the use of his limbs, and the muscles were so shrunk that his shoes fell from his feet; he consented to go forward, with such assistance as could be given him, but no attempts to relieve poor Richmond were successful, who, with a seaman sent to his relief, died. Long. 65° 27 W., lat. 54° 50 S.

Succession, in law. See Descent, Inheritance, and Law.

Succession, in metaphysics, the idea which we get by reflecting on the ideas which follow one another in our mind; and from the succession of ideas we get the idea of time. See Metaphysics.

Succession of Colonels. A particular part of the official army list is so called. The dates of the several appointments are therein specified, together with the numbers and facings of the different regiments.

A commission in Succession, a commission in which an individual has an inherent property from having purchased it, or raised men; or which, through interest, he is at liberty to sell to the best advantage, provided it does not go in the regiment; in which case no more than the king's regulation can be taken.

Succession to the Crown of England. See Hereditary Right. From the days of Egbert, the first sole monarch of England, even to the present, the four cardinal maxims mentioned in that article have ever been held constitutional canons of succession. It is true, as Sir William Blackstone observes, this succession, through fraud or force, or sometimes through necessity, when in hostile times the crown descended on a minor or the like, has been very frequently suspended; but has generally at last returned back into the old hereditary channel, though sometimes a very considerable period has intervened. And even in those instances where this succession has been violated, the crown has ever been looked on as hereditary in the wearer of it; of which the usurpers themselves were so sensible that they for the most part endeavoured to vamp up some feeble show of a title by descent, to amuse the people, while they took the possession of the kingdom. And, when possession was once gained, they considered it as the purchase or acquisition of a new estate of inheritance, and transmitted, or endeavoured to transmit it, to their own posterity by a kind of hereditary right of usurpation. See Blackstone's Commentaries, vol. i. 197—217. From the historical view there given it appears that the title to the crown is at present hereditary, though not so absolutely hereditary as formerly; and the common stock, or ancestor, from whom the descent must be derived, is also different. In the time of the Anglo-Saxons the common stock was king Egbert; then William I. introduced a new

race of Normans. In the person of Henry II. the Saxon and Norman blood were united. In Henry VII. were united the blood of the jarring houses of York and Lancaster, whose dissensions had occasioned the shedding of so much royal blood. In Henry's veins too flowed the blood of the British king Arthur, the progenitor of the house of Tudor. By the marriage of Henry VII.'s daughter, Margaret, with king James IV. of Scotland, the royal blood of both kingdoms was united in James V., whose son James VI. united the crowns and the two common stocks; and so continued till the vacancy of the throne in 1688, when William III., Mary II., and Anne succeeded; but the succession was fixed in the heirs of the princess Sophia, in whom the inheritance was vested by the new king and parliament. Formerly, the descent was absolute, and the crown went to the next heir without any restriction; but now, upon the new settlement, the inheritance is continued; being limited to such heirs only of the body of the princess Sophia as are Protestant members of the church of England, and are married to none but Protestants. And in this due medium consists the true constitutional notion of the right of succession to the imperial crown of these kingdoms. The extremes between which it steers are each of them equally destructive of those ends for which societies were formed and are kept up. Where the magistrate, upon every succession, is elected by the people, and may, by the express provision of the laws, be deposed (if not punished) by his subjects, this may sound like the perfection of liberty, and look well enough when delineated on paper; but in practice will be ever productive of tumult, contention, and anarchy. And, on the other hand, divine indefeasible hereditary right, when coupled with the doctrine of unlimited passive obedience, is surely of all constitutions the most thoroughly slavish and dreadful. But, when such an hereditary right as our laws have created and vested in the royal stock, is closely interwoven with those liberties which are equally the inheritance of the subject, this union will form a constitution in theory the most beautiful of any, in practice the most approved, and, we trust, in duration the most permanent. Et esto perpetua! Amen.

In France the succession to the monarchy was formerly limited to heirs male (see SALIC), but in Navarre the crown was inherited by the heir of line, whether male or female. Philip IV., king of France, in 1285, espoused Jane queen of Navarre in her own right; and, as king consort of this latter kingdom, added the title of Navarre to that of France. Louis X., son and heir of Philip and Jane, succeeded to both crowns. By Margaret his first wife, who had been crowned queen of Navarre, he left one daughter Joan. His second wife Clementina was pregnant at the time of his decease, and was delivered of a posthumous son, whom most of the French annalists recognise as John I. of France, though he lived only three weeks. On his death the kingdom of France passed to Philip V., and that of Navarre to Joanna the only child and heir of Louis X. and Margaret. From Joanna, in lineal succession, the kingdom of Navarre passed to Jane d'Albert, mother of Henry IV. of France, and wife of Anthony of Bourbon, who, as king consort, wore the crown of Navarre. On the accession of Henry to the kingdom of France the two monarchies were united, and the four succeeding princes assumed the joint titles.

SUCCINAS, or SUCCINAT (from Lat. succinum, amber), a salt formed by the combination of the succinic acid with different bases. 'These bases are acids, alkalies, and metallic oxides. But scarcely any of these succinats have yet been examined with attention. 'For the few experiments (adds Dr. Thomson) that have been made, we are indebted to Stockar, Wenzel, Leonhardi, and Bergman.' The doctor then enumerates seven species besides the metallic succinats; viz. 1. Succinat of alumina. This salt, according to Wenzel, crystallises in prisms, and is easily decomposed by heat. 2. Succinat of ammonia forms needle-shaped crystals. It has a sharp bitter and cooling taste; when exposed to heat it sublimes without decomposition. 3. Succinat of barytes. This salt, according to Bergman, is difficultly soluble in water. 4. Succinat of lime. This salt forms oblong, pointed, non-deliquescent salts, which are difficultly soluble even in boiling water. It is not altered by exposure to the air. It is decomposed by muriat of ammonia, and by the fixed alkaline carbonats. 5. Succinat of magnesia has the form of a white, glutinous, frothy mass; which, when dried by the fire, attracts moisture from the air, and deliquesces. 6. Succinat of potass. This salt, according to Leonhardi and Stockar, crystallises in three-sided prisms. It has a bitter saline taste, is very soluble in water, and deliquesces when exposed to the air. When exposed to heat it decrepitates and melts, and in a strong heat is decomposed. 7. Succinat of silver. See SILVER. 8. Succinat of soda. When pure succinic acid is saturated with soda, the solution by spontaneous evaporation yields beautiful transparent crystals of succinat of soda; some of which are four-sided prisms with dihedral summits; others six-sided prisms terminated by an oblique face. This salt has a bitter taste, is less soluble in water than common salt, and does not deliquesce when exposed to the air. It is decomposed completely when exposed to a sufficient heat in close vessels. See SUCCINIC ACID.

SUCCINATED, impregnated with amber, or the succinic acid.

SUCCINCT', *adj.* French *succinct;* Lat. *succinctus.* Literally tucked or girded up; having the clothes drawn up to disengage the legs: hence short; concise.

> A strict and *succinct* style is that where you can take nothing away without loss, and that loss manifest. *Ben Jonson.*
>
> Let all your precepts be *succinct* and clear,
> That ready wits may comprehend them soon.
> *Roscommon.*
>
> I'll recant, when France can shew me wit
> As strong as ours, and as *succinctly* writ. *Id.*
>
> I shall present you very *succinctly* with a few reflections that most readily occur. *Boyle.*
>
> His vest *succinct* then girding round his waist,
> Forth rushed the swain. *Pope.*

SUCCINIC (from Lat. succinum, amber), of or belonging to amber; containing the vir-

tues or essence of amber; of the nature of amber.

Succinic Acid, or the acid of amber, one of the recently discovered acids extracted from amber. See Amber and Chemistry, Index. When amber (says Dr. Thomson, vol. ii. p. 134) is distilled, a volatile salt is obtained, which is mentioned by Agricola under the name of salt of amber; but its nature was long unknown. Boyle was the first who discovered that it was an acid. It is obtained by the following process:—Fill a retort half way with powdered amber, and cover the powder with dry sand; lute on a receiver and distil in a sand bath, without employing too much heat. See Chemistry. Dr. Thomson adds, 'It may be made tolerably pure by dissolving it in hot water, and putting upon the filter a little cotton moistened with oil of amber; this substance retains most of the oil, and allows the solution to pass clear. This acid is then to be crystallised by a gentle evaporation, to be repeated till the acid be sufficiently pure.' Guyton Morveau has discovered that it may be made quite pure by distilling off it a sufficient quantity of nitric acid, taking care not to employ a heat strong enough to sublime the succinic acid. The crystals are transparent, white, shining, and of a foliate, triangular, prismatic form; they have an acid taste, but are not corrosive: they redden tincture of turnsole, but have little effect on that of violets. They sublime when exposed to a considerable heat, but not at the heat of a water bath. In a sand bath they melt, and then sublime and condense in the upper part of the vessel; but the coal which remains shows that they are partly decomposed. One part of this acid dissolves in ninety-nine parts of water, at the temperature of 50°, according to Spielman in twenty-four parts at 52°; and in two parts of water at 212°, according to Stockar de Neuforn; but the greatest part crystallises as the water cools. According to Rox, however, it still retains more of the acid than cold water is capable of dissolving; 240 grains of boiling alcohol dissolve 177 of this acid; but crystals again shoot as the solution cools. The compounds which it forms with acids, alkalies, and metallic oxides, are named succinats. When the succinat of soda is distilled in a retort the succinic acid is completely decomposed. There passes over into the receiver an acid liquor, which is the acetous much diluted and a quantity of brown oil. At the same time carbonic acid gas, and carbonated hydrogen gas, are disengaged, and there remains in the retort soda and charcoal. Hence it follows that this acid is decomposed by heat, and is composed of oxygen, hydrogen, and carbon. Its affinities, Morveau says, are barytes, lime, potass, soda, ammonia, magnesia, alumina, metallic oxides.

SUCCINUM, amber, in mineralogy, a species of bitumen classed under the inflammable substances. As a full account of this mineral was given under Amber, nothing remains but to mention a few things which recent experiments enable us to add. According to Dr. Kirwan 100 grains of amber afford about seventy-two of petro eum, forty-five of succinic acid, and a residue fixed matter and water. Mr. Scheele says that when distilled it yields an aqueous acid resembling vinegar in its qualities. This would induce us to believe it to be of vegetable origin. But its origin is a point not yet ascertained. Its specific gravity is from 1·065 to 1·100, and it melts at 550° of Fahrenheit. Wallerius affirms that mirrors, prisms, &c., may be made of amber.

SUC'CORY, *n. s.* Lat. *cichoreum.* A plant.

A garden sallad
Of endive, radishes, and *succory.* *Dryden.*

The medicaments to diminish the milk are lettuce, purslane, endive, and *succory.* *Wiseman of Tumours.*

Succory, in botany. See Cichorium.

Succory, gum. See Chondrilla.

Succory, wart. See Lapsana.

SUCCOTH BENOTH, a goddess of the Chaldeans; supposed to be the same with Mylitta or the Assyrian Venus; in honor of whom the young women were obliged to prostitute themselves once in their lives in her temple; where each was called on in her turn by a man throwing a piece of money in her lap. The worship of this obscene goddess was introduced into Samaria, along with the corrupted worship of the true God, by the Babylonian emigrants settled there by Shalmanezer, 2 Kings xvii. 30. As Succoth signifies tents, perhaps the rites of Succoth Benoth were celebrated in tent-beds.

SUC'COUR, *v. a.* & *n. s.* } French *secourir;*
Succour'less, *adj.* } la. *succurro.* To help; assist in difficulty or distress; relieve: the noun substantive and adjective corresponding.

She hath been a *succourer* of many. *Rom.* xvii. 2.

Fear nothing else but a betraying of *succour* which reason offereth. *Wisdom* xvii. 12.

As that famous queen
Of Amazons, whom Pyrrhus did destroy,
Did shew herself in great triumphant joy,
To *succour* the weak state of sad afflicted Troy. *Spenser.*

Here's a young maid with travail oppress'd,
And faints for *succour.* *Shakspeare.*

Our watchful general hath discerned from far
The mighty *succour* which made glad the foe. *Dryden.*

A grateful beast will stand upon record, against those that in their prosperity forget their friends, that to their loss and hazard stood by and *succoured* them in their adversity. *L'Estrange.*

Succourless and sad,
She with extended arms his aid implores. *Thomson.*

SUCCUBUS, a term used by some writers for a demon who assumes the shape of a woman, and as such lies with a man; in which sense it stands opposed to incubus, which was a demon in form of a man that lies with a woman. But the truth is that succubus is only a species of the incubus, or the night-mare. See Medicine.

SUC'CULENCE, *n. s.* } Fr. *succulent;* Lat.
Suc'culency, } *succulentus.* Juiciness; juicy; moist.
Suc'culent, *adj.* }

These plants have a strong, dense, and *succulent,* moisture, which is not apt to exhale. *Bacon.*

Divine Providence has spread her table every where, as with a juiceless green carpet, but with *succulent* herbage and nourishing grass, upon which most beasts feed. *More.*

On our account has Jove,
Indulgent, to all lands some *succulent* plant

Allotted. that poor helpless man might slack
His present thirst. *Philips.*

Succulent Plants, among botanists, such whose leaves are thick and full of juice.

SUCCULENTÆ, in botany, an order of plants in the natural method. See Botany, Index.

SUCCUMB', *v. n.* Lat. *succumbo;* Fr. *succomber.* To yield; to sink under any difficulty.

To their will we must *succumb,*
Quocunque trahunt, 'tis our doom. *Hudibras.*

SUCCUSSA'TION, *n. s.* Lat. *succusso.* A trot.

They rode, but authors do not say
Whether tolutation or *succussation.* *Butler.*

They move two legs of one side together, which is tolutation or ambling; or lift one foot before, and the cross foot behind, which is *succussation* or trotting. *Browne's Vulgar Errours.*

When any of that risible species were brought to the doctor, and when he considered the spasms of the diaphragm, and all the muscles of respiration, with the tremulous *succussion* of the whole human body, he gave such patients over. *Martin Scriblerus.*

SUCH, *pronoun.* Sax. ꝼpilc; Goth. *sulleiks;* Belg. *sulk;* Swed. *salik.* So-like; of that kind; of the like kind; taking *as* before the thing to which it relates: the same that; a particular person or thing, as in the phrase, 'such and such.'

Can we find *such* a one *as* this, in whom the spirit of God is? *Genesis* xli. 38.

I have appointed my servants to *such* and *such* place. 1 *Samuel.*

You will not make this a general rule to debar *such* from preaching of the gospel, *as* have through infirmity fallen. *Whitgifte.*

If you repay me not on *such* a day,
In *such* a place, *such* sum or sums as are
Expressed in the condition, let the forfeit
Be an equal pound of your flesh.
Shakspeare. Merchant of Venice.

I saw him yesterday
With *such* and *such.* *Id. Hamlet.*

Scarce this word death from sorrow did proceed,
When in rushed one, and tells him *such* a knight
Is now arrived. *Daniel's Civil War.*

That which doth constitute any thing in its being, and distinguish it from all other things, is called the form or essence of *such* a thing. *Wilkins.*

That thou art happy, owe to God;
That thou continuest *such* owe to thyself. *Milton.*

Such precepts *as* tend to make men good, singly considered, may be distributed into *such as* enjoin piety towards God, or *such as* require the good government of ourselves. *Tillotson.*

Such another idol was Manah, worshipped between Mecca and Medina, which was called a rock or stone. *Stillingfleet.*

Such are the cold Riphean race, and *such*
The savage Scythian. *Dryden's Virgil.*

The same sovereign authority may enact a law, commanding *such* or *such* an action to-day, and a quite contrary law forbidding the same to-morrow. *South.*

To assert that God looked upon Adam's fall as a sin, and punished it as *such,* when, without any antecedent sin, he withdrew that actual grace upon which it was impossible for him not to fall, highly reproaches the essential equity of the Divine Nature. *Id.*

You love a verse, take *such as* I can send. *Pope.*

SUCK, *v. a., v. n.,* & *n. s.* Sax. ꝼucan; Fr. *sucer;* Ital. *succiare;* Lat. *sugo, suctum.* To draw by making a rarefaction of the air; draw in with the mouth; empty by sucking; draw or drain: as a verb neuter to draw by rarefaction; draw the breast; imbibe; the act of sucking; milk given by females: a sucker is a draining instrument; the embolus of a pump; a young twig, 'perhaps,' says Johnson, 'from Lat. *surculus.* Sucket is a sweet-meat: sucking-bottle, a bottle to aid children in sucking, or as a substitute for the breast: to suckle, to nurse at the breast: suckling, the creature nursed: suction is the act of sucking.

Suck'er, *n. s.*
Suck'et,
Suck'ing-bottle,
Suck'le, *v. a.*
Suck'ling, *n. s.*
Suc'tion.

A nursing father beareth with the *sucking* child. *Numb.* xi.

The cup of astonishment thou shalt drink, and *suck* it out. *Ezekiel* xxiii. 34.

Desire, the more he *sucked,* more sought the breast,
Like dropsy folk still drink to be a-thirst. *Sidney.*

They draw with their *suck* the disposition of nurses. *Spenser.*

Thy valiantness was mine, thou *sucked'st* it from me;
But own thy pride thyself. *Shakspeare. Coriolanus.*

The breast of Hecuba,
When she did *suckle* Hector, looked not lovelier. *Shakspeare.*

I can *suck* melancholy out of a song, as a weasel *sucks* eggs. *Id.*

I would
Pluck the young *sucking* cubs from the she-bear,
To win thee, lady. *Id. Merchant of Venice.*

The cutting away of *suckers* at the root and body doth make trees grow high. *Bacon's Natural History.*

The crown had *sucked* too hard, and now, being full, was like to draw less. *Bacon's Henry VIII.*

Pumping hath tired our men;
Seas into seas thrown, we *suck* in again. *Donne.*

Nature's confectioner, the bee,
Whose *suckets* are moist alchimy;
The still of his refining mold
Minting the garden into gold. *Cleaveland.*

The ascent of waters is by *suckers,* or forcers, or something equivalent thereunto. *Wilkins's Dædalus.*

Oil must be poured into the cylinder, that the *sucker* may slip up and down in it more smoothly. *Boyle.*

Though the valve were not above an inch and a half in diameter, yet the weight kept up by *suction,* or supported by the air, and what was cast out of it weighed ten pounds. *Id.*

We'll hand in hand to the dark mansions go,
Where *sucking* in each other's latest breath,
We may transfuse our souls. *Dryden.*

Bees on tops of lilies feed,
And creep within their bells to *suck* the balmy seed. *Id.*

Those first unpolished matrons
Gave *suck* to infants of gigantic mold. *Id.*

I provide a *suckling,*
That ne'er had nourishment but from the teat. *Id.*

She nurses me up and *suckles* me. *L'Estrange.*

A fox lay with whole swarms of flies *sucking* and galling of him. *Id.*

He that will say children join these general abstract speculations with their *sucking-bottles,* has more zeal for his opinion, but less sincerity. *Locke.*

Such as are nourished with milk find the paps and

suck at them; whereas none of those that are not designed for that nourishment ever offer to *suck*.
Ray on the Creation.

Out of this old root a *sucker* may spring, that with a little shelter and good seasons, may prove a mighty tree. *Ray.*

Continual repairs, the least defects in *sucking* pumps are constantly requiring. *Mortimer's Husbandry.*

Marines aye ply the pump,
So they, but chearful, unfatigued, still move
The draining *sucker*. *Philips.*

One of the round leathers wherewith boys play, called *suckers*, not above an inch and half diameter, being well soaked in water, will stick and pluck a stone of twelve pounds up from the ground.
Grew's Museum.

The Roman soldiers bare on their helmets the first history of Romulus, who was begot by the god of war, and *suckled* by a wolf. *Addison on Italy.*

Young animals participate of the nature of their tender aliment, as *sucklings* of milk.
Arbuthnot on Aliments.

Transfixed as o'er Castalia's streams he hung,
He *sucked* new poisons with his triple tongue.
Pope's Statius.

Suckling (Sir John), an English poet and dramatic writer, was the son of Sir John Suckling, comptroller of the household to king Charles I., and born at Witham in Essex, in 1613. He discovered an uncommon propensity to the acquiring of languages, insomuch that he is reported to have spoken Latin at five years of age, and to have written it at nine. When he was grown up he travelled; but seems to have affected nothing more than the character of a courtier and a fine gentleman; which he so far attained that he was allowed to have the peculiar happiness of making every thing he did become him. In his travels he made a campaign under the great Gustavus Adolphus: and his loyalty, if not his valor, appeared in the beginning of our civil wars; for, after his return to England, he raised a troop of horse for the king's service entirely at his own charge; and mounted them so completely and richly that they are said to have cost him £12,000. But his troop, with Sir John at its head, behaved so ill in the engagement with the Scots, upon the English borders, in 1639, as to occasion the famous lampoon composed by Sir John Mennis:—

'Sir John he got him an ambling nag, &c.'

This ballad, which was set to a brisk tune, was much sung by the parliamentarians. This disastrous expedition, and the ridicule that attended it, was supposed to have hastened his death; being seized by a fever, of which he died, at twenty-eight years of age. He was a sprightly wit, and an easy versifier, but no great poet. His works, consisting of a few poems, letters, and plays, have nevertheless gone through several editions.

SUCRO, a river of Hispania Tarraconensis, famous for a battle fought on its bank between Sertorious and Pompey the Great, in which the latter was defeated. It is now called Xucar.

Suction, in physiology, the act of drawing into the mouth fluids and other substances by means of the pressure of the external air. When an infant is imbibing its food from the breast of the mother its lips are applied closely to the nipple, so that no air can enter; by enlarging the chest, the atmospheric pressure is removed from the surface of the nipple, while it still continues on the external surface of the breast; and thus forces the contents of the lactiferous tubes into the mouth. If the lips are immersed in any fluid, and the chest expanded, the pressure of the external atmosphere will force it into the mouth. The act of suction, indeed, depending on this atmospheric pressure, is in all cases essentially the same. See Lungs. Air is sucked through a pipe in the same manner as with the naked mouth; it being here the same as if the mouth were extended through the length of the pipe. If a man apply his mouth to one end of an open tube, the other end of which is placed in water, the operation of sucking is performed in the following manner. By enlarging his chest, he rarefies the air, and of course diminishes its pressure on the liquor, which is immediately under the tube; in consequence of which the pressure of the atmosphere on the surface of the surrounding liquor forces the liquor to ascend into the tube.

The suction of heavier liquors is performed after the same manner, e. gr. in lying prone to drink out of a spring, &c., the lips are applied close to the surface of the water, so as to prevent any passage of the air between them; then the cavity of the abdomen, &c., being distended as before, the pressure of the air incumbent on the surface of the water, without the circumference of the mouth, prevailing over that upon the water within the same, the fluid is raised from the same principle as water in a pump. In sucking a heavy liquor, as water, through a pipe, the longer the pipe is, the greater difficulty is found in the suction; and the bigness and diameter of the pipe make a farther alteration therein. The reason of this arises from that great principle in hydrostatics, that fluids press in the compound ratio of the bases, and perpendicular altitudes.

From what we have said, it evidently enough appears that what we call suction is not performed by any active faculty in the mouth, lungs, &c.; but by the mere impulse and pressure of the atmosphere. A very curious and intelligent person distinguishes two different sorts of suction, performed after two quite different manners; a distinction which, however hitherto overlooked by authors, seems absolutely necessary.

Suction then, according to him, is performed either, 1st, by the dilatation of the thorax; or, 2dly, by that of the cavity of the mouth. In the former case the lungs are kept continually distended; for, if the breath be let go ever so little, the liquor in the tube will begin to subside. On the contrary, when suction is performed by enlarging the cavity of the mouth, we may suck with our utmost force, and yet breathe freely through the nostrils at the same time. This is the true proper suction: the other ought rather to be called supping than sucking through a tube.

Note, the cavity of the mouth is enlarged by being a little opened, while the lips are close shut, the tongue being at the same time contracted, and drawn backwards towards the throat.

In the operation of sucking, after the manner of children, the rarefaction is produced in the

fore part of the mouth; i. e. the tongue is applied so as to fill up the space between the lips and the nipple, or pipe which conveys the milk or other liquor; then the tongue is drawn backwards, whilst the lips are laterally pressed against it, by which means a small vacuum is formed before it, and the liquor is forced into that vacuum by the pressure of the atmosphere upon its external surface, or upon the surface of the bag which contains it. It is for the same reason that snails remain attached to solids, that limpets adhere very firmly to rocks, that the sea polypus holds with great force whatever it fastens its claws to, and that some insects suspend themselves to solids; for, though not performed with the mouth, the principle of the operation is exactly the same, viz. a soft membrane is applied to the solid, then the middle part of that surface is withdrawn a little way, so as to form a vacuum, or at least a rarefaction of the air between the centre of the soft membrane and the solid, in consequence of which the parts of the membrane which surround that spot are, by the gravity of the atmosphere, pressed against the solid, and the latter is pressed against the former; hence the adhesion takes place.

Leather suckers, which act precisely upon the same principle, are not unfrequently seen in the hands of boys about the streets of London. A circular piece of thick leather, about two inches in diameter, has a string fastened to its centre. The leather, being previously well soaked in water, is applied flat and close to the smooth surface of a stone. The interposition of a little water promotes the adhesion. Then the boy pulls up the string, and the stone, if not too heavy, comes up adhering to the leather. The claws of the polypus are furnished with a great many suckers of the like nature. The limpet forms one sucker of its whole body, and the same thing, with little variation, is done by various other animals, especially of the insect tribe. The action of the glass cup, which is made to adhere to the flesh, for the purpose of bleeding, depends upon the same principle; excepting that the air within the glass cup is rarefied by means of heat, or by means of a small exhausting engine. It is hardly needful to add that the limpet could not adhere to the rock, nor could the leather sucker act, or, in short, that none of those sucking operations could take place, in vacuo.

SUCZAVA, an ancient town in the Bukowine, Austrian Galatia, at the confluence of the Suczava and Sereth. It is surrounded with a wall and ditch, and contains about 4000 inhabitants, but is only a shadow of what it once was, having been the residence of the princes of Moldavia, the ruins of whose palace, with those of seventeen large churches, bear testimony to its former grandeur. At present it contains hardly any establishment worth notice, except a manufactory of Russian leather, and a school for training teachers for the adjacent country. Seventy miles west of Jassy, and ninety-seven S. S. E. of Lemberg.

SUDBURY, a borough and market-town, consisting of three parishes, in Babergh hundred, Suffolk, situated on the river Stour, fourteen miles S.S.E. of Bury-St.-Edmund's, and fifty-four north-east of London. The streets are tolerably well built, and there are three handsome churches; viz. St. Gregory's, St. Peter's, and All-Saints'; over the river is a good stone bridge. The traffic of the town has much increased since the Stour has been made navigable for barges to Manningtree. It is said to have been one of the first towns in which the woollen manufactory was introduced, but that is now gone to decay, and is succeeded by serges and a silk manufactory. It first returned members to parliament in 1559; and now sends two, chosen by those who are free of the borough, the number of voters being about 720. It is governed by a mayor, six aldermen, and twenty-four common councilmen. Market on Saturday. Fairs 12th of March and 10th of July.

SUD'DEN, *adj.* & *n. s.* } Sax. ȝoȝen; Fr.
SUD'DENLY, *adv.* } *soudain.* Happening
SUD'DENNESS, *n. s.* } without notice; coming without common preparatives: hence hasty; violent: as a noun substantive, surprise; an unexpected occurrence; thus 'on a sudden' is sooner than could have been anticipated: the adverb and noun substantive following correspond.

All in the open hall amazed stood,
At *suddenness* of that unwary sight,
And wondered at his breathless hasty mood.
Spenser.

He speedily run forward, counting his *suddenness* his most advantage, that he might overtake the English. *Id.*

We have not yet set down this day of triumph;
To-morrow, in my judgment, is too *sudden.*
Shakspeare.

I grant him
Sudden, malicious, smacking of every sin. *Id.*

Following the flyers at the very heels,
With them he enters, who *upon the sudden*
Clapt to their gates. *Id. Macbeth.*

If thou canst accuse,
Do it without invention *suddenly.* *Id. Henry VI.*

If elision of the air made the sound, the touch of the bell or string could not extinguish so *suddenly* that motion. *Bacon.*

Parents should mark the witty excuses of their children at *suddains* and surprisals, rather than pamper them. *Wotton.*

SUDERMANIA, or SODERMANLAND, a province of Middle Sweden, to the west of Stockholm. Its greatest length from east to west is about 100 miles; its breadth from north to south fifty-five: its territorial extent is 3470 square miles. The face of the province is hilly, finely variegated with lakes: the climate, though cold, is not intemperate; and the air is pure and healthy. The inhabitants raise corn in sufficiency for consumption and a small export. The pasturage is good; the forests extensive. In the mountains are mines of lead, copper, iron; and from Tunaberg a large quantity of cobalt ore is sent to England. Population 150,000.

SUDETES, a large mountain chain of Germany, separating the Austrian states from those of Saxony and Prussia. It is distinguished by the names of the Erzgebirge and the Riesengebirge, viz. the Mining and the Giant's Mountains. Besides this great chain it sends off on both sides a number of branches into Bohemia, Moravia, Lusatia, and Silesia.

SUDORIFIC, *adj.* & *n. s.* Fr. *sudorifique*; Lat. *sudor* and *facio*. Provoking or causing sweat: the noun substantive corresponding.

Physicians may well provoke sweat in bed by bottles, with a decoction of *sudorifick* herbs in hot water. *Bacon.*

Exhaling the most liquid parts of the blood by *sudorifick* or watery evaporations, brings it into a morbid state. *Arbuthnot.*

As to *sudorificks*, consider that the liquid which goes off by sweat is often the most subtile part of the blood. *Id.*

SU'DOROUS, *adj.* Lat. *sudor*. Consisting of sweat. Not used.

Beside the strigments and *sudorous* adhesions from men's hands, nothing proceedeth from gold in the usual decoction thereof. *Browne's Vulgar Errours.*

SUE, *v. a.* & *v. n.* Fr. *suiver*; Lat. *sequor*; Gr. ζεω. To prosecute by law; to petition; entreat; beg: obtain by law or petition.

If any *sue* thee at the law, and take away thy coat, let him have thy cloak also. *Matt.* v. 40.

Full little knowest thou that hast not tried,
What hell it is in *suing* long to bide. *Spenser.*

If me thou deign to serve and *sue*,
At thy command, lo! all these mountains be. *Id.*

Ambassadors came unto him as far as the mouth of the Euphrates, *suing* unto him for peace. *Knolles.*

We were not born to *sue*, but to command. *Shakspeare.*

For this, this only favor let me *sue*,
Refuse it not: but let my body have
The last retreat of human kind, a grave. *Dryden's Æneid.*

'Twill never be too late,
To *sue* for chains, and own a conqueror. *Addison's Cato.*

The fair Egyptian
Courted with freedom now the beauteous slave,
Now faltering *sued*, and threatening now did rave. *Blackmore.*

By adverse destiny constrained to *sue*,
For counsel and redress, he *sues* to you. *Pope's Odyssey.*

SUE (John Joseph), F. R. S., an eminent French surgeon, who was surgeon in chief of the hospitals at Paris. He wrote several learned works on surgery and medicine; and was admitted F. R. S. of London. He died in 1792.

SVEABORG, a sea port and fortress on the Gulf of Finland, three miles and a half south of Helsingfors. The harbour, capable of containing seventy men of war, is defended by batteries which sweep the channel forming its only entrance. Here are several small islands, of which the principal, called Wargoe, contains the arsenal, docks, basins, and magazines for fitting out or repairing men of war. The fortifications are likely, when completed, to stand a comparison with Gibraltar, and the garrison often amounts to 3500 men. The works were begun in 1748, and continued by the Swedish government, with more or less activity, from that date to 1808, when the place falling into the hands of the Russians, they have been farther continued. The walls are chiefly of granite, covered with earth from six to ten feet in thickness, and in some places forty in height. In 1790 Gustavus III. of Sweden defeated the Russians in a naval engagement near this place. Population 3500.

SUECA, a town in the province of Valencia, Spain, not far from the mouth of the Xucar, joined here by a small stream flowing from the lake of Albufera. It stands on the great road along the coast, contains 4800 inhabitants, and belonged formerly to the grand master of the knights of Montesa. Twenty-one miles south of Valencia.

SUESSI, SUESSIONES, SUESSONES, a branch of the Remi, a people of Gallia Belgica (Pliny) called sometimes Suessones, in the lower age Suessi; situated between the Remi to the east, the Nervii to the north, the Veromandoui to the west, and the Meldæ to the south, in the tract now called Soissonois.

SUESSONES, SUESSIONES, or SUESSONEI, the name of their city in the lower age; thought to have been formerly called Noviodunum (Cæsar), now called Soissons. See SAXONY, SOISSONNOIS, and SOISSONS.

SU'ET, *n. s.* } From old Fr. *suet*, according
SU'ETY, *adj.* } to Skinner. A hard fat, particularly that about the kidneys: of the nature of or abounding in suet.

The steatoma being *suet*, yields not to escarotick. *Wiseman.*

If the matter forming a wen resembles fat, or a *suety* substance, it is called steatoma. *Sharp's Surgery.*

SUET, sevum, a fat found in deer, sheep, oxen, hogs, &c., which, melted down and clarified, makes what we call tallow, used in the making of candles. The word is formed from the Latin suedum, sebum, or sevum, which signify the same; and these a sue, sow, by reason of the fatness of that beast.

Of all real animal fats mutton-suet is the most consistent; it has some degree of brittleness, and requires a temperature of 127° Fahrenheit to melt it. In other respects it agrees with animal fats in general. Like these it is emollient: it is sometimes boiled in milk in the proportion of ℥ij of the suet to ℥j of milk, and a cupful of the mixture is given occasionally in chronic diarrhœa when there is much acrimony of the contents of the bowels; but its principal use is to give consistence to ointments and plasters. The sevum præparatum, or prepared suet of the London pharmacy, is obtained by cutting the suet in pieces, then melting it by a gentle heat, and pressing it through linen. Another kind of fat which we shall mention is the axungia porcina of the Edinburgh pharmacy, the adeps suillus of Dublin, the adeps of London, or the hog's lard. The lard is chiefly obtained from the flank of the animal. It is freed from the membranes and vessels by being cut in small pieces, then well washed in water till the water comes off colorless, and afterwards melted with a very gentle heat in a shallow vessel, kept on the fire till the water is wholly evaporated. While still liquid it is poured into bladders, in which it concretes, and in this state it is brought to market.

This fat is inodorous, tasteless, and white; soft, and nearly semifluid. Exposed to a heat of 97° it melts, and concretes again when cooled. It is insoluble in water, alcohol, and ether: but is dissolved by the strong acids, being at the same time decomposed; and, like the fixed oils, it combines with the alkalies and forms soap. It

is oxidised if when melted a little nitric acid be stirred into it; and assumes a greater degree of firmness, with a yellow color. By destructive distillation it affords results very similar to those obtained from the analysis of fixed oil; and appears to be a compound of oxygen, hydrogen, and carbon, in unknown proportions. When lard is long exposed to a warm air it becomes yellow, emits a fœtid odor, and, owing to oxygen being attracted from the atmosphere, the sebacic acid is formed. This state of rancidity may in some degree be removed by washing it with very pure soft water; which during the operation becomes acid, and reddens litmus paper. Lard is emollient, and on account of its softness and unctuosity is preferable to fat as a friction, but seldom used for this purpose; and is chiefly employed in the formation of ointments. Its officinal preparation is the adeps præparata, or prepared lard. That of the London pharmacopœia is obtained by cutting the fat into small fragments, then melting it by a gentle heat, and pressing it through linen. The adeps suillus præparatus, or prepared hog's lard of the Dublin pharmacopœia, is had by cutting fresh lard into small pieces, then melting it by a moderate heat, and straining by pressing it through a linen cloth. Lard prepared by the dealers, and preserved with salt, is to be melted with twice its weight of boiling water, and well stirring the mixture: it is then allowed to cool, when the lard may be separated. The above-mentioned processes are intended for purifying suet and lard; but in order to obtain them very pure they should be washed in water till the water comes off colorless, before they be melted. During the melting the remaining water is evaporated; and that this is the case may be ascertained by throwing a little of the melted fat into the fire, when it will crackle if any water remain. The heat must not be raised above 97°, the melting point of fat; because otherwise the fat is decomposed, rendered acrid, and assumes a yellow color. This purification is seldom attempted by the apothecary, as both kinds of fat may be procured very well purified from the dealers. To keep lard clean, and preserve it from the action of the air, it is, as we have already said, run into bladders in its liquid state.—Thomson's Disp.

SUETONIUS Tranquillus (Caius), a famous Latin historian, was born at Rome, and became secretary to the emperor Adrian, about A. D. 118; but that post was taken from him three years after, for not showing the empress Sabina all the respect she deserved. During his disgrace he composed many works, which are lost. Those extant are his History of the Twelve Cæsars, and a part of his Treatise of the Illustrious Grammarians and Rhetoricians. Pliny the Younger was his intimate friend, and persuaded him to publish his books. His History of the Twelve Cæsars has been much commended by many of the literati. He represents, in a series of curious particulars, without digressions or reflections, the actions of the emperors, exposing their vices in all their deformity; yet mentions their good qualities; but the horrid dissoluteness and obscene actions he relates of Tiberius, Caligula, Nero, &c., have made some say that he wrote the lives of the emperors with the same licentiousness with which they lived. The edition of this history by Grævius at Utrecht, in 1672, with the excellent Commentaries of Torrentius and Casaubon, and the notes of some other learned critics, is much esteemed.

SUETRI, an ancient nation of Gaul, who inhabited near the Alps.

SUEVI. See Alemanni.

Suevi, the Catti or Chatti of Cæsar, an ancient nation of Germany, who lived on the Rhine; considerably distant from the proper Suevi or Alemanni. See Saxons.

Suevi, a common name of the people situated between the Elbe and the Vistula (Tacitus), distinguished otherwise by particular names; as in Ptolemy, Suevi Angeli, Suevi Senones.

SUEUR (Eustace le), an eminent French painter, born at Paris in 1617. He studied under Simon Vouet, but soon greatly excelled him. Although he was never out of France, he attained the highest degree of perfection. His works, which are chiefly at Paris, exhibit a grand style, formed upon antiquity, and after the best masters. His master-piece is St. Bruno, formerly in the convent of Carthusians, probably now in the National Museum. He died in 1655, aged only thirty-eight.

SUEVUS, in ancient geography, a river of Germany, thought to be the same with the Viadrus or Oder, running by three mouths into the Baltic, the middlemost of which is called Swine or Swene.

SUEZ, a city of Egypt, remarkable for its situation at the head of the Red Sea, on the borders of Arabia. The existing city appears to have been of modern origin. According to D'Anville it occupies the site of the ancient Arsinoe. Volney thinks that place was situated farther north, towards the bottom of the gulf. The celebrated Arabian city called Kolzum, which among that people gave its name to the Red Sea, was also farther to the north. Its ruins may still be traced. Suez, about the beginning of the sixteenth century, became a flourishing mart, being at once the emporium of the trade with India, and the rendezvous of the numberless pilgrims who went from every part of the Turkish empire to Mecca. When Niebuhr was there, Suez appeared to him as populous as Cairo. Since that time it has greatly declined, in consequence of the diminution both of the general trade of the Red Sea, as well as of the concourse to Mecca. It sustained, also, irreparable injury from the devastations of the French. Great part of the trade being carried on by the Beys, each of whom had a factor stationed here, the French, in revenge for the spirited resistance made by that race, demolished a great part of the town.

Suez is so situated that vessels cannot approach nearer than two miles and a half. From this point the water is divided into three channels, which unite before reaching the town. The surrounding country is a complete desert, composed of a bed of rock, slightly covered with sand. All provisions and necesssaries of life are brought

from Cairo. Its very bad water also is brought from the distance of about two leagues, at the opposite side of an arm of the gulf. The town contains about 500 stone houses, of which more than half were destroyed by the French. It has no walls; but the houses are built so close together that it can be entered from the land side only at one point, defended by three canon; eight are placed on the side towards the sea. Mr. Turner conceives Suez to be indisputably the most miserable place in the Levant, and that only the settled passion for money, which characterises the Levantines, could induce any man to make it his residence. Its trade lies under many disadvantages, particularly from the difficult navigation of this part of the Red Sea, where vessels can only pass through a narrow channel, amid rocks often sunk beneath the surface. Danger also arises from the north winds, which blow with great violence for nine months. Cosseir, which is less liable to these disadvantages, is now, notwithstanding the inconvenience of a longer and more difficult land journey, often preferred for the trade to Egypt. Suez, however, still carries on much of the communication of Syria, Arabia, and India, with Cairo. Coffee is the staple import.

SUF'FER, *v.a.* & *v.n.*, SUF'FERABLE, *adj.*, SUF'FERABLY, *adv.*, SUF'FERANCE, *n.s.*, SUF'FERER, SUF'FERING. Fr. *souffrir;* Lat. *suffero.* To endure; undergo; support; pass through; be affected by; allow; permit: to undergo pain, inconvenience, or penalty; be injured: sufferable is tolerable; such as may be endured: the adverb corresponding: sufferance, inconvenience; pain; tolerance; permission; moderation: a sufferer, one who endures suffering; one who permits or allows (unusual): suffering is pain or inconvenience suffered.

Rebuke thy neighbour, and not *suffer* sin upon him. *Leviticus.*

A man of great wrath shall *suffer* punishment. *Prov.* xix.

A woman *suffered* many things of physicians, and spent all she had. *Mark* v. 26.

He thought t' have slain her in his fierce despight;
But hasty heat tempering with *sufferance* wise,
He staid his hand. *Spenser.*

In process of time, somewhiles by *sufferance*, and somewhiles by special leave and favor, they erected to themselves oratories not in any sumptuous or stately manner. *Hooker.*

He wondered that your lordship
Would *suffer* him to spend his youth at home.
Shakspeare.

Oft have I seen a hot o'erweening cur
Run back and bite, because he was withheld:
Who being *suffered*, with the bear's fell paw
Hath clapt his tail betwixt his legs and cried. *Id.*

Some villains of my court
Are in consent and *sufferance* in this. *Id.*

He must not only die,
But thy unkindness shall the death draw out
To lingering *sufferance*. *Id. Measure for Measure.*

Thy rages be
Now no more *sufferable*. *Chapman.*

He hath given excellent *sufferance* and vigorousness to the *sufferers*, arming them with strange courage. *Taylor.*

It is *sufferable* in any to use what liberty they list in their own writing, but the contracting and extending the lines and sense of others would appear a thankless office. *Wotton.*

This evil on the Philistines has fallen,
The *sufferers* then will scarce molest us here:
From other hands we need not much to fear.
Milton.

To *suffer*, as to do,
Our strength is equal, nor the law unjust
That so ordains. *Id.*

Obedience imposed,
On penalty of death, and *suffering* death. *Id.*

Both gloried to have escaped the Stygian flood,
As gods, and by their own recovered strength;
Not by the *sufferance* of supernal power.
Id. Paradise Lost.

The air now must *suffer* change. *Milton.*

And, should I touch it nearly, bear it
With all the *sufferance* of a tender friend.
Otway's Orphan.

Nor was his *sufferance* of other kinds less exemplary than that he evidenced in the reception of calumny. *Fell.*

Publick business *suffers* by private infirmities, and kingdoms fall into weaknesses by the diseases or decays of those that manage them. *Temple.*

He thus
Was forced to *suffer* for himself and us!
Heir to his father's sorrows with his crown.
Dryden.

SUFFERANCE, in law. Tenant at sufferance is he who holdeth over his term at first lawfully granted.—Terms de Ley. A person is tenant at sufferance that continues after his estate is ended, and wrongfully holdeth against another, &c.—1 Inst. 57. An estate at sufferance is where one comes into possession of land by lawful title, but keeps it afterwards without any title at all. As if a man takes a lease for a year, and, after the year is expired, continues to hold the premises without any fresh leave from the owner of the estate. Or, if a man maketh a lease at will, and dies, the estate at will is thereby determined; but, if the tenant continueth possession, he is tenant at sufferance.—Co. Litt. 57. But a lease at will being now considered as a lease from year to year, which cannot be vacated without half a year's notice to quit, the tenant cannot be ejected at the death of the lessor without half a year's notice from his heir.—2 Term Rep. 159. And it is also necessary, in case of the death of the tenant, to give that notice to his personal representative.—3 Wils. 25. No man can be tenant at sufferance against the king, to whom no laches or neglect, in not entering and ousting the tenant, is ever imputed by law; and his tenant, so holding over, is considered as an absolute intruder.—1 Inst. 57. But, in the case of a subject, this estate may be destroyed whenever the true owner shall make an actual entry on the lands and oust the tenant; for, before entry, he cannot maintain an action of trespass against the tenant by sufferance as he might against a stranger; and the reason is, because the tenant being once in by a lawful title, the law (which presumes no wrong in any man) will suppose him to continue upon a title equally lawful, unless the owner of the land, by some public and avowed act, such as entry is, will de-

clare his continuance to be tortious, or, in common language, wrongful.—1 Inst. 57 : 2 Comm. c. 9, p. 150.

SUFFETES, magistrates of Carthage.

SUFFETIUS. See METIUS and ROME.

SUFFETULA, an ancient town of Africa, in the dominions of Carthage, probably so called from suffetes, the title of the magistrates of that city. It is now called Spaitla, in the kingdom of Tunis, and has many elegant remains of antiquity. There are three temples in a great measure entire; one of them of the Composite order, the other two Corinthian. The town lies in the most beautiful spot in Barbary, surrounded by great numbers of juniper trees, and watered by a pleasant stream, which sinks under the earth at that place, without appearing any more. See SPAITLA.

SUFFICE', *v. n.* & *v. a.* SUFFI'CIENCY, SUFFI'CIENT, *adj.* SUFFI'CIENTLY, *adv.* Fr. *suffire;* Lat. *sufficio.* To be enough; be sufficient, or efficient, to an end or purpose: as a verb active to afford; supply; satisfy: sufficiency is, competency; qualification for a purpose; enough: sufficient, equal to an end or purpose; qualified: the adverb corresponding.

Parched corn she did eat, and was *sufficed,* and left. *Ruth.*

Israel, let it *suffice* you of all your abominations. *Ezek.*

Sufficient unto the day is the evil thereof. *Matthew* vi. 34.

If religion did possess sincerely and *sufficiently* the hearts of all men, there would need be no other restraint from evil. *Hooker.*

If thou ask me why, *sufficeth,* my reasons are good. *Shakspeare.*

In saying he is a good man, understand me, that he is *sufficient.* *Id. Merchant of Venice.*

I am not so confident of my own *sufficiency,* as not willingly to admit the counsel of others. *King Charles.*

Seem I to thee *sufficiently* possessed
Of happiness? *Milton.*

To recount almighty works,
What words or tongue of seraph can *suffice,*
Or heart of man *suffice* to comprehend? *Id.*

Let it *suffice* thee that thou knowest us happy. *Id.*

Heaven yet retains
Number *sufficient* to possess her realms. *Id.*

His *sufficiency* is such that he bestows and possesses, his plenty being unexhausted. *Boyle.*

Man is not *sufficient* of himself to his own happiness. *Tillotson.*

Sufficiency is a compound of vanity and ignorance. *Temple.*

Their pensioner De Wit was a minister of the greatest authority and *sufficiency* ever known in their state. *Id.*

Thou king of horned floods, whose plenteous urn
Suffices fatness to the fruitful corn,
Shall share my morning song and evening vows. *Dryden.*

When the herd, *sufficed,* did late repair
To ferny heaths, and to the forest lare. *Id.*

The indolency we have, *sufficing* for our present happiness, we desire not to venture the change; being content; and that is enough. *Locke.*

She would ruin me in silks, were not the quantity that goes to a large pincushion *sufficient* to make her a gown and petticoat. *Addison.*

All to whom they are proposed, are by his grace *sufficiently* moved to attend and assent to them; *sufficiently,* but not irresistibly; for if all were irresistibly moved, all would embrace them; and if none were *sufficiently* moved, none would embrace them. *Rogers.*

Seven months are a *sufficient* time to correct vice in a Yahoo. *Swift.*

The most proper subjects of dispute are questions not of the very highest importance, nor of the meanest kind; but rather the intermediate questions between them; and there is a large *sufficiency* of them in the sciences. *Watts's Imp. of the Mind.*

An elegant *sufficiency,* content. *Thomson.*

SUFFIELD, a post town of Hartford county, Connecticut, on the west bank of the Connecticut; eleven miles south of Springfield, and seventeen north of Hartford. It is a pleasant and considerable town, and contains four houses of public worship, two for Congregationalists, and two for Baptists. Here is a mineral spring considerably resorted to.

SUFFI'SANCE, *n. s.* Fr. *suffisance.* Excess; plenty. Obsolete.

There him rests in riotous *suffisance*
Of all gladfulness and kingly joyance. *Spenser.*

SUF'FOCATE, *v. a.* SUFFOCA'TION, *n. s.* SUF'FOCATIVE, *adj.* Fr. *suffoquer;* Latin *suffoco.* To choke by exclusion or interception of air: the act of choking or state of being choked: having the power to choke.

This chaos, when degree is *suffocate,*
Follows the choaking. *Shakspeare. Troilus and Cressida.*

Diseases of stoppings and *suffocations* are dangerous. *Bacon.*

A swelling discontent is apt to *suffocate* and strangle without passage. *Collier of Friendship.*

Mushrooms are best corrected by vinegar; some of them, being poisonous, operate by *suffocation,* in which the best remedy is wine or vinegar and salt, and vomiting as soon as possible. *Arbuthnot on Diet.*

From rain, after great frosts in the winter, glandulous tumours and *suffocative* catarrhs proceed. *Id. on Air.*

White consists in an equal mixture of all the primitive colours, and black in a *suffocation* of all the rays of light. *Cheyne.*

All involved in smoke, the latent foe
From every cranny *suffocated* falls. *Thomson.*

SUFFOLK, a maritime county of England, bounded north by Norfolk, west by Cambridgeshire, south by Essex, and on the east by the German Ocean. The river Stour divides it from Essex, the Little Ouse and Waveny from Norfolk, and the Great Ouse and its branches from Cambridgeshire. Its figure resembles a crescent, with the concavity towards the north, and the two horns projecting along the coast towards Yarmouth, and westward along the Ouse; but an oblong of almost unindented form may be measured on its surface from east to west, forty-seven miles long, and thirty broad. Mr. Young estimates its area at 1269 square miles, or upwards of 800,000 acres. It contains from 150 to 160 inhabitants to each mile.

The two grand divisions are the liberty of Bury St. Edmund's, and what is termed the Body of the County, having each a separate grand jury. It is subdivided into twenty-one hun-

dreds and seventy-five parishes, which contain four boroughs, viz., Eye, Ipswich, Sudbury, and Bury St. Edmund's, and twenty-one other market towns, viz., Beccles, Bildeston, Brandon, Botesdale, Bungay, Clare, Debenham, Framlingham, Hadleigh, Haverhill, Ixworth, Lavenham, Lowestoff, Mendlesham, Mildenhall, Needham, Neyland, Saxmundham, Southwold, Stow Market, and Woodbridge. It sends thirteen members to parliament, viz., four for the county, one for Eye, and two for each of the other boroughs.

Suffolk is in general a level county, with few elevations; the highest part is in the west, where a great chalk ridge extends from Haverhill, by Bury, to Thetford, in Norfolk. This is sometimes called High Suffolk. The rivers, besides the Stour, Waveney, and Ouse, on the borders, are none of them of any magnitude, except perhaps the Orwell, which rises above Stow Market; and, under the name of Gipping, descends by Needham to Ipswich, where it becomes navigable, widens into an estuary, and then joins the Stour at Harwich. Other rivers are the Deben, Ald, and Blyth, along the coast, and the Lark on the west.

The *climate* is reckoned the driest in the kingdom: the frosts are severe, and north-east winds are in the spring sharp and prevalent. The soil of this county is very distinctly marked into 1st, a strong loam or a clay marl bottom pervading the centre and greatest part of the county, from Haverhill to Beccles on the one hand, and from near Ipswich to beyond Ixworth on the other. 2d, On the east, and between the former and the coast, extending northwards of the river Orwell, a district of sandy soil, and southwards a much smaller one of rich loam. 3d, To the west again occurs a considerable district of sand, which extends to the north-west corner of the county, where a fourth track of fen land is included between the Great and Little Ouse. The loam in the middle of the county is of a clayey nature, and highly productive, but varies in different places, more particularly along the banks of the rivers and streams, where it becomes a rich friable loam of superior quality. The sandy district along the coast varies from pure sand to loamy sand, and rests on a substratum of sand chalk, or a shell marl, termed here crag, which is found in great masses in various parts of the county. This is one of the best cultivated districts in England, and abounds with wealthy farmers. Besides its arable land, it contains heaths, which afford extensive sheep walks, and marshes covered with cattle. The sea shore is composed of cliffs, which are continually falling down by the action of the waves. The soil of the fens is composed, from one to six feet under the surface, of peat bog: part of the land is under water, but a good deal has been drained.

Suffolk is almost solely an agricultural county. The largest estate is supposed not to exceed £9000 a year; and of the smaller estates, which are very numerous, many are occupied by the proprietors. The size of farms is in general large: but the farm houses, much improved of late years, are still too often built of lath and plaster. The common crops are wheat, barley oats, rye, beans, pease, buck-wheat, cole-seed, turnips, clover, trefoil, white clover, and saintoin. Buck-wheat forms a very valuable crop on sandy soils, and is more common here, even on the poorest, than in most other parts of England. Cole-seed is one of the principal productions of the fens. The culture of turnips prevails greatly: various other crops are raised in particular spots. A district called the Sandlands, lying between Woodbridge, Saxmundham, and Orford, is famous for its carrots, which have been raised here in great quantities for upwards of two centuries, and formerly used to supply the London market. Hops are raised in small quantity at Stow Market and in the neighbourhood, and cabbages for cows on the heavier land. Hemp is raised in a district about ten miles in breadth, extending from Eye to Beccles. It is woven on the spot into cloth of various degrees of fineness Lucerne and chicory are also raised.

The management of arable land, and the courses of crops, vary considerably in the different districts. In strong soils the best rotation is, first fallow, second wheat, third beans, fourth barley, fifth clover, and sixth wheat. On the rich loam and sand, the most usual course is, first turnip, second barley, third clover, and fourth wheat. On the said districts, turnips are every where the preparative, both for corn and grass. In the fenny district cole-seed is usually sown after paring and burning; and, after two successive oat crops, the land is laid down in grass for six years. Several new agricultural implements have been introduced into this county. Irrigation is very little practised.

The dairy district lies near Framlingham, and extends about twenty miles by twelve; but the late high price of corn induced the ploughing up of a great quantity of pasture. The butter made is chiefly used in this and the adjoining county of Essex. Much cheese is also made; but is of an inferior quality. Suffolk cows have long been celebrated for their milk, which, in proportion to the quantity of food, and size of the animal, exceeds that of any other kind in the kingdom. They are all of the hornless or polled breed. The best milkers are in general red, brindled, or of a yellowish cream color. They yield from four to six gallons a day. The practice of feeding them on cabbages, once universal, is now on the decline. In some parts of the county black cattle are bought from north country drovers, to eat up the turnips. After being fattened, these are sent to the metropolis. The sheep, of which large flocks are kept in the county, were, till of late years, almost entirely of the Norfolk breed. The South Down, however, which were introduced by Mr. Young, are now very prevalent, and, from their superior qualities, have superseded the former.

Suffolk is no less noted for its *horses* than for its cows. These are found in the highest perfection in the maritime district, extending to Woodbridge, Debenham, Eye, and Lowestoff. Of hogs, the short white breed in the cow district has great merit Poultry is kept here in abundance, and great quantities of pigeons are reared in the open field. Suffolk contains also

many rabbit warrens. One near Brandon is reckoned to return about 40,000 rabbits in a year. Of late years, however, considerable tracks occupied by them have been converted into arable and pasture land. Mr. Young estimates the waste lands in this county at 100,000 acres, comprehending sheep walk, commons, warrens, &c.; most of which are capable of improvement. It contains few woods or plantations of consequence. The commerce and manufactures of Suffolk have been long on the decline, and are inconsiderable. Corn and malt are the principal exports, and the imports are for the supply of the county with the articles of ordinary consumption. Lowestoff is noted for its herring fishery. The spinning and carding of wool was formerly carried on to a great extent, but this has been of late in a great measure transferred to Yorkshire. At Sudbury, one of the first seats of the Flemings, there is a manufactory of serges, and a small silk manufactory. Some calimancoes are still made at Lavenham. At the time of the Roman invasion, Suffolk belonged to the Tiene, and afterwards formed a part of the province of Flavia Cæsariensis.

SUFFOLK, a county of New York, on the east part of Long Island, bounded north by Long Island Sound, east and south by the Atlantic, and west by King's county. It comprises about two-thirds of the island. Chief towns, Riverhead, Sag Harbour, Satauket, and Huntington.

SUF'FRAGAN, *n. s.* Fr. *suffragant;* Latin *suffraganeus.* A bishop considered as subject to his metropolitan.

The four archbishops of Mexico, Lima, S. Foy, and Dominico, have under them twenty-five *suffragan* bishops, all liberally endowed and provided for. *Heylyn.*

Becket, archbishop of Canterbury, insolently took upon him to declare five articles void, in his epistle to his *suffragans.* *Hale.*

Suffragan bishops shall have more than one riding apparitor. *Ayliffe's Parergon.*

SUFFRAGAN is likewise the appellation given to a bishop who is occasionally appointed to reside in a town or village, and assist the diocesan.

SUF'FRAGE, *n. s.* } French *suffrage;* Latin
SUF'FRAGATE, *v. n.* } *suffragium.* Vote; voice given in a controverted point: to vote or agree with.

Noble confederates, thus far is perfect,
Only your *suffrages* I will expect
At the assembly for the chusing of consuls.
Ben Jonson.

No tradition could universally prevail, unless there were some common congruity of somewhat inherent in nature, which suits and *suffragates* with it, and closeth with it. *Hale.*

Fabius might joy in Scipio, when he saw
A beardless consul made against the law;
And join his *suffrage* to the votes of Rome.
Dryden.

The fairest of our island dare not commit their cause to the *suffrage* of those who most partially adore them. *Addison.*

Lactantius and St. Austin confirm by their *suffrage* the observation made by the heathen writers. *Atterbury.*

To the law and to the testimony let the appeal be in the first place; and next to the united *suffrage* of the primitive churches, as the best and safest commentary upon the other. *Waterland.*

SUFFRAG'INOUS, *adj.* L.at. *suffrago.* Belonging to the knee joint of beasts.

In elephants, the bought of the forelegs is not directly backward, but laterally, and somewhat inward; but the hough, or *suffraginous* flexure behind, rather outward. *Browne.*

SUFFRUTEX, among botanists, denotes an undershrub, or the lowest kind of woody plants, as lavender.

SUFFU'MIGE, *n. s.* Latin *suffumigo.* A medical fume. Not used.

For external means, drying *suffumiges* or smoaks, are prescribed with good success; they are usually composed out of frankincense, myrrh, and pitch. *Harvey.*

If the matter be so gross as it yields not to remedies, it may be attempted by *suffumigation.* *Wiseman's Surgery.*

SUF'FUSE, *v. a.* } Lat. *suffusus.* To spread
SUFFU'SION, *n. s.* } over with something expansible, as with a vapour or a tincture: the noun substantive corresponding.

A drop serene hath quenched their orbs,
Or dim confusion veiled. *Milton.*

The disk of Phœbus, when he climbs on high,
Appears at first but as a bloodshot eye;
And, when his chariot downward draws to bed,
His ball is with the same *suffusion* red. *Dryden.*

Suspicions, and fantastical surmise,
And jealousy *suffused* with jaundice in her eyes. *Id.*

To those that have the jaundice, or like *suffusion* of eyes, objects appear of that color. *Ray.*

To that recess,
When purple light shall next *suffuse* the skies,
With me repair. *Pope.*

Instead of love-enlivened cheeks,
With flowing rapture bright, dark looks succeed,
Suffused and glaring with untender fire. *Thomson.*

SUG, *n. s.* Lat. *sugo,* to suck. A kind of lice.

Many have sticking on them *sugs,* or trout-lice, which is a kind of worm like a clove or pin, with a big head, and sticks close to him, and sucks his moisture. *Walton.*

SUG'AR, *n. s.* & *v. a.* } Fr. *sucre;* Lat. *sac-*
SUG'ARY, *adj.* } *charum.* The native salt of the sugar-cane. See below. Any thing proverbially sweet; a dry chemical crystallisation: to impregnate with sugar; sweeten: sugary is abounding with sugar.

All the blood of Zelmane's body stirred in her, as wine will do when *sugar* is hastily put into it. *Sidney.*

With the *suggary* sweet thereof allure
Chaste ladies' ears to phantasies impure. *Spenser.*

Your fair discourse has been as *sugar,*
Making the hard way sweet and delectable. *Shakspeare.*

Thou would'st have plunged thyself
In general riot, and never learned
The icy precepts of respect, but followed
The *sugared* game before thee. *Id. Timon*

His glossing sire his errand daily said,
And *sugared* speeches whispered in mine ear. *Fairfax.*

Lumps of *sugar* loose themselves, and twine
Their subtle essence with the soul of wine. *Crashaw.*

Who casts out threats, no man deceives,
But flattery still in *sugared* words betrays,
And poison in high-tasted meats conveys. *Denham.*

Sugar of lead, though made of that insipid metal, and sour salt of vinegar, has in it a sweetness surpassing that of common *sugar*. *Boyle.*

If the child must have *sugar*-plumbs when he has a mind, rather than be out of humour; why, when he is grown up, must he not be satisfied too with wine? *Locke.*

Saccharum candidum shoots into angular figures, by placing a great many sticks a-cross a vessel of liquid *sugar*. *Grew.*

SUGAR. From the few remains of the Grecian and Roman authors which have survived the ravages of time, we can find no proofs that the juice of the sugar-cane was known at a very early period. There can be no doubt, however, that in those countries where it was indigenous its value was not long concealed. It is not improbable that it was known to the ancient Jews; for there is some reason to suppose, that the Hebrew word קנה, which occurs frequently in the Old Testament, and is by our translators rendered sometimes calamus and sometimes sweet-cane, does in fact mean the sugar-cane. The sugar-cane was first made known to the western parts of the world by the conquests of Alexander the Great. Strabo relates that Nearchus his admiral found it in the East Indies A. A. C. 325. It is evidently alluded to in a fragment of Theophrastus, preserved in Photius. Varro, who lived A. C. 68, describes it in a fragment quoted by Isidorus, as a fluid pressed from reeds of a large size, which was sweeter than honey. Dioscorides, about A. A. C. 35, says, 'that there is a kind of honey called saccharon, which is found in India and Arabia Felix. It has the appearance of salt, and is brittle when chewed. If dissolved in water, it is beneficial to the bowels and stomach, is useful in diseases of the bladder and kidneys, and, when sprinkled on the eye, removes those substances that obscure the sight.' This is the first account we have of its medical qualities. Galen often prescribed it as a medicine. Lucan relates that an oriental nation in alliance with Pompey used the juice of the cane as a common drink. Pliny says it was produced in Arabia and India, but that the best came from the latter country. It is also mentioned by Arrian, in his Periplus of the Red Sea, by the name of Σαχαρ (sachar) as an article of commerce from India to the Red Sea. Ælian, Tertullian, and Alexander Aphrodisæus, mention it as a species of honey procured from canes.

The sugar-cane, or saccharum officinarum of botanists, is a jointed reed, commonly measuring (the flag part not included) from three and a half to seven feet in height, but sometimes rising to twelve feet. When ripe it is of a fine straw color, inclining to yellow, producing leaves or blades, the edges of which are finely and sharply serrated, and terminating in an arrow decorated with a panicle. The joints in one stalk are from forty to sixty in number, and the stalks rising from one root are sometimes very numerous. The young shoot ascends from the earth like the point of an arrow; the shaft of which soon breaks, and the first two leaves, which had been enclosed within a quadruple sheath of seminal leaves, rise to a considerable height. 'A field of canes, when standing, in November, when it is in arrow or full blossom,' says Mr. Beckford in his account of Jamaica, 'is one of the most beautiful productions that the pen or pencil can possibly describe. It in common rises from three to eight feet or more in height; a difference of growth that very strongly marks the difference of soil or the varieties of culture. It is when ripe of a bright and golden yellow; and, where obvious to the sun, is in many parts very beautifully streaked with red; the top is of a darkish green; but the more dry it becomes, from either an excess of ripeness or a continuance of drought, of a russet yellow, with long and narrow leaves depending; from the centre of which shoots up an arrow like a silver wand from two to six feet in height; and from the summits of which grows out a plume of white feathers, which are delicately fringed with a lilac dye; and indeed is, in its appearance, not much unlike the tuft that adorns this particular and elegant tree.'

That the sugar-cane is an indigenous plant of the East Indies we have the strongest reason to believe; for Thunberg found it in Japan, and has mentioned it as a native of that country in his Flora Japonica, published in 1784. Osbeck also found it in China in 1751. Marco Paolo, a noble Venetian, who travelled into the east about 1250, found sugar in abundance in Bengal. Vasco de Gama, who doubled the Cape of Good Hope in 1497, relates that a considerable trade in sugar was then carried on in the kingdom of Calicut. Dioscorides and Pliny, say that it is a native of Arabia; but Niebuhr, in his Travels, has omitted it when enumerating the most valuable plants of that country. Mr. Bruce found it in Upper Egypt. John Lioni says that a considerable trade was carried on in sugar in Nubia, in 1500; it abounded also at Thebes, on the Nile, and in the northern parts of Africa, about the same period. There is reason to believe that the sugar-cane was introduced into Europe during the crusades. Peter Martyr, in the third book of his first decade, composed during Columbus's second voyage, between 1493 and 1495, says that the sugar-cane was then known in Hispaniola. There are authors who maintain that it is a native both of the islands and of the continent of America; and that it is not for the plant itself, but for the secret of making sugar from it, that the West Indies are indebted to the Spaniards and Portuguese; and these to the nations of the east.

As the cane is a rank succulent plant, it requires a strong deep soil to bring it to perfection The soil most favorable to the cultivation of it is the dark gray loam of St. Christopher's, which is so light and porous as to be penetrable by the slightest application of the hole. The under stratum is gravel from eight to twelve inches deep. Canes planted in particular spots in this island have yielded 8000 lbs. of Muscovado sugar from a single acre. The average produce of the island for a series of years has been 16,000 hogsheads of 16 cwt., which is one-half of the whole cane land, or 8500 acres. When

annually cut, it gives nearly two hogsheads of 16 cwt. per acre, for the whole of the land in ripe canes. Next to the ashy loam of St. Christopher's is the soil which in Jamaica is called brick-mould; not as resembling a brick in color, but as containing such a due mixture of clay and sand as is supposed to render it well adapted for the use of the kiln. It is a deep, warm, and mellow, hazel earth, easily worked; and, though its surface soon grows dry after rain, the under stratum retains a considerable degree of moisture in the driest weather; with this advantage, too, that even in the wettest season it seldom requires trenching. Plane-canes, or canes of the first growth, have in very fine seasons yielded two tons and a half of sugar per acre. After this may be reckoned the black mould of several varieties. The best is the deep black earth of Barbadoes, Antigua, and some other of the windward islands; but there is a species of this mould in Jamaica that is but little, if any thing, inferior to it, which abounds with limestone and flint on a substratum of soapy marle. Black mould on clay is more common; but as the mould is generally shallow, and the clay stiff and retentive of water, this last sort of land requires great labor, both in ploughing and trenching, to render it profitable. When manured, and properly pulverised, it becomes very productive. There is a peculiar sort of land on the north side of Jamaica, chiefly in the parish of Trelawney, remarkable, not only on account of its scarcity, but its value; few soils producing finer sugars, or such as answer so well in the pan; an expression signifying a greater return of refined sugar than common. This land is of a red color; the shades however, vary considerably from a deep chocolate to a rich scarlet; in some places it approaches to a bright yellow, but it is every where remarkable for a glossy surface, and, if wetted, stains the fingers like paint. It is of great importance that the plants for seed be put into the ground at the commencement of this season. As the cane requires a great deal of moisture to bring it to maturity, the properest season for planting it is in September and October when the autumnal rains commence, that it may be sufficiently luxuriant to shade the ground before the dry weather sets in. Thus the root is kept moist, and the crop is ripe for the mill in the beginning of the next year. Canes planted in November, or later, lose the advantage of the autumnal rains; and dry weather in the beginning of the year retards their vegetation until the May rains set in, when they sprout both at the roots and the joints; so that by the time they are cut, the field is loaded with unripe suckers instead of sugar-canes. A January plant, however, commonly turns out well; but canes planted very late in the spring, though they have the benefit of the May rains, seldom answer expectation; for they generally come in unseasonably, and throw the succeeding crops out of regular rotation. They are therefore often cut before they are ripe; or, if the autumnal seasons set in early, are cut in wet weather, which has probably occasioned them to spring afresh: in either case the effect is the same. The juice is unconcocted, and, all the sap being in motion, the root is deprived of its natural nourishment, to the great injury of the ratoon. The chief objection to a fall plant is this, that the canes become rank and top heavy, at a period when violent rains and high winds are expected, and are therefore frequently lodged before they are fit to be cut. The sugar-cane is propagated by the top shoots, which are cut from the tops of the old canes. The usual method of planting in the West Indies is this:—The quantity of land intended to be planted, being cleared of weeds and other incumbrances, is first divided into several plats of certain dimensions, commonly from fifteen to twenty acres each; the spaces between each plat or division are left wide enough for roads, for the conveniency of carting, and are called intervals. Each plat is then subdivided, by a line and wooden pegs, into small squares of about three and a half or four feet. The negroes are then placed in a row in the first line, one to a square, and directed to dig out with their hoes the several squares, to the depth of five or six inches. The mould which is dug up being formed into a bank, at the lower side, the excavation or cane-hole seldom exceeds fifteen inches in width at the bottom, and two feet and a half at the top. The negroes then fall back to the next line, and proceed as before. Thus the several squares between each line are formed into a trench of much the same dimensions with that which is made by the plough. An able negro will dig from 100 to 120 of these holes for his day's work of ten hours; but, if the land has been previously ploughed and lain fallow, the same negro will nearly double the number in the same time. The cane-holes or trench being now completed, whether by the plough or by the hoe, and the cuttings selected for planting, which are commonly the tops of the canes that have been ground for sugar (each cutting containing five or six gems), two of them are sufficient for a cane-hole of the dimensions described. These, being placed longitudinally in the bottom of the hole, are covered with mould about two inches deep; the rest of the bank being intended for future use. In twelve or fourteen days the young sprouts begin to appear; and, as soon as they rise a few inches above the ground, they are carefully cleared of weeds, and furnished with an addition of mould from the banks. This is usually performed by the hand. At the end of four or five months the banks are wholly levelled, and the spaces between the rows carefully hoe-ploughed. Frequent cleanings, while the canes are young, are indeed essentially necessary. A careful manager will remove all the lateral shoots or suckers that spring up after the canes begin to joint, as they seldom come to maturity, and draw nourishment from the original plants. In the cultivation of other lands, in Jamaica especially (says Mr. Edwards, the elegant historian of the West Indies), the plough has been introduced of late years, and in some few cases to great advantage: but it is not every soil or situation that will admit the use of the plough; some lands being much too stony and others too steep. The only advantageous system of ploughing in the West Indies is to confine it to the

simple operation of holing, which may be performed with much greater facility by the plough than by the hoe; and the relief which, in the case of stiff and dry soils, is thus given to the negroes, exceeds all estimation, in the mind of a humane owner. At a plantation of my own, the greatest part of the land which is annually planted is neatly and sufficiently laid into cane-holes, by the labor of one able man, three boys, and eight oxen, with the common single-wheeled plough. The plough-share indeed is somewhat wider than usual: but this is the only difference, and the method of ploughing is the simplest possible. By returning the plough back along the furrow, the turf is alternately thrown to the right and to the left, forming a trench seven inches deep, about two feet and a half wide at the top, and one foot wide at the bottom. A space of eighteen or twenty inches is left between each trench, on which the mould being thrown, by the share, the banks are properly formed, and the holing is complete. Thus the land is not exhausted by being too much exposed to the sun; and a field of twenty acres is thus holed with one plough, and with great ease, in thirteen days. The plants are afterwards placed in the trench as in the common method where manual labor is alone employed. In most parts of the West Indies it is usual to hole and plant a certain proportion of the cane land, commonly one-third, in annual rotation. The sprouts that spring from the roots of the canes that have been previously cut for sugar are called ratoons; the first yearly returns from their roots are called first ratoons; the second year's growth second ratoons. Mr. Edwards informs us that the manure generally used is a compost, formed, 1st, Of the vegetable ashes drawn from the fires of the boiling and still houses. 2dly, Feculencies discharged from the still-house, mixed up with rubbish of buildings, white lime, &c. 3dly, Refuse, or field-trash, i. e. the decayed leaves and stems of the canes; so called in contradistinction to cane-trash, reserved for fuel. 4thly, Dung, obtained from the horse and mule stables, and from moveable pens, or small enclosures made by posts and rails, occasionally shifted upon the lands intended to be planted, and into which the cattle are turned at night. 5thly, Good mould, collected from gullies and other waste places, and thrown into the cattle-pens.

The sugar-cane is liable to be destroyed by monkeys, rats, and insects. The upland plantations suffer greatly from monkeys; these creatures, which now abound in the mountainous parts of St. Christopher's, were first brought thither by the French, when they possessed half that island; they come down from the rocks in silent parties by night; and, having posted sentinels, to give the alarm if any thing approaches, they destroy incredible quantities of the cane, by their gambols as well as their greediness. It is in vain to set traps for these creatures, however baited; and the only way to protect the plantation, and destroy them, is to set a numerous watch, well armed with fowling-pieces, and furnished with dogs. The negroes will perform this service cheerfully, for they are very fond of monkeys as food. Labat says they are very delicious, but the white inhabitants of St. Kitt's never eat them. The lowland plantations suffer as much by rats as those on the mountains do from monkeys; they also came with the shipping from Europe, and breed in the ground under loose rocks and bushes; the field negroes eat them greedily, and they are said to be publicly sold in the markets at Jamaica. To free the plantations from these vermin, the breed of wild cats should be encouraged, and snakes suffered to multiply unmolested; they may also be poisoned with arsenic, and the rasped root of the cassava, made into pellets and plentifully scattered over the grounds. This practice, however is dangerous; for, as the rats when thus poisoned become exceedingly thirsty, they run in droves to the neighbouring streams, which they poison as they drink, and the cattle grazing on the banks of these polluted waters have frequently perished by drinking after them. It is safer therefore to make the pellets of flour, kneaded with the juice of the night-shade, the scent of which will drive them away though they will not eat it. There is an East Indian animal called mungoes, which bears a natural antipathy to rats; if this animal were introduced into our sugar islands it would probably extirpate the whole race of these noxious vermin. The formica omnivora of Linnæus, the carnivorous ant, which is called in Jamaica the raffle's ant, would soon clear the sugar plantations of rats. The sugar-cane is also subject to a disease which no foresight can obviate, and for which human wisdom has in vain attempted to find a remedy. This disease is called the blast, and is occasioned by the aphis of Linnæus. When this happens, the fine broad green blades become sickly, dry, and withered; soon after they appear stained in spots; and, if these spots are carefully examined, they will be found to contain innumerable eggs of an insect like a bug, which are soon quickened, and cover the plants with the vermin; the juice of the canes thus affected becomes sour, and no future shoot issues from the joints. Ants also concur with the bugs to spoil the plantation, and against these evils it is hard to find a remedy.

The crops of sugar-canes do not ripen precisely at the same period in all the colonies. In the Danish, Spanish, and Dutch settlements they begin in January and continue till October. This method doth not imply any fixed season for the maturity of the sugar-cane. The plant, however, like others, must have its progress; and it has been justly observed to be in flower in the months of November and December. It must necessarily follow, from the custom these nations have adopted of continuing to gather their crops for ten months without intermission, that they cut some canes which are not ripe enough, and others that are too ripe, and then the fruit has not the requisite qualities. The time of gathering them should be at a fixed season, and probably the months of March and April are the fittest for it; because all the sweet fruits are ripe at that time, while the sour ones do not arrive to a state of maturity till the

months of July and August. The English cut their canes in March and April; but they are not induced to do this on account of their ripeness. The drought that prevails in their islands renders the rains which fall in September necessary to their planting; and, as the canes are eighteen months in growing, this period always brings them to the precise point of maturity. 'The time of crop in the sugar islands,' says Mr. Edwards, is the season of gladness and festivity to man and beast. So palatable, salutary, and nourishing, is the juice of the cane, that every individual of the animal creation, drinking freely of it, derives health and vigor from its use. The meagre and sickly among the negroes exhibit a surprising alteration in a few weeks after the mill is set in action. The laboring horses, oxen, and mules, though almost constantly at work during this season, yet, being indulged with plenty of the green tops of this noble plant, and some of the scummings from the boiling house, improve more than at any other period of the year. Even the pigs and poultry fatten on the refuse. In short, on a well regulated plantation, under a humane and benevolent director, there is such an appearance during crop-time of plenty and busy cheerfulness, as to soften in a great measure the hardships of slavery.'

The plants being cut, the branches at the top are given to the cattle for food; the top shoot, which is full of eyes, is preserved for planting. The canes are cut into pieces about a yard long, tied up in bundles, and carried in carts to the mill, where they are bruised and the juice is extracted from them. The mill consists principally of three upright iron-plated rollers or cylinders, from thirty to forty inches in length, and from twenty to twenty-five inches in diameter; and the middle one, to which the moving power is applied, turns the other two by means of cogs. Between these rollers the canes (being previously cut short and tied into bundles) are twice compressed; for, having passed through the first and second rollers, they are turned round the middle one by a circular piece of frame-work or screen, called in Jamaica the dumb returner, and forced back through the second and third; an operation which squeezes them completely dry, and sometimes even reduces them to powder. The cane-juice is received in a leaden bed, and thence conveyed into a vessel called the receiver. The refuse or macerated rind of the cane (which is called cane-trash, in contradistinction to field-trash), serves for fuel to boil the liquor. The juice as it flows from the mill, taken at a medium, contains eight parts of pure water, one part of sugar, and one part consisting of coarse oil and mucilaginous gum, with a portion of essential oil. As this juice has a strong disposition to fermentation, it must be boiled as soon as possible. There are some water mills that will grind with great ease canes sufficient for thirty hogsheads of sugar in a week. It is necessary to have boiling vessels, or clarifiers, that will correspond in dimensions to the quantity of juice flowing from the receiver. These clarifiers are commonly three in number, and are sometimes capable of containing 1000 gallons each; but it is more usual to see them of 300 or 400 gallons each. Besides the clarifiers which are used for the first boiling there are generally four coppers or boilers. The clarifiers are placed in the middle or at one end of the boiling house. If at one end, the boiler called the teache is placed at the other, and several boilers (generally three) are ranged between them. The teache is ordinarily from seventy to 100 gallons, and the boilers between the clarifiers and teache diminish in size from the first to the last. Where the clarifiers are in the middle, there is usually a set of three boilers on each side, which constitute in effect a double boiling house. On very large estates this arrangement is found useful and necessary. The objection to so great a number is the expense of fuel, to obviate which, in some degree, the three boilers on each side of the clarifiers are commonly hung to one fire. The juice runs from the receiver along a wooden gutter lined with lead into the boiling house, where it is received into one of the clarifiers. When the clarifier is filled, a fire is lighted, and a quantity of Bristol quicklime in powder, which is called temper, is poured into the vessel. The use of the lime is to unite with the superabundant acid, which, for the success of the process, it is necessary to get rid of. The quantity sufficient to separate the acid must vary according to the strength of the quicklime and the quality of the liquor. Some planters allow a pint of lime to every 100 gallons of liquor; but Mr. Edwards thinks that little more than half the quantity is a better medium proportion; and even then that it ought to be dissolved in boiling water, that as little of it as possible may be precipitated. The heat is suffered gradually to increase till it approaches within a few degrees of the heat of boiling water, that the impurities may be thoroughly separated. But, if the liquor were suffered to boil with violence, the impurities would again incorporate with it. It is known to be sufficiently heated when the scum begins to rise in blisters, which break into white froth, and appear generally in about forty minutes. The fire is then suddenly extinguished by means of a damper, which excludes the external air, and the liquor is allowed to remain about an hour undisturbed, during which period the impurities are collected in scum on the surface. The juice is then drained off, either by a syphon or a cock; the scum, being of a tenacious gummy nature, does not flow out with the liquor, but remains behind in the clarifier. The liquid juice is conveyed from the clarifier by a gutter into the evaporating boiler, commonly termed the grand copper; and, if it has been obtained from good canes, it generally appears transparent. In the evaporating boiler, which should be large enough to receive the contents of the clarifier, the liquor is allowed to boil; and as the scum arises it is taken off. The scumming and evaporation are continued till the liquor becomes finer and thicker, and so far diminished in bulk that it may be easily contained in the second copper. When put into the second copper, it

is nearly of the color of Madeira wine; the boiling and scumming are continued; and, if the impurities be considerable, a quantity of lime-water is added. This process is carried on till the liquor be sufficiently diminished in quantity to be contained in the third copper. After being purified a third time, it is put into the fourth copper, which is called the teache, where it is boiled and evaporated till it is judged sufficiently pure to be removed from the fire. In judging of the purity of the liquor, many of the negroes (says Mr. Edwards) guess solely by the eye (which, by long habit, they do with great accuracy), judging by the appearance of the grain on the back of the ladle: but the practice most in use is to judge by what is called the touch; i. e. taking up with the thumb a small portion of the hot liquor from the ladle; and, as the heat diminishes, drawing with the fore finger the liquid into a thread. This thread will suddenly break, and shrink from the thumb to the suspended finger, in different lengths, according as the liquor is more or less boiled. The proper boiling height for strong muscovado sugar is generally determined by a thread of a quarter of an inch long. It is evident that certainty in this experiment can be attained only by long habit, and that no verbal precepts will furnish any degree of skill in a matter depending wholly on constant practice. The juice being thus purified, by passing through the clarifier and four coppers, it is poured into coolers, which are usually six in number. The removal from the teache to the cooler is called striking. The cooler is a shallow wooden vessel, seven feet long, from five to six wide, about eleven inches deep, and capable of containing a hogshead of sugar. As the liquor cools, the sugar *grains*, that is, collects into an irregular mass of imperfect crystals, separating itself from the melasses. It is then removed from the cooler and conveyed to the curing-house, where the melasses drain from it. For receiving them there is a large cistern, the sloping sides of which are lined with boards. Directly above the cistern a frame of joist-work without boarding is placed, on which empty hogsheads without heads are ranged. The bottoms of these hogsheads are pierced with eight or ten holes, in each of which the stalk of a plantain leaf is fixed, so as to project six or eight inches below the joists, and rise a little above the top of the hogshead. The hogsheads being filled with the contents of the cooler, consisting of sugar and melasses, the melasses being liquid, drain through the spongy stalk, and drop into the cistern. After the melasses are drained off, the sugar becomes pretty dry and fair, and is then called muscovado or raw sugar. Such is the process for extracting sugar, which is generally adopted in the British West India Islands, according to the latest improvements.

The above is the method of cultivating and manufacturing sugar in the West Indies, where slaves alone are employed: but we feel a peculiar pleasure in having it in our power to add a short description of the method used in the East Indies, because there sugar is manufactured by free men, on a plan much more economical than what is followed in the West Indies. It is an extract from the report of the committee of privy council for trade on the subject of the African slave-trade, drawn up by Mr. Botham. We give it in the author's own words. 'Having been for two years in the English and French West Indian islands, and since conducted sugar estates in the East Indies, before the abolition of the slave trade was agitated in parliament, it may be desirable to know that sugar of a superior quality and inferior price to that in our islands is produced in the East Indies; that the culture of the cane, the manufacture of the sugar and arrack, is, with these material advantages, carried on by free people. China, Bengal, the coast of Malabar, all produce quantities of sugar and spirits; but, as the most considerable growth of the cane is carried on near Batavia, I shall explain the improved manner in which sugar estates are there conducted. The proprietor of the estate is generally a wealthy Dutchman, who has erected on it substantial mills, boiling and curing houses. He rents this estate to a Chinese, who resides on it as a superintendant: and this renter (supposing the estate to consist of 300 or more acres) relets it to freemen in parcels of fifty or sixty, on these conditions: 'that they shall plant it in canes, and receive so much per pecul of 133½ lbs. for every pecul of sugar that the canes shall produce.' When crop time comes on the superintendant collects a sufficient number of persons, from the adjacent towns or villages, and takes off his crop as follows. To any set of tradesmen who bring their carts and buffaloes he agrees to give such a price per pecul to cut all his crop of canes, carry them to the mill, and grind them. A second to boil them per pecul. A third to clay them and basket them for market per pecul. So that by this method of conducting a sugar estate, the renter knows to a certainty what the produce of it will cost him per pecul. He has not any permanent or unnecessary expense; for, when the crop is taken off, the taskmen return to their several pursuits in the towns and villages they came from; and there only remains the cane planters who are preparing the next year's crop. This, like all other complex arts, by being divided into several branches, renders the labor cheaper, and the work more perfectly done. Only clayed sugars are made at Batavia; these are in quality equal to the best sort from the West Indies, and are sold so low from the sugar estates as eighteen shillings sterling per pecul of 133½ lbs. This is not the selling price to the trader at Batavia, as the government there is arbitrary, and sugar subject to duties imposed at will. The shabander exacts a dollar per pecul on all sugar exported. The price of common labor is from ninepence to tenpence per day. By the method of carrying on the sugar estates, the taskmen gain considerably more than this not only from working extraordinary hours, but from being considered artists in their several branches. They do not make spirits on the sugar estates. The melasses is sent for sale to Batavia, where one distillery may purchase the produce of 100 estates. Here is a vast saving and reduction of the price of spirits, not, as in the West Indies, a distillery for each estate; many centre in one, and arrack is sold in Batavia from twenty-one to

twenty-five rix dollars per leaguer of 160 gallons; say eightpence per gallon.'

The operation of the French sugar refiners consists in dissolving the cassonade, or clayed sugar, in lime-water. Bullocks' blood is added to promote the clarifying; and, when the liquor begins to boil, the heat is diminished, and the scum carefully taken off. It is in the next place concentrated by a brisk heat; and, as it boils up, a small quantity of butter is thrown in to moderate its agitation. When the boiling is sufficiently effected, the fire is put out; the liquor is poured into moulds and agitated, to mix the syrup together with the grain sugar already formed. When the whole is cold, the moulds are opened, and the loaves are covered with moistened clay, which is renewed from time to time till the sugar is well cleansed from its syrup. The loaves, being then taken out of the moulds, are carried to a stove, where they are gradually heated to 145° Fahrenheit. They remain in this stove eight days, after which they are wrapped in blue paper for sale.

The following is the method by which the French make their sugar purer and whiter than ours. A quantity of sugar from the cooler is put into conical pans or earthen pots, called by the French formes, having a small perforation at the apex, which is kept closed. Each cone, reversed on its apex, is supported in another earthen vessel. The syrup is stirred together, and then left to crystallise. At the end of fifteen or sixteen hours, the hole in the point of each cone is opened, that the impure syrup may run out. The base of these sugar loaves is then taken out, and white pulverised sugar substituted in its stead; which being well pressed down, the whole is covered with clay moistened with water. This water filters through the mass, carrying the syrup with it which was mixed with the sugar, but which by this management flows into a pot substituted in the place of the first. This second fluid is called fine syrup. Care is taken to moisten and keep the clay to a proper degree of softness as it becomes dry. The sugar loaves are afterwards taken out, and dried in a stove for eight or ten days; after which they are pulverised, packed, and exported to Europe, where they are still farther purified. The reason assigned why this process is not universally adopted in the British sugar islands is this, that the water which dilutes and carries away the melasses dissolves and carries with it so much of the sugar that the difference in quality does not pay for the difference in quantity. The French planters think otherwise.

The art of refining sugar was first made known to the Europeans by a Venetian, who is said to have received 100,000 crowns for the invention. This discovery was made before the new world was explored; but whether it was an invention of the person who first communicated it, or was conveyed from China, where it had been known before, cannot be ascertained. We find no mention made of the refining of sugar in Britain till 1659, though it probably was practised several years before. The sugar which undergoes the operation of refining in Europe is either raw sugar, sometimes called muscovado, or cassonado, which is raw sugar in a purer state. The raw sugar generally contains a certain quantity of melasses as well as earthy and feculant substances. The cassonado, by the operation of earthing, is freed from its melasses. As the intention of refining these sugars is to give them a higher degree of whiteness and solidity, it is necessary for them to undergo other processes. The first of these is called clarification. It consists in dissolving the sugar in a certain proportion of lime water, adding a proper quantity of bullock's blood, and exposing it to heat in order to remove the impurities which still remain. The heat is increased very gradually, till it approach that of boiling water. By the assistance of the heat, the animal matter which was thrown in coagulates, at the same time that it attracts all the solid feculent and earthly matter, and raises it to the surface in the appearance of a thick foam of a brownish color. As the feculencies are never entirely removed by a first process, a second is necessary. The solution is therefore cooled to a certain degree, by adding some water; then a fresh quantity of blood, but less considerable than at first, is poured in. The fire is renewed, and care is taken to increase the heat gently as before. The animal substance seizes on the impurities which remain, collects them on the surface, and they are then skimmed off. The same operation is repeated a third and even a fourth time, but no addition is made to the liquor except water. If the different processes have been properly conducted, the solution will be freed from every impurity, and appear transparent. It is then conveyed by a gutter into an oblong basket about sixteen inches deep, lined with a woollen cloth; and, after filtering through this cloth, it is received in a cistern or copper, which is placed below. The solution being thus clarified, it undergoes a second general operation called evaporation. Fire is applied to the copper into which the solution was received, and the liquid is boiled till it has acquired the proper degree of consistency. A judgment is formed of this, by taking up a small portion of the liquid and drawing it into a thread. When, after this trial, it is found sufficiently viscous, the fire is extinguished, and the liquid is poured into coolers. It is then stirred violently by an instrument called an oar, resembling the oar of a boat. This is done to diminish the viscosity, and promote what is called the granulation, that is, the forming of it into grains or imperfect crystals. When the liquid is properly mixed and cooled, it is then poured into moulds of the form of a sugar loaf. The moulds are ranged in rows. The small ends, which are lowest, are placed in pots; and they have each of them apertures stopped up with linen for filtering the syrup, which runs from the moulds into the pots. The liquor is then taken out slowly in ladlefuls from the coolers, and poured into the moulds. When the moulds are filled, and the contents still in a fluid state, it is necessary to stir them, that no part may adhere to the moulds, and that the small crystals which are just formed may be equally diffused through the whole mass. When the sugar is completely crystallised, the linen is taken away from the apertures in the moulds, and the syrup, or that part which did not crystallise, descends into the pots in which the moulds are placed. After this

purgation the moulds are removed and fixed in other pots, and a stratum of fine white clay diluted with water is laid on the upper part of the loaf. The water descending through the sugar by its own weight, mixes with the syrup which still remains in the body of the loaf, and washes it away. When the clay dries, it is taken off, and another covering of moist clay put in its place; and, if it be not then sufficiently washed, a third covering of clay is applied. After the loaves have stood some days in the moulds, and have acquired a considerable degree of firmness and solidity, they are taken out and carried to a stove, where they are gradually heated to the 50° of Reaumur (64° of Fahrenheit), in order to dissipate any moisture which may be still confined in them. After remaining in the stove eight days, they are taken out; and after cutting off all discoloring specks, and the head if still wet, they are wrapped in blue paper, and are ready for sale. The several syrups collected during the different parts of the process, treated in the same manner which we have just described, afford sugars of inferior quality; and the last portion, which no longer affords any sugar, is sold by the name of melasses. The beauty of refined sugar, when formed into loaves, consists in whiteness, joined to a smallness of grain; in being dry, hard, and somewhat transparent. The process which we have described above, refers to sugar once refined; but some more labor is necessary to produce double refined sugar. The principal difference in the operation is this, the latter is clarified by white of eggs instead of blood and fresh water in place of lime-water.

As the sugar-cane is the principal production of the West Indies, and the great source of their riches; as it is so important in a commercial view, from the employment which it gives to seamen, and the wealth which it opens for merchants; and besides is now become a necessary of life—it may justly be esteemed one of the most valuable plants in the world. The quantity consumed in Europe is estimated at £9,000,000 sterling, and the demand would probably be greater if it could be sold at a reduced price. In the Portuguese island of St. Thomas, in 1624, there were seventy-four sugar ingenios, each having upwards of 200 slaves.

An idea of the importance of this import at the present time may be found from the following parliamentary papers:—

I. Account of the Quantity of Sugar Imported into Great Britain from the several British Colonies and Plantations, from the British Possessions in the East Indies, and from Foreign Countries, from 5th January 1825 to 5th January 1826; distinguishing the several Sorts of Sugar, and the Colonies and Countries from which the same was Imported.

Countries.	Sugar Unrefined.			
	British Plantation.	Foreign Plantation, or uncertified.	East India.	Total Quantity Imported.
	Cwt. qr. lb.	Cwt. qr. lb.	Cwt. qr. lb.	Cwt. qr. lb.
British Colonies and Plantations				
Antigua	142,901 2 4			142,901 2 4
Barbadoes	278,346 3 25	2 2 11		278,349 2 8
Dominica	38,036 0 3			38,036 0 3
Grenada	209,984 2 12			209,984 2 12
Jamaica	1,115,366 0 10	6 3 13		1,115,372 3 23
Montserrat	19,653 1 9			19,653 1 9
Nevis	49,769 3 22	469 2 9		50,239 2 3
St. Kitt's	78,658 1 21			78,658 1 21
St. Lucia	82,362 2 27	2 0 17		82,364 3 16
St. Vincent's	257,800 1 3			257,800 1 3
Tobago	111,349 3 0			111,349 3 0
Tortola	13,670 1 9	1,145 0 9		14,815 1 18
Trinidad	188,927 0 25	76 1 19		189,003 2 16
Demerara	650,276 2 6	3 2 13		650,280 0 19
Berbice	58,274 1 19			58,274 1 19
Honduras	2 1 16			2 1 16
Brit. N. American Colonies	0 0 20			0 0 20
East Indies and China			244,068 0 5	244,068 0 5
Cape of Good Hope			2 0 27	2 0 27
Foreign Colonies; viz.				
Cuba		86,479 2 8		86,479 2 8
St. Thomas		0 0 6		0 0 6
America; viz.				
United States		1,887 3 20		1,887 3 20
Brasil		72,710 0 26		72,710 0 26
Total, exclusive of Ireland	3,295,380 3 7	162,784 0 11	244,070 1 4	3,702,235 0 22
Ireland	28,251 3 3			28,251 3 3
Total from all parts	3,323,632 2 10	162,784 0 11	244,070 1 4	3,730,486 3 25

II. An Account of the Quantity of Sugar Imported into Ireland from the several British Colonies and Plantations, from the British Possessions in the East Indies, and from Foreign Countries, from 5th January 1825 to 5th January 1826; distinguishing the several Sorts of Sugar, and the Colonies and Countries from which the same was Imported.

British Colonies and Plantations, viz.

	Cwt.	qrs.	lbs.
British Colonies in North America:			
Newfoundland	26	0	8
British West Indies:			
Antigua	19,082	3	19
Barbadoes	40,948	1	14
Jamaica	20,057	2	7
St. Lucia	8,604	0	14
Trinidad	87,414	0	8
Demerara	29,766	3	8
Total	205,899	3	22

III. An Account of the Average Prices of Sugar in Great Britain, at the several periods at which the Rates of Duty may have been regulated; from the 5th January 1825 to the 5th January 1826, with the rate of Duty payable at each of the said periods respectively.

Duty.	Average Price, Exclusive of the Duty. £	s.	d.	Rate of Duty. £	s.	d.
5th January, 1825	1	8	4	1	7	0
5th May, 1825	1	11	9¾	1	7	0
5th September, 1825	1	15	2½	1	7	0
5th January, 1826	1	19	7½	1	7	0

IV. An Account of the Average Prices of Sugar in Ireland, at the several periods at which the Rates of Duty may have been regulated, from the 5th January 1825 to the 5th January 1826; with the rate of Duty payable at each of the said periods respectively.

Average Price as Published in the Dublin Gazette.	£	s.	d.		Rate of Duty. £	s.	d.	
From January 5th to May 5th 1825	1	11	9¾	per cwt.	1	7	0	per cwt.
From May 5th to September 5th 1825	1	15	2½	do.	1	7	0	do.
From September 5th 1825 to January 5th 1826	1	19	7½	do.	1	7	0	do.

There are several other vegetables raised in our own country which afford sugar; as beet-roots, skirrets, parsnips, potatoes, celery, red cabbage stalks, &c., besides the shoots of Indian wheat. The sugar is most readily obtained from these by making a tincture of the subject in rectified spirit of wine; which, when saturated by heat, will deposit the sugar upon standing in the cold.

The uses to which sugar are applied are indeed numerous and important. It can be made so solid as in the art of preserving to receive the most agreeable colors and the greatest variety of forms. It can be made so fluid as to mix with any soluble substance. It preserves the juice and substance of fruits in all countries and in all seasons. It affords a delicious seasoning to many kinds of food. It is useful in pharmacy; for it unites with medicines and removes their disagreeable flavor. It is the basis of all syrups. M. Macquer has shown in a very satisfactory manner how useful sugar would be if employed in fermenting wines. Sugar has also been found a remedy for the scurvy, and a valuable article of food in cases of necessity. M. Jambert de Lennes, first surgeon to the late duke of Orleans, published the following story in the Gazette de Santé which confirms this assertion. A vessel laden with sugar bound from the West Indies was becalmed in its passage for several days, during which the stock of provisions was exhausted. Some of the crew were dying of the scurvy, and the rest were threatened with a still more terrible death. In this emergency recourse was had to the sugar. The consequence was the symptoms of the scurvy went off, the crew found it a wholesome and substantial aliment. and returned in good health to France. 'Sugar (says Dr. Rush) affords the greatest quantity of nourishment in a given quantity of matter of any substance in nature; of course it may be preserved in less room in our houses, and may be consumed in less time, than more bulky and less nourishing aliment. It has this peculiar advantage, over most kinds of aliment, that it is not liable to have its nutritious qualities affected by time or the weather; hence it is preferred by the Indians in their excursions from home They mix a certain quantity of maple sugar with an equal quantity of Indian corn, dried and powdered, in its milky state. This mixture is packed in little baskets, which are frequently wetted in travelling without injuring the sugar. A few spoonfuls of it mixed with half a pint of spring water afford them a pleasant and strengthening meal. From the degrees of strength and nourishment which are conveyed into animal bodies by a small bulk of sugar, it might probably be given to horses with great advantage, when they are used in places or under circumstances which make it difficult or expensive to support them with more bulky or weighty aliment. A pound of sugar with grass or hay has supported the strength and spirits of a horse during a whole day's labor in one of the West India islands. A larger quantity given alone has fattened horses

and cattle, during the war before last in Hispaniola, for a period of several months, in which the exportation of sugar, and the importation of grain, were prevented by the want of ships. The plentiful use of sugar in diet is one of the best preventatives that has ever been discovered of the diseases which are produced by worms. Nature seems to have implanted a love for this aliment in all children, as it were on purpose to defend them from those diseases. I knew a gentleman in Philadelphia who early adopted this opinion, and who, by indulging a large family of children in the use of sugar, has preserved them all from the diseases usually occasioned by worms. Sir John Pringle has remarked that the plague has never been known in any country where sugar composes a material part of the diet of the inhabitants. It is probable that the frequency of malignant fevers of all kinds has been lessened by this diet, and that its more general use would defend that class of people who are most subject to malignant fevers from being so often affected by them. In the numerous and frequent disorders of the breast, which occur in all countries where the body is exposed to a variable temperature of weather, sugar affords the basis of many agreeable remedies. It is useful in weaknesses, and acrid defluxions upon other parts of the body. Many facts might be adduced in favor of this assertion. Upon my enquiring of Dr. Franklin, at the request of a friend (says Dr. Rush), about a year before he died, whether he had found any relief from the pain of the stone from the blackberry jam, of which he took large quantities, he told me that he had; but that he believed the medicinal part of the jam resided wholly in the sugar; and, as a reason for thinking so, he added that he often found the same relief by taking about half a pint of syrup, prepared by boiling a little brown sugar in water, just before he went to bed, that he did from a dose of opium. It has been supposed by some of the early physicians of our country that the sugar obtained from the maple-tree is more medicinal than that obtained from the West India sugar-cane; but this opinion, I believe, is without foundation. It is preferable in its qualities to the West India sugar only from its superior cleanliness. Cases may occur in which sugar may be required in medicine, or in diet, by persons who refuse to be benefited, even indirectly, by the labor of slaves. In such cases the innocent maple sugar will always be preferred. It has been said that sugar injures the teeth; but this opinion now has so few advocates that it does not deserve a serious refutation.'

Sugar is soluble in water, and in a small degree in alcohol. When united with a small portion of water, it becomes fusible; from which quality the art of preserving is indebted for many of its preparations. It is phosphoric and combustible; when exposed to fire emitting a blue flame if the combustion be slow, and a white flame if the combustion be rapid. By distillation it produces a quantity of phlegm, acid, oil, gas, and charcoal. Bergman, in treating sugar with the nitrous acid, obtained a new acid, now known by the name of the oxalic acid; but he omitted to mention the principles of which sugar is composed. Lavoisier, however, supplied this omission; and after many experiments has assigned three principles in sugar, hydrogen, oxygen, and carbon. If the juice expressed from the sugar-cane be left to itself, it passes into the acetous fermentation; and during the decomposition of the sugar, which is continued for three or four months, a great quantity of glutinous matter is separated. This matter when distilled gives a portion of ammoniac. If the juice be exposed to the spirituous fermentation, a wine is obtained analogous to cyder. If this wine, after being kept in bottles a year, be distilled, we obtain a portion of eau de vie.

It appears that sugar has the property of rendering some of the earths soluble in water. This property was accidentally discovered by Mr. William Ramsay, of Glasgow. Being employed in making experiments on sugar, and happening to put some quicklime into a cold solution of it, he noticed that it had acquired an uncommon caustic taste. Hence he concluded that sugar possesses the property of dissolving a certain proportion of lime; and, in order to ascertain its capacity in this respect, experiments were made upon this earth, together with strontites magnesia, and barytes.

Sugar, dissolved in water at the temperature of 50°, is capable of dissolving one-half of its weight of lime. The solution of lime in sugar is of a beautiful white-wine color, and has the smell of fresh-slaked quicklime. It is precipitated from the solution by the carbonic, citric, tartaric, sulphuric, and oxalic acids; and it is decomposed by double affinity, by caustic and carbonated potash and soda, the citrate, tartrate, and oxalate of potash, &c.

An equal weight of strontia, with the sugar employed, is capable of being dissolved at the temperature of 212°, and of being retained in solution by the sugar at 50° of Fahrenheit. On exposing the crystals, which had fallen down during the cooling of the liquid, to the air of the atmosphere, they attracted carbonic acid, and effloresced.

The solution of strontia in sugar is of a fine white-wine color, and, like that of lime, has a peculiar caustic smell. This earth is precipitated by caustic and carbonated potash and soda; also by the carbonic, citric, tartaric, sulphuric, and oxalic acids; and it is decomposed, by compound affinity, by the carbonates of potash and soda; also by the citrate, tartrate, and oxalate of potash.

The solution of magnesia in syrup, like those of lime and strontia, was of a pure white color, and had no sensible variation in smell or taste from the common solution of sugar, farther than that the sweet seemed much improved, and was softer and more agreeable to the palate, as if it were entirely freed from the earthy taste which unrefined sugar frequently has. On its remaining at rest for some months, in a bottle well corked, the magnesia appears to be entirely separated. Very little alumina is dissolved by a solution of sugar, when fresh precipitated earth is presented to it, either in the cold or hot state.

The union of sugar with the alkalies has been long known; but this is rendered more strikingly evident, by carbonated potash or soda, for in-

stance, decomposing the solutions of lime and strontia in sugar, by double affinity. The power possessed by tartaric acid of preventing the precipitation of iron and some other metals from their muriatic solution, is well known from the observations of M. Rose and others. A similar effect is produced by sugar, according to M. Peschier, if the mixture be boiled, but not otherwise.—Ann. de Chim. et Phys. xxxi. 197.

In making solutions of unrefined sugar for culinary purposes, a gray-colored substance is found frequently precipitated. It is probable that this proceeds from a superabundance of lime, which has been used in clarifying the juice of the sugar-cane at the plantations abroad. Sugar with this imperfection is known among the refiners of this article by the name of *weak*. And it is justly termed so, the precipitated matter being nothing but lime which has attracted carbonic acid from the sugar (of which there is a great probability), or from the air of the atmosphere. A bottle in which I had kept a solution of lime in sugar for at least four years, closely corked, was entirely incrusted with a yellowish-colored matter, which on examination was found to be entirely carbonate of lime.

In the ordinary refining of raw sugars, from twenty to thirty-five per cent. of melasses are separated, of which a considerable part, probably two-thirds, are formed by the high heat used in the concentration of the syrup. Various plans have been contrived to diminish this production of melasses. One of these consisted in surrounding the sugar boiler with oil or steam at a high temperature, instead of exposing it to a naked fire. In a second, the boiler is covered at top, and by means of an air-pump the atmospheric pressure is removed, so as to favor ebullition, and rapid evaporation, at moderate heats.

The celebrated chemist, Mr. Howard, took out a patent for his plan, which is undoubtedly the most scientific and productive of any; but requires superior skill and very minute attention in the manufacturer. No blood is used for clarification. This is accomplished by a system of most ingenious canvass filters, aided by the intermixture with the syrup of a small quantity of pasty gypsum and alumina, made by saturating a solution of alum with quicklime. In the final purification the base of the inverted sugar cone is covered with a stratum of very pure saturated syrup, instead of moist pipe-clay.

The third method is founded on the property which animal charcoal (bone-black) possesses, of destroying vegetable coloring matter. Perhaps the combination of the last two modes promises the best results.

A fourth process for refining sugar is that of Mr. Daniel Wilson, for which a patent was granted. The specification is in the thirty-fourth volume of the Repertory, p. 134. The pan is to be charged with strong lime-water, the sugar added, and the fire set in the usual manner. For every hundred weight of sugar used, a solution is to be made of four ounces of sulphate of zinc in as small a quantity of water as will dissolve it. When the sugar in the pan is melted, the solution of sulphate of zinc is added, and the whole well stirred. The oxide of zinc combines with the extractive matter, tannin, and gallic acid, and renders them insoluble, while the sulphuric acid, in combination with the lime, becomes insoluble. When raw sugar contains much acid, and a strong grain is required, take one ounce of lime in powder for every four ounces of sulphate of zinc, and as much water as will form a milk of lime, which is added to the solution of sugar in the pan, about five minutes after the solution of sulphate of zinc has been added. This purification of sugar by separating impurities chemically combined with it, is employed with much advantage in conjunction with the patent filtering apparatus invented by Mr. John Sutherland. The solution of sugar brought to the boiling point is run through the filter, and afterwards boiled to a proof. Mr. Wilson boils the syrup in a pan, having a coil of tinned copper or pure tin tubes placed along its bottom and sides, through which a constant stream of strongly heated oil, or rather fatty matter, is made to pass. The oxide of zinc, precipitated previously by adding a solution of the salt to lime-water, is also recommended, as well as the oxide of tin.

Mr. Kirchoff, an ingenious Russian chemist, accidentally discovered that starch is convertible into sugar, by being boiled for some time with a very dilute sulphuric acid. Saussure showed that 100 parts of starch yield 110 of sugar. He concluded that this sugar was merely a compound of water and starch. According to his analysis starch consists of

Oxygen	56·87
Carbon	37·29
Hydrogen . . .	6·84
	100·00

Sugar of grapes, according to the same chemist, is composed of,

Oxygen	56·51
Carbon	36·71
Hydrogen . . .	6·78
	100·00

Common sugar has been analysed by many eminent chemists. The following is a general view of the results:—

	G. Lussac and Thenard.	Berzelius, Mean of 3.	Prout.
Oxygen	50·63	49·856	53·35
Carbon	42·47	43·265	39·99
Hydrogen	6·90	6·879	6·66
	100·00	100·000	100·00

By my ultimate analysis of sugar its constituents are,

Carbon . .	43·38	5 atoms	45·4
Hydrogen .	6·29	4 . .	6·1
Oxygen . .	50·33	4 . .	48·5
	100·00		100·0

Phil. Trans. 1822.

It may be observed that Dr. Prout's experimental results agree with M. Gay Lussac's theory, of sugar being a compound of 40 parts of carbon + 60 of water, or its elements. By Berzelius's analysis starch consists of,

Oxygen	49·5
Carbon	43·5
Hydrogen	7·0
	100·0

The abstraction of a little hydrogen and carbon would convert it into sugar. But no carbonic acid or other gas is extricated during the conversion, according to Vogel's experiments. I find that potatoes digested with dilute sulphuric acid yield sugar cheaply and abundantly. The acid is afterwards removed by chalk; and the strained liquor left to repose, after due evaporation, affords crystals of sugar. From starch sugar, good beer has been made. I would recommend potatoes for this purpose. They are washed, grated down, and treated with the dilute acid for a day or two at a temperature of 212°.

M. Braconnot has recently extended our views concerning the artificial production of sugar and gum. Sulphuric acid (specific gravity 1·827) mixed with well dried elm dust, became very hot, and on being diluted with water, and neutralised with chalk, afforded a liquor which became gummy on evaporation. Shreds of linen triturated in a glass mortar with sulphuric acid yield a similar gum. Nitric acid has a similar power. If the gummy matter from linen be boiled for some time, with dilute sulphuric acid, we obtain a crystallisable sugar, and an acid, which M. Braconnot calls the vegeto-sulphuric acid. The conversion of wood also into sugar will no doubt appear remarkable; and, when persons not familiarised with chemical speculations are told that a pound weight of rags can be converted into more than a pound weight of sugar, they may regard the statement as a piece of pleasantry, though nothing, says M. Braconnot, can be more real.

Silk is also convertible into gum by sulphuric acid. Twelve grammes of glue, reduced to powder, were digested with a double weight of concentrated sulphuric acid without artificial heat. In twenty hours the liquid was not more colored than if mere water had been employed. A decilitre of water was then added, and the whole was boiled for five hours, with renewal of the water, from time to time, as it wasted. It was next diluted, saturated with chalk, filtered, and evaporated to a syrupy consistence, and left in repose for a month. In this period a number of granular crystals had separated, which adhered pretty strongly to the bottom of the vessel, and had a very decided saccharine taste. This sugar crystallises much more easily than cane sugar. The crystals are gritty under the teeth, like sugar-candy, and in the form of flattened prisms or tabular groups. Its taste is nearly as saccharine as grape sugar; its solubility in water scarcely exceeds that of sugar of milk. Boiling alcohol, even when diluted, has no action on this sugar. By distillation it yields ammonia, indicating the presence of azote. This sugar combines intimately with nitric acid without sensibly decomposing it, even with the assistance of heat, and there results a peculiar crystallised acid, to which the name nitro-saccharine has been given.—Annales de Chimie, xii., or Tilloch's Magazine, vol. 55 and 56.

The varieties of sugar are, cane sugar, maple sugar, liquid sugar of fruits, sugar of figs, sugar of grapes, starch sugar, the mushroom sugar of Braconnot, manna, sugar of gelatin, sugar of honey, and sugar of diabetes.

Sugar of grapes does not affect a peculiar form. It is deposited from its alcoholic solution in small grains, which have little consistence, are grouped together, and which constitute tubercles similar to those of cauliflowers. When put in the mouth it produces at first a sensation of coolness, to which succeeds a saccharine taste not very strong. Hence, to sweeten to an equal degree the same quantity of water, we must employ two and a half times as much sugar of grapes as of that of the cane. In other respects it possesses all the properties of cane sugar. Its extraction is very easy. The expressed juice of the grapes is composed of water, sugar, mucilage, bitartrate of potash, tartrate of lime, and a small quantity of other saline matters. We pour into it an excess of chalk in powder, or rather of pounded marble. There results, especially on agitation, an effervescence, due to the unsaturated tartaric acid. The liquor is then clarified with whites of eggs or blood. It is next evaporated in copper pans till it marks a density of 1·32 at the boiling temperature. It is now allowed to cool. At the end of some days it concretes into a crystalline mass, which, when drained, washed with a little cold water, and strongly compressed, constitutes sugar. In the south of France, where this operation was some years back carried on on the great scale, to prevent fermentation of the *must*, there was added to this a little sulphate of lime, or it was placed in tuns in which sulphur matches had been previously made to burn. The oxygen of the small quantity of air left in the tuns being thus abstracted by the sulphurous acid, fermentation did not take place. By this means the *must* can be preserved a considerable time; whereas, in the ordinary way, it would lose its saccharine taste at the end of a few days and become vinous. *Must* thus treated is said to be muted. The syrup was evaporated to the density of only 1·285.—Proust, Ann. de Chimie, lvii. 131; and the Collection of Memoirs published by Parmentier in 1813.

It is this species of sugar which is obtained from starch and woody fibre by the action of dilute sulphuric acid.

Sugar of diabetes has sometimes the sweetening force of sugar of grapes; occasionally much less.

Braconnot's mushroom sugar is much less sweet than that of the cane. It crystallises with remarkable facility, forming long quadrilateral prisms with square bases. It yields alcohol by fermentation.

All honeys contain two species of sugar; one similar to sugar of the grape, another like the uncrystallisable sugar of the cane (melasses). These combined, and mingled in different proportions with an odorant matter, constitute the honeys of good quality. Those of inferior quality contain, besides, a certain quantity of wax and acid: the honeys of Britanny contain even an animal secretion (couvain) to which they owe their putrescent quality. A slight washing with

a little alcohol separates the uncrystallisable sugar, and leaves the other, which may be purified by washing with a very little more alcohol.

'The relation,' says Dr. Prout, 'which exists between urea and sugar seems to explain in a satisfactory manner the phenomena of diabetes, which may be considered as a depraved secretion of sugar. The weight of the atom of sugar is just half that of the weight of the atom of urea; the absolute quantity of hydrogen in a given weight of both is equal; while the absolute quantities of carbon and oxygen in a given weight of sugar are precisely twice those of urea.'

The constituents of these two bodies and lithic acid are thus expressed by that ingenious philosopher:—

Elements.	Urea.			Sugar.			Lithic Acid.		
	No.	Per Atom.	Per Cent.	No.	Per Atom.	Per Cent.	No.	Per Atom.	Per Cent.
Hydrogen	2	2·5	6·66	1	1·25	6·66	1	1·25	2 85
Carbon	1	7·5	19·99	1	7·50	39·99	2	15·00	34·28
Oxygen	1	10·0	26·66	1	10·00	53·33	1	10·00	22·85
Azote	1	17·5	46·66				1	17·50	40·00
	5	37·5	100·00	3	18·75	100·00	5	43·75	100·00

The above compounds appear to be formed by the union of more simple compounds, as sugar, of carbon and water; urea, of carburetted hydrogen and nitrous oxide; lithic acid, of cyanogen and water, &c., whence it is inferred that their artificial formation falls within the limits of chemical operations.

Sugar, Acid of. See Acid, Chemistry, and Oxalic Acid.

Sugar Candy is the true essence of the cane formed into large crystals by a slow process. When the syrup is well clarified it is boiled a little, but not so much as is done for the proof mentioned in the process for making common sugar. It is then placed in old moulds, having their lower ends stopped with linen, and crossed at little distances with small twigs to retain the sugar as it crystallises. The moulds are then laid in a cool place. In proportion as the syrup cools, crystals are formed. In about nine or ten days the moulds are carried to the stove and placed in a pot; but the linen is not removed entirely, so that the syrup falls down slowly in drops. When the syrup has dropped away, and the crystals of the sugar-candy are become dry, the moulds are taken from the stove and broken in pieces to disengage the sugar, which adheres strongly to the sides of the moulds. If the syrup has been colored with cochineal the crystals take a slight tint of red; if indigo has been mixed they assume a bluish color. If it be desired to have the candy perfumed, the essence of flowers or amber may be dropped into the moulds along with the syrup.

Sugar Cane, in botany. See Saccharum and Sugar.

The Sugar Maple, acer saccharinum of Linnæus (see Acer), as well as the sugar-cane, produces a great quantity of sugar. This tree grows in great numbers in the western counties of all the middle states of the American union. Those which grow in New York and Pennsylvania yield the sugar in a greater quantity than those which grow on the waters of Ohio. These trees are generally found mixed with the beech, hemlock, white and water ash, the cucumber tree, linden, aspen, butter nut, and wild cherry trees. They sometimes appear in groves covering five or six acres in a body, but they are more commonly interspersed with some or all of the forest trees which have been mentioned. From thirty to fifty trees are generally found upon an acre of ground. They grow only in the richest soils, and frequently in stony ground. Springs of the purest water abound in their neighbourhood. They are, when fully grown, as tall as the white and black oaks, and from two to three feet in diameter. They put forth a beautiful white blossom in spring before they show a single leaf. The color of the blossom distinguishes them from the acer rubrum (see Acer), or the common maple, which affords a blossom of a red color. The wood of the sugar maple-tree is extremely inflammable, and is preferred upon that account by hunters and surveyors for fire-wood. Its small branches are so much impregnated with sugar as to afford support to the cattle, horses, and sheep of the first settlers during the winter, before they are able to cultivate forage for that purpose. Its ashes afford a great quantity of potash, exceeded by few, or perhaps by none, of the trees that grow in the woods of the United States. The tree is supposed to arrive at its full growth in the woods in twenty years. It is not injured by tapping; on the contrary, the oftener it is tapped the more syrup is obtained from it. In this respect it follows a law of animal secretion. A single tree had not only survived but flourished after forty-two tappings in the same number of years The effects of a yearly discharge of sap from the tree, in improving and increasing the sap, are demonstrated from the superior excellence of those trees which have been perforated in a hundred places by a small wood-pecker which feeds upon the sap. The trees, after having been wounded in this way, distil the remains of their juice on the ground, and afterwards acquire a black color. The sap of these trees is much sweeter to the taste than that which is obtained from trees which have not been previously wounded, and it affords more sugar. From twenty-three gar-

ions and one quart of sap, procured in twenty-four hours from only two of those dark colored trees. Arthur Noble, esq., of the state of New York, obtained four pounds and thirteen ounces of good grained sugar. A tree of an ordinary size yields in a good season from twenty to thirty gallons of sap, from which are made from five to six pounds of sugar. Samuel Lowe, esq., a justice of peace in Montgomery county, in the state of New York, informed Arthur Noble, esq., that he had made twenty pounds and one ounce of sugar between the 14th and 23d of April, in 1789, from a single tree that had been tapped for several successive years before; and that he had once obtained twenty-three gallons in one day from a single tree. But such instances are uncommon. From the influence which culture has upon forest and other trees it has been supposed that, by transplanting the sugar maple-tree into a garden, or by destroying such other trees as shelter it from the rays of the sun, the quantity of the sap might be increased, and its quality much improved. A farmer in Northampton county, in Pennsylvania, planted a number of these trees above thirty years ago in his meadow, from three gallons of the sap of which he obtained every year a pound of sugar. The sap distils from the wood of the tree. Trees which have been cut down in winter, for the support of the domestic animals of the new settlers, yield a considerable quantity of sap as soon as their trunks and limbs feel the rays of the sun in the spring. It is in consequence of the sap of these trees being equally diffused through every part of them that they live three years after they are girded, that is, after a circular incision is made through the bark into the substance of the tree for the purpose of destroying it. It is remarkable that grass thrives better under this tree in a meadow than in situations exposed to the constant action of the sun. The season for tapping the trees is in February, March, and April, according to the weather which occurs. Warm days and frosty nights are most favorable to a plentiful discharge of sap. The quantity obtained in a day from a tree is from five gallons to a pint, according to the greater or less heat of the air. There is always a suspension of the discharge of sap in the night if a frost succeed a warm day. The perforation in the tree is made with an axe or an augur. The latter is preferred from experience of its advantages. The augur is introduced about three quarters of an inch, and in an ascending direction (that the sap may not be frozen in a slow current in the mornings or evenings), and is afterwards deepened gradually to the extent of two inches. A spout is introduced about half an inch into the hole made by this augur, and projects from three to twelve inches from the tree. The spout is generally made of the sumach or elder, which usually grows near the sugar trees. The tree is first tapped on the south side; when the discharge of its sap begins to lessen, an opening is made on the north side, from which an increased discharge takes place. The sap flows from four to six weeks, according to the temperature of the weather. Troughs large enough to contain three or four gallons made of white pine, or white ash, or of dried water ash, aspen, linden, poplar, or common maple, are placed under the spout to receive the sap, which is carried every day to a large receiver, made of either of the trees before mentioned. From this receiver it is conveyed, after being strained, to the boiler. There are three modes of reducing the sap to sugar; by evaporation, by freezing, and by boiling; of which the latter is most general, as being the most expeditious. The profit of the maple tree is not confined to its sugar. It affords most agreeable melasses, and an excellent vinegar. The sap which is suitable for these purposes is obtained after the sap which affords the sugar has ceased to flow, so that the manufactories of these different products of the maple tree, by succeeding, do not interfere with each other. The melasses may be made to compose the basis of a pleasant summer beer. The sap of the maple is also capable of affording a spirit.

Dr. Rush, in the Transactions of the American Philosophical Society, vol. iii., has given an account, at length, of the sugar maple tree, of which the following is a short abstract:—The acer saccharinum of Linnæus, or sugar maple tree, grows in great quantities in the western counties of all the middle States of the American Union. It is as tall as the oak, and from two to three feet in diameter; puts forth a white blossom in the spring, before any appearance of leaves; its small branches afford sustenance for cattle, and its ashes afford a large quantity of excellent potash. Twenty years are required for it to attain its full growth. Tapping does not injure it, but on the contrary, it affords more syrup, and of a better quality the oftener it is tapped. A single tree has not only survived, but flourished after tapping, for forty years. Five or six pounds of sugar are usually afforded by the sap of one tree; though there are instances of the quantity exceeding twenty pounds. The sugar is separated from the sap either by freezing, by spontaneous evaporation, or by boiling. The latter method is the most used.

Dr. Rush describes the process; which is simple, and practised without any difficulty by the farmers. From frequent trials of this sugar, it does not appear to be in any respect inferior to that of the West Indies. It is prepared at a time of the year when neither insect, nor the pollen of plants, exists to vitiate it, as is the case with common sugar. From calculations grounded on facts, it is ascertained that America is now capable of producing a surplus of one-eighth more than its own consumption; that is, on the whole, about 135,000,000 lbs.; which, in the country, may be valued at fifteen pounds weight for one dollar. The Indians likewise extract sugar from the pith of the bamboo. The beet has lately been much cultivated in Germany for the purpose of extracting sugar from its root. For this the roots are taken up in autumn, washed clean, wiped, sliced lengthwise, strung on threads, and hung up to dry. From these the sugar is extracted by maceration in a small quantity of water; drawing off this upon fresh roots, and adding fresh water to the first roots, which is again to be employed in the same way, so as to get out all their sugar, and saturate

the water as much as possible with it. This water is to be strained and boiled down for the sugar. Some merely express the juice from the fresh roots, and boil this down; others boil the roots; but the sugar extracted in either of these ways is not equal in quality to the first.

Professor Lampadius obtained from 110 lbs. of the roots four pounds of well-grained white powder sugar; and the residuums afforded seven pints of a spirit resembling rum. Achard says that about a ton of roots produced him 100 lbs. of raw sugar, which gave fifty-five pounds of refined sugar, and twenty-five pounds of treacle. But the sugar which is so universally used is afforded by the sugar-cane (arundo saccharifera) which is raised in our colonies. When this plant is ripe it is cut down, and crushed by passing it between iron cylinders placed perpendicularly and moved by water or animal strength. The juice which flows out by this strong pressure is received in a shallow trough placed beneath the cylinder. The juice is called in the French sugar colonies vesou; and the cane, after having undergone this pressure, is called begasse. The juice is more or less saccharine, according to the nature of the soil on which the cane has grown, and the weather that has predominated during its growth. It is aqueous, when the soil or the weather has been humid; and in contrary circumstances it is thick and glutinous.

The juice of the cane is conveyed into boilers, where it is boiled with wood ashes and lime. It is subjected to the same operation in three several boilers, care being taken to remove the scum as it rises. In this state it is called syrup; and is again boiled with lime and alum till it is sufficiently concentrated, when it is poured into a vessel called the cooler. In this vessel it is agitated with wooden stirrers, which break the crust as it forms on the surface. It is afterward poured into casks, to accelerate its cooling; and while it is still warm, it is conveyed into barrels standing upright over a cistern, and pierced through their bottom with several holes stopped with cane. The syrup which is not condensed filters through these canes into the cistern beneath; and leaves the sugar in the state called coarse sugar, or muscovado. This sugar is yellow and fat, and is purified in the islands in the following manner:—The syrup is boiled, and poured into conical earthen vessels, having a small perforation at the apex, which is kept closed. Each cone, reversed on its apex, is supported in another earthen vessel. The syrup is stirred together, and then left to crystallise. At the end of fifteen or sixteen hours, the hole in the point of each cone, is opened, that the impure syrup may run out. The base of these sugar-loaves is then taken out, and white pulverised sugar substituted in its stead, which being well pressed down, the whole is covered with clay, moistened with water. This water filters through the mass, carrying the syrup with it which was mixed with the sugar, but which by this management flows into a pot substituted in the place of the first. This second fluid is called fine syrup. Care is taken to moisten and keep the clay in a proper degree of softness as it becomes dry. The sugar loaves are afterward taken out and dried in a stove for eight or ten days; after which they are pulverised, packed, and exported to Europe, where they are still farther purified.

SUGAT, a town of Asia Minor, in the pachalic of Bursa, occupying the site of the ancient Tottarium. The houses are built of wood and mud, in general two stories high, with projecting verandahs, and roofed with a red tile, which almost always admits the rain. It is remarkable for the tomb of Ali Osman.

SUGER (abbé), a French priest and prime minister of France, who flourished in the eleventh century, and died in 1152. His reputation was so great that after his death it was thought sufficient to inscribe on his tomb, Cy git l'abbé Sugar. Here lies the abbé Sugar. Of consequence we know no more of him. David Hume was influenced by a similar piece of vanity when he ordered his name, and no more, to be inscribed on his monument.

SUGGEST', *v. a.*, SUGGEST'ER, *n. s.*, SUGGES'TION. Fr. *suggerer*; Lat. *suggero, suggestum.* To hint; intimate; insinuate good or ill; inform secretly; seduce (these last two are obsolete): the noun substantives corresponding.

It allayeth all base and earthly cogitations, banisheth and driveth away those evil secret *suggestions* which our invisible enemy is always apt to minister. *Hooker.*

He was a man
Of an unbounded stomach, ever ranking
Himself with princes; one that by *suggestion*
Tied all the kingdom. *Shakspeare. Henry VIII.*

When devils will their blackest sins put on,
They do *suggest* at first with heavenly shows. *Shakspeare.*

Arthur, they say, is killed to-night
On your *suggestion.* *Id. King John.*

Are you not ashamed?
What spirit *suggests* this imagination? *Shakspeare.*

Some ideas make themselves way, and are *suggested* to the mind by all the ways of sensation and reflexion. *Locke.*

Native and untaught *suggestions* of inquisitive children. *Id.*

These Romish casuists speak peace to the consciences of men, by *suggesting* something to them which shall satisfy their minds, notwithstanding a known, actual, avowed continuance of their sins. *South.*

Search for some thoughts thy own *suggesting* mind,
And others dictated by heavenly power
Shall rise spontaneous. *Pope's Odyssey.*

SUG'GILATE, *v. a.* Lat. *suggillo.* To beat black and blue; to make livid by a bruise.

The head of the os humeri was bruised, and remained *suggilated* long after. *Wiseman's Surgery.*

SUGULMESSA, SIGILMESSA, or, according to Jackson, SEGIN MESSA, a district of Africa to the south-west of Morocco, beyond the Atlas. It forms part of that immense plain which intervenes between Barbary and the Great Sahara. Aridity is the prevailing character of the soil, though it still retains moisture sufficient for the production of dates. At an early period Sugulmessa was a city of importance, being the rendezvous of the caravans from Morocco to Soudan; but since these have been in the habit of passing by Akka and Jaffa, Sugulmessa has lost its importance: the district is now included in the kingdom of Tafilet.

SUHLA, a town of Prussian Saxony, the chief place of the circle of the Henneberg, is situated in the hilly track called the Forest of Thuringia. It contains four churches, four hospitals, and two manufactures of a very different description, viz. fire-arms and cotton goods, particularly dimity. From the fifteenth to the seventeenth century this was the principal place in Germany for fire-arms. At present this manufacture, though shared with a number of other towns, is still sufficient to consume the metals prepared at six forges. The cotton manufactures were introduced in the latter part of the eighteenth century. Inhabitants 6000. Eight miles north by west of Schleussingen.

SUHM (Peter Frederick), a celebrated Danish historian, was born at Copenhagen October 18th, 1728, and descended from a family originally from Germany, but long settled in Denmark. He displayed in his youth an unconquerable passion for reading; and in 1746 he was admitted into the university of Copenhagen, where the ensuing year he received the title of hofjunker, or gentleman of the court. He was after appointed assessor of the court tribunal; but having accepted of this office merely to gratify his father, an admiral in the Danish service, he ere long resigned it. Though the government successively made him gentleman of the royal chamber, counsellor of conference, chamberlain, and at last historiographer royal, he scarcely ever interfered in public affairs; the only occasion on which he is known to have done so having been at the revolution, which proved fatal to Struensee, when he joined the party of the queen-dowager, and drew up the plan of a temperate monarchical constitution, which, however, was not adopted. Suhm, who was a member of almost all the literary academies in the north of Europe, died of the gout on the 7th of September, 1798. His principal writings are An Introduction to the Critical History of Denmark, 1769—73, 5 vols. 4to; The Critical History of Denmark during the Pagan Ages, 1774—81, 4 vols.; The Modern History of Denmark, of which seven volumes have been published, the first of which appeared in 1782. His miscellaneous works were collected and reprinted, with an account of his life, at Copenhagen 1788—98, 15 vols.

SU'ICIDE, *n. s.* Lat. *suicidium.* Self-murder; the crime of destroying one's self: a self-murderer.

Child of despair, and *suicide* my name. *Savage.*

To be cut off by the sword of injured friendship is the most dreadful of all deaths, next to *suicide.* *Clarissa.*

If fate forbears us, fancy strikes the blow;
We make misfortunes, *suicides* in woe. *Young.*

SUICIDE is one of those crimes which are not common among savage nations. The first instances of it recorded in the Jewish history are those of Saul and Ahithophel; for the death of Samson is not a proper example. It never became common among the Jews till their wars with the Romans, when multitudes slaughtered themselves that they might not fall alive into the hands of their enemies. But at this period the Jews were a most desperate and abandoned race of men, had corrupted the religion of their fathers, and rejected that pure system which their promised Messiah came to Jerusalem to announce. We know not when it became remarkable among the Greeks; but it was forbidden by Pythagoras, by Socrates and Aristotle, and by the Theban and Athenian laws. In the earliest ages of the Roman republic it was seldom committed; though that republic owed its origin to the suicide of Lucretia: but, when luxury and the Epicurean and Stoical philosophy had corrupted the simplicity and virtue of the Roman character, then they began to seek shelter in suicide from their misfortunes or the effects of their vices. The religious principles of the Brahmins of India led them to admire suicide on particular occasions as honorable. Accustomed to abstinence, mortification, and the contempt of death, they considered it as a mark of weakness of mind to submit to the infirmities of old age. The modern Gentoos, who still in most things conform to the customs of their ancestors, when old and infirm, are frequently brought to the banks of rivers, particularly to those of the Ganges, that they may die in its sacred streams, which they believe can wash away the guilt of their sins. But the maxims of the Brahmins, which have encouraged this practice, we are assured by Mr. Holwell, are a corruption of the doctrines of the Shasta, which positively forbid suicide. The practice which religion or affection has established among the Gentoos, for women at the death of their husbands to burn themselves alive on the funeral pile (See HINDOOS), we do not think ought to be considered as suicide; for, were we to extend it thus far, it would be as proper to apply it to those who choose rather to die in battle than escape at the expense of their honor; and we should condemn as suicides the brave Spartans, who died at Thermopylæ in the defence of their country: we should also be obliged to apply the same disgraceful epithet to all those well-meaning but weak-minded Christians in this island, who in the seventeenth century chose rather to die as martyrs than comply with commands which they thought unlawful, though they were not morally wrong.

According to the historians of Japan, voluntary death is common in that empire. The devotees of the idol Amida drown themselves in his presence, attended by their relations and friends, and several of the priests, who all consider the devoted person as a saint who is gone to everlasting happiness. Such being the supposed honors appropriated to a voluntary death, it is not surprising that the Japanese anxiously cherish a contempt of life. Accordingly suicide is held as the most heroic of actions. A notion also prevailed among the ancient Scythian tribes, that it was pusillanimous for a man whose strength was wasted with disease or infirmity, to continue to live. It was reckoned an heroic action voluntarily to seek that death which he had the good fortune to meet in battle. The tribes of Scandinavia, who worshipped Odin the 'father of slaughter,' were taught that dying in the field of battle was the most glorious event that could befal them. See MYTHOLOGY, ODIN, and VALHALLA. This was a maxim suited to a warlike nation. Natural death being thus deemed inglo-

rious, and punished with exclusion from Valhalla, the paradise of Odin, he who did not fall in battle was led to suicide, when sickness or old age began to assail him. In such a nation suicide must have been very common. As suicide prevailed much in the decline of the Roman empire, when luxury, licentiousness, profligacy, and false philosophy, pervaded the world, so it continued to prevail even after Christianity was established. But the principles from which it proceeded were explained, so as to appear more agreeable to the new system which they had espoused. It was committed, either to secure from the danger of apostasy, to procure the honor of martyrdom, or to preserve the crown of virginity. In modern times we lament to find so many instances of suicide among the most polished nations who have the best opportunities of knowing the atrocity of that unnatural crime. The English have long been reproached by foreigners for the frequent commission of it; and the 'gloomy month of November' has been stigmatized as the season when it is most common. But this imputation may be justly attributed, not to the greater frequency of the crime in England than in other places, but to the custom of publishing in the newspapers every instance of suicide which is known. Mr. Moore was at great pains to obtain accurate information concerning the perpetration of this crime in different countries. Mercier, who wrote in 1782, says that the annual number of suicides in Paris was then about 150. But the abbé Fontana asserts that more persons put an end to their lives in Paris than in London. He had this information from the lieutenant of police. Mr. Moore was informed by a magistrate of Geneva that in that city, which contains about 25,000 inhabitants, the average number of suicides is about eight. In twenty-eight years there were thirty-two each year for London, Southwark, and Westminster at the same period, and in Edinburgh, containing above 80,000 inhabitants, the average number of suicides did not exceed four. Mr. Moore was informed by the coroners of Kent that for the last eighteen years the number had been upwards of thirty-two each year. Kent then containing about 200,000 inhabitants, and London 800,000. In the metropolis, therefore, many instances of suicide occur which are never known to the world; whereas in the country towns and villages it is scarcely possible to conceal such an action. The calculation therefore respecting Kent we may receive as true, while we must increase the average number in London very considerably. Mercier says that at Paris the lower ranks were most commonly guilty of it; that it was committed in garrets or hired lodgings; and that it proceeded from poverty and oppression. Many, he says, wrote letters to the magistrates before their death. Mr. Moore's correspondent from Geneva informed him that from 1777 to 1787 more than 100 suicides were committed in Geneva; that two-thirds of these unfortunate persons were men; that few of the clerical order have been known to commit it; and that it is not so much the end of an immoral, irreligious, dissipated life, as the effect of melancholy and poverty. By the information obtained from the coroners of Kent, it appears that, of the thirty-two, three-fourths destroyed themselves by hanging; that the proportion of males to females has been about two-thirds of the former; that no one season of the year is more distinguished for this crime than another; and that suicide was upon the increase. Our accounts respecting London are very imperfect; but we think that suicide is more common among the great and wealthy than among the lower ranks, and that it is usually the effect of gaming and dissipation.

As suicide was deemed a crime by the most illustrious of the Greek and Roman philosophers, it was considered as a crime by the laws, and treated with ignominy. By the law of Thebes suicides were to have no honors paid to their memory. The Athenian law ordained the hand which committed the deed to be cut off, and burned apart from the rest of the body. The body was not buried with the usual solemnities, but was ignominiously thrown into some pit. In Cea and Massilia (the ancient Marseilles) it was considered as a crime against the state. Plutarch relates, that an unaccountable passion for suicide seized the Milesian virgins; from which they could not be prevented by the tears and entreaties of friends: but a decree being issued, 'that the body of every young woman who hanged herself should be dragged naked through the streets, by the same rope with which she had committed the deed,' a complete stop was put to the extraordinary frenzy. In the early part of the Roman history the only instance recorded occurs in the reign of Tarquin I. The soldiers who were appointed to make common sewers, thinking themselves disgraced by such offices, put themselves to death in great numbers. The king ordered the bodies of all the self-murderers to be exposed on crosses, and this put a stop to the practice. There was no law against suicide during the republic; but under the emperors it was thought proper to lay it under certain regulations. When the Christian church had extended its jurisdiction in the Roman empire it was decreed, in the sixth century, that no commemoration should be made in the eucharist for such as destroyed themselves; neither should their bodies be carried out to burial with psalms, nor have the usual service said over them. This ecclesiastical law continued till the reformation, when it was admitted into the statute code of England by the authority of parliament. As an additional punishment, however, confiscation of land and goods seems to have been adopted from the Danes. At present the punishment consists in confiscating all the personal property of a felo de se for the use of the crown, and in excluding his body from interment in consecrated ground. Formerly the warrant of the coroner required that the body should be buried in some public highway, and a stake driven through it; but this has been recently abolished. Suicide is a common evil, but it is difficult to find an effectual remedy; for what motives can be held out sufficient to influence that man's mind who is dead to the voice of nature, and nature's God? His reputation and property are indeed within the reach of the laws, his body may be treated with ignominy, and his property con-

fiscated; but this punishment will not be a preventive even if it could be always inflicted; and that it is seldom inflicted is well known. Humanity disposes us to sympathise with the relations of the deceased, instead of demanding that the sentence of the law should be executed.

In countries, such as some of those abovementioned, where suicide is recommended by false views of honor or of religion, there can be no preventive till a general change takes place in such customs and habits of thinking. But in the civilised countries of Europe, where no such false opinions prevail, much might be done, with proper care and attention, to prevent many of the accidents of this kind that daily happen. We call them accidents, and not crimes, because among the class we speak of, the deed is often involuntary, and therefore not criminal. For although there have doubtless been many who very unfortunately have been led to commit this crime from pride, habits of dissipation, and a total want of religious principle, yet of the great numbers whom we annually read of in the public newspapers, we may charitably hope that the majority are really in a state of insanity when they commit this rash action. Persons of either sex, who have met with great misfortunes, either by loss of property, or still more readily by the loss of near and dear relations, are apt, if allowed to indulge their grief, to grow low-spirited and melancholy, and gradually to fall into such a weak state of the nerves as at last to affect the brain. They either do not sleep, or their sleep is not sound or refreshing. Young women, by disappointments in love, and married women by the death of husbands or favorite children, often fall into such a degree of hysteria as to be nothing short of absolute lunacy. And it is acknowledged by physicians that the most amiable of the sex, and those of the best dispositions, are, from their excess of sensibility, most apt to fall into that habit of body and mind in consequence of the loss of near and dear relations. In such cases such persons should never be left a moment alone while under the influence of such a malady: and, though medicine can do little to recover patients in these cases, yet the most fatal effects may be prevented by a constant attention to them on the part of friends, and by their endeavours to console and solace them, by amusement, air, and exercise, and every species of kind usage. The writer of this article knew an instance of a lady in Edinburgh, who had lingered long in a desperate state of hysteria, who one night rose out of bed and ran to a window four stories high, which she opened, but was prevented from throwing herself over by her husband awaking and catching her in his arms just when she had nearly accomplished it. She thought she was in a prison, and that was the easiest way out. She was afterwards, by proper care, completely restored to her senses; but it is highly probable that, among the numerous suicides we daily hear of, there are many similar instances where no deliberate intention of self-murder is entertained.

In the whole train of nervous, hysterical, and hypochondriac affections, there is no symptom so decisive of the approach of an incipient lunacy as the want of sleep, or what physicians call an altered state of sleep. It is often induced by a continued melancholy and brooding over past misfortunes; but it is also sometimes occasioned by excessive joy upon some sudden circumstance of great prosperity. The writer of this article knew a melancholy instance of this last effect. A gentleman possessed of a small fortune, by the death of a relation abroad fell heir to a large estate. The fourth day after the news had arrived the writer called and congratulated him on his good fortune; when, amidst much hospitality, and many promises of making all his friends the better for it, he mentioned that he had got no sleep since he received the letter. To this the writer replied that this was a dangerous state of health, and sleep must be procured by soporifics as quickly as possible, else the consequences might be fatal. Next time he called, which was only within a week, his unfortunate friend was in confinement under keepers; and within two months, so rapidly did his son seize the opportunity his father's misfortune afforded him, the old gentleman was cognosced as a lunatic, and the son legally put in possession of the whole fortune; thus fulfilling Ovid's remark,

Filius ante diem patrios inquirit in annos!

SUIDAS, a Greek writer, who, according to some, flourished in the eleventh century under Alexius Comnenus; according to others in the tenth century. He wrote, in Greek, an Historical and Geographical Dictionary or Lexicon, a work which, though not always strictly accurate, is nevertheless of great importance, as it contains many things taken from the ancients nowhere else to be found. The best edition of Suidas is that of Kuister, in Greek and Latin, with notes, in three volumes folio, which has been much improved by Toup.

SUIL'LAGE, *n. s.* Fr. *souillage*. Drain of filth. Obsolete.

When they have chosen the plot, and laid out the limits of the work, some Italians dig wells and cisterns, and other conveyances for the *suillage* of the house. *Wotton.*

SU'ING, *n. s.* From Fr. *suer*, to sweat. it is perhaps peculiar to Bacon. The act of soaking through any thing.

Note the percolation or *suing* of the verjuice through the wood: for verjuice of itself would never have passed through the wood. *Bacon.*

SUIONES, an ancient people of Germany, mentioned by Tacitus, supposed to have inhabited Sweden.

SUIT, *n. s.*, *v. a.*, & *v. n.* Suit'able, *adj.* Suit'ably, *adv.* Suit'er, or Suit'or, *n. s.* Suit'ress. Fr. *suite*. A set; a number of things correspondent one to the other; a set of clothes; series; a petition; an action at law; courtship; regular order: 'out of suits,' out of order or consecution: to suit is, to fit; adapt; be fitted to; become: as a verb neuter, to agree; accord: suitable is, fitting; according: the adverb and noun substantive corresponding: suiter or suitor, he, suitress, she who sues.

Many shall make *suit* unto thee. *Job* xi. 19.

All that had any *suits* in law came unto them. *Susanna.*

Through all those miseries, in both there appeared a kind of nobleness not *suitable* to that affliction. *Sidney.*

High amongst all knights hast hung thy shield,
Thenceforth the *suit* of earthly conquest shone,
And wash thy hands from guilt of bloody field. *Spenser.*

As humility is in *suiters* a decent virtue, so the testification thereof, by such effectual acknowledgments, not only argueth a sound apprehension of his supereminent glory and majesty before whom we stand, but putteth also into his hands a kind of pledge or bond for security against our unthankfulness. *Hooker.*

What he did purpose, it was the pleasure of God that Solomon his son should perform, in manner *suitable* to their present and ancient state. *Id.*

He that hath the steerage of my course,
Direct my *suit*. *Shakspeare. Romeo and Juliet.*

Wear this for me; one *out of suits* with fortune,
That would give more, but that her hand lacks means. *Shakspeare.*

Suit the action to the word, the word to the action, with this special observance, that you o'erstep not the modesty of nature. *Id. Hamlet.*

I would I could find in my heart that I had not a hard heart; for truly I love none.

—A dear happiness to women! they would else have been troubled with a pernicious *suitor*. *Shakspeare.*

Be better *suited*;
These weeds are memories of those misfortunes:
I pry'thee put them off to worser hours. *Id.*

I'll disrobe me
Of these Italian weeds, and *suit* myself
As does a Briton peasant. *Id. Cymbeline.*

What a beard of the general's cut, and a horrid *suit* of the camp, will do among foaming bottles, and ale-washed wits, is wonderful. *Id. Henry V.*

She hath been a *suitor* to me for her brother,
Cut off by course of justice. *Id. Measure for Measure.*

Wars are *suits* of appeal to the tribunal of God's justice, where there are no superiors on earth to determine the cause. *Bacon's War with Spain.*

Not only bind thine own hands, but bind the hand of *suitors* also from offering. *Bacon.*

By many *suitors* sought, she mocks their pains,
And still her vowed virginity maintains. *Dryden.*

This says, because it *suits with* his hypothesis, but proves it not. *Locke.*

Whosoever speaks upon an occasion may take any text suitable thereto; and ought to speak *suitably* to that text. *South.*

He creates those sympathies and *suitablenesses* of nature that are the foundation of all true friendship, and by his providence brings persons so affected together. *Id.*

Give me not an office
That *suits* with me so ill; thou knowest my temper. *Addison.*

'Twere pity
That could refuse a boon to such a *suitress*;
Y' have got a noble friend to be your advocate. *Rowe.*

My lord, I come an humble *suitor* to you. *Id.*

It will be as unreasonable to expect that God should attend and grant those *suits* of ours, which we do not at all consider ourselves. *Duty of Man.*

John Bull was flattered by the lawyers that his *suit* would not last above a year, and that before that time he would be in quiet possession of his business. *Arbuthnot.*

As the blessings of God upon his honest industry had been great, so he was not without intentions of making *suitable* returns in acts of charity. *Atterbury.*

He drew his seat, familiar, to her side,
Far from the *suitor* train, a brutal crowd. *Pope's Odyssey.*

It is as great an absurdity to suppose holy prayers and divine petitions without an holiness of life *suitable to* them, as to suppose an holy and divine life without prayers. *Law.*

Suit is used in different senses; as, 1. Suit custom, which is where one and his ancestors have owed suit time out of mind. 2. It is used for a petition to the king or any person of dignity, where a lord distrains his tenant for suit and none is due. In this case the party may have an attachment against him to appear in the king's court.

Suit, in law, is the same as action. The Romans introduced pretty early set forms for actions and suits into their law, after the example of the Greeks; and made it a rule that each injury should be redressed by its proper remedy only. See Actio and Action. The forms of these actions were originally preserved in the books of the pontifical college as choice and inestimable secrets, till one Cneius Flavius, the secretary of Appius Claudius, stole a copy and published them to the people. The concealment was ridiculous. Bracton, speaking of the original writs upon which all our actions are founded, declares them to be fixed and immutable, unless by authority of parliament. And all the modern legislators of Europe have found it expedient to fall into the same or a similar method. In England the several suits of justice are, from the subjects of them, distinguished into three kinds; actions personal, real, and mixed. 1. Personal actions are such whereby a man claims a debt, or personal duty, or damages in lieu thereof; and likewise whereby a man claims a satisfaction in damages for some injury done to his person or property. The former are said to be founded upon contracts, the latter upon torts or wrongs. Of the former nature are all actions upon debts or promises; of the latter are all actions of trespasses, nuisances, assaults, defamatory words, and the like. 2. Real actions (or feudal actions), which concern real property only, are such whereby the plaintiff, here called the demandant, claims title to have any lands or tenements, rents, commons, or any other hereditaments, in fee-simple, fee-tail, or for term of life. By these actions formerly all disputes concerning real estates were decided; but they are now pretty generally laid aside; a much more expeditious method of trying titles being introduced by actions personal and mixed. 3. Mixed actions are suits partaking of the mixture of the other two, wherein some real property is demanded, and also personal damages for a wrong sustained. As for instance an action of waste: which is brought by him who hath the inheritance, in remainder or reversion, against the tenant for life, who hath committed waste therein, to recover not only the land wasted, which would make it

a real action, but also treble damages, in pursuance of the statute of Gloucester, which is a personal recompense; and so both, being joined together, denominate it a mixed action. See LAW.

SUITE, *n. s.* Fr. *suite.* Retinue; company.

Plexirtus's ill-led life, and worse-gotten honour, should have tumbled together to destruction, had there not come in Tydeus and Telenor, with fifty in their *suite* to his defence. *Sidney.*

SUL'CATED, *adj.* Lat. *sulcus.* Furrowed.

All are much chopped and *sulcated* by having lain exposed on the top of the clay to the weather, and to the erosion of the vitriolick matter mixed amongst the clay. *Woodward.*

SULI, a large valley of Greece, enclosed by almost inaccessible mountains. The only entrance, a defile on the south, is defended by three towers, nearly a mile distant from each other, and situated on eminences where the road is most difficult; the other three sides are composed of perpendicular precipices. This territory, about twenty-six miles long from north to south, and eight in breadth, is inhabited by a tribe of Greeks, who, until lately, maintained themselves in the form of an independent republic. It contains eighteen villages, of which five are situated in the southern and less difficult part of the valley towards Louro, and thirteen in the upper or more rugged and inaccessible part. The principal places are Mega Souli, the capital, Navarikes, and Kiapha. On the east, at the foot of the mountain, is a fine plain of about six square leagues. In it the Suliotes have settled for the purpose of cultivating the land, but in times of danger retire with their property to the mountains. On the south Suli is bounded by the Chimæra mountains. The population of this tribe is about 10,000. Their wars, particularly between 1786 and 1803, were remarkable for the courage and pertinacity which they displayed. In vain in 1792 did Ali Pacha attack them with a powerful army. He was repulsed as well in that year as subsequently; and it was not until 1803 that he definitely succeeded. On the loss of their independence, a part of the Suliotes left their country, and took service in Russia and France. Their country is at present again subject to the Porte.

SULIA, a large river of New Granada, in Pamplona. It rises in the vicinity of this province, runs north, and, collecting the waters of many other rivers, unites itself with the Catacumbo, and again separating itself, after a little space, it forms three mouths, whereby to enter the lake Maracaibo. Its mouth is in lat. 8° 35′ N.

SUL'LEN, *adj.* } Saxon ȳal, ȳl. The
SUL'LENLY, *adv.* } etymology is obscure;
SUL'LENNESS, *n. s.* } gloomily angry or discon-
SUL'LENS, *n. s.* } tented; intractable; dark; heavy; dull: the adverb and noun substantive corresponding: the plural sullens is used burlesquely for morose temper; gloominess.

Speech being as rare as precious, her silence without *sullenness*, her modesty without affectation, and her shamefacedness without ignorance. *Sidney.*

Why are thine eyes fixt to the *sullen* earth,
Gazing at that which seems to dim thy sight?
Shakspeare. Henry VI.

Let them die that age and *sullens* have.
Shakspeare.

To fit my *sullenness*
He to another key his style doth dress. *Donne.*

Wilmot continued still *sullen* and perverse, and every day grew more insolent. *Clarendon.*

In those vernal seasons, when the air is calm and pleasant, it were an injury and *sullenness* against nature not to go out and see her riches. *Milton.*

Things are as *sullen* as we are, and will be what they are, whatever we think of them. *Tillotson.*

With these comforts about me, and *sullenness* enough to use no remedy, Zulichem came to see me. *Temple.*

A man in a jail is *sullen* and out of humour at his first coming in. *L'Estrange.*

A glimpse of moon-shine, streaked with red,
A shuffled, *sullen*, and uncertain light,
That dances through the clouds, and shuts again.
Dryden

He in chains demanded more
Than he imposed in victory before:
He *sullenly* replied, he could not make
These offers now. *Id. Indian Emperor.*

Forced by my pride, I my concern suppressed;
Pretended drowsiness, and wish of rest;
And *sullen* I forsook the imperfect feast. *Prior.*

No cheerful breeze this *sullen* region knows;
The dreaded east is all the wind that blows. *Pope.*

SULLIVAN, a county of New York, United States, bounded north-west by Delaware, north-east by Ulster, south by Orange, and south-west by the Delaware, which separates it from Pennsylvania. It contains a pretty large proportion of mountainous country, with fertile plains, however, intervening. Thompson is the chief town.

SULLIVAN COVE, a harbour about nine miles from the mouth of Derwent River, in Van Diemen's River, where a settlement was established in 1804.

SULLIVAN ISLAND, an island of the United States, at the mouth of Ashley and Cooper Rivers, six miles below Charleston, South Carolina; much resorted to by the people of Charleston during the summer months.

SULLIVAN MOUNTAINS, mountains of the United States, in New Hampshire, extending from Cockburne to the White Mountains; they are about 2000 feet high.

SUL'LY, *v. a.* & *n. s.* } Fr. *souiller, sulliage.*
SUL'LIAGE, *n. s.* } To soil; tarnish; dirt: a tarnish or spot; pollution; filth. Neither of the noun substantives are in use.

You laying these light *sullies* on my son,
As 'twere a thing a little soiled i' the working.
Shakspeare.

Calumniate stoutly; for, though we wipe away with never so much care the dirt thrown at us, there will be left some *sulliage* behind. *Decay of Piety.*

The falling temples which the gods provoke,
And statues *sullied* yet with sacrilegious smoke.
Roscommon.

He's dead, whose love had *sullyed* all your reign,
And made you empress of the world in vain.
Dryden.

A noble and triumphant merit breaks through little spots and *sullies* in his reputation. *Addison's Spectator.*

Lab'ring years shall weep their destined race,
Charged with ill omens, *sullied* with disgrace.
Prior.

Ye walkers too, that youthful colours wear,
Three *sullying* trades avoid with equal care;
The little chimney-sweeper skulks along,
And marks with sooty stains the heedless throng.
Gay.

Let there be no spots to *sully* the brightness of this solemnity. *Atterbury.*

SULLY (Maximilian de Bethune, duke de), born at Rosny, December 13th, 1560, was of an ancient family, being the second son of Francis de Bethune and Charlotte D'Auvet. He was educated as a Protestant; and his father, possessing but a moderate fortune, presented him at the age of eleven to the queen of Navarre, who educated him with her son, afterwards Henry IV. Accompanying the latter to Paris, he narrowly escaped becoming a victim in the massacre of St. Bartholomew's day, and when the young king escaped from the court the baron du Rosny, as Sully was then called, retired with him. In the wars which Henry carried on before he obtained the crown, du Rosny greatly distinguished himself, particularly at Marmande, Lectoure, Coutras, where he commanded the artillery, and at Ivry, where he took the standard of the duke of Maine, and was dangerously wounded. In 1591 he took Gisors; and at Dreux in 1593, at Laon in 1594, at La Fere in 1596, at Amiens in 1597, and at Montmelian in 1600, reaped new laurels. His abilities as a diplomatist were no less remarkable. In 1586 he concluded a treaty with the Swiss for a supply of 20,000 troops; and in 1597 was placed at the head of the department of finance: about the same time he nogociated the marriage of Henry with Mary de Medici. After the death of our queen Elizabeth, he displayed great penetration and address in a treaty he concluded with James I., and was for some time ambassador at the English court. In addition to his other offices he was now appointed grand surveyor of France, grand master of the artillery, governor of the Bastile, and superintendant of fortifications. The revenues of the government, which had been reduced to a state of complete dilapidation by civil anarchy or open warfare, were by his care restored to order and affluence. He was no less firm than wise in his conduct. Whilst he was resisting applications for oppressive edicts, to which the king, who was always disposed to listen to the requests of his favorites and mistresses, inclined, his mistress d'Entragues, the marchioness de Verneuil, haughtily said to him, 'To whom would you have the king to grant favors, if not to his relations, courtiers, and mistresses?'—'Madam,' he replied, 'you would be in the right if his majesty took the money out of his own purse; but is it reasonable that he should take it from those of the traders, the artisans, the laborers, and peasants? These people, who maintain him and all of us, find one master sufficient, and have no need of so many courtiers, princes, and mistresses.' His industry was unwearied. Rising every morning at four o'clock, he dedicated a regular time to business, and then gave audience to all who solicited admission to him. Though he persevered in the reformed religion, he does not appear to have been very conscientiously attached to it, as it was principally owing to his counsels that the king professed himself a Catholic. The pope, however, having addressed to him a letter, in which, after paying him many compliments, he invited him to become a Catholic, and concluded with declaring that he should always pray for his conversion; Sully, in his reply, observed that, on his part, he would never cease to pray God for the conversion of his holiness. In 1606 the territory of Sully-sur-Loire was erected into a duchy in his favor. After the murder of Henry IV. he was obliged to retire from court; but after some years he was recalled, and, on making his appearance in the royal circle, the courtiers did not treat him with that respect to which he thought himself entitled; on which he said to Louis XIII. 'Sire, when your father did me the honor to consult me, we never spoke on affairs till he had dismissed his flatterers and buffoons to the ante-chamber.' In 1634 he received the staff of a marshal in exchange for the office of grand master of the artillery; and died at Villebon, December 22d, 1641. His Memoirs were partly published by himself, under the title of Economies Royales, Amstergam, 1634, 2 vols. folio, but printed in his own house; the third and fourth volumes were published at Paris in 1662.

SULMO, an ancient town of Italy, belonging to the Peligni, about ninety miles from Rome. founded by one of Æneas's followers. It is famous for having been the birth place of the poet Ovid; and is now called Sulmona.

SULMONA, an ancient town of Naples, in the Abruzzo Citra. It was the birth place of Ovid: in 1709 it was greatly injured by an earthquake. At present it contains 4000 inhabitants, and is the see of a bishop. Twenty-one miles south of Civita di Chieti, and seventy-two north of Naples.

SULPHATES, in chemistry, are definite compounds of sulphuric acid with the salifiable bases. See SULPHURIC ACID, and the respective bases.

SULPHITES is also a name for definite compounds of sulphuric acid with the bases.

SUL'PHUR, *ns. s.* / SULPHU'REOUS, *adj.* / SUL'PHUROUS. } Lat. *sulphur*. Brimstone. See below. The adjectives correspond.

My hour is almost come,
When I to *sulphurous* and tormenting flames
Must render up myself. *Shakspeare. Hamlet.*

Dart and javelin, stones and *sulphurous* fire.
Milton.

In his womb was hid metallick ore,
The work of *sulphur*. *Id.*

Is not the strength and vigour of the action between light and *sulphureous* bodies, observed above, one reason why *sulphureous* bodies take fire more readily, and burn more vehemently, than other bodies do? *Newton's Opticks.*

Sulphur is produced by incorporating an oily or bituminous matter with the fossil salt. *Woodward.*

No *sulphureous* glooms
Swelled in the sky, and sent the lightning forth.
Thomson.

SULPHUR is a well known substance, yellow, hard, brittle, and when rubbed becomes electric. Its specific gravity is from 1·990 to 2·35. Ac-

cording to Bergman, it gently evaporates at 170°, melts at 185°, and flames at 302° of Fahrenheit. It burns with a blue flame, and a disagreeable suffocating smell; in close vessels it sublimes without decomposition, or only a decomposition proportionable to the quantity of air they contain; when melted it becomes red, but recovers its color on cooling. It is insoluble in water, though by long trituration water will take up some of it, but it is rather diffused than dissolved in it; neither can spirit of wine unite to it, except when both are in a vaporous state, and then seventy-two parts of spirit of wine take up one of sulphur; it is soluble in hot oils, and also in fixed alkalies, both in the dry and liquid way. See CHEMISTRY, Index. Sulphur, formerly considered as a compound, is now reckoned a simple substance, and is even ranked among the elements. This conclusion is founded on the following facts: 1. Sulphur does not burn unless oxygen have access to it. 2. During combustion it absorbs vital air from the atmosphere. 3. The sulphuric acid produced by the combustion of sulphur is equal in weight to the sulphur employed and the quantity of air that has been consumed.

Sulphur unites readily with most metallic substances, excepting gold, platinum, and zinc. The affinities of sulphur, according to Geoffroy, Bergman, and Dr. Thompson, are fixed alkalies, iron, copper, tin, lead, silver, bismuth, antimony, mercury, arsenic, and molybdenum. The compounds formed by sulphur with different metals are different; but all of them possess a metallic lustre, without any ductility: these combinations of sulphur and of metals are very frequently found in a natural state. Almost all the metals dug from the earth are found combined with sulphur, forming most of the ores and metallic minerals. It is a curious phenomenon, that nitre mixed with sulphur burns rapidly, even in close vessels; this is easily explained by the new system. Nitre, when heat is applied to it, yields a great quantity of oxygen gas; and sulphur has a strong attraction for oxygen. As oxygen is thus supplied, which is the only principle necessary to combustion, communication with the atmospheric air is unnecessary. The sulphur will burn till the whole oxygen which the nitre furnishes be consumed. The products obtained by this process are different according to the proportions of nitre and sulphur employed. If eight parts of sulphur and one of nitre be set on fire in a close vessel, sulphuric acid is produced; and this is the method by which oil of vitriol or strong sulphuric acid was formerly made in Great Britain. The vessels in which the operation was performed were large glass balloons, with very large necks, each containing 400 or 500 pints. But it was attended with great expense, on account of the high price and bitterness of the balloons. A few years ago a cheaper method was attempted with success in France. The sulphur is burned on a kind of gridirons, in large apartments lined with lead. As the acid condenses it is conveyed by gutters into a reservoir, and afterwards concentrated. The sulphuric acid thus obtained is always combined with a little sulphur and sulphate of potash, a small quantity of aluminous sulphate and sulphate of lead; but these substances are in so small a proportion, that for common use it is not necessary to separate them. If necessary, however, it may easily be done by distilling the acid to dryness. Gunpowder, the terrible effects of which are owing to its strong tendency to combustion, is a mixture of sulphur, nitre, and charcoal. See GUNPOWDER. But there is another mixture, of which sulphur is an ingredient, still more violent in its effects: this is called fulminating powder, and is composed of three parts of nitre, two parts of the carbonate of potash, and one of powdered sulphur. These being closely united together by trituration, in a hot marble mortar, when exposed to a slight degree of heat, will melt, and produce a violent detonation like the report of a cannon. A dram of this mixture is sufficient for the experiment. Sulphur is of great use in chemistry, in medicine, and the arts. Sulphur is useful in making some fusions, precipitations, and separations of metals and minerals: but is particularly useful, as being the substance from which the sulphuric acid is obtained.

Sulphur is employed in medicine both internally and externally. It is given either in flowers or in lozenges, made up with sugar, or joined to magnesia, crystals of tartar, manna, cassia, lenitive electuary, &c. Two or three drams generally prove laxative; and it is given in such doses in cases of piles, of uterine and other hæmorrhagies; because it does not stimulate nor heat during its operation, nor leave a disposition to costiveness, as rhubarb, aloes, and other hot residuous purges do. Sulphur was formerly much recommended in coughs and diseases of the breast, but of late its virtues as a pectoral have been much doubted. When applied externally, it is mixed with some unctuous substance, as hog's lard, butter, &c., and is rubbed on such parts of the body as are affected with eruptions. Some physicians and chemists, considering that sulphur is insoluble in water, and capable of resisting the action of most menstruums, have affirmed that it can produce no effect when taken internally, single and unaltered; but this assertion seems to be without foundation; for it is certain that the sweat and perspiration of those who take sulphur internally have a smell evidently sulphureous. Besides sulphur is much more soluble than is generally believed. It is attacked by all oily and saponaceous substances, and consequently by almost all animal liquors. We cannot easily form a very distinct and clear idea of the manner in which sulphur acts internally upon our bodies; but, from observations made upon its effects, it appears to be dividing, stimulating, and somewhat heating: it principally acts upon the perspirable parts of the body, the chief of which are the skin and lungs; and from this property it is particularly useful in some diseases of those parts. Sulphur is also a powerful repellent, as appears from its curing several kinds of itch, merely by external application, in form of ointments and pomatums. Several mineral waters, which are drunk or used as baths for some diseases, owe their good qualities to sulphur contained in them.

Sulphur is found sometimes pure, and sometimes in combination with other substances. Of native sulphur there are seven varieties; 1. Transparent sulphur, in eight-sided crystals, with two truncated pyramids. It is generally deposited by water on the surface of calcareous spar. Cadiz sulphur is of this kind. 2. Transparent sulphur in irregular fragments. Such is the sulphur of Switzerland. 3. Whitish pulverulent sulphur deposited in siliceous geodes. In the ci-devant Franche Compté there are flints full of sulphur. 4. Pulverulent sulphur deposited on the surface of mineral waters, such as those of Aix-la-Chapelle. 5. Crystalline sulphur that has been sublimed, found in the neighbourhood of volcanoes. 6. Pulverulent sulphur sublimed from volcanoes, found in abundance at Solfatara in the vicinity of Naples. See SOLFATARA. 7. Sulphur in stalactites, formed by volcanic fires. Sulphur is also found united with different substances, as with metals, and in this state was formerly called pyrites. See PYRITES. It is also extracted from vegetables, from dock-root, cochlearia, &c. M. Deyeux obtained it from the white of eggs. It has been also procured from horse dung. The sulphur used in Great Britain is generally brought in a pure state from volcanic countries, where it abounds in an inexhaustible quantity. Some of the metallic ores in this country abound with it; but, from the common mode of purifying them, the sulphur is dissipated and lost. Dr. Watson has shown, in a paper on lead ore in the Philosophical Transactions, that no less than 700 tons are annually dissipated in the various lead mines of England. It is extracted from pyrites in Saxony and Bohemia.

Sulphur is also used in several arts. By means of it fine impressions of engraved stones are taken. Matches are formed of it; and its utility as an ingredient in the preparation of gunpowder and fireworks is well known. Lastly, it is used for whiting wool, silk, and many other matters exposed to its vapor during its combustion; the colors and redness of which could not be destroyed by any other substance, but are quickly effaced by this acid vapor.

Of native or prismatic sulphur, says Dr. Ure, there are two species, the common and volcanic; the former is of two kinds, compact and earthy sulphur.

1. *Compact common sulphur.*—Color sulphur-yellow, and yellow of other shades. Massive, disseminated, and crystallised. Its primitive figure is a pyramid of 107° 19′; and 84° 24′; basis = 102° 41′. The secondary figures are, the primitive variously truncated or acuminated, and delicate acicular crystals. Shining or glimmering. Cleavage prismatic and axifrangible. Fracture uneven. Translucent. Refracts double. Harder than talc. Brittle. When rubbed, it exhales a faint sulphureous smell, and becomes resino-electric. Specific gravity 1·9 to 2·1. It occurs in considerable abundance in primitive mountains, in a state of combination with metals, forming the different genera of pyrites, glance, and blende. In secondary mountains it is more abundant in the pure uncombined state. It is found in the island of Iceland, associated with gypsum; or in crusts investing alluvia substances. Very superb specimens of crystallised sulphur are found at Conil near Cape Trafalgar. It occurs abundantly in Sicily, at Urbino, in the Papal States, in Arragon in Spain, and Lauenstein in Hanover.

2 *Earthy common sulphur.*—Color pale straw-yellow. Massive and disseminated. Dull. Fracture fine earthy. Opaque. Does not soil Soft to friable. It occurs in drusy cavities in flint, and along with the compact varieties in gypsum, and other rocks.

Volcanic sulphur.—Color pale sulphur-yellow. Massive, imitative, and crystallised in pyramids. Glistening, inclining to adamantine. Fracture uneven. Slightly translucent. It occurs abundantly at Solfaterra, in the neighbourhood of Vesuvius, and in Iceland.

Sulphur is a simple inflammable body, of great importance in chemistry and the arts. To the properties above-mentioned we shall here add, that its fusing point is about 220° Fahrenheit, before which temperature it begins to evaporate. At 560° it takes fire in the open air, and burns with a pale blue flame. When kept melted in an open vessel for some time, about 300° Fahrenheit, it becomes thick and viscid; and, if it be then poured into a basin of water, it appears of a red color, and ductile like wax. In this state it is used for taking impressions of seals or medals. Its specific gravity is said to be increased from 1·99 to 2·325. This change is not owing to oxidation, for it takes place in close vessels. When a roll of sulphur is suddenly seized in a warm hand, it crackles, and sometimes falls in pieces. This is owing to the unequal action of heat, on a body which conducts that power slowly, and which has little cohesion. If a mass of sulphur be melted in a crucible, and, after the surface begins to concrete, if the liquid matter below be allowed to run out, fine acicular crystals of sulphur will be obtained.

Sulphur is insoluble in water; but in small quantity in alcohol and ether, and more largely in oil. It combines with oxygen in four definite proportions, constituting an interesting series of acids. See SULPHURIC ACID. From these combinations it is inferred, that the prime equivalent of sulphur is 2; and the density of its vapor is 1·111 = that of oxygen gas.

Sulphur combines readily with chlorine. This compound was first made by Dr. Thomson, who passed chlorine gas through flowers of sulphur. It may be made more expeditiously by heating sulphur in a retort containing chlorine. The sulphur and chlorine unite, and form a fluid substance, which is volatile below 200° Fahrenheit, and distils into the cold part of the retort. This substance, seen by reflected light, appears of a red color, but is yellowish-green when seen by transmitted light. It smokes when exposed to air, and has an odor somewhat resembling that of sea-weed, but much stronger; it affects the eyes like the smoke of peat. Its taste is acid, hot, and bitter. Its specific gravity is 1·7. It does not redden perfectly dry paper tinged with litmus; when it is agitated in contact with water, the water becomes cloudy from the ap-

pearance of sulphur, and strongly acid, and it is found to contain oil of vitriol. According to Sir H. Davy's experiments, ten grains of pure sulphur absorb nearly thirty cubic inches of chlorine, so that the compound contains about 2 sulphur to 4·5 chlorine, or a prime equivalent of each. The compound formed in the manner above described cannot be made to unite to more chlorine; but it can dissolve a considerable portion of sulphur by heat, and becomes of a tawny-yellow color.

Iodide of sulphur is easily formed by mixing the two ingredients in a glass tube, and exposing them to such a heat as melts the sulphur. It is grayish-black, and has a radiated structure like that of sulphuret of antimony. When distilled with water, iodine is disengaged.

Sulphur and hydrogen combine. Their union may be effected by causing sulphur to sublime in dry hydrogen in a retort. There is no change of volume, but only a part of the hydrogen can be united with the sulphur in this mode of operating. The usual way of preparing sulphuretted hydrogen is to pour a dilute sulphuric or muriatic acid on the black sulphuret of iron or antimony in a retort. For accurate experiments it should be collected over mercury. It takes fire when a lighted taper is brought in contact with it, and burns with a pale blue flame, depositing sulphur. Its smell is extremely fetid, resembling that of rotten eggs. Its taste is sour. It reddens vegetable blues. It is absorbable by water, which takes up more than an equal volume of the gas. Its specific gravity, according to M.M. Gay Lussac and Thenard, is to that of air as 1·1912 to 1·0. From Sir H. Davy's experiments, it would appear to be a little less, but he is inclined to adopt the results of the French chemists, rather than his own, as their gas was weighed in larger quantity and dried. Notwithstanding this preference of other experiments to his own, we must prefer a number nearer to Sir H. Davy's than M. Gay Lussac's. Its true specific gravity is 1·1805. 100 cubic inches weigh 36·006; and it consists of 1 vol. vapor of sulphur = 1·1111 + 1 vol. of hydrogen = 0·0694 = 1·1805; or a prime equivalent of each = 2·125. If platina wires be ignited in it by the voltaic apparatus, it is rapidly decomposed. Sulphur is deposited, and an equal volume of hydrogen remains. The same change is effected more slowly by electric sparks.

M. Berthier recommends the following process for procuring pure sulphuretted hydrogen at an economical rate:—Powdered common iron pyrites is to be mixed with half its weight of dry carbonate of soda, and heated red hot in a crucible; a fused sulphuret of sodium and iron is obtained, which may be poured out on a stone to cool. It is then a homogeneous deep-yellow colored mass, having a lamellar fracture. It absorbs much water, forming with it a black paste, which, when acted on by sulphuric or muriatic acid, instantly yields abundance of sulphuretted hydrogen; leaving a black sulphuret of iron, which, by the application of acid and heat, will yield a second portion of the gas. Sulphuret of lime, made by decomposing the sulphate at a high heat, with one-fifth of its weight of charcoal, yields 46·8 per cent. of sulphuretted hydrogen, when acted on with dilute muriatic acid.—Ann. de Chimie, xxiv. 271.

When a few drops of fuming nitric acid are put into a flask filled with pure sulphuretted hydrogen, the hydrogen is oxidized by the nitric acid, and the sulphur is disengaged in a solid form. If the flask be closed with the finger, so that the gas which becomes heated cannot escape, its temperature is raised so much as to produce combustion with a beautiful flame, and a slight detonation which forces the finger from the mouth of the flask. This experiment may be made without the least danger, with a flask containing four or five cubical inches of gas.—Berzelius.

Of all the gases, sulphuretted hydrogen is perhaps the most deleterious to animal life. A greenfinch, plunged into air, which contains only $\frac{1}{1500}$ of its volume, perishes instantly. A dog of middle size is destroyed in air that contains $\frac{1}{500}$; and a horse would fall a victim to an atmosphere containing $\frac{1}{250}$.

Dr. Chaussier proves that, to kill an animal, it is sufficient to make the sulphuretted hydrogen gas act on the surface of its body, when it is absorbed by the inhalants. He took a bladder having a stop-cock at one end, and at the other an opening, into which he introduced the body of a rabbit leaving its head outside, and securing the bladder air-tight round the neck by adhesive plaster. He then sucked the air out of the bladder, and replaced it by sulphuretted hydrogen gas. A young animal in these circumstances usually perishes in fifteen or twenty minutes. Old rabbits resist the poison much longer. When potassium or sodium is heated, merely to fusion, in contact with sulphuretted hydrogen, it becomes luminous, and burns with extrication of hydrogen, while a metallic sulphuret remains, combined with sulphuretted hydrogen, or a sulphuretted hydrosulphuret. Sulphuretted hydrogen combines with an equal volume of ammonia, and unites to alkalies and oxides, so that it has all the characters of an acid. These compounds are called hydrosulphurets.

All the hydrosulphurets, soluble in water, have an acrid and bitter taste, and, when in the liquid state, the odor of rotten eggs. All those which are insoluble are, on the contrary, insipid, and without smell. There are only two colored hydrosulphurets, that of iron, which is black, and of antimony, which is chestnut-brown. All the hydrosulphurets are decomposed by the action of fire. That of magnesia is transformed into sulphuretted hydrogen and oxide of magnesium; those of potash and soda into sulphuretted hydrogen, hydrogen, and sulphuretted alkalies; those of manganese, zinc, iron, tin, and antimony, into water and metallic sulphurets. When we put in contact with the air, at the ordinary temperature, an aqueous solution of a hydrosulphuret, there results, in the space of some days, 1st. water, and a sulphuretted hydrosulphuret, which is yellow and soluble; 2dly, water, and a colorless hydrosulphite, which, if its base be potassa, soda, or ammonia, remains in solution in the water; but which falls down in acicular crystals, if its base be barytes, strontia,

or lime. The acids in general combine with the base of the hydrosulphurets, and disengage sulphuretted hydrogen with a lively effervescence, without any deposition of sulphur, unless the acid be in excess, and be capable, like the nitric and nitrous acid, of yielding a portion of its oxygen to the hydrogen of the sulphuretted hydrogen.

The hydrosulphurets of potash, soda, ammonia, lime, and magnesia, are prepared directly, by transmitting an excess of sulphuretted hydrogen gas through these bases, dissolved or diffused in water. The composition of the hydrosulphurets is such that the hydrogen of the sulphuretted hydrogen is to the oxygen of the oxide in the same ratio as in water. Hence, when we calcine the hydrosulphurets of iron, tin, &c., we convert them into water and sulphurets.

Hydrosulphuret of potash crystallises in four-sided prisms, terminated by four-sided pyramids. Its taste is acrid and bitter. Exposed to the air, it attracts humidity, absorbs oxygen, passes to the state of a sulphuretted hydrosulphuret, and finally to that of a hydrosulphite. It is extremely soluble in water. Its solution in this liquid occasions a perceptible refrigeration. Subjected to heat, it evolves much sulphuretted hydrogen, and the hydrosulphuret passes to the state of a sub-hydrosulphuret.

Hydrosulphuret of soda crystallises with more difficulty than the preceding.

Hydrosulphuret of ammonia is obtained by the direct union of the two gaseous constituents in a glass balloon, at a low temperature. As soon as the gases mingle, transparent white or yellowish crystals are formed. When a mere solution of this hydrosulphuret is wished for medicine or analysis, we pass a current of sulphuretted hydrogen through aqueous ammonia till saturation.

The pure hydrosulphuret is white, transparent, and crystallised in needles or fine plates. It is very volatile. Hence, at ordinary temperatures, it gradually sublimes into the upper part of the phials in which we preserve it. We may also by the same means separate it from the yellow sulphuretted hydrosulphuret, with which it is occasionally mixed. When exposed to the air, it absorbs oxygen, passes to the state of a sulphuretted hydrosulphuret, and becomes yellow. When it contains an excess of ammonia, it dissolves speedily in water, with the production of a very considerable cold.

Sub-hydrosulphuret of barytes is prepared by dissolving, in five or six parts of boiling water, the sulphuret of the earth obtained by igniting the sulphate with charcoal. The solution, being filtered while hot, will deposit, on cooling, a multitude of crystals, which must be drained, and speedily dried by pressure between the folds of blotting paper. It crystallises in white scaly plates. It is much more soluble in hot than in cold water. Its solution is colorless, and capable of absorbing, at the ordinary temperature, a very large quantity of sulphuretted hydrogen.

Sub-hydrosulphuret of strontites crystallises in the same manner as the preceding. The crystals obtained in the same way must be dissolved in water; and the solution being exposed to a stream of sulphuretted hydrogen, and then concentrated by evaporation in a retort, will afford, on cooling, crystals of pure sub-hydrosulphuret. Hydrosulphurets of lime and magnesia have been obtained only in aqueous solutions. The metallic hydrosulphurets of any practical importance are treated of under their respective metals.

When we expose sulphur to the action of a solution of a hydrosulphuret, saturated with sulphuretted hydrogen, as much more sulphuretted hydrogen is evolved as the temperature is more elevated. But when the solution of hydrosulphuret, instead of being saturated, has a sufficient excess of alkali, it evolves no perceptible quantity of sulphuretted hydrogen, even at a boiling heat; although it dissolves as much sulphur as in its state of saturation. It hence follows, 1st. That sulphuretted hydrogen, sulphur, and the alkalies, have the property of forming very variable triple combinations; 2d. That all these combinations contain less sulphuretted hydrogen than the hydrosulphurets; and, 3d. That the quantity of sulphuretted hydrogen is inversely as the sulphur they contain, and reciprocally. These compounds have been called, in general, sulphuretted hydrosulphurets; but the name of hydrogenated sulphurets is more particularly given to those combinations which are saturated with sulphur at a high temperature, because, by treating them with acids, we precipitate a peculiar compound of sulphur and hydrogen, of which we shall now treat.

This compound of hydrogen and sulphur, the proportions of the elements of which have not yet been accurately ascertained, is also called hydruret of sulphur. It is formed by putting flowers of sulphur in contact with nascent sulphuretted hydrogen. With this view, we take an aqueous solution of the hydrogenated sulphuret of potash, and pour it gradually into liquid muriatic acid, which seizes the potash, and forms a soluble salt, whilst the sulphur and sulphuretted hydrogen unite, fall down together, collecting by degrees at the bottom of the vessel, as a dense oil does in water. To preserve this hydruret of sulphur, we must fill with it a phial having a ground stopper, cork it, and keep it inverted in a cool place. We may consider this substance either as a combination of sulphur and hydrogen, or of sulphur and sulphuretted hydrogen; but its properties, and the mode of obtaining it, render the latter the more probable opinion. The proportion of the constituents is not known.

The most interesting of the hydrogenated sulphurets is that of ammonia. It was discovered by the honorable Robert Boyle, and called his fuming liquor. To prepare it, we take one part of muriate of ammonia and of pulverised quicklime, and half a part of flowers of sulphur. After mixing them intimately, we introduce the mixture into an earthen or glass retort, taking care that none of it remains in the neck. A dry cooled receiver is connected to the retort by means of a long adopter-tube. The heat must be urged slowly almost to redness. A yellowish liquor condenses in the receiver, which is to be put into a phial with its own weight of flowers of sulphur, and agitated with it seven or eight

minutes. The greater part of the sulphur is dissolved, the color of the mixture deepens remarkably, and becomes thick, constituting the hydrogenated sulphuret. The distilled liquor diffuses, for a long time, dense vapor in a jar full of oxygen or common air; but scarcely any in azote or hydrogen; and the dryness or humidity of the gases makes no difference in the effects. It is probably owing to the oxygen converting the liquor into a hydrogenated sulphuret, or perhaps to the state of sulphite, that the vapors appear. Hydrogenated sulphurets are frequently called hydroguretted sulphurets. Sulphur combines with carbon, forming an interesting compound, to which the name of sulphuret of carbon is sometimes given.

Sulphur Island, an island of the North Pacific Ocean, discovered by captain Gore, in 1779; about five miles long, in a N. N. E. and S. S. W. direction. The south point is a high barren hill, flat at top, and presents an evident volcanic crater. Long. 141° 12′ E., lat. 24° 28′ N.

Sulphur Mountain, in geology, a volcanic mountain, frequently found in the islands of the Western Atlantic, perpetually throwing forth sulphurous or sulphuric exhalations from fissures or a direct crater; and which exhalations often concrete and form beautiful crystals on the surrounding parts of the mountain. The best description we have met with of these sulphur mountains is given by Dr. Nugent, and published as follows in the Transactions of the Geological Society, vol. i.

'On my voyage last year (October 1810) from Antigua to England, the packet touched at Montserrat, and my curiosity having been excited by the accounts I received of a place in the island called The Sulphur, and which, from the descriptions of several persons, I conceived might be the crater of an inconsiderable volcano, I determined to avail myself of the stay of the packet to visit that place.

'The island of Montserrat, so called by the Spaniards from a fancied resemblance to the celebrated mountain of Catalonia, is every where extremely rugged and mountainous, and the only roads, except in one direction, are narrow bridle-paths winding through the recesses of the mountains: there is hardly a possibility of using wheeled carriages, and the produce of the estates is brought to the place of shipment on the backs of mules. Accompanied by a friend, I accordingly set out on horseback from the town of Plymouth, which is situated at the foot of the mountains on the sea shore. We proceeded by a circuitous and steep route about six miles, gradually ascending the mountain, which consisted entirely of a uniform porphyritic rock, broken every where into fragments and large blocks, and which in many places was so denuded of soil as to render it a matter of astonishment how vegetation, and particularly that of the cane, should thrive so well. The far greater part of the whole island is made up of this porphyry, which by some systematics would be considered as referrible to the newest floetz trap formation, and by others would be regarded only as a variety of lava. It is a compact and highly indurated argillaceous rock of a gray color, replete with large and perfect crystals of white felspar and black hornblende. Rocks of this description generally pass in the West Indies by the vague denomination of fire-stone, from the useful property they possess of resisting the operation of intense heat. A considerable quantity of this stone is accordingly exported from Montserrat to the other islands which do not contain it, being essential in forming the masonry around the copper boilers in sugar works. We continued our ride a considerable distance beyond the estate called Galloway's (where we procured a guide), till we came to the side of a very deep ravine which extends in a winding direction the whole way from one of the higher mountains to the sea. A rugged horse-path was traced along the brink of the ravine, which we followed, amidst the most beautiful and romantic scenery. At the head of this ravine is a small amphitheatre, formed by lofty surrounding mountains, and here is situated what is termed The Sulphur. Though the scene was extremely grand, and well worthy of observation, yet I confess I could not help feeling a good deal disappointed, as there was nothing like a crater to be seen, or any thing else that could lead me to suppose the place had any connexion with a volcano. On the north, east, and west sides were lofty mountains wooded to the tops, composed apparently of the same kind of porphyry we had noticed all along the way. On the south the same kind of rock, of no great height, quite bare of vegetation, and in a very peculiar state of decomposition. And, on the south-eastern side, our path and the outlet into the ravine. The whole area thus included might be 300 or 400 yards in length, and half that distance in breadth. The surface of the ground, not occupied by the ravine, was broken and strewed with fragments and masses of the porphyritic rock, for the most part so exceedingly decomposed as to be friable and to crumble on the smallest pressure. For some time I thought that this substance, which is perfectly white, and in some instances exhibits an arrangement like crystals, was a peculiar mineral; but afterwards became convinced that it was merely the porphyritic rock singularly altered, not by the action of the air or weather, but, as I conjecture, by a strong sulphureous or sulphuric acid vapor which is generated here, and which is probably driven more against one side by the eddy wind up the ravine, the breeze from any other quarter being shut out by the surrounding hills.

'Amidst the loose stones and fragments of decomposed rock are many fissures and crevices, whence very strong sulphureous exhalations arise, and which are diffused to a considerable distance: these exhalations are so powerful as to impede respiration, and near any of the fissures are quite intolerable and suffocating. The buttons of my coat, and some silver and keys in my pockets, were instantaneously discolored. An intense degree of heat is at the same time evolved, which, added to the apprehension of the ground crumbling and giving way, renders it difficult and painful to walk near any of these fissures. The water of a rivulet which flows down the sides of the mountain, and passes over

this place, is made to boil with violence, and becomes loaded with sulphureous impregnations. Other branches of the same rivulet, which do not pass immediately near these fissures, remain cool and limpid; and thus you may with one hand touch one rill which is at the boiling point, and with the other hand touch another rill which is of the usual temperature of water in that climate. The exhalations of sulphur do not at all times proceed from the same fissures, but new ones appear to be daily formed, others becoming, as it were, extinct. On the margins of these fissures, and indeed almost over the whole place, are to be seen most beautiful crystallisations of sulphur, in many spots quite as fine and perfect as those from Vesuvius, or indeed as any other specimens I have ever met with. The whole mass of decomposed rock in the vicinity is, in like manner, quite penetrated by sulphur. I did not perceive at this place any trace of pyrites, or any other metallic substance, except indeed two or three small fragments of clay iron-stone at a little distance, but did not discover even this substance any where in situ. It is very probable that the bed of the glen or ravine might throw some light on the internal structure of the place; but it was too deep, and its banks infinitely too precipitous, for me to venture down to it. I understood that there was a similar exhalation and deposition of sulphur on the side of a mountain not more than a mile distant in a straight line; and a subterranean communication is supposed to exist between the two places.

'Almost every island in the western Archipelago, particularly those which have the highest land, has in like manner its sulphur, or, as the French better express it, its souffrière. This is particularly the case with Nevis, St. Kitts, Guadaloupe, Dominica, Martinico, St. Lucia, and St. Vincent's. Some islands have several such places, analogous, I presume, to this of Montserrat; but in others, as Guadaloupe, St. Lucia, and St. Vincent's, there are decided and well characterised volcanos, which are occasionally active, and throw out ashes, scoriæ, and lava with flame. The volcano of St. Vincent's is represented by Dr. Anderson, and others who have visited it, as extremely large and magnificent, and would bear a comparison with some of those of Europe. These circumstances appear to have been entirely overlooked by geologists in their speculations concerning the origin and formation of these islands. It has indeed occurred to most persons, on surveying the regular chain of islands extending from the southern Cape of Florida to the mouths of the Orinoco, as exhibited on the map, to conclude that it originally formed part of the American continent, and that the encroachments of the sea have left only the higher parts of the land, as insular points above its present level. But this hypothesis, however simple and apparently satisfactory in itself, will be found to accord very partially with the geological structure of the different islands. Many of them are made entirely of vast accretions of marine organized substances; and others evidently owe their origin to a volcanic agency, which is either in some degree apparent at the present time, or else may be readily traced by vestiges comparatively recent. There is every reason to believe, however, that some of the islands are really of contemporaneous formation with the adjacent parts of the continent, from which they have been disjoined by the incursions of the sea, or by convulsions of nature, and it is probably in those islands which contain primitive rocks that we are chiefly to look for a confirmation of this supposition.'

SULPHURET OF LIME having been recommended by Mr. Higgins as a substitute for potash in the new method of bleaching, which, if it answer, may certainly be afforded at less expense, we shall here give the method of preparing the sulphuret. Take of sulphur, or brimstone in fine powder, four pounds; lime well slaked and sifted twenty pounds; water sixteen gallons: these are all to be well mixed and boiled for about half an hour in an iron vessel, stirring them briskly from time to time. Soon after the agitation of the boiling is over, the solution of the sulphuret of the lime clears, and may be drawn off free from the insoluble matter, which is considerable, and which rests upon the bottom of the boiler. The liquor in this state is pretty nearly of the color of small beer, but not quite so transparent. Sixteen gallons of fresh water are afterwards to be poured upon the insoluble dregs in the boiler, to separate the whole of the sulphuret from them. When this clears (being previously well agitated) it is also to be drawn off and mixed with the first liquor; to these again thirty-three gallons more of water may be added, which will reduce the liquor to a proper standard for steeping the cloth. Here we have (an allowance being made for evaporation, and for the quantity retained in the dregs) sixty gallons of liquor from four pounds of brimstone. Although sulphur by itself is not in any sensible degree soluble in water, and lime but very sparingly so, water dissolving but about $\frac{1}{700}$th part of its weight of lime; yet the sulphuret of lime is highly soluble. When the above proportion of lime and sulphur is boiled with only twelve gallons of water, the sulphuret partly crystallises upon cooling; and when once crystallised it is not easy of solution.

SULPHURETS OF ALKALIES AND EARTHS. Heretofore these were reckoned compounds of the alkalies and earths themselves with sulphur, that is, sulphureted oxides; but M. Berthier has proved that they are all true metallic sulphurets. He reduces the sulphates of alkalies into sulphurets, not by mixing them directly with powdered charcoal, but by placing them in the centre of a crucible thickly lined with charcoal, covering them with the same substance, and, after having luted on a cover, heating the whole in a furnace. In this way the sulphates are reduced by cementation. All are reducible at a white heat, and where the sulphuret is fusible very quickly. In this way not only are pure sulphurets formed, but the result may be collected without the smallest loss, its weight ascertained, and the weight of oxygen evolved accurately estimated.

If a sulphate of barytes, strontites, or lime, be thus reduced to a sulphuret, and weighed, the loss will be found to equal exactly the quantity of oxygen contained in the base and the acid. If

the sulphuret be dissolved in dilute muriatic acid, nothing will be liberated but pure sulphureted hydrogen; no sulphur will be set free, nor any acid containing sulphur and oxygen formed; finally, if a portion of the sulphuret be heated in a crucible of silver, with nitre equal to three or four times its weight, the sulphate regenerated will correspond with the quantity of sulphuret employed, and will contain neither acid nor base in excess. These three experiments prove that the sulphuret produced contains no oxygen.

SULPHURIC ACID. Oil of vitriol. Vitriolic acid. When sulphur is heated to 180° or 190° in an open vessel, it melts, and soon afterwards emits a bluish flame, visible in the dark, but which, in open day-light has the appearance of a white fume. This flame has a suffocating smell, and has so little heat that it will not set fire to flax, or even gunpowder, so that in this way the sulphur may be entirely consumed out of it. If the heat be still augmented, the sulphur boils and suddenly bursts into a much more luminous flame, the same suffocating vapor still continuing to be emitted. The suffocating vapor of sulphur is imbibed by water, with which it forms the fluid formerly called volatile vitriolic, now sulphurous acid. If this fluid be exposed for a time to the air it loses the sulphurous smell it had at first, and the acid becomes more fixed. It is then the fluid which was formerly called the spirit of vitriol. Much of the water may be driven off by heat, and the dense acid which remains is the sulphuric acid, commonly called oil of vitriol; a name which was probably given to it from the little noise it makes when poured out, and the unctuous feel it has when rubbed between the fingers, produced by its corroding and destroying the skin, with which it forms a soapy compound.

The stone or mineral called martial pyrites, which consists for the most part of sulphur and iron, is found to be converted into the salt vulgarly called green vitriol, but more properly sulphate of iron, by exposure to air and moisture. In this natural process the pyrites breaks and falls in pieces; and if the change takes place rapidly a considerable increase of temperature follows, which is sometimes sufficient to set the mass on fire. By conducting this operation in an accurate way it is found that oxygen is absorbed. The sulphate is obtained by solution in water and subsequent evaporation; by which the crystals of the salt are separated from the earthy impurities which were not suspended in the water.

The sulphuric acid was formerly obtained in this country by distillation from sulphate of iron, as it still is in many parts abroad: the common green vitriol is made use of for this purpose, as it is to be met with at a low price and the acid is most easily to be extracted from it. With respect to the operation itself the following particulars should be attended to:—First the vitriol must be calcined in an iron or earthen vessel till it appears of a yellowish-red color: by this operation it will lose half its weight. This is done in order to deprive it of the greater part of the water which it has attracted into its crystals during the crystallisation, and which would otherwise, in the ensuing distillation, greatly weaken the acid. As soon as the calcination is finished the vitriol is to be put immediately, while it is warm, into a coated earthen retort, which is to be filled two-thirds with it, so that the ingredients may have sufficient room upon being distended by the heat, and thus the bursting of the retort be prevented. It will be most advisable to have the retort immediately enclosed in brickwork in a reverberatory furnace, and to stop up the neck of it till the distillation begins, in order to prevent the materials from attracting fresh humidity from the air. At the beginning of the distillation the retort must be opened and a moderate fire is to be applied to it, in order to expel from the vitriol all that part of the phlegm which does not taste strongly of the acid, and which may be received in an open vessel placed under the retort. But as soon as there appear any acid drops, a receiver is to be added, into which has been previously poured a quantity of the acidulous fluid which has come over, in the proportion of half a pound of it to twelve pounds of the calcined vitriol; when the receiver is to be secured with a proper luting. The fire is now to be raised by little and little to the most intense degree of heat, and the receiver carefully covered with wet cloths, and, in winter time, with snow or ice, as the acid rises in the form of a thick white vapor, which toward the end of the operation becomes hot and heats the receiver to a great degree. The fire must be continued at this high pitch for several days till no vapor issues from the retort, nor any drops are seen trickling down its sides. In the case of a great quantity of vitriol being distilled, Bernhardt has observed it to continue emitting vapors in this manner for the space of ten days. When the vessels are quite cold the receiver must be opened carefully, so that none of the luting may fall into it; after which the fluid contained in it is to be poured into a bottle and the air carefully excluded. The fluid that is thus obtained is the German sulphuric acid, of which Bernhardt got sixty-four pounds from 600 cwt. of vitriol; and, on the other hand, when no water had been previously poured into the receiver, fifty-two pounds only of a dry concrete acid. This acid was formerly called glacial oil of vitriol, and its consistence is owing to a mixture of sulphurous acid, which occasions it to become solid at a moderate temperature.

It has been lately stated by Vogel that when this fuming acid is put into a glass retort, and distilled by a moderate heat into a receiver cooled with ice, the fuming portion comes over first, and may be obtained in a solid state by stopping the distillation in time. This has been supposed to constitute absolute sulphuric acid, or acid entirely void of water. It is in silky filaments, tough, difficult to cut, and somewhat like asbestos. Exposed to the air it fumes strongly and gradually evaporates. It does not act on the skin so rapidly as concentrated oil of vitriol. Up to 66° it continues solid, but at temperatures above this it becomes a colorless vapor, which whitens on contact with air. Dropped into water in small quantities it excites a hissing noise as if it were red-hot iron; in larger quantities it produces a species of explosion. It

is said to be convertible into ordinary sulphuric acid by the addition of a fifth of water. It dissolves sulphur, and assumes a blue, green, or brown color, according to the proportion of sulphur dissolved. The specific gravity of the black fuming sulphuric acid, prepared in large quantities from copperas at Nordhausen, is 1·896. Its constitution is not well ascertained.

The sulphuric acid made in Great Britain is produced by the combustion of sulphur. There are three conditions requisite in this operation. Oxygen must be present to maintain the combustion; the vessel must be so close as to prevent the escape of the volatile matter which rises, and water must be present to imbibe it. For these purposes a mixture of eight parts of sulphur with one of nitre is placed in a proper vessel, enclosed within a chamber of considerable size, lined on all sides with lead, and covered at bottom with a shallow stratum of water. The mixture being set on fire will burn for a considerable time by virtue of the supply of oxygen which nitre gives out when heated, and the water imbibing the sulphurous vapors becomes gradually more and more acid after repeated combustions, and the acid is afterward concentrated by distillation. Such was the account usually given of this operation till Clement and Desormes showed, in a very interesting memoir, its total inadequacy to account for the result. 100 parts of nitre, judiciously managed, will produce, with the requisite quantity of sulphur, 2000 parts of concentrated sulphuric acid. Now these contain 1200 parts of oxygen, while the 100 parts of nitre contain only thirty-nine and a half of oxygen; being not one-thirtieth part of what is afterwards found in the resulting sulphuric acid. But after the combustion of the sulphur the nitre is converted into sulphate and bisulphate of potassa, which mingled residuary salts contain nearly as much oxygen as the nitre originally did. Hence the origin of the 1200 parts of the oxygen in the sulphuric acid is still to be sought for. The following ingenious theory was first given by Clement and Desormes:—The burning sulphur, or sulphurous acid, taking from the nitre a portion of its oxygen, forms sulphuric acid, which unites with the potassa, and displaces a little nitrous and nitric acids in vapor. These vapors are decomposed by the sulphurous acid into nitrous gas, or deutoxide of azote. This gas, naturally little denser than air, and now expanded by the heat, suddenly rises to the roof of the chamber, and might be expected to escape at the aperture there which manufacturers were always obliged to leave open, otherwise they found the acidification would not proceed. But, the instant that nitrous gas comes in contact with atmospherical oxygen, nitrous acid vapor is formed, which, being a very heavy aëriform body, immediately precipitates on the sulphurous flame and converts it into sulphuric acid; while itself resuming the state of nitrous gas reascends for a new charge of oxygen, again to redescend and transfer it to the flaming sulphur. Thus we see that a small volume of nitrous vapor, by its alternate metamorphoses into the states of oxide and acid, and its consequent interchanges, may be capable of acidifying a great quantity of sulphur.

This beautiful theory received a modification from Sir H. Davy. He found that nitrous gas had no action on sulphurous gas, to convert it into sulphuric acid, unless water be present. With a small proportion of water, four volumes of sulphurous acid gas and three of nitrous gas are condensed into a crystalline solid, which is instantly decomposed by abundance of water; oil of vitriol is formed, and nitrous gas given off, which with contact of air becomes nitrous acid gas, as above described. The process continues, according to the same principle of combination and decomposition, till the water at the bottom of the chamber is become strongly acid. It is first concentrated in large leaden pans, and afterwards in glass retorts heated in a sand bath. Platinum alembics, placed within pots of cast-iron of a corresponding shape and capacity, have been lately substituted in many manufactories for glass, and have been found to save fuel and quicken the process of concentration.

The proper mode of burning the sulphur with the nitre, so as to produce the greatest quantity of oil of vitriol, is a problem concerning which chemists hold a variety of opinions. Thenard describes the following as the best:—Near one of the sides of the leaden chamber, and about a foot above its bottom, an iron plate, furnished with an upright border, is placed horizontally over a furnace, whose chimney passes across, under the bottom of the chamber, without having any connexion with it. On this plate, which is enclosed in a little chamber, the mixture of sulphur and nitre is laid. The whole being shut up, and the bottom of the large chamber covered with water, a gentle fire is kindled in the furnace. The sulphur soon takes fire, and gives birth to the products described. When the combustion is finished, which is seen through a little pane adapted to the trap-door of the chamber, this is opened, the sulphate of potassa is withdrawn, and is replaced by a mixture of sulphur and nitre. The air in the great chamber is meanwhile renewed by opening its lateral door and a valve in its opposite side. Then, after closing these openings, the furnace is lighted anew. Successive mixtures are thus burned, till the acid acquires a specific gravity of about 1·390, taking care never to put at once on the plate more sulphur than the air of the chamber can acidify. The acid is then withdrawn by stopcocks and concentrated.

The following details are extracted from a paper on sulphuric acid, which Dr. Ure published in the fourth volume of the Journal of Science and the Arts:—'The best commercial sulphuric acid that I have been able to meet with,' says he, 'contains from one-half to three-quarters of a part in the 100 of solid saline matter, foreign to its nature. These fractional parts consist of sulphate of potassa and lead, in the proportion of four of the former to one of the latter. I. is, I believe, difficult to manufacture it directly, by the usual methods, of a purer quality. The ordinary acid sold in the shops contains often three or four per cent. of saline matter. Even more is occasionally introduced, by the employment of nitre, to remove the brown color given to the acid by carbonaceous matter. The amount of these adulterations, whether acci-

dental or fraudulent, may be readily determined by evaporating, in a small capsule of porcelain, or rather platinum, a definite weight of the acid. The platinum cup placed on the red cinders of a common fire will give an exact result in five minutes. If more than five grains of matter remain from 500 of acid we may pronounce it sophisticated.

'Distillation is the mode by which pure oil of vitriol is obtained. This process is described in chemical treatises as both difficult and hazardous; but since adopting the following plan I have found it perfectly safe and convenient:—I take a plain glass retort, capable of holding from two to four quarts of water, and put into it about a pint measure of the sulphuric acid (and a few fragments of glass), connecting the retort with a large globular receiver, by means of a glass tube four feet long, and from one to two inches in diameter. The tube fits very loosely at both ends. The retort is placed over a charcoal fire. and the flame is made to play gently on its bottom. When the acid begins to boil smartly, sudden explosions of dense vapor rush forth from time to time, which would infallibly break small vessels. Here, however, these expansions are safely permitted, by the large capacity of the retort and receiver, as well as by the easy communication with the air at both ends of the adopter tube. Should the retort, indeed, be exposed to a great intensity of flame, the vapor will no doubt be generated with incoercible rapidity and break the apparatus. But this accident can proceed only from gross imprudence. It resembles, in suddenness, the explosion of gunpowder, and illustrates admirably Dr. Black's observation that, but for the great latent heat of steam, a mass of water, powerfully heated, would explode on reaching the boiling temperature. I have ascertained that the specific caloric of the vapor of sulphuric acid is very small, and hence the danger to which rash operators may be exposed during its distillation. Hence, also, it is unnecessary to surround the receiver with cold water, as when alcohol and most other liquids are distilled. Indeed the application of cold to the bottom of the receiver generally causes it, in the present operation, to crack. By the above method I have made the concentrated oil of vitriol flow over in a continuous slender stream, without the globe becoming sensibly hot.

'I have frequently boiled the distilled acid till only one-half remained in the retort; yet at the temperature of 60° Fahrenheit I have never found the specific gravity of acid so concentrated, to exceed 1·8455. It is, I believe, more exactly 1·8452. The number 1·850, which it has been the fashion to assign for the density of pure oil of vitriol, is undoubtedly very erroneous and ought to be corrected. Genuine commercial acid should never surpass 1·8485; when it is denser we may infer sophistication, or negligence, in the manufacture.'

The sulphuric acid strongly attracts water, which it takes from the atmosphere very rapidly, and in larger quantities, if suffered to remain in an open vessel, imbibing one-third of its weight in twenty-four hours, and more than six times its weight in a twelvemonth. If four parts by weight be mixed with one of water at 50° they produce an instantaneous heat of 300° Fahrenheit; and four parts raise one of ice to 212°: on the contrary, four parts of ice mixed with one of acid sink the thermometer to 4° below 0. When pure it is colorless and emits no fumes. It requires a great degree of cold to freeze it; and if diluted with half a part or more of water, unless the dilution be carried very far, it becomes more and more difficult to congeal; yet at the specific gravity of 1·78, or a few hundredths above or below this, it may be frozen by surrounding it with melting snow. Its congelation forms regular prismatic crystals with six sides. Its boiling point, according to Bergman, is 540°, according to Dalton 590°.

Pure sulphuric acid is without smell and color, and of an oily consistence. Its action on litmus is so strong that a single drop of acid will give to an immense quantity of water the power of reddening. It is a most violent caustic, and has sometimes been administered with the most criminal purposes. The person who unfortunately swallows it speedily dies in dreadful agonies and convulsions. Chalk, or common carbonate of magnesia, is the best antidote for this as well as for the strong nitric and muriatic acids. When transmitted through an ignited porcelain tube, of one-fifth of an inch diameter, it is resolved into two parts of sulphurous acid gas, and one of oxygen gas, with water. Voltaic electricity causes an evolution of sulphur at the negative pole; whilst a sulphate of the metallic wire is formed at the positive. Sulphuric acid has no action on oxygen gas or air. It merely abstracts their aqueous vapor.

If the oxygenised muriatic acid of Thenard be put in contact with the sulphate of silver there is immediately formed insoluble chloride, of silver and oxygenised sulphuric acid. To obtain sulphuric acid in the highest degree of oxygenation, it is merely necessary to pour barytes water into the above oxygenised acid, so as to precipitate only a part of it, leaving the rest in union with the whole of the oxygen. Oxygenised sulphuric acid partially reduces the oxide of silver, occasioning a strong effervescence.

All the simple combustibles decompose sulphuric acid with the assistance of heat. About 400° Fahrenheit sulphur converts sulphuric into sulphurous acid. Several metals at an elevated temperature decompose this acid, with evolution of sulphurous acid gas, oxidisement of the metal, and combination of the oxide with the undecomposed portion of the acid.

The sulphuric acid is of very extensive use in the art of chemistry, as well as in metallurgy, bleaching, and some of the processes for dyeing; in medicine it is given as a tonic and stimulant, and is sometimes used externally as a caustic. The combinations of this acid with the various bases are called sulphates, and most of them have long been known by various names. With barytes it is found native and nearly pure in various forms; in coarse powder, rounded masses, stalactites, and regular crystallisations, which are in some lamellar, in others needly, in others prismatic or pyramidal. This salt, if at all deleterious, is less so than the car-

bonate of barytes, and is more economical for preparing the muriate for medicinal purposes. It requires 43,000 parts of water to dissolve it at 60°.

Sulphate of strontian has a considerable resemblance to that of barytes in its properties. It is found native in considerable quantities at Aust Passage and other places in the neighbourhood of Bristol. It requires 3840 parts of boiling water to dissolve it. Its composition is 5 acid + 6·5 base.

The sulphate of potassa, vitriolated kali, formerly vitriolated tartar, sal de duobus, and arcanum duplicatum, crystallises in hexahedral prisms, terminated by hexagonal pyramids, but susceptible of variations. Its crystallisation by quick cooling is confused. Its taste is bitter, acrid, and a little saline. It is soluble in five parts of boiling water, and sixteen parts at 60°. In the fire it decrepitates, and is fusible by a strong heat. It is decomposable by charcoal at a high temperature. It may be prepared by direct mixture of its component parts; but the usual and cheapest mode is to neutralise the acidulous sulphate left after distilling nitric acid, the sal enixen of the old chemists, by the addition of carbonate of potassa. The sal polychrest of old dispensatories, made by deflagrating sulphur and nitre in a crucible, was a compound of the sulphate and sulphite of potassa. The acidulous sulphate is sometimes employed as a flux, and likewise in the manufacture of alum. In medicine, the neutral salt is sometimes used as a deobstruent, and in large doses as a mild cathartic; dissolved in a considerable portion of water, and taken daily in such quantity as to be gently aperient, it has been found serviceable in cutaneous affections, and is sold in London for this purpose as a nostrum; and certainly it deserves to be distinguished from the generality of quack-medicines, very few indeed of which can be taken without imminent hazard. It consists of 5 acid + 6 base; but there is a compound of the same constituents, in the proportion of 10 acid + 6 potassa, called the bisulphate.

The sulphate of soda is the vitriolated natron of the college, the well known Glauber's salt, or sal mirabile. It is commonly prepared from the residuum left after distilling muriatic acid, the superfluous acid of which may be saturated by the addition of soda, or precipitated by lime; and is likewise obtained in the manufacture of the muriate of ammonia. Scherer mentions another mode by Funcke, which is, making eight parts of calcined sulphate of lime, five of clay, and five of common salt, into a paste with water; burning this in a kiln; and then powdering, lixiviating, and crystallising. It exists in large quantities under the surface of the earth in some countries, as Persia, Bohemia, and Switzerland; is found mixed with other substances in mineral springs and sea water; and sometimes effloresces on walls. Sulphate of soda is bitter and saline to the taste. It is soluble in 2·85 parts of cold water, and 0·8 at a boiling heat. It crystallises in hexagonal prisms bevelled at the extremities, sometimes grooved longitudinally, and of very large size, when the quantity is great. These effloresce completely into a white powder if exposed to a dry air, or even if kept wrapped up in paper in a dry place; yet they retain sufficient water of crystallisation to undergo the aqueous fusion on exposure to heat; but, by urging the fire, melt. Barytes and strontian take their acid from it entirely, and potassa partially; the nitric and muriatic acids, though they have a weaker affinity for its base, combine with a part of it when digested on it. Heated with charcoal its acid is decomposed. As a purgative its use is very general; and it has been employed to furnish soda. Pajot des Charmes has made some experiments on it in fabricating glass; with sand alone it would not succeed, but equal parts of carbonate of lime, sand, and dried sulphate of soda, produced a clear, solid, pale, yellow glass. It is composed of 5 acid + 4 base + 11·25 water in crystals; when dry, the former two primes are its constituents. Sulphate of soda and sulphate of ammonia form together a triple salt.

Sulphate of lime, selenite, gypsum, plaster of Paris, or sometimes alabaster, forms extensive strata in various mountains. The specular gypsum, or glacies Mariæ, is a species of this salt, and affirmed by some French travellers to be employed in Russia, where it abounds, as a substitute for glass in windows. Its specific gravity is from 1·872 to 2·311. It requires 500 parts of cold water, and 450 of hot, to dissolve it. When calcined, it decrepitates, becomes very friable and white, and heats a little with water, with which it forms a solid mass. In this process it loses its water of crystallisation. In this state it is found native in Tyrol, crystallised in rectangular parallelopipeds, or octahedral or hexahedral prisms, and is called anhydrous sulphate of lime. Both the natural and artificial anhydrous sulphate consists of 56·3 lime, and 43·6 acid, according to Chenevix. The calcined sulphate is much employed for making casts of anatomical and ornamental figures; as one of the bases of stucco; as a fine cement for making close and strong joints between stone, and joining rims or tops of metal to glass; for making moulds for the Staffordshire potteries; for cornices, mouldings, and other ornaments in building. For these purposes, and for being wrought into columns, chimney-pieces, and various ornaments, about 800 tons are raised annually in Derbyshire, where it is called alabaster. In America it is laid on grass land as a manure. Ordinary crystallised gypsum consists of 5 sulphuric acid + 3·5 lime + 2·25 water; the anhydrous variety wants of course the last ingredient.

Sulphate of magnesia, the vitriolated magnesia of the late, and sal catharticus amarus of former London Pharmacopœias, is commonly known by the name of Epsom salt, as it was furnished in considerable quantity by the mineral water at that place, mixed, however, with a considerable portion of sulphate of soda. It is afforded, however, in greater abundance, and more pure, from the bittern left after the extraction of salt from sea water. It has likewise been found efflorescing on brick walls, both old and recently erected, and in small quantity in the ashes of coals. The capillary salt of Idria, found in silvery crystals mixed with the aluminous schist in the mines of

that place, and hitherto considered as a feathery alum, has been ascertained by Klaproth to consist of sulphate of magnesia, mixed with a small portion of sulphate of iron. When pure, it crystallises in small quadrangular prisms, terminated by quadrangular pyramids or dihedral summits. Its taste is cool and bitter. It is very soluble, requiring only an equal weight of cold water, and three-fourths its weight of hot. It effloresces in the air, though but slowly. If it attract moisture, it contains muriate of magnesia or of lime. Exposed to heat, it dissolves in its own water of crystallisation, and dries, but is not decomposed nor fused, but with extreme difficulty. It consists, according to Bergman, of 33 acid, 19 magnesia, 48 water. A very pure sulphate is said to be prepared in the neighbourhood of Genoa, by roasting a pyrites found there; exposing it to the air in a covered place for six months; watering it occasionally, and then lixiviating. Sulphate of magnesia is one of our most valuable purgatives; for which purpose only it is used, and for furnishing the carbonate of magnesia. It is composed of 5 acid + 2·5 magnesia + 7·875 water, in the state of crystals.

Sulphate of ammonia crystallises in slender, flattened, hexahedral prisms, terminated by hexagonal pyramids; it attracts a little moisture from very damp air, particularly if the acid be in excess; it dissolves in two parts of cold, and one of boiling, water. It is not used, though Glauber, who called it his secret ammoniacal salt, vaunted its excellence in assaying. It consists of 5 acid + 2·125 ammonia + 1·125 water in its most desiccated state; and in its crystalline state of 5 acid + 2·125 ammonia + 3·375 water. If sulphate of ammonia and sulphate of magnesia be added together in solution, they combine into a triple salt of an octahedral figure, but varying much; less soluble than either of its component parts; unalterable in the air; undergoing on the fire the watery fusion; after which it is decomposed, part of the ammonia flying off, and the remainder subliming with an excess of acid. It contains, according to Fourcroy, 68 sulphate of magnesia, and 32 sulphate of ammonia.

Sulphate of glucina crystallises with difficulty, its solution readily acquiring and retaining a syrupy consistence; its taste is sweet, and slightly astringent; it is not alterable in the air; a strong heat expels its acid, and leaves the earth pure; heated with charcoal, it forms a sulphuret; infusion of galls forms a yellowish-white precipitate with its solution.

Yttria is readily dissolved by sulphuric acid; and, as the solution goes on, the sulphate crystallises in small brilliant grains, which have a sweetish taste, but less so than sulphate of glucina, and are of a light amethyst-red color. They require thirty parts of cold water to dissolve them, and give up their acid when exposed to a high temperature. They are decomposed by oxalic acid, prussiate of potassa, infusion of galls, and phosphate of soda.

Sulphate of alumina in its pure state is but recently known, and it was first attentively examined by Vauquelin. It may be made by dissolving pure alumina in pure sulphuric acid, heating them for some time, evaporating the solution to dryness, drying the residuum with a pretty strong heat, redissolving it, and crystallising. Its crystals are soft, foliaceous, shining, and pearly; but these are not easily obtained without cautious evaporation and refrigeration. They have an astringent taste; are little alterable in the air; are pretty soluble, particularly in hot water; give out their acid on exposure to a high temperature; are decomposable by combustible substances, though not readily; and do not form a pyrophorus like alum. If the evaporation and desiccation directed above be omitted, the alumina will remain supersaturated with acid, as may be known by its taste, and by its reddening vegetable blue. This is still more difficult to crystallise than the neutral salt, and frequently thickens into a gelatinous mass. A compound of acidulous sulphate of alumina, with potassa or ammonia, has long been known by the name of alum.

Sulphate of zircon may be prepared by adding sulphuric acid to the earth recently precipitated, and not yet dry. It is sometimes in small needles, but commonly pulverulent; very friable; insipid; insoluble in water, unless it contain some acid; and easily decomposed by heat. Sulphuric acid is a powerful antiseptic and tonic: it is given, properly diluted, in the dose of from one to three drops with cinchona and other medicines in the cure of fevers and debilities, and it is often applied externally, when very much diluted, against psora and some chronic affections of the skin.

SULPHURIC ÆTHER, and SULPHURIC SALTS. See CHEMISTRY, Index.

SULPHUROPRUSSIC ACID. The sulphureted chyazic acid of Porrett. Dissolve in water one part of sulphuret of potassa, and boil it for a considerable time with three or four parts of powdered Prussian blue added at intervals. Sulphuret of iron is formed, and a colorless liquid containing the new acid combined with potassa, mixed with hyposulphate and sulphate of potassa. Render this liquid sensibly sour, by the addition of sulphuric acid. Continue the boiling for a little, and, when it cools, add a little peroxide of manganese in fine powder, which will give the liquid a fine crimson color. To the filtered liquid add a solution containing persulphate of copper, and protosulphate of iron, in the proportion of two of the former salt to three of the latter, until the crimson color disappears. Sulphuroprussiate of copper falls. Boil this with a solution of potassa, which will separate the copper. Distil the liquid mixed with sulphuric acid in a glass retort, and the peculiar acid will come over. By saturation with carbonate of barytes, and then throwing down this by the equivalent quantity of sulphuric acid, the sulphuroprussic acid is obtained pure. It is a transparent and colorless liquid, possessing a strong odor, somewhat resembling acetic acid. Its specific gravity is only 1·022. It dissolves a little sulphur at a boiling heat. It then blackens nitrate of silver; but the pure acid throws down the silver white. By repeated distillations sulphur is separated and the acid is decomposed.

SULPHUROUS. See SULPHUREOUS. Sulphurous is preferred to sulphureous by many modern chemists.

Sulphurous Acid. Sulphur burned at a low temperature absorbs less oxygen than it does when exposed to greater heat, and is consequently acidified in a slighter degree, so as to form sulphurous acid. This in the ordinary state of the atmosphere is a gas; but on reducing its temperature very low by artificial cold, and exposing it to strong compression, it becomes a liquid. To obtain it in the liquid state, however, for practical purposes, it is received into water, by which it is absorbed.

As the acid obtained by burning sulphur in this way is commonly mixed with more or less sulphuric acid, when sulphurous acid is wanted, it is commonly made by abstracting part of the oxygen from sulphuric acid by means of some combustible substance. Mercury or tin is usually preferred. For the purposes of manufactures, however, chopped straw or saw dust may be employed. If one part of mercury and two of concentrated sulphuric acid be put into a glass retort with a long neck, and heat applied till an effervescence is produced, the sulphurous acid will arise in the form of gas, and may be collected over quicksilver, or received into water which at the temperature of 61° will absorb thirty-three times its bulk, or nearly an eleventh of its weight. Water thus saturated is intensely acid to the taste, and has the smell of sulphur burning slowly. It destroys most vegetable colors, but the blues are reddened by it previous to their being discharged. A pleasing instance of its effect on colors may be exhibited by holding a red rose over the blue flame of a common match, by which the color will be discharged wherever the sulphurous acid comes into contact with it, so as to render it beautifully variegated, or entirely white. If it be then dipped into water, the redness after a time will be restored.

Sulphurous acid is used in bleaching, particularly for silks. It likewise discharges vegetable stains, and iron-moulds from linen. In combination with the salifiable bases, it forms sulphites, which differ from the sulphates in their properties. The alkaline sulphites are more soluble than the sulphates, the earthy less. They are converted into sulphates by an addition of oxygen, which they acquire even by exposure to the air.

SULPICIA, or Sulpitia, an ancient Roman poetess, who lived under the reign of Domitian, and has been so much admired as to be termed the Roman Sappho. We have nothing, however, left of her writings but a satire, or rather the fragment of one, against Domitian, who published a decree for the banishment of philosophers from Rome: which satire is to be found in Scaliger's Appendix Virgiliana. She is mentioned by Martial and Sidonius Appollinaris; and is said to have addressed a poem on conjugal love to her husband Calenus, a Roman knight.—Mart. Ep. 35.

SULPICIUS Severus. See Severus. He was contemporary with Rufinus and St. Jerome; the disciple of St. Martin of Tours, whose life he has written; and the friend of Paulinus bishop of Nola, with whom he held an intimate correspondence. The style of his Historia Sacra is elegant beyond the age he lived in.

SULTAN, *n. s.* Arab. *sooltan*. The Turkish emperor.

By this scimitar,
That won three fields of *sultan* Solyman.
Shakspeare.

I affirm the same of the *sultanry* of the Mamalukes, where slaves bought for money, and of unknown descent, reigned over families of freemen.
Bacon.

Turn the *sultana's* chambermaid. *Cleaveland.*
Lay the towering *sultanes* aside. *Irene.*

Sultan, or Soldan, is said by Vattier to be a Turkish word, and to signify king of kings; adding that it was first given to the Turkish princes Angrolipex and Masgud, about A. D. 1055; others will have it originally Persian, alleging, in proof hereof, an ancient medal of Cosroes; others derive it from soldanus, quasi solus dominus: others from the Hebrew שלט, schalet or sheleth, to rule. It had its rise under Mahmoud, son of Sebecteghin, the first emperor of the dynasty of the Gaznevides, towards the close of the fourth century of the era of the Hegira: when that prince going to Segestan to reduce Kalaf, governor of that province, who affected the sovereignty, Kalaf was no sooner advertised of his coming than he went out to meet him, delivered the keys of his fortress, and owned him his sultan, that is, his lord or commander. The title pleased Mahmoud so well that he assumed it ever afterwards; and from him it passed to his descendants, and to other Mahometan princes. It is chiefly confined to the Turkish and Persian monarchs.

SULTANIA, an ancient and considerable town of Persia, in Irac, built in the thirteenth century, on the ruins of the ancient Tigranocerta. It was often a royal residence, and was once one of the largest cities of Asia. It was taken and pillaged by Tamerlane; but he spared the edifices dedicated to religion. It has a magnificent mosque, and is fifty miles north-west of Casbin, and 225 or 250 N. N. W. of Ispahan.

SULTRY, *adj.* Imagined by Skinner to be corrupted from sulphury, or sweltry. But Sax. rol, like Lat. *sol*, is both heat and sun. Hot without ventilation; hot and close.

The *sultry* breath
Of tainted air had cloyed the jaws of death.
Sandys.

It is very *sultry* and hot. *Shakspeare. Hamlet.*

Such as, born beneath the burning sky
And *sultry* sun, betwixt the tropicks lie.
Dryden's Æneid.

Our foe advances on us,
And envies us even Lybia's *sultry* desarts.
Addison's Cato.

Then would *sultry* heats and a burning air have scorched and chapped the earth, and galled the animal tribes in houses or dens. *Cheyne.*

SULZER (John George), a celebrated philosopher, born at Winterthun, in Zurich, October 16th, 1720. He was the youngest of twenty-five children. His early education did not promise much, though it was by no means neglected. He made but a small progress in the learned languages, to prepare him for theology, for which his parents designed him. At sixteen, when he went to the academical school of Zurich, he had no notion of the sciences, nor any taste for study. The first incident that developed a hidden germ

of philosophical genius was his meeting with Wolfe's Metaphysics: this excited his taste for science; but he wanted a guide. The clergyman with whom he lodged was ignorant; and the academical prelections were as yet above the reach of his comprehension. On the other hand a sociable turn of mind led him often into company, where he lost much time in frivolous amusements, yet without corrupting his morals. The learned Gesner rendered Sulzer's inclination to study triumphant over his passion for amusement. Animated by the counsels and example of this worthy man, he applied himself to philosophy and mathematics with great ardor, and resumed the pursuit of Grecian literature and the Oriental languages. The contemplation of nature became his favorite passion. An ecclesiastical settlement in a rural scene that exhibited happy objects and occasions for this delightful study began to render his days happy and useful; and he published in 1741 Moral Contemplations of the Works of Nature; and in 1742 an account of a journey he had made through the Alps; which showed his knowledge of natural history, and the sensibility with which he surveyed the beauties of nature, and the grandeur and goodness of its Author. He afterwards became private tutor to a young gentleman at Magdeburg. This procured him the acquaintance of Messrs. Maupertuis, Euler, and Sack, which opened to his merit the path of preferment, and advanced him successively to the place of mathematical professor in the King's College at Berlin in 1747, and to that of member of the Royal Academy in 1750. In this last quality he distinguished himself in a very eminent manner, enriched the class of speculative philosophy with a great number of excellent memoirs, and was justly considered as one of the first-rate metaphysicians in Germany. But his genius was not confined to this branch of science. His Universal Theory of the Fine Arts is a valuable production. A profound knowledge of the arts and sciences, and a perfect acquaintance with true taste, are eminently displayed in this work. The first volume was published in 1771, and the second in 1774. His Remarks on the Philosophical Essays of the late Mr. Hume is a work of real merit, which does justice to the acuteness, while it often detects the sophistry, of the British Bayle. The moral character of M. Sulzer was amiable and virtuous; and his virtues were animated by that sacred philosophy that forms the Christian, ennobles man, and is the only source of that heart-felt serenity and sedate fortitude which support humanity when every other object of confidence fails. His dying moments were calm, humble, and sublime. He had no enemy; and his friends were numerous, affectionate, and worthy of the tender returns he made them. Frederick the Great of Prussia distinguished him by repeated marks of munificence and favor, though he had never seen him before 1777. Sulzer died in 1779.

SUM, *n. s.* & *v. a.* } Lat. *summa;* Fr. *somme.*
SUM'LESS, *adj.* } The whole; many particulars aggregated; compendium; amount; height; completion; abridgment: to compute; comprise; comprehend: in falconry, to have full grown plumage: the adjective corresponds.

The high priest may *sum* the silver brought in.
2 *Kings* xxii.

How precious are thy thoughts unto me, O God! how great is the *sum* of them! *Psalm* cxxxix. 17.

We may as well conclude so of every sentence, as of the whole *sum* and body thereof. *Hooker.*

This, in effect, is the *sum* and substance of that which they bring by way of opposition against those orders which we have common with the church of Rome. *Id.*

You cast the' event of war,
And *summed* the' account of war.
Shakspeare. Henry IV.

I did send to you
For certain *sums* of gold, which you denied me.
Shakspeare.

Make his chronicle as rich with prize,
As is the ouzy bottom of the sea
With sunken wreck and *sumless* treasuries.
Id. Henry V.

In sickness, time will seem longer without a clock than with it; for the mind doth value every moment, and then the hour doth rather *sum* up the moments than divide the day. *Bacon.*

This having learned, thou hast attained the *sum*
Of wisdom. *Milton.*

So lovely fair!
That what seemed fair in all the world, seemed now
Mean, or in her *summed* up, in her contained. *Id.*
With prosperous wing full *summed.* *Id.*
A *sumless* journey of incorporeal speed. *Id.*

To conclude, by *summing* up what I would say concerning what I have, and what I have not been; in the following paper I shall not deny that I pretended not to write an accurate treatise of colours, but an occasional essay. *Boyle.*

I appeal to the readers, whether the *sum* of what I have said be not this. *Tillotson.*

SUMATRA, a large island in the eastern seas, obliquely divided by the equator into almost equal parts, is situated the most to the west of all the Sunda chain. Its northern point stretches into the Bay of Bengal; its south-west coast is exposed to the great Indian Ocean; towards the south-east it is separated by the Straits of Sunda from the island of Java; on the east by the China and Eastern Seas from Borneo and other islands; and on the north-east by the straits of Malacca from the Malay Peninsula. In length it may be estimated at 1050 miles, by 165 miles the average breadth. Among the eastern people generally, and the better informed of the natives, this island is known by the names of Pulo Purichu and Indalas; the origin of the name Sumatra is uncertain. By Marco Polo it is called Java Minor.

A chain of mountains runs through its whole extent, the range being in some parts double and triple; but, in general, much nearer the western than the eastern shore. Its distance from the sea on the former side is seldom more than twenty miles, but on the latter a level country intervenes of at least 150 miles in the broadest part. The height of these mountains is not sufficient to cause them to be covered with snow during any part of the year. The highest point visible from the sea is Mount Ophir, which is situated nearly under the equator, and is stated by Marsden to be 13,842 feet high. Many other points are also very elevated, and the summit of a volcano, south of Mount Ophir, is said,

by the same writer, to be 12,465 feet above the sea. Between these ridges there are extensive plains of considerable height, which render the air cool, and make them the most desirable parts of the island. They are consequently the best peopled, and the most cleared from woods, which, in other parts, cover both hill and valley with perpetual shade. Many large and beautiful lakes are interspersed amid these mountains, which greatly facilitate the intercourse between the adjacent districts. These are represented as of great extent, but of uncertain situation, as the accounts are merely derived from the natives, who have not the means of correctly determining their positions. One in the Lampong country, towards the southern extremity of the island, is navigated by large boats with sails, and is said to require a day and a night to cross it; but it is not said at what season. Few parts of the world, indeed, are better supplied with water. Numerous streams descend from the interior to the coasts, and water the intervening regions. From the proximity of the elevated tracts, those on the west are too small and rapid for the purposes of navigation, but those on the opposite side of the island, flowing through a much wider space, accumulate a great number of subsidiary streams, and acquire a more equable and gentle current before they reach the sea. They are therefore navigable for many miles from the coast; but the entrance of most of them is impeded by sand banks thrown up by the violent surf that continually beats against the shore. The same cause also compels many of them to run nearly parallel to the coast before they mingle their waters with the sea.

As to the *climate* of this island, Mr. Marsden observes, 'The heat of the air is by no means so intense as might be expected, in a country occupying the middle of the torrid zone. It is more temperate than in many regions within the tropics, the thermometer at the most sultry hour, which is about two in the afternoon, generally fluctuating between 82° and 85°. I do not recollect to have ever seen it higher than 86° in the shade, at Fort Marlborough; although at Natal, in lat. 24′ N., it is not unfrequently at 87° and 88°. At sun-rise it is usually as low as 70°; the sensation of cold, however, is much greater than this would seem to indicate, as it occasions shivering and a chattering of the teeth; doubtless from the great relaxation of the body and openness of the pores in that climate; for the same temperature in England would be esteemed a considerable degree of warmth. These observations on the state of the air apply only to the districts near the sea coast, where, from their comparatively low situation, and the greater compression of the atmosphere, the sun's rays operate more powerfully. Inland as the country ascends, the degree of heat decreases rapidly, insomuch that, beyond the first range of hills, the inhabitants find it expedient to light fires in the morning, and continue them till the day is advanced, for the purpose of warming themselves; a practice unknown in other parts of the island; and in the journal of lieutenant Dare's expedition it appears that, during one night's halt on the summit of a mountain, in the rainy season, he lost several of his party from the severity of the weather, whilst the thermometer was not lower than 40°. The atmosphere is in common more cloudy than in Europe, which is sensibly perceived, from the unfrequency of clear star-light nights. This may proceed from the great rarefaction of the air occasioning the clouds to descend lower, and become more opaque, or merely from the stronger heat exhaling from the land and sea a thicker and more plentiful vapor. The fog, called kabut by the natives, which is observed to rise every morning among the distant hills, is dense to a surprising degree; the extremities of it, even when near at hand, being perfectly defined; and it is seldom observed to disperse till about three hours after sun-rise.' Thunder and lightning are so common here that they scarcely attract the attention of persons who have been long resident: but during the north-west monsoon the explosions are extremely violent. The sky frequently seems on fire, and the agitation of the ground resembles a slight earthquake. In the opposite monsoon the lightning is more constant, but the coruscations are less vivid, and the thunder more feeble. Some variation takes place in the monsoon in the different parts of the archipelago, as well as on the opposite coasts of the Indian peninsula. On the west side of Sumatra, and south of the equator, the south-east monsoon, or dry season, commences in May, and declines in September. The wind sets in from the opposite quarter in November, and the heavy rains cease in March. Variable wind and weather occupy the intermediate periods. In both this and the other countries within the tropics, the land and sea breezes alternately prevail, and contribute greatly towards mitigating the intensity of the solar rays.

The *soil* is in general a black mould upon a substratum of red clay, which produces an exuberance of vegetation; and what would be one of the most productive countries on the globe, if properly cultivated, naturally becomes an impervious forest. Rice is the staple product of agriculture, and the crops are often very abundant. According to the historian of Sumatra the return is frequently a hundred-fold. Nearly all the vegetables and animals of the torrid zone are to be found in this island, which also abounds in minerals and fossil treasures. It has in all ages been noted for its gold, besides which there are copper, iron, tin, and sulphur, saltpetre, and coals, with other fossils. Petrifactions, and all the substances ejected by volcanoes, are also met with, and coral reefs are formed in many places off the coast. The English settlement at Bencoolen, or Fort Marlborough, is near the western shore, in 3° of S. lat. Belonging to the residency at Bencoolen are a number of districts chiefly inhabited by the tribe of Sumatrans called Rejang, who are a peaceable and inoffensive race. These tracts are devoted to the growth of pepper, of which they yield about 1000 tons annually. The culture of the clove and nutmeg has also been introduced.

Acheen, or Achin, the most celebrated native kingdom of the island, occupies the north-west extremity of the island. See Acheen. It is the only one whose political importance has been thought sufficient to render its transactions the

subject of general history. Acheen the capital is situated on a plain near the banks of a river, about a league from the sea.

Among the *productions* of Sumatra which are regarded as articles of commerce, the most abundant, and formerly the most important, was pepper, of which the East India Company used to export large quantities, but it is now reduced to one solitary cargo annually of the value of about £15,000. The white pepper is made by bleaching the grains of the common sort, by which it is deprived of its exterior pellicle. This article takes little damage by submersion in sea water. On the capture of the Moluccas, in 1796, nutmeg and clove plants were introduced, and have since rapidly increased. There are now, according to major Hamilton, above 20,000 nutmeg trees in full bearing, capable of yielding annually 200,000 lbs. and 56,000 lbs. of mace. Among the most valuable productions of the island is camphor, for which Sumatra and Borneo have been celebrated from the earliest times. The tree is sometimes fifteen feet in circumference, the camphor being found in a concrete state in the natural fissures and crevices of the wood. The natives cut down a great many trees at random before they find one that contains a sufficient quantity to repay their labor, although always assisted in their research by a professional conjurer, whose skill must be chiefly employed in concealing or accounting for his own mistakes. The whole quantity brought for sale rarely exceeds fifty peculs ($133\frac{1}{3}$ lbs. each). The trade is chiefly in the hands of the Acheenese, who buy the article from the Batta people, and dispose of it to the Europeans and Chinese. The Japan camphor is of a very inferior quality.

Benzoin, or benjamin, is found almost exclusively in the Batta country. The best is sent to Europe, and the inferior sort is exported to Arabia, Persia, and some parts of Hindostan, where it is burned to perfume their temples and private houses. From England it is re-exported to the Roman Catholic and Mahometan countries, to be used as incense. It is also employed in medicine as a styptic. Cassia is also produced and exported, and rattans furnish annually many cargoes. The annual and the shrub cotton are cultivated by the natives, but only in sufficient quantities to supply their own wants. The silk cotton is a most beautiful raw material, but owing to the shortness and brittleness of the staple is unfit for the reel and the loom, and is only applied to the unworthy purposes of stuffing pillows and mattresses. The coffee tree is universally planted, but the berry is not of a good quality, probably owing to the want of skill in the management. Among the other articles of commerce are dammer, a species of turpentine or resin; dragons' blood, a drug obtained from a large species of rattan; gambir, a juice extracted from the leaves of a plant of the same name. Lignum aloes, or agila wood, highly prized in the east for its fragrant scent while burning.

The forests contain an inexhaustible store and endless variety of timber trees, many sorts of which are capable of being applied to shipbuilding; but the teak does not appear to be indigenous to the island, although it flourishes to the northward and southward, in Pegu and Java. The other remarkable trees are the poon, so named from a Malay word, which signifies wood in general, and is preferred for masts and spars. The camphor wood is used for carpenters' purposes. The iron wood so named on account of its hardness. The marbau, used as beams for ships and houses. The pinaga, valuable as crooked timber from frames and knees. The ebony; the kayu gadis, a wood possessing the flavor and qualities of sassafras; the rangi, supposed to be the manchineel tree of the West Indies, has a resemblance to mahogany. Of the various sorts of trees producing dammer, some are also valuable as timber, and here also is found the spreading banyan tree of Hindostan.

In the central parts of the island gold is procured, and Menancabow has always been esteemed the richest in this metal. In the districts inland from Padang, which is the principal mart, it is collected from mines, and from the channels of rivers; pieces of gold have also occasionally been found, weighing nine ounces and upwards. Probably only one-half of all the gold procured reaches the hands of Europeans; yet it is asserted, on good authority, that from 10,000 to 12,000 ounces have been annually received at Padang alone, at Nalaboo 2000, at Natal 800, and at Mocomoco 600. The merchants carry the gold from the interior to the sea coast, where they barter it for iron and iron working tools, opium, and the fine piece goods of Madras and Bengal. When bought at the settlements, it used formerly to be purchased at the rate of £3 5*s.* per ounce, but afterwards rose to £3 18*s.*, which would yield no profit on exportation to Europe. In many parts of the country it is employed instead of coin, every man carrying a small pair of scales about with him. At Acheen small thin gold coins were formerly struck, but the coinage has been abandoned in modern times. Silver is not known as a production of Sumatra. Tin is a considerable article of trade, the mines of which are situated on the island of Banca. Iron ore is dug on Sumatra, but not in large quantities, the consumption of the natives being supplied with English and Swedish bar iron. Sulphur is procured from the volcanoes, and yellow arsenic is an article of traffic. In the country of Kuttaun are extensive caves, from the soil of which saltpetre is extracted; and from similar caverns the edible bird nests are procured for the China market, where also the biche de mar is sent, and is there employed as a seasoning. At Batavia the last article sells for forty-five dollars per pecul of $133\frac{1}{3}$ lbs. The other exports are bees' wax, gum lac, and ivory. Elephants were formerly exported from Acheen to the Coromandel coast, in vessels built on purpose, but this trade has long declined.

The most general articles of import, says Mr. Hamilton, are the following. From the coast of Coromandel various cotton goods, such as long cloth, blue and white chintzes, colored handkerchiefs, and also salt. From Bengal muslins, striped and plain; and several kinds of cotton

goods, as baftaes, cossaes, hummums, &c., taffetas and some other silks, and opium in considerable quantities. From the western coast of India various cotton goods, mostly of a coarse fabric. From China coarse porcelain, iron pans in sets of different sizes, tobacco shred very fine, gold threads, fans, and a number of small articles. From Celebes (known here by the name of its chief provinces, Macassar, Buggess, and Mandar), Java, Bally, Ceram, and other eastern islands, the rough striped cotton cloth, commonly called Buggess clouting, the universal body dress of the natives; creeses, and other weapons; silken creese belts, tudongs, or hats, small pieces of ordnance, commonly of brass, called rantaka, spices, salt of a large grain, and sometimes rice, chiefly from Bali. From Europe are imported silver, iron, steel, lead, cutlery, various sorts of hardware, brass wire, and broad cloths, especially scarlet.

'The beautiful gold and silver filagree work of Sumatra has long been celebrated and admired, and is a matter of still greater curiosity from the extreme coarseness of the tools employed in the manufacture. From a piece of old iron hoop the wire drawing instrument is made, a hammer head stuck in a block serves for an anvil; and a pair of compasses is seen composed of two old nails tied together at one end. The gold is fused in a piece of a rice pot; in general they use no bellows, but blow the fire with their mouths through a joint of bamboo. If the quantity of gold to be melted be considerable, three or four persons sit around their furnace, which is an old iron pot, and blow altogether. But little skill is shown by the natives in forging iron. They make nails, although seldom used in building They are ignorant of the use of the saw, except where it has been introduced by the Europeans. Painting and drawing they are strangers to; in carving they are fanciful, and their designs grotesque, and always out of nature. Silk and cotton cloths manufactured by themselves are worn by the natives in all parts of the country. Their looms and weaving apparatus are extremely defective. They manufacture different kinds of earthenware of a coarse fabric; and extract the cocoa nut oil, which is in general use. Gunpowder is manufactured in various parts of the island, but less in the southern provinces than among the people of Menancabow, the Battas, and the Acheenese, whose frequent wars demand large supplies. The powder is very imperfectly granulated, being often hastily prepared in small quantities for immediate use. Salt is mostly supplied by cargoes imported, but they also manufacture it themselves by a very tedious process.'

Among the modern political divisions of the island, the principal are the empire of Menancabow and the Malays; in the next place, the Acheenese; then the Battas, the Rejangs, and next to them the people of Lampong. The chain of islands which extends in a line nearly parallel to the western coast, at the distance of little more than a degree, are inhabited by a race, or races of people, apparently from the same original stock as those of the interior of Sumatra. Their genuineness of character has been preserved to a remarkable degree, whilst the islands on the eastern side are uniformly peopled with Malays. Until about 100 years ago the southern coast of Sumatra, as far as the Urei River, was dependant on the king of Bantam in Java, whose lieutenant came yearly to Bencoolen, or Sillebar, to collect pepper, and fill up the vacancies. Almost all the forms of government throughout Sumatra are a mixture of the feudal and patriarchal; but the system of government among the people near the sea coast is much influenced by the power of the Europeans. The districts over which the East India Company's influence extends are preserved in a state of uninterrupted peace, and, were it not for this coercion, every village would be in a state of perpetual hostility with its neighbour. The form of government among the Rejangs applies generally to the Orang ulu, or inhabitants of the interior. Among the hills and woods property in land depends upon occupancy, unless where fruit trees have been planted; and, as there is seldom any determined boundary between neighbouring villages, such marks are rarely disturbed.

The Sumatran laws are properly a set of long established customs handed down to them from their ancestors, the authority for which is founded in usage and general consent. The law which renders all the members of a family reciprocally bound for each other's debts, forms a strong connexion among them. When a man dies, his effects descend to his children in equal shares. The Sumatran code admits of a pecuniary compensation for murder, on which account their laws take no cognisance of the distinction between a wilful murder and what we term manslaughter. Corporeal punishment of any kind is rare. The place of the greatest solemnity for administering an oath is the burying ground of their ancestors; and they have certain reliques, or swearing apparatus, which they produce on important occasions. These generally consist of an old broken creese, a broken gun barrel, some copper bullets, or any thing else to which chance or caprice has annexed the idea of extraordinary virtue. These they generally dip in water, which the person who swears drinks off, after pronouncing a form of words. At Manna the relique most venerated is a gun barrel, which, when produced to be sworn on, is carried to the spot wrapt up in silk, and under an umbrella. The Sumatran impressed with the idea of invisible powers, but not of his own immortality, regards with awe the supposed instruments of their agency, and swears on creeses, bullets, and gun barrels, weapons of personal destruction.

Slavery is established in this island, as it is universally throughout the east; yet but few instances occur of the country people actually having slaves, although they are common in the Malayan or sea-port towns. At Bencoolen the East India Company have a body of negro slaves. These hold the natives of the island in great contempt, have an antipathy to them, and enjoy any occasion of doing them mischief; the Sumatrans, on the other hand, consider the negroes merely as devils half humanized.

The *inhabitants* are rather below the middle size; their limbs are, for the most part, slight,

but well shaped, and are particularly small at the wrists and ancles. The women follow the preposterous custom of flattening the noses and compressing the skulls of children newly born, and also pull out the ears of the infants to make them stand at an angle with the head. The males destroy their beards, and keep their chins remarkably smooth. Their complexion is properly yellow, wanting the red tinge that constitutes a tawny or copper color. The females of the upper classes, not exposed to the rays of the sun, approach to a degree of fairness. Persons of superior rank encourage the growth of their hand nails to an extraordinary length; the hands of the natives generally, and even those of the half breed, are always cold. The inland natives are superior in size and strength to the Malays on the coast, and possess also fairer complexions. Among the hills the inhabitants are subject to monstrous wens, or goitres on the throat. Both sexes have the extraordinary custom of filing and disfiguring their teeth, which are naturally very white and beautiful, from the simplicity of their food. Many, particularly the women of the Lampong country, have their teeth rubbed down even with their gums; others have them formed into points, while some file off no more than the outer extremities, and then blacken them with the empyreumatic oil of the cocoa nut shell. The great men set their teeth in gold, by casing with a plate of that metal the under row; which ornament, contrasted with the black dye, has by candle light a very splendid effect. It is sometimes indented to the shape of their teeth, but more usually is quite plain, and it is not removed either to sleep or eat. The original clothing of the Sumatrans is the same with that found by navigators among the South Sea Islands, and in Europe generally called Otaheitan cloth. It is still used among the Rejangs as their working dress, but the country people now conform to the costume of the Malays.

The dusuns, or villages for the inhabitants, are so few that they are not entitled to the name of towns, are always situated on the banks of a river or lake, for the convenience of bathing and of transporting goods. Their buildings are of wood and bamboos, covered with palm leaves. The frames of the houses rest on stout wooden pillars, about six or eight feet in height, and are ascended to by a piece of stout bamboo cut into notches. Detached buildings in the country are raised ten or twelve feet from the ground, as security against tigers. The furniture is extremely simple, and neither knives nor forks are required, as in eating they take up the rice and other victuals between the thumb and fingers, and throw it into the mouth by the action of the thumb. The art of medicine here consists almost entirely in the application of simples. Every old man and woman is a physician, and their rewards depend on their success, but they generally procure a small sum in advance, under the pretext of purchasing charms. In fevers, during the paroxysm, they pour over the patient a quantity of very cold water, which afterwards brings on a copious perspiration. The venereal disease, although common in the Malay bazars, is little known in the interior.

On the sea-coast the Malay language is intermixed with the Batta and other original languages. The Malays fix the length of the year at 354 days, or twelve lunar months of twenty-nine days and a half each; the original Sumatrans count their years from the number of their crops of grain. They are fond of music, and have many instruments, mostly borrowed from the Chinese. The Malays of Sumatra use the Arabic character, and have incorporated a great many Arabic, and also Portuguese words, in their language. The other principal languages of Sumatra are the Batta, the Rejang, and the Lampong; the difference between them being chiefly marked by their being expressed in distinct written characters. They write on the inner bark of a tree, and on bamboos, and form their lines from their left hand towards the right. The native Sumatran of the interior differs in some respects from the Malay of the coast, being mild, peaceable, and forbearing, unless when roused by violent provocation. He is temperate and sober, his diet being mostly vegetable, and his only beverage water. Their hospitality is very great with very simple manners; and they are in general, except among the chiefs, devoid of the Malay cunning and chicane. On the other hand they are litigious, indolent, and addicted to gaming, dishonest in their dealings with strangers, which they consider as no moral defect, regardless of truth, mean, servile; and, though cleanly in their persons, filthy in their apparel, which they never wash. They are careless and improvident of the future, and make no advances in improving their condition. The Macassars and Buggesses, who come annually from Celebes in their prows to trade at Sumatra, are looked up to by the Sumatrans and Malays as their superiors in manners. They also derive part of the respect paid to them from the richness of their cargoes, and the spirit with which they spend the produce in gaming, cock fighting, and smoking opium. Through every rank of the people there prevails a strong propensity to gaming, and to cock-fighting they are still more passionately addicted. The artificial spur used resembles the blade of a scimitar, and proves a more destructive weapon than the European spur. The Malay breed of cocks are much esteemed by connoisseurs who have had an opportunity of trying them. In some places they match quails in the manner of cocks, which fight with great inveteracy, and endeavour to seize each other by the tongue.

The Sumatrans generally, but more particularly the Malays, are much addicted to the custom of smoking opium. The poppy which produces it not growing on the island, it is annually imported from Bengal in considerable quantities, in chests of 140 lbs. each, and on the west coast about 20,000 lbs. are used annually. It is mixed up with tobacco into the form of pills about the size of a pea, which quantity is consumed at one whiff. The smoke is never emitted by the mouth, but usually receives vent through the nostrils, and sometimes by adepts through the passages of the ears and eyes. Although so much opium is smoked in this island, the practice of running a muck (called by the natives mangamok) is by no means fre-

quent. It is remarkable that at Batavia, where the criminals are broken on the wheel with every aggravation of cruelty, mucks or deadly affrays often occur; while at Bencoolen, where they are executed in the easiest manner, the offence is extremely rare. On the west coast the Malays have been so long accustomed to the mild government of the British, that their manners and habits are considerably improved; while on the east coast they continue ferocious, sanguinary, and treacherous. The original Sumatran vessel for boiling rice, and which is still used for that purpose, is a joint of green bamboo. By the time the rice is dressed, the utensil is nearly destroyed by the fire; but it resists the flame so long as there is no moisture within. Although the natives subsist in a great measure on vegetable food, they are not restrained by any prejudice of caste from other aliments; and accordingly, at their entertainments, the flesh of the buffalo, the goat, and fowls, are served up. Their dishes are almost all dressed as curries, and their flesh meat is cooked immediately after it is killed, which is still warm. Sago, although common, is not in such general use as among the more eastern islands, where it is employed as a substitute for rice. When these articles of subsistence fail, the Sumatran finds others in the woods; hence famines in the island are never attended with any very destructive consequences.

The natives are in general good speakers, the gift of oratory seeming natural to them. A Sumatran ever scrupulously abstains from pronouncing his own name, not from any motive of superstition, but merely as a punctilio in manners: and it occasions him infinite embarrassment when a stranger, unacquainted with their customs, requires it of him. As soon as he recovers from his confusion, he solicits the interposition of his neighbour. They can seldom give an accurate account of their age; but, so far as can be inferred from observation, not a great proportion of the men attain the age of fifty, and sixty is accounted a long life.

If by *religion* is meant a public or private form of worship of any kind, and of prayers, processions, meetings; offerings, images, or priests, are all or any of them necessary to constitute it; the Rejangs, that race of Sumatrans with which we are most acquainted, are totally without religion, and cannot with propriety be even termed pagans, if that phrase is understood to convey the idea of mistaken worship. They neither worship God, devil, nor idol. They are not, however, without superstitious beliefs of many kinds; and have a confused notion, though perhaps derived from their intercourse with other people, of some superior beings, who have the power of rendering themselves visible and invisible at pleasure. These they call orang alus, fine or impalpable beings, and regard them as possessing the faculty of doing them good or evil. They also call them maleikat and jin, which are the angels and evil spirits of the Arabians, and the idea was probably borrowed at the same time with the name. They have no word in their language to express the person of God except the 'Allah tala' of the Malays, corrupted by them to 'Ulah talo.' The Sumatrans, where untinctured with Mahometanism, do not appear to have any notion of a future state. Where Mahometanism prevails boys are circumcised between the sixth and tenth year.

The superstition which has the strongest influence on their minds, and which approaches the nearest to a species of religion, is that which leads them to venerate, almost to the point of worshipping, the tombs and manes of their deceased ancestors. They have an imperfect notion of a metempsychosis, but not in any degree systematic, nor considered as an article of religious faith. They seem to think in general that tigers are actuated by the spirits of deceased men, and speak of them with a degree of awe. They relate stories also of a place in the interior country, where the tigers have a court, and maintain a regular form of government, and have their houses thatched with women's hair. The Sumatrans are also firmly persuaded, that various particular persons are what they term betuah (sacred impassive, invulnerable and not liable to accident); and this quality they extend to things inanimate, such as ships and boats.

Few attempts have ever been made by missionaries, or others, to convert the inhabitants of this island to Christianity. Of the many thousands baptised in the Eastern Isles by the celebrated Francis Xavier, in the sixteenth century, not one of their descendants are now found to retain a ray of the light imparted to them. As it was novelty only, and not conviction, that induced the original converts to embrace a new faith, the impression lasted no longer than the sentiment which recommended it, and disappeared as rapidly as the missionary. Under the influence, however, of the Spanish government at Manilla, and of the Dutch at Batavia, there are many native Christians educated as such from their childhood. The neglect of missions to Sumatra is one of the causes that the interior of the country is so little known. From various sources of information, sufficiently distinct from each other, the conclusion may be drawn, that the Mahometan religion had not made any considerable progress in the interior of Sumatra earlier than the fourteenth century. The province of Menancabow, although situated inland, is by far the most completely converted, the inhabitants being wholly Mahometans. Perhaps it is less surprising that this one kingdom should have been completely converted than that so many districts should remain to this day without any religion whatever. Every thing conspires to induce the Sumatran to embrace a system of belief, and scheme of instruction, in which there is nothing repugnant to prejudices already imbibed; he relinquishes no favorite ancient worship to adopt a new, and is manifestly a gainer by the exchange.

SUMBHAWA, a large island of the eastern seas, situated between 8° and 9° S. lat., separated from Lombhook by the Straits of Allass; in length it may be estimated at 180 miles, by forty the average breadth. It is deeply indented near the middle, by an extensive bay, which almost divides it into two portions.

This island contains the petty states of Bima, Dompo, Tambora, Sangar, Papikat, and Sumb-

hawa. Their chiefs were either the allies of, or under the protection of the Dutch East India Company; and were all sufficiently obedient, except the last, which was refractory, being instigated thereto by the Macassars and Wadjorese of Celebes, who resort in great numbers to this island, especially the latter. Country ships here procure articles of trade for the China market; and, in 1778, sapan wood to the amount of 580,000 lbs. weight was exported from this island, and sold in Holland. The Dutch trade to Sumbhawa was under the superintendance of the Macassar residency.

Bima is at the east end of Sumbhawa, and comprehends under its jurisdiction the Straits of Sapy, the whole of Manjeray, and the island of Goonong Api. The Bima language extends over the east part of Sumbhawa, and the western portion of the Island of Ende, denominated Floris by the early Portuguese navigators. The dialect of Sumbhawa, which prevails in the districts not subject to the sultan of Bima, is of a more mixed character than that of Bima. Neither the latter, nor the Sumbhawa, have any peculiar character, but use indifferently the Buggess or Malay characters. Stavorinus and Notes, Leyden, Hamilton.

SUMBHOONAUTH, a town and temple in the Ghoorkhali territories, in Nepaul, in lat. 27° 33′ N., long. 85° 38′ E. The temple is a very ancient edifice, having been erected when Nepaul was subject to the Tibet race, who, having been expelled by the Newars, obtained the name of Khat Bhooteas (or Bhooteas of Catmandoo), which they preserve: at present they occupy the Kutchar mountains. The possession of the temple is claimed by the Delai lama (the sovereign pontiff of Lehassa), as a dependency on his spirituality. Upon the rupture which took place some years ago between the Tibetians and Nepaul, the lama's vicar was obliged to evacuate the sanctuary, which was afterwards held on the part of the Deb rajah of Bootan. The temple principally visited by the Bootias and Bahauras is on the terrace of a hill, and is distinguished at a great distance by its spires covered with plates of copper, highly gilt. It is chiefly celebrated for its perpetual fire, the priests asserting that the flame of the two largest lamp wicks have been preserved from time immemorial.

SUMBHULPOOR, or Sambhalpura, a town and district in the province of Gundwana, situated between the twenty-first and twenty-second parallels of N. lat. This territory takes its name from the capital, but the rajah is styled Rajah Autaraghur, or the rajah of eighteen forts. It is bounded on the west by the district of Ruttunpoor and Boora Shumbur; to the east by Bimbera, Landacoli, and Boad; to the south by Patna and Coondon; and on the north by Gangpoor and Sirgoojah. The air is very unwholesome, owing to the quantity of jungle. The soil in the valleys is a rich loam, in which grain or pulse thrive; and in the mountains gold and diamonds are found. The natives, in washing the sand of the rills that descend from them, procure considerable quantities of gold. The diamonds are found about thirteen miles beyond Sumbhulpoor, near the junction of the Hebe with the Mahanuddy. At this place, after the rains, the natives find the diamonds in the red earth of the river Hebe. The matrix is a clay, which appears burned red, nearly to the degree bricks usually are.

SUM'MARY, *adj.* & *n. s.* } Fr. *sommaire*; or
Sum'marily, *adv.* } from Sum. Short; brief; compendious: a compendium or abstract: the adverb corresponding.

The decalogue of Moses declareth *summarily* those things which we ought to do; the prayer of our Lord, whatsoever we should request or desire. *Hooker.*

We are enforced from our most quiet sphere
By the rough torrent of occasion;
And have the *summary* of all our griefs,
When time shall serve, to show in articles.
Shakspeare. Henry IV.

When the parties proceed *summarily*, and they chuse the ordinary way of proceeding, the cause is made plenary. *Ayliffe.*

In that comprehensive *summary* of our duty to God, there is no express mention thereof. *Rogers.*

The judge
Directed them to mind their brief,
Nor spend their time to shew their reading;
She'd have a *summary* proceeding. *Swift.*

SUM'MER, *n. s.*, *v. n.*, & } Saxon pumep;
Sum'merhouse, *n. s.* [*v. a.* } Belg. *somer*; Goth. *sumar*. The season in which the sun arrives at the hither solstice: to pass the summer: to keep warm: a summerhouse is a garden apartment used chiefly in summer.

He was sitting in a *summer* parlour. *Judges* iii. 20.

The fowls shall *summer* upon them, and all the beasts shall winter upon them. *Isaiah* xviii. 6.

Can't such things be,
And overcome us like a *summer's* cloud,
Without our special wonder? *Shakspeare. Macbeth.*

Maids well *summered*, and warm kept, are like flies at Bartholomew-tide, blind, though they have their eyes. *Shakspeare.*

I'd rather live
With cheese and garlick, in a windmill, far
Than feed on cates, and have him talk to me,
In any *summerhouse* in Christendom.
Id. Henry IV.

In all the liveries decked of *summer's* pride. *Milton.*

Dry weather is best for most *summer* corn. *Mortimer.*

The dazzling roofs,
Resplendent as the blaze of *summer* noon,
Or the pale radiance of the midnight moon. *Pope.*

With here a fountain, never to be played,
And there a *summerhouse* that knows no shade. *Id.*

Child of the sun,
See sultry *summer* comes. *Thomson.*

Sum'mer, *n. s.* (*Trabs summaria*). The principal beams of a floor.

Oak, and the like true hearty timber, may be better trusted in cross and transverse works for *summers*, or girders, or binding beams. *Wotton.*

Summer, one of the quarters of the year, when the year is divided into four quarters, or one-half when the year is divided only into summer and winter. In the former case, summer is the quarter during which, in northern climates, the sun passes through the signs Cancer, Leo, Virgo, or from the time of the greatest

declination, till the sun come to the equinoctial again, or have no declination; which is from about the 21st of June till about the 22d of September. In the latter case, summer contains the six warmer months, while the sun is on one side of the equinoctial; and winter the other six months, when the sun is on the other side of it. See METEOROLOGY.

SUMMER FALLOWING, in agriculture, a term applied to the process or practice of frequently ploughing and working over arable land at this season, with the view of clearing it of weeds. It is chiefly had recourse to for crops of the wheat kinds, but sometimes for those of the barley, turnip, and some other sorts, which require a fine mouldy clean state of the more superficial parts of the soil. Sir H. Davy in his Agricultural Chemistry has supposed that the chemical theory of summer-fallowing is very simple. It affords, it is said, no new source of riches to the soil or land; it merely tends to produce an accumulation of decomposing matter, which in the common course of crops would be employed as it is formed; and that it is scarcely possible to imagine a single instance of a cultivated soil, which can be supposed to remain in summer-fallow for a year with advantage to the farmer. The only cases where this practice can be beneficial, it is said, seem to be those in which it may be used for the destruction of weeds, and for cleansing such soils as are in a foul condition. In this ancient practice, which is still extensively made use of, the soil or mouldy surface earth is much exposed to the air, and submitted to different processes, which are purely of a mechanical nature. It is thought that the benefits arising from fallows, or fallowings, have been much overrated; that a summer-fallow, fallowing, or a clean fallow, may sometimes be necessary on lands overgrown with weeds, especially if they be lands which cannot be pared and burnt with advantage; but that it is certainly unprofitable as a part of a general system in husbandry or management of land.

It has been supposed, it is said, by some writers, that certain principles necessary to fertility are derived from the atmosphere, which are exhausted by a succession of crops; and that these are again supplied during the repose of the land, and the exposure of the pulverised or broken down parts of the soil to the influence of the air; but that this, in truth, is not the case. The earths commonly found in soils cannot, it is said, be combined with more oxygen; none of them unite with azote; and such of them as are capable of attracting carbonic acid are always saturated with it in those soils on which the practice of summer-fallowing is adopted. The vague ancient opinion of the use of nitre, and of nitrous salts, in vegetation seems, it is said, to have been one of the principal speculative reasons for the defence of summer-fallows or fallowings. Nitrous salts are produced, it is said, during the exposure of soils containing vegetable and animal remains, and in the greatest abundance in hot weather; but that it is probably by the combination of azote from these remains with oxygen in the atmosphere, that the acid is formed; and at the expense of an element which otherwise would have formed ammonia; the compounds of which are evidently much more efficacious than the nitrous compounds in assisting vegetation.

It is further noticed, on the subject, that when weeds are buried in the soil, by their gradual decomposition they furnish a certain quantity of soluble matter; but that it may be doubted whether there is as much useful manure in the land at the end of a clean fallow, or fallowing, as at the time the vegetables clothing the surface were first ploughed in. Carbonic acid gas is formed during the whole time by the action of the vegetable matter upon the oxygen of the air, and the greater part of it is lost to the soil in which it was formed, being dissipated in the atmosphere. The action of the sun, too, upon the surface of the soil or land tends, it is said, to disengage the gaseous and the volatile fluid matters that it contains; and heat increases the rapidity of fermentation; and, in the summer-fallow or fallowing, nourishment is rapidly produced, at a time when no vegetables are present capable of absorbing or drinking it up, by which much waste is the consequence.

It is justly concluded that land, when it is not employed in preparing food for animals, should be applied to the purpose of the preparation of manure for plants; which is effected by means of green crops, in consequence of the absorption of carbonaceous matter in the carbonic acid of the atmosphere. But that in a summer's fallow, or fallowing, a period is constantly lost, in which vegetables may be raised, either as food for animals, or as nourishment for the next crop; and that the texture of the soil or land is not so much improved by its exposure then as in the winter season, when the expansive powers of frost and ice, the gradual dissolution of snows, and the alternations from wet to dry, tend to pulverize and reduce it, and to blend its different parts together more fully. From these facts and circumstances it is evident that the practice of summer-fallowing should be had recourse to as little as possible by the farmer, as there is obviously much waste and loss by it in other ways than by the length of time the land lies idle and unproductive.

SUM'MERSAULT, *n. s.* } Fr. *soubresault.*
SUM'MERSET. } A high leap, in which the heels are thrown over the head.

And if at first he fail, his second *summersault*
He instantly assays. *Drayton.*
Some do the *summersault*,
And o'er the bar like tumblers vault. *Hudibras.*
Frogs are observed to use divers *summersaults.* *Walton.*

The treasurer cuts a caper on the strait rope: I have seen him do the *summerset* upon a trencher fixed on the rope, which is no thicker than a common packthread. *Swift.*

SUM'MIT, *n. s.* Lat. *summitas.* The top, the utmost height.

Have I fall'n or no?
—From the dread *summit* of this chalky bourn!
Look up a-height, the shrill-gorged lark so far
Cannot be seen or heard. *Shakspeare. King Lear.*

Ætna's heat, that makes the *summit* glow,
Enriches all the vales below. *Swift.*

SUM'MON, *v. a.* } Lat. *summoneo.* To call
SUMMONER, *n. s.* } with authority; admonish
SUMMONS. } to appear; cite; call up; excite: a summoner is he who cites or summons: summons, the call or admonition made; citation; authoritative call.

Catesby, sound lord Hastings,
And *summon* him to-morrow to the Tower.
Shakspeare. Richard III.

Close pent up guilts,
Rive your concealing continents, and ask
These dreadful *summoners* grace. *Id. King Lear.*

When the blast of war blows in our ears,
Stiffen the sinews, *summon* up the blood.
Id. Henry V.

The tirsan is assisted by the governor of the city where the feast is celebrated, and all the persons of both sexes are *summoned* to attend. *Bacon.*

He sent to *summon* the seditious, and to offer pardon; but neither *summons* nor pardon was any thing regarded. *Hayward.*

The course of method *summoneth* me to discourse of the inhabitants. *Grew's Survey of Cornwall.*

The sons of light
Hasted, resorting to the *summons* high,
And took their seats. *Milton's Paradise Lost.*

This *summons*, as he resolved unfit either to dispute or disobey, so could he not, without much violence to his inclinations, submit unto. *Fell.*

We are *summoned* in to profess repentance and amendment of all our sins. *Kettlewell.*

Nor trumpets *summon* him to war,
Nor drums disturb his morning sleep. *Dryden.*

Love, duty, safety, *summon* us away;
'Tis nature's voice, and nature we obey. *Pope.*

SUMOROKOF (Alexander), the founder of the Russian theatre, was the son of Peter Sumorokof, a Russian nobleman, born in Moscow, November 14th, 1527. He began his studies in his father's house; and afterwards received a liberal education at Petersburg, where he gave early proofs of a genius for poetry. On leaving the seminary of cadets, he was appointed adjutant, first to count Colovkin, next to count Rosomouski; and soon after was patronised by John count Shuvalof, the Mæcenas of Russia, who introduced him to the empress Elizabeth. In 1756 he wrote his celebrated tragedy of Koref; which was first acted by some of his fellow cadets, who had previously performed a play of Racine's. The empress, hearing of this dramatic phenomenon, expressed a desire to see it. It was accordingly performed in her presence; and the author and actors were highly applauded. This encouraged Sumorokof to proceed in his dramatic career; and he produced, in succession, the tragedies of, 1. Hamlet; 2. Aristona; 3. Sinaf and Truvor; 4. Zemira; 5. Dimisa; 6. Vitshelaf; 7. The False Demetrius; and 8. Micislaf. He was equally fertile in comedy; and published, 9. Trisotinus; 10. The Judge; 11. The Dispute between Husband and Wife; 12. The Guardian; 13. The Portion acquired by Fraud; 14. The Envious Man; 15. Tartuffe; 16. The Imaginary Cuckold; 17. The Mother who Rivals her Daughter; 18. The Gossip; and, 19. The Three Royal Brothers. Mean time the empress Elizabeth rewarded his exertions, by raising him to the rank of a brigadier, appointing him director of the Russian theatre, and settling upon him a pension of £4000 a year. Catherine II. also honored and rewarded him: created him a counsellor of state, and conferred on him the order of St. Anne. He also attempted every species of poetry, except the epic; wrote two operas, viz. Alcestes, and Cephalus and Procris; and three historical tracts, viz. 1. A Chronicle of Moscow; 2. A History of the First Insurrection of the Strelitz, in 1682, by which prince John was appointed joint sovereign with Peter the Great, and the princess Sophia regent: and, 3. An Account of Stenko Razin's Rebellion. He died at Moscow, October 1st, 1777, aged nearly fifty-one.

SUMP, in metallurgy, a round pit of stone, lined with clay within, for receiving the metal on its first fusion from the ore.

SUMPH, in mining, denotes a pit sunk down in the bottom of the mine, to cut or prove the lode still deeper than before; and in order to slope and dig it away if necessary; and also to drive on the lode in depth. The sumph principally serves as a basin or reservoir to collect the water of a mine together, that it may be cleaned out by an engine or machine.

SUMP'TER, *n. s.* Fr. *sommier*; Ital. *somaro.* A horse that carries the clothes or furniture.

Return with her!
Persuade me rather to be a slave and *sumpter*
To this detested groom. *Id. King Lear.*

With full force his deadly bow he bent,
And feathered fates among the mules and *sumpter* sent. *Dryden.*

Sumpter mules, bred of large Flanders mares. *Mortimer.*

SUMP'TION, *n. s.* Lat. *sumptus.* The act of taking. Not in use.

The *sumption* of the mysteries does all in a capable subject. *Taylor.*

SUMP'TUOUS, *adj.* } Latin, *sumptuosus, sumptus.* Costly; expensive; splendid: sumptuary is, relating to expense; regulating cost: sumptuosity, costliness: the adverb and noun substantive following agree with sumptuous.
SUMP'TUARY,
SUMPTUOS'ITY, *n. s.*
SUMP'TUOUSLY, *adv.*
SUMP'TUOUSNESS, *n. s.*

We see how most Christians stood then affected, how joyful they were to behold the *sumptuous* stateliness of houses built unto God's glory. *Hooker.*

This monument five hundred years hath stood,
Which I have *sumptuously* re-edified.
Shakspeare. Titus Andronicus.

He added *sumptuosity*, invented jewels of gold and stone, and some engines for the war. *Raleigh.*

To remove that material cause of sedition, which is want and poverty in the estate, serveth the opening and well balancing of trade, the banishing of idleness, the repressing of waste and excess by *sumptuary* laws. *Bacon.*

I will not fall out with those that can reconcile *sumptuousness* and charity. *Boyle.*

Ethelwold, bishop of Winchester, in a famine, sold all the rich vessels and ornaments of the church, to relieve the poor with bread; and said, There was no reason that the dead temples of God should be *sumptuously* furnished, and the living temples suffer penury. *Id. Apophthegms.*

We are too magnificent and *sumptuous* in out tables and attendance. *Atterbury.*

SUMPTUARY LAWS, leges sumptuariæ, are laws made to restrain excess in apparel, costly furni-

ture, eating, &c. Most ages and nations have had their sumptuary laws; and some retain them still. But it is observed that no laws are worse executed than sumptuary laws. Political writers have been much divided in opinion with respect to the utility of these laws to a state. Montesquieu observes that luxury is necessary in monarchies, as in France, but ruinous to democracies, as in Holland. With regard to England, whose government is compounded of both species, it may still be a dubious question, says judge Blackstone, how far private luxury is a public evil, and as such cognisable by public laws. The sumptuary laws of that ancient Locrian legislator Zaleucus are famous: by these it was ordained that no woman should go attended by more than one maid in the street, except she were drunk: that she should not go out of the city in the night, unless she went to commit fornication: that she should not wear any gold or embroidered apparel, unless she proposed to be a common strumpet; and that men should not wear rings or tissues except when they went a whoring, &c. Among the Romans, the sumptuary laws were very numerous: by the Lex Orchia, the number of guests at feasts was limited, though without any limitation of the charges: by the Fannian law, made twenty-two years afterwards, it was enacted that more than ten asses should not be spent at any ordinary feast: for the solemn feasts, as the Saturnalia, &c., 100 asses were allowed; ten of which, Gellius informs us, was the price of a sheep, and 100 of an ox. By the Didian law, which was preferred eighteen years after, it was decreed that the former sumptuary laws should be in force, not only in Rome, but throughout all Italy; and that for every transgression, not only the master of the feast, but all the guests too should be liable to the penalty. The English have had their share of sumptuary laws, chiefly made in the reigns of Edward III., Edward IV., and Henry VIII., against shoes with long points, short doublets, and long coats; all repealed by stat. 1 Jac. I. c. 25. As to excess in diet, there remains still one law unrepealed. Under king Henry IV., Camden tells us, pride was got so much into the foot that it was proclaimed that no man should wear shoes above six inches broad at the toes. And their other garments were so short that it was enacted, 25 Edward IV., that no person under the condition of a lord should, from that time, wear any mantle or gown, unless of such length, that it might reach below his waist.

SUMY, a large town of European Russia, in the government of Charkov, on the Psol. It is surrounded with a wall and ditch, and defended by an old citadel. Chiefly built of wood and wretchedly paved; it still contains several excellent charitable institutions, and public depôts and warehouses. It is the chief place of a circle, and agriculture, tillage, or pasturage, forms the chief employment of the inhabitants; for the only manufacture is the distilling of spirits. The traffic is considerable, but confined in a great measure to four annual fairs, which a number both of Greek and Russian merchants attend. Inhabitants 11,000. Ninety miles north-west of Charkov.

SUN, *n. s.* & *v. a.*, SUN'BEAM, *n. s.*, SUN'BEAT, *adj.*, SUN'BRIGHT, SUN'BURNING, *n.s.*, SUN'BURNT, *adj.*, SUN'DAY, *n. s.*, SUN'LESS, *adj.*, SUN'LIKE, SUN'NY, SUN'RISE, *n. s.*, SUN'RISING, SUN'SET, SUN'SHINE, SUN'SHINY, *adj.* Sax. ronna; Goth. *sunno*; Swed. *son*; Teut. *sonne*; Belg. *zon*. The luminary of day; a place particularly warmed by the sun; any thing eminently splendid or great: 'under the sun' is, in this world: to sun is to expose to, or warm in the sun: Sunday is treated of at large below: sunless is wanting sun or warmth: sunny, resembling the sun; bright as sunbeams; exposed to or colored by the sun: the other compounds are of obvious meaning.

There is no new thing *under the sun*.
Ecclesiasticus i. 9.

Doth beauty keep which never *sun* can burn,
Nor storms do turn? *Sidney.*

The fruitful-headed beast amazed
At flashing beams of that *sunshiny* shield,
Became stark blind, and all his senses dazed,
That down he tumbled. *Spenser.*

She saw Duessa *sunny* bright,
Adorned with gold and jewels shining clear. *Id.*

Gathering up himself out of the mire,
With his uneven wings did fiercely fall
Upon his *sunbright* shield. *Id.*

The cry to shady delve him brought at last,
Where Mammon earst did *sun* his treasury. *Id.*

Her *sunny* locks
Hang on her temples like a golden fleece.
Shakspeare.

Bid her steal into the pleached bower,
Where honey-suckles, ripened by the *sun*,
Forbid the *sun* to enter. *Id.*

An' she were not kin to me, she would be as fair on Friday as Helen is on Sunday.
Id. Troilus and Cressida.

The Roman eagle, winged
From the spongy south to this part of the west,
Vanished in the *sunbeams*. *Id. Cymbeline.*

My decayed fair
A *sunny* look of his would soon repair. *Shakspeare.*

If thou canst love a fellow of this temper, Kate, whose face is not worth *sunburning*, let thine eye be thy cook. *Id.*

Now would I have thee to my tutor,
How and which way I may bestow myself,
To be regarded in her *sunbright* eye. *Id.*

When the *sun* sets the air doth drizzle dew;
But for the *sunset* of my brother's son
It rains downright. *Id.*

Send out a pursuivant
To Stanley's regiment; bid him bring his power
Before *sun-rising*. *Id. Richard III.*

That man that sits within a monarch's heart,
And ripens in the *sunshine* of his favour,
Would he abuse the countenance of the king,
Alack, what mischiefs might be set abroach,
In shadow of such greatness! *Id. Henry IV.*

In those days the giants of Libanus mastered all nations, from the *sunrising* to the *sunset*.
Raleigh's History.

The stars are of greater use than for men to gaze on after *sun-set*. *Raleigh.*

I will never consent to put out the *sun* of sovereignty to posterity, and all succeeding kings.
King Charles.

He had been many years in that *sunshine*, when a new comet appeared in court. *Clarendon.*

Where such radiant lights have shone,
No wonder if her cheeks be grown
Sunburnt with lustre of her own. *Cleaveland.*

I that in his absence
Blazed like a star of the first magnitude,
Now in his brighter *sunshine* am not seen.
Denham's Sophy.

High in the midst exalted as a God,
The' apostate in his *sunbright* chariot sat,
Idol of majesty divine! inclosed
With flaming cherubims and golden shields. *Milton.*

Sun, Sol, ☉. See Astronomy, Index. The sun is certainly that celestial body which of all others should most attract our attention. It has accordingly employed much of the time and meditation, not only of the astronomer, but also of the speculative philosopher, in all ages of the world; and many hypotheses have been formed, and some discoveries made respecting the nature and the uses of this vast luminary. Sir Isaac Newton has shown that the sun, by its attractive power, retains the planets of our system in their orbits: he has also pointed out the method whereby the quantity of matter which it contains may be accurately determined. Dr. Bradley has assigned the velocity of the solar light with a degree of precision exceeding our utmost expectation. Galileo, Scheiner, Hevelius, Cassini, and others, have ascertained the rotation of the sun upon its axis, and determined the position of its equator. By means of the transit of Venus over the disk of the sun, mathematicians have calculated its distance from the earth, its real diameter and magnitude, the density of the matter of which it is composed, and the fall of heavy bodies on its surface. We have therefore a very clear notion of the vast importance and powerful influence of the sun on its planetary system; but, with regard to its internal construction, we are yet extremely ignorant. Many ingenious conjectures have indeed been formed on the subject; a few of which we shall mention as an introduction to Dr. Herschel's, of which, as it is the latest, and perhaps the most plausible, we shall give a pretty full account, nearly in his own words. The dark spots in the sun, for instance, have been supposed to be solid bodies revolving very near its surface. They have been conjectured to be the smoke of volcanoes, or the scum floating upon an ocean of fluid matter. They have also been taken for clouds. They were explained to be opaque masses swimming on the fluid matter of the sun, dipping down occasionally. It has been supposed that a fiery liquid surrounded the sun, and that, by its ebbing and flowing, the highest parts of it were occasionally uncovered, and appeared under the shape of dark spots; and that, by the return of the fiery liquid, they were again covered, and in that manner successively assumed different phases. The sun itself has been supposed to be a globe of fire. The waste it would undergo by a gradual consumption, on the supposition of its being ignited, has been ingeniously calculated; and in the same point of view its immense power of heating the bodies of such comets as draw very near to it has been assigned. In 1779 there was a spot on the sun which was large enough to be seen with the naked eye. By a view of it with a seven feet reflector, charged with a very high power, it appeared to be divided into two parts. The largest of the two, on the 19th of April, measured 1′ 8·06″ in diameter, which is equal in length to more than 31,000 miles. Both together must certainly have extended above 50,000. 'The idea of its being occasioned by a volcanic explosion violently driving away a fiery fluid, ought to be rejected,' says Dr. Herschel, 'on many accounts. To mention only one, the great extent of the spot is very unfavorable to such a suppostion. Indeed a much less violent and less pernicious cause may account for all the appearances of the spot. When we see a dark belt near the equator of the planet Jupiter, we do not recur to earthquakes and volcanoes for its origin. An atmosphere, with its natural changes, will explain such belts. Our spot on the sun may be accounted for on the same principles. The earth is surrounded by an atmosphere composed of various elastic fluids. The sun also has its atmosphere; and, if some of the fluids which enter into its composition should be of a shining brilliancy, in the manner that will be explained hereafter, while others are merely transparent, any temporary cause which may remove the lucid fluid, will permit us to see the body of the sun through the transparent ones. If an observer were placed on the moon, he would see the solid body of the earth only in those places where the transparent fluids of our atmosphere would permit him. In others, the opaque vapors would reflect the light of the sun without permitting his view to penetrate to the surface of our globe. He would probably also find that our planet had occasionally some shining fluids in its atmosphere: as, not unlikely, some of our northern lights might not escape his notice, if they happened in the unenlightened part of the earth, and were seen by him in his long dark night. Nay, we have pretty good reason to believe, that probably all the planets emit light in some degree; for the illumination which remains on the moon in a total eclipse cannot be entirely ascribed to the light which may reach it by the refraction of the earth's atmosphere. For instance, in the eclipse of the moon October 22d, 1790, the rays of the sun refracted by the atmosphere of the earth towards the moon, admitting the mean horizontal refraction to be 30′ 50·8″, would meet in a focus 189,000 miles beyond the moon; so that consequently there could be no illumination from rays refracted by our atmosphere. It is, however, not improbable that about the polar regions of the earth there may be refraction enough to bring some of the solar rays to a shorter focus. The distance of the moon at the time of the eclipse would require a refraction of 54′ 6″, equal to its horizontal parallax at that time, to bring them to a focus so as to throw light on the moon. The unenlightened part of the planet Venus has also been seen by different persons; and, not having a satellite, those regions that are turned from the sun cannot possibly shine by a borrowed light; so that this faint illumination must denote some phosphoric quality of the atmosphere of Venus.'

In the instance of the large spot on the sun

already mentioned, Dr. Herschell concludes from appearances, that he viewed the real body of the sun itself, of which we rarely see more than its shining atmosphere. In 1783 he observed a fine large spot, and followed it up to the edge of the sun's limb. Here he took notice that the spot was plainly depressed below the surface of the sun, and that it had very broad shelving sides. He also suspected some part, at least, of the shelving sides to be elevated above the surface of the sun; and observed that, contrary to what usually happens, the margin of that side of the spot which was farthest from the limb was the broadest. The luminous shelving side of a spot may be explained by a gentle and gradual removal of the shining fluid, which permits us to see the globe of the sun. As to the uncommon appearance of the broadest margin being on that side of the spot which was farthest from the limb when the spot came near the edge of it, we may surmise that the sun has inequalities on its surface, which may possibly be the cause of it. For, when mountainous countries are exposed, if it should chance that the highest parts of the landscape are situated so as to be near that side of the margin or penumbra of the spot which is towards the limb, they may partly intercept our view of it when the spot is seen very obliquely. This would require elevations at least 500 or 600 miles high; but, considering the great attraction exerted by the sun upon bodies at its surface, and the slow revolution it has upon its axis, we may readily admit inequalities to that amount. From the centrifugal force at the sun's equator, and the weight of bodies at its surface, he computes that the power of throwing down a mountain by the exertion of the former, balanced by the superior force of keeping it in its place of the latter, is nearly six times and a half less on the sun than on our equatorial regions; and, as an elevation similar to one of three miles on the earth would not be less than 334 miles on the sun, there can be no doubt but that a mountain much higher would stand very firmly. The little density of the solar body seems also to be in favor of the height of its mountains; for, cæteris paribus, dense bodies will sooner come to their level than rare ones. The difference in the vanishing of the shelving side, instead of explaining it by mountains, may also, and perhaps more satisfactorily, be accounted for from the real difference of the extent, the arrangement, the height, and the intensity of the shining fluid, added to the occasional changes that may happen in these particulars during the time in which the spot approaches to the edge of the disk. However, by admitting large mountains on the face of the sun, we shall account for the different opinions of two eminent astronomers; one of whom believed the spots depressed below the surface of the sun, while the other believed them elevated above it. For it is not impossible that some of the solar mountains may be high enough occasionally to project above the shining elastic fluid, when, by some agitation or other cause, it is not of the usual height: and this opinion is much strengthened by the return of some remarkable spots which served Cassini to ascertain the period of the sun's rotation. A very high country, or chain of mountains, may oftener become visible, by the removal of the obstructing fluid, than the lower regions, on account of its not being so deeply covered with it. In 1791 the doctor examined a large spot on the sun, and found it evidently depressed below the level of the surface. In 1792 he examined the sun with several powers from ninety to 500, when it appeared evident, that the black spots are the opaque ground, or body of the sun; and that the luminous part is an atmosphere, which, being interrupted or broken, gives us a transient glimpse of the sun itself. He perceived, likewise, that the shining surface of the sun is unequal, many parts of it being elevated and others depressed; and that the elevations, to which Hevelius gave the name of faculæ, so far from resembling torches, were rather like the shrivelled elevations upon a dried apple, extended in length, and most of them joined together, making waves or waving lines. The faculæ being elevations, very satisfactorily explains the reason why they disappear towards the middle of the sun, and reappear on the other margin; for, about the place where we lose them, they begin to be edgewise to our view; and, if between the faculæ should lie dark spots, they will most frequently break out in the middle of the sun, because they are no longer covered by the side views of these faculæ. The doctor gives a very particular account of all his observations, which seem to have been accurately made, and we need scarcely add with excellent telescopes. For that account, however, we must refer to the memoir itself, and hasten to lay before our readers the result of his observations.

'That the sun,' says he, 'has a very extensive atmosphere, cannot be doubted; and that this atmosphere consists of various elastic fluids, that are more or less lucid and transparent, and of which the lucid one is that which furnishes us with light, seems also to be fully established by all the phenomena of its spots, of the faculæ, and of the lucid surface itself. There is no kind of variety in these appearances but what may be accounted for with the greatest facility, from the continual agitation which, we may easily conceive, must take place in the regions of such extensive elastic fluids. It will be necessary, however, to be a little more particular as to the manner in which I suppose the lucid fluid of the sun to be generated in its atmosphere. An analogy that may be drawn from the generation of clouds in our own atmosphere, seems to be a very proper one, and full of instruction. Our clouds are probably decompositions of some of the elastic fluids of the atmosphere itself, when such natural causes, as in this grand chemical laboratory are generally at work, act upon them: we may therefore admit that in the very extensive atmosphere of the sun, from causes of the same nature, similar phenomena will take place; but with this difference, that the continual and very extensive decompositions of the elastic fluids of the sun are of a phosphoric nature, and attended with lucid appearances, by giving out light. If it should be objected, that such violent and unremitting decompositions would exhaust the sun, we may recur again to

our analogy, which will furnish us with the following reflections.—The extent of our own atmosphere, we see, is still preserved, notwithstanding the copious decompositions of its fluids in clouds and falling rain; in flashes of lightening; in meteors, and other luminous phenomena; because there are fresh supplies of elastic vapors continually ascending to make good the waste occasioned by these decompositions. But it may be urged that the case with the decomposition of the elastic fluids in the solar atmosphere would be very different, since light is emitted, and does not return to the sun, as clouds do to the earth when they descend in showers of rain. To which I answer, that, in the decomposition of phosphoric fluids, every other ingredient but light may also return to the body of the sun. And that the emission of light must waste the sun is not a difficulty that can be opposed to our hypothesis; for as it is an evident fact that the sun does emit light, the same objection, if it could be one, would equally militate against every other assignable way to account for the phenomenon. There are, moreover, considerations that may lessen the pressure of this alleged difficulty. We know the exceeding subtilty of light to be such, that in ages of time its emanation from the sun cannot very sensibly lessen the size of this great body. To this may be added, that very possibly there may always be ways of restoration to compensate for what is lost by the emission of light, though the manner in which this can be brought about should not appear to us. Many of the operations of nature are carried on in her great laboratory which we cannot comprehend; but now and then we see some of the tools with which she is at work. We need not wonder that their construction should be so singular as to induce us to confess our ignorance of the method of employing them; but we may rest assured that they are not a mere lusus naturæ.' Here he alludes to the great number of small telescopic comets; which he supposes, as others had done before him, may be employed to restore to the sun what had been lost by the emission of light. 'My hypothesis, however,' continues he, 'does not lay me under any obligation to explain how the sun can sustain the waste of light, nor to show that it will sustain it for ever; and I should also remark that, as in the analogy of generating clouds, I merely allude to their production as owing to a decomposition of some of the elastic fluids of our atmosphere, that analogy, which firmly rests upon the fact, will not be less to my purpose, to whatever cause these clouds may owe their origin. It is the same with the lucid clouds, if I may so call them, of the sun. They plainly exist, because we see them; the manner of their being generated may remain an hypothesis—and mine, till a better can be proposed, may stand good; but, whether it does or not, the consequences I am going to draw from what has been said, will not be affected by it.' Before he proceeds to draw these consequences, he informs us that, according to the above theory, a dark spot in the sun is a place in its atmosphere, which happens to be free from luminous decompositions; that faculæ are, on the contrary, more copious mixtures of such fluids as decompose each other; and that the regions in which the luminous solar clouds are formed, adding thereto the elevation of the faculæ, cannot be less than 1843, nor much more than 2765 miles in depth. It is true, continues he, that in our atmosphere the extent of the clouds is limited to a very narrow compass; but we ought rather to compare the solar ones to the luminous decompositions which take place in our aurora borealis, or luminous arches, which extend much farther than the cloudy regions. The density of the luminous solar clouds, though very great, may not be exceedingly more so than that of our aurora borealis. For if we consider what would be the brilliancy of a space 2000 or 3000 miles deep, filled with such coruscations as we see now and then in our atmosphere, their apparent intensity, when viewed at the distance of the sun, might not be much inferior to that of the lucid solar fluid. From the luminous atmosphere of the sun, he proceeds to its opaque body; which, by calculation from the power it exerts upon the planets, we know to be of great solidity; and from the phenomena of the dark spots, many of which, probably on account of their high situations, have been repeatedly seen, and otherwise denote inequalities in their level, we surmise that its surface is diversified with mountains and valleys. What has been said enables us to come to some very important conclusions, by remarking that this way of considering the sun and its atmosphere removes the great dissimilarity we have hitherto been used to find between its condition and that of the rest of the great bodies of the solar system. The sun, viewed thus, appears to be nothing else than a very eminent, large, and lucid planet, evidently the first, or, in strictness of speaking, the only primary one of our system, all others being truly secondary to it. Its similarity to the other globes of the solar system with regard to its solidity, its atmosphere, and its diversified surface, the rotation upon its axis, and the fall of heavy bodies, leads us on to suppose that it is most probably also inhabited, like the rest of the planets, by beings whose organs are adapted to the peculiar circumstances of that vast globe. It may, however, not be amiss to remove a certain difficulty, which arises from the effect of the sun's rays upon our globe. The heat which is here, at the distance of 95,000,000 miles, produced by these rays, is so considerable that it may be objected, that the surface of the globe of the sun itself must be scorched up beyond all conception. This may be very substantially answered by many proofs drawn from natural philosophy, which show that heat is produced by the sun's rays only when they act upon a calorific medium; they are the cause of the production of heat, by uniting with the matter of fire which is contained in the substances that are heated; as the collision of flint and steel will inflame a magazine of gunpowder, by putting all the latent fire it contains into action. But an instance or two of the manner in which the solar rays produce their effect will bring this home to our most common experience. On the tops of mountains of a sufficient height, at an altitude where clouds can very seldom reach to shelter them from the direct rays

of the sun, we always find regions of ice and snow. Now, if the solar rays themselves conveyed all the heat we find on this globe, it ought to be hottest where their course is least interrupted. Again, our aëronauts all confirm the coldness of the upper regions of the atmosphere; and since, therefore, even on our earth, the heat of any situation depends upon the aptness of the medium to yield to the impression of the solar rays, we have only to admit that, on the sun itself, the elastic fluids composing its atmosphere, and the matter on its surface, are of such a nature as not to be capable of any excessive affection from its own rays; and indeed this seems to be proved by the copious emission of them; for if the elastic fluids of the atmosphere, or the matter contained on the surface of the sun, were of such a nature as to admit of an easy chemical combination with its rays, their emission would be much impeded. Our author then proceeds to support his theory by analogical reasonings; but, as these will occur to such of our readers as are conversant with the speculations of astronomers, we pass on to his reflections upon the consequences of this theory. 'That the stars are suns can hardly admit of a doubt. Their immense distance would perfectly exclude them from our view, if the light they send us were not of the solar kind. Besides, the analogy may be traced much farther. The sun turns on its axis, so does the star Algol; so do the stars called β Lyræ, δ Cephei, η Antinoi, o Ceti, and many more; most probably all. From what other cause can we so probably account for their periodical changes? Again, our sun has spots on its surface; so has the star Algol, and so have the stars already named, and probably every star in the heavens. On our sun these spots are changeable; so they are on the star o Ceti, as evidently appears from the irregularity of its changeable lustre, which is often broken in upon by accidental changes, while the general period continues unaltered. The same little deviations have been observed in other periodical stars, and ought to be ascribed to the same cause. But if stars are suns, and suns are inhabitable, we see at once what an extensive field for animation opens itself to our view. It is true that analogy may induce us to conclude that since stars appear to be suns, and suns, according to the common opinion, are bodies that serve to enlighten, warm, and sustain a system of planets, we may have an idea of numberless globes that serve for the habitation of living creatures. But, if these suns themselves are primary planets, we may see some thousands of them with our own eyes, and millions by the help of telescopes, when at the same time the same analogical reasoning still remains in full force with regard to the planets which these suns may support.' The doctor then observes that, from other considerations, the idea of suns or stars being merely the supporters of systems or planets, is not absolutely to be admitted as a general one. 'Among the great number of very compressed clusters of stars I have given,' says he, 'in my catalogue, there are some which open a different view of the heavens to us. The stars in them are so very close together, that, notwithstanding the great distance at which we may suppose the cluster itself to be, it will hardly be possible to assign any sufficient mutual distance to the stars composing the cluster, to leave room for crowding in those planets for whose support these stars have been, or might be, supposed to exist. It should seem, therefore, highly probable, that they exist for themselves; and are, in fact, only very capital, lucid, primary planets, connected together in one great system of mutual support. The same remark may be made with regard to the number of very close double stars, whose apparent diameters being alike, and not very small, do not indicate any very great mutual distance, from which, however, must be deducted all those where the different distances may be compensated by the real difference in their respective magnitudes. To what has been said may be added, that, in some parts of the milky way, where yet the stars are not very small, they are so crowded that in 1792, August 22d, I found by the gauges, that in forty-one minutes of time, no less than 258,000 of them had passed through the field of view of my telescope. It seems, therefore, upon the whole, not improbable, that in many cases stars are united in such close systems as not to leave much room for the orbits or planets or comets; and that consequently, upon this account also, many stars, unless we would make them mere useless brilliant points, may themselves be lucid planets, perhaps unattended by satellites.' What a magnificent idea does this theory give of the universe, and of the goodness, as well as power, of its Author! And how cold must be that heart, and clouded that understanding, which, after the contemplation of it, can for one moment listen to the atheistical doctrines of those men who presume to account for all the phenomena of nature by chemical affinities and mechanical attraction! The man who, even in his heart, can say that such an immense system, differing so widely in the structure of the different parts of it, but every where crowded with life, is the effect of unintelligent agency, is indeed, to use the emphatic language of an ancient astronomer—*a fool.*

SUNAPEE, a lake of the United States, in New Hampshire, in the townships of Fisherfield, Wendell, and New London. It is eleven miles long, and one and a half broad. Little Sunapee, two miles long, lies north-east in New London.

SUNART, Loch, a navigable inlet of the sea, between the counties of Argyle and Inverness, in Scotland, about twenty miles long, and from one and a half to two miles broad. Also the name of the district bordering on the Loch.

SUNDA, Straits of. An arm of the sea which separates the islands of Sumatra and Java; by the Malays it is termed Sunda Kalapa. The length of this channel, taken from the flat point to Varkens, or Hog Point, is about seventy miles, and on the opposite coast, from Java Head to Bantam Point, about ninety. In the mouth lies Prince's Island, by the situation of which two passages are formed; one between Prince's Island and Java, which is made use of for the most part by ships which have to pass the straits during the south-east monsoon, in

order that, sailing close in with the Java shore, they may soon get within anchoring depth. The other passage, called by seamen the Great Channel, sometimes also serves as an entrance to the straits during the south-east monsoon, but it is with the greatest difficulty, and after continual struggling with the south-easterly winds and the current that this can be effected. In the narrowest part of the straits, opposite to Hog's Point, on Sumatra, lies an island that on account of its situation has been called Thwart the Way, or Middle Isle. A strong current runs through the passage on both sides of this island during the whole year, setting with the prevailing easterly or westerly winds, either to the north-east or south-west. The chief islands in these straits are Prince's Isle, Krakatau, Thwart the Way, and Pulo Baby. The others are very insignificant, mostly level, founded on beds of coral and covered with trees. A few have steep naked sides, and at a little distance resemble old castles, mouldering into ruins; but, on a nearer view, appear to be of volcanic origin. The Dutch East India Company claim an absolute sovereignty over the Straits of Sunda, but it never has been enforced.

SUNDAY, or the Lord's-day, is a solemn festival observed by Christians on the first day of every week, in memory of our Saviour's resurrection. See SABBATH. In the breviary and other offices we meet with Sundays of the first and second class. Those of the first class are Palm, Easter, Advent, and Whitsunday, those of Quasimodo and Quadragesima. Those of the second class are the common Sundays. Anciently each Sunday in the year had its particular name, which was taken from the introit of the day; which custom has only been continued to some few in Lent; as Reminiscere, Lætare, Oculi, Judica. The Lord's day, mentioned in the Apocalypse, is certainly our Sunday; which was very early instituted by the apostles. A regard was had to this day in the earliest ages of the church, as appears from the first apology of Justin Martyr, where he describes the exercise of the day not much unlike to ours. See SABBATH. But Constantine the Great first made a law for the proper observation of Sunday; and, according to Eusebius, appointed it to be regularly celebrated throughout the Roman empire. Before him, and even in his time, they observed the Jewish Sabbath as well as Sunday. By his law, made in 321, it was decreed, that the Sunday should be kept a day of rest in all cities and towns; but the country people were allowed to follow their work. In 338 the council of Orleans prohibited country labor; but because there were still many Jews in Gaul, and the people fell into many superstitious usages in the celebration of the new Sabbath, like those of the Jews among that of the old, the council declares that to hold it unlawful to travel with horses, cattle, and carriages, to prepare food, or to do any thing necessary to the cleanliness and decency of houses or persons, savours more of Judaism than of Christianity. See SABBATH-BREAKING.

The appellation of Lord's day was adopted and applied to the first day of the week by the Christian writers. At the time when St. John wrote the book of his revelation, the first day of the week seems to have obtained this name (Rev. i. 10); and this name, together with St. John's use of it, sufficiently denotes the appropriation of the day to the service of religion; as well as that this appropriation was perfectly known to the churches of Asia. We have reason to believe that, by the 'Lord's day,' was meant the 'first' day of the week; because we find no traces of any distinction of days, which could entitle any other to that appellation; accordingly this appellation was used both by the Greek and Latin churches. So it is styled by Clemens Alexandrinus, by Ignatius, by Dionysius, bishop of Corinth, by an African synod, and by Tertullian. Sometimes, indeed, it is simply called ἡ κυριακή, and 'Dominicus,' that is, 'the Lord's,' without the addition of the word 'day,' as it is thus called την κοριακκήν by Ignatius, and 'Dominicus' by Cyprian. Clemens Alexandrinus writes to this effect:—that a true Christian, according to the commandment of the gospel, observes the Lord's day, by casting out all evil thoughts and entertaining all good ones, glorifying the resurrection of the Lord on that day.' Barnabas says, 'we keep the eighth day with gladness, on which Christ arose from the dead;' and Ignatius also says, 'let us keep the Lord's day, on which our life arose through him.' Justin Martyr also relates, that 'on Sunday the Christians assembled together, because it was the first day of the week, on which God out of the confused chaos made the world, and Jesus Christ our Saviour arose from the dead; for on Friday he was crucified, and on Sunday he appeared to his apostles and disciples, and taught them those things which the Christians now believe.' To the same purpose, Origen advises his auditors to pray unto Almighty God, 'especially on the Lord's day, which is a commemoration of Christ's passion; for the resurrection of Christ is not only celebrated once a year, but every seven days.' That this day was denominated '*Sunday*' at a very early period, is evinced by a variety of testimonies, which it is needless to cite. Justin Martyr and Tertullian in particular use this appellation. But, though they so far complied with the Heathens to call this day Sunday, yet they do not seem to have so far indulged the Jews as to call it the 'Sabbath-day;' for through all their writings they violently declaim against sabbatizing, or keeping the sabbath-day, that is the Judaical observation of the seventh day, which we must always understand by the word 'Sabbatum' in the writings of the ancients, not the observation of the first day, or the Lord's day; for that was constantly celebrated: and, by those who condemn the observance of the sabbath-day, the sanctification of the Lord's day is approved and recommended, as by Justin Martyr and Tertullian, and also by Ignatius, who says in one place, 'let us no longer sabbatize,' and in another, 'instead of sabbatizing, let every Christian keep the Lord's day, the day on which Christ arose again; the queen of days, on which our life arose, and death was conquered by Christ.' The Eastern churches, however, in compliance with the Jewish converts, who were numerous in those parts, performed on the seventh day the

same public religious services that they did on the first, observing both the one and the other. Whence Origen enumerates Saturday as one of the four feasts solemnised in his time; though, on the contrary, some of the Western churches, that they might not seem to judaize, fasted on Saturday.

The principal arguments pertaining to this question have been glanced at under the article SABBATH. Paley, who adopted the opinion of those who maintain that the institution of the Jewish sabbath first took place in the wilderness, considers, as they do, the blessing and sanctification, i. e. the religious distinction and appropriation of the seventh day, mentioned in the book of Genesis, as not having been made till many ages afterwards. He alleges that the words do not assert, that God then 'blessed' and 'sanctified' the seventh day, but that he blessed and sanctified it, because he had on that day rested from the work of creation, and for that reason: and if it be asked, why the sabbath, or sanctification of the seventh day, was then mentioned, if it was not then appointed, our author replies, that the order of connexion, and not of time, introduced the mention of the sabbath in the history of the subject which it was ordained to commemorate. This interpretation, he says, is strongly supported by a passage in the prophecy of Ezekiel, where the sabbath is plainly spoken of as given, or, as the expression is supposed to mean, as first instituted, in the wilderness. Ezek. xx. 10, 11, 12. Nehemiah also accounts the promulgation of the sabbatic law amongst the transactions in the wilderness, and this circumstance is considered as affording another important argument in favor of the same opinion. Nehem. ix. 14. If the divine command, by which the sabbath was instituted, was actually delivered at the creation, as many learned writers have maintained, it was without doubt addressed to the whole human species alike, and continues, unless repealed by some subsequent revelation, obligatory upon all who have the knowledge of it. But, if the command was published for the first time in the wilderness, then it was immediately directed to the Jewish people alone, and the sabbath ought to be regarded as part of the peculiar law of the Jewish policy. In farther support of this latter opinion, it is alleged that the sabbath is described as a sign between God and the people of Israel (Exod. xxxi. 16, 17, Ezek. xx. 16); and that it does not seem easy to understand how the sabbath could be a 'sign' between God and the people of Israel, unless the observance of it was peculiar to that people, and designed to be so. The distinction of the sabbath is, in its nature, as much a positive ceremonial institution as that of many other seasons which were appointed by the Levitical law to be kept holy, and to be observed by a distinct rest: such were the first and seventh days of unleavened bread; the feast of pentecost; the feast of tabernacles; and, in the twenty-third chapter of Exodus, the sabbath and these are recited together. It is further argued, that the observation of the sabbath was not one of the articles enjoined by the apostles in the fifteenth chapter of Acts, upon them 'which, from among the Gentiles, were turned unto God.' St. Paul evidently appears to have considered the sabbath as part of the Jewish ritual, and not binding upon Christians as such. Col. ii. 16, 17.

If the law by which the Sabbath was instituted be considered as a law only to the Jews, it becomes an important enquiry, whether the founder of Christianity delivered any new command upon the subject; or, if that should not appear to be the case, whether any day was appropriated to the service of religion by the authority or example of his apostles? The practice of holding religious assemblies upon the first day of the week was so early and universal in the Christian church, that we derive hence considerable proof of its having originated from some precept of Christ, or of his apostles, though no such precept be now extant. It was on the first day of the week that the disciples were assembled, when Christ appeared to them for the first time after his resurrection. John xx. 19. If we allow that this might have been accidental, yet we read in the twenty-sixth verse of the same chapter, 'that after eight days,' that is, on the first day of the week following, 'again the disciples were within,' which second meeting upon the same day of the week seems like an appointment and design to meet on that particular day. The same custom seems also to have been observed in a Christian church at a great distance from Jerusalem. Acts xx. 6, 7. The practice mentioned in this passage seems now to have been familiar and established. See also 1 Cor. xvi. 1, 2. From these passages we deduce ample evidence that the Christians held and frequented religious assemblies upon the first day of the week. Nevertheless, a cessation upon that day from labor, beyond the time of attendance upon public worship, is not intimated in any passage in the New Testament; nor did Christ or his apostles deliver, as Paley supposes, any command to their disciples for a discontinuance upon that day of the common offices of their respective professions. This reserve cannot be censured as a defect in the Christian institution by any who consider that, in the primitive condition of Christianity, the observation of a new sabbath would have been useless, or inconvenient, or impracticable. During Christ's personal ministry, his religion was preached to the Jews alone. They already had a sabbath, which, as subjects of that economy, they were obliged to keep, and did keep. It was not, therefore, probable that Christ would enjoin another day of rest in conjunction with this.

Dr. Paley deduces from his whole enquiry on this subject the conclusion that the assembling upon the first day of the week, for the purpose of public worship and religious instruction, is a law of Christianity, of divine appointment; and that the resting on that day from our employments, longer than we are detained from them by an attendance upon these assemblies, is to Christians an ordinance of human institution; binding, nevertheless, upon the conscience of every individual of a country in which a weekly sabbath is established, for the sake of the beneficial purposes which the public and regular observance of it promotes; and recommended, perhaps, in some

degree, to the divine approbation, by the resemblance it bears to what God was pleased to make a solemn part of the law which he delivered to the people of Israel, and by its subserviency to many of the same uses. In general, we may observe, that if the design of a religious assembly require that it be held frequently, it is most expedient that it should return at stated intervals; and that the same seasons should be observed throughout the country. That part of the religious distinction of seasons, which consists in a general intermission of labor and business during times set apart for the exercise of public worship, is founded in the reasons which make public worship itself a duty. But, as the celebration of divine service never occupies the whole day, the other interval of Sunday, that is not spent at church, must be considered as a mere rest from the ordinary occupations of civil life; and he, says Paley, who would defend the institution, as it is required to be observed in Christian countries, unless he can produce a command for 'a Christian sabbath,' must point out the uses of it in that view. First, that interval of relaxation which Sunday affords to the laborious class of mankind contributes, in a great degree, to the comfort and satisfaction of their lives, both as it refreshes them for the time, and as it relieves their six days' labor by the prospect of a day of rest always approaching. In this view of the institution, whatever may be its origin, it must appear to be highly useful; nor is any thing lost to the community by the intermission of public industry one day in the week; for in countries tolerably advanced in population, and the arts of civil life, there is always more than enough of human labor. Secondly, Sunday, by suspending many public diversions, and the ordinary rotation of employment, leaves to men of every rank and profession sufficient leisure, and not more than sufficient, both for the external offices of Christianity, and the actual, but equally necessary, duties of religious meditation and enquiry. And thirdly, they whose humanity embraces the whole sensitive creation, will esteem it no inconsiderable recommendation of a weekly return of public rest, that it affords a respite to the toil of brutes.

The uses of this institution, therefore, being to facilitate attendance upon public worship, or to meliorate the condition of the laborious classes of mankind, and, by a general suspension of business and amusement, to invite and enable persons of every description to apply their time and thoughts to subjects pertaining to their salvation, the duty of the day must be violated; first, by all such employments or engagements as hinder our attendance upon public worship, or occupy so much of our time as not to afford sufficient leisure for religious reflection; such are travelling, visiting during the whole day, or employing the time at home in any kind of business that bears no relation to religion. Secondly, by unnecessary encroachments on the rest and liberty which Sunday ought to afford to the inferior orders of the community. Thirdly, by such recreations as are customarily forborne, out of respect to the day; as hunting, shooting, fishing, public diversions, and playing at cards or dice.

Sunday Schools. See Education.

SUNDEEP Isle (Somadwipa, or Isle of the Moon), an island in the district of Chittagong, and province of Bengal, which may be estimated at sixteen miles in length, by eight the average breadth. It contains a government establishment for the manufacture of salt, subordinate to the Bulwa and Chittagong agency. A number of Portuguese settled on this coast at the conclusion of the sixteenth century, many of whom entered into the service of the native princes, and obtained grants of land. They were extirpated or expelled from Arracan about A. D. 1607, the few who escaped taking refuge among the islands, where they practised piracy. Futteh Khan, the Mogul governor of Sundeep, having attempted to suppress them, was defeated and killed, and his whole fleet captured. On this event the pirates elected for their chief a common sailor, named Sebastian Gonzales, and in 1609 gained possession of Sundeep. This chief established an independent principality, his force amounting to 1000 Portuguese, 2000 native troops, 200 cavalry, and eighty vessels of different sizes, well supplied with guns. Soon after he added to his territory the adjacent island of Shahabaspoor, and some others. With common prudence his power now might have attained a considerable height and stability, but he soon disgusted his subjects by the brutal tyranny of his government, and rendered the Moguls and Arracaners hostile by the perfidy and cruelty of his conduct. He was finally abandoned by the greater part of his followers, and in 1616 was defeated by the Rajah of Arracan, who conquered Sundeep and the other islands. This island continued in possession of these barbarians until A. D. 1666, when Shaista Khan, the Mogul governor of Bengal, having fitted out a fleet at Dacca, despatched it down the Megna to attack Sundeep, where the Mughs (so the Arracaners were now called) had erected fortifications, which they defended with great resolution for a considerable time, but were at length all taken or destroyed. Since that period it remained attached to the Mogul government of Bengal, until it devolved, along with that province, to the East India Company.

SUN'DER, *v. a.* & *n. s.* Sax. ſynopian. To part; separate; divide: two.

He breaketh the bow, and cutteth the spear in *sunder*. *Psalms.*

Vexation almost stops my breath,
That *sundred* friends greet in the hour of death.
Shakspeare.

She that should all parts to re-union bow,
She that had all magnetick force alone,
To draw and fasten *sundred* parts in one. *Donne.*

It is *sundred* from the main land by a sandy plain.
Carew.

The enormous weight was cast,
Which Crantor's body *sundered* at the waist.
Dryden.

Bears, tigers, wolves, the lion's angry brood,
Whom heaven endued with principles of blood,
He wisely *sundred* from the rest, to yell
In forests. *Id.*

Bring me lightning, give me thunder;
—Jove may kill, but ne'er shall *sunder*. *Granville.*

SUNDERBUNDS, a woody tract of country

on the coast of Bengal, being part of the Delta of the Ganges, and extending along the bay about 180 miles. It is in fact a labyrinth of rivers and creeks, all of which are salt, except those that communicate immediately with the principal arm of the Ganges: these numerous natural canals are so disposed as to form a complete inland navigation. In tracing the coast of this Delta, eight openings are found, each of which appears to be the principal mouth of the Ganges. The navigation of the Sunderbunds is effected chiefly by means of the tides, there being two distinct passages; the one named the Southern or Sunderland Passage, and the other the Balliaghaut Passage. The first is the furthest, and leads through the widest and deepest rivers, opening into the Hooghly or Calcutta River, about sixty-five miles below the town. The Balliaghaut Passage opens into a lake on the east side of Calcutta. The navigation by these passages extends more than 200 miles through a thick forest, divided into numberless islands by a multitude of channels, so various in point of width that a vessel has at one time her masts entangled among the branches of trees, and at other times sails on a broadly expanded river, beautifully skirted. The water is every where salt, and almost the whole forest abandoned to wild beasts. But during the dry season the lower shores of these rivers are visited by the salt-makers and woodcutters; while tigers of the most enormous size not only appear on the margin, but frequently swim off to the boats that lie at anchor in the rivers. These waters also swarm with alligators. Throughout the year these passages are open; and, during the season, when the Ganges is low, the whole trade of Bengal (the western districts excepted) passes either by Channel Creek, or by Balliaghaut; but chiefly by the former. The existence of this forest also has always been considered of importance as a strong natural barrier along the southern frontier of Bengal. Great quantities of excellent salt are here manufactured, and esteemed of peculiar sanctity, as being extracted from the Ganges. The woods also present an inexhaustible supply of timber for fuel, boat building, and other purposes. In 1784 the Sunderbunds, Cooch Bahar, and Rangamatty, all nearly waste, according to major Rennell, contained 37,549 square miles.

SUNDERLAND, a sea-port and market-town of Durham, is situate at the mouth of the river Wear, where it falls into the ocean, thirteen miles north-east of Durham, and 276 north of London. The High Street, which is the principal, is nearly a mile in length, running from east to west; the houses in general are well built, and the street in many places thirty yards broad. Parallel with this runs the Lower street, which is very narrow and dirty, and may be called the Wapping of the town, on the bank of the river; but in these, and the numerous narrow lanes connecting the two streets, there have of late years been many improvements, and it is well lighted. Besides an extensive church, at the top of the town, here is a neat built chapel of ease, and several meeting-houses; a dispensary, humane society, charity for decayed seamen, and seamen's widows; besides four good charity schools, and other benevolent institutions. Here are also a handsome exchange, public library, large assembly room, theatre, commercial bank, &c. The harbour is too shallow for large vessels to take in their lading, so that they are obliged to lie in the open road, and receive their coals by the keels. The entrance of the harbour is defended by a pier projecting about 200 yards, and its mouth by a battery, opposite to which are barracks for 3000 men. The harbour has been further improved by the erection of an elegant light-house.

The trade of Sunderland has been long on the increase: its imports are flour, wines, liquors, timber, iron, flax, &c.: of its exports, coal is the staple article, which alone employs nearly 600 vessels; the other articles are lime, glass, glass bottles, copperas, patent ropes, earthenware, &c.: ship-building is also carried on here. At the extremity of the town, towards Bishopwearmouth, is a bridge over the Wear, built of cast iron, and of a single arch; it is 100 feet high and 236 feet long, so that any vessel that can navigate the depth of water can pass with her top-mast up. This is a borough, governed by a mayor, and returns two members to parliament. Market on Friday. Fairs, May 12th, and October 12th.

SUN-DEW, in botany. See DROSERA.

SUN'DIAL, *n. s.* Sun and dial. A marked plate on which the shadow points the hour.

All your graces no more you shall have,
Than a *sundial* in a grave. *Donne.*

The body, though it really moves, yet, not changing perceivable distance, seems to stand still; as is evident in the shadows of *sundials.* *Locke.*

SUN-DIAL. See DIAL and DIALLING.

SUN'DRY, *adj.* Sax. ſunder. Several; more than one.

Not of one nation was it peopled, but of *sundry* people of different manners. *Spenser.*

That law, which, as it is laid up in the bosom of God, we call eternal, receiveth, according unto the different kind of things which are subject unto it, different and *sundry* kinds of names. *Hooker.*

He caused him to be arrested upon complaint of *sundry* grievous oppressions. *Davies.*

But, dallying in this place so long why do'st thou dwell,
So many *sundry* things here having yet to tell? *Drayton.*

I have composed *sundry* collects, as the Adventual, Quadragesimal, Paschal or Pentecostal. *Sanderson.*

Sundry foes the rural realm surround. *Dryden.*

SUN-FISH. See SQUALUS.

SUN-FLOWER, in botany. See HELIANTHUS.

SUN-FLOWER, BASTARD. See HELENIUM.

SUNG. The *pret.* and *part. pass.* of SING, which see.

A larger rock then heaving from the plain,
He whirled it round, it *sung* across the main. *Pope.*

SUNK. The *pret.* and *part. pass.* of SINK, which see.

We have large caves; the deepest are *sunk* six hundred fathom, and some digged and made under great hills. *Bacon.*

Thus we act, and thus we are,
Or tossed by hope or *sunk* by care. *Prior.*

His spirit quite *sunk* with those reflections that solitude and disappointment brings, he is utterly undistinguished and forgotten. *Swift.*

SUOVETAURILIA, an ancient Roman sacrifice, so called because it consisted of a pig (sus), a sheep or rather ram (ovis), and a bull (taurus). They were all males, to denote the masculine courage of the Roman people. It was likewise called solitaurilia, because the animals offered up were always solida, whole or uncut.

SUP, *v. a., v. n., n. s* Sax. ȝupan; Norman Fr. *souper;* Belg. *soepen.* To drink by mouthfuls; drink by little at a time; to sip: to treat with supper: eat the evening meal: a small draught.

When they had *supped*, they brought Tobias in. *Tobit* viii.

You'll *sup* with me?
—Anger 's my meat; I *sup* upon myself,
And so shall starve with feeding.
Shakspeare. Coriolanus.

He 's almost *supped;* why have you left the chamber? *Shakspeare.*

Let what you have within be brought abroad,
To *sup* the stranger. *Chapman's Odyssey.*

Tom Thumb had got a little *sup*,
And Tomalin scarce kissed the cup. *Drayton.*

There 's none observes, much less repines,
How often this man *sups* or dines. *Carew.*

To feed my life with: there I'll *sup*
Balm and nectar in my cup. *Crashaw.*

Late returning home, he *supped* at ease. *Dryden.*

A pigeon saw the picture of a glass with water in it, and flew eagerly up to 't for a *sup* to quench her thirst. *L'Estrange.*

We saw it smelling to every thing set in the room; and, when it had smelt to them all, it *supped* up the milk. *Ray.*

The least transgression of your's, if it be only two bits and one *sup* more than your stint, is a great debauch. *Swift.*

SUPERABOUND', *v. n.* } Super and a-
SUPERABUN'DANCE, *n. s.* } bound. To be ex-
SUPERABUN'DANT, *adj.* } uberant; be stored
SUPERABUN'DANTLY, *adv.* } with more than enough: the noun substantive, adjective, and adverb, corresponding.

This case returneth again at this time, except the clemency of his majesty *superabound.* *Bacon.*

She *superabounds* with corn, which is quickly convertible to coin. *Howel.*

The precipitation of the vegetative terrestrial matter at the deluge amongst the sand, was to retrench the luxury and *superabundance* of the productions of the earth. *Woodward.*

Nothing but the uncreated infinite can adequately fill and *superabundantly* satisfy the desire. *Cheyne.*

So much *superabundant* zeal could have no other design than to damp that spirit raised against Wood. *Swift.*

SUPERADD', *v. a.* } Lat. *superaddo.* To
SUPERADDI'TION, *n. s.* } add over and above; to join any thing extrinsic: the act of doing so.

The strength of any living creature, in those external motions, is something distinct from and *superadded* unto its natural gravity. *Wilkins's Mathematical Magick.*

The fabrick of the eye, its safe and useful situation, and the *superaddition* of muscles, are a certain pledge of the existence of God. *More.*

The schools dispute, whether in morals the external action *superadds* any thing of good or evil to the internal elicit act of the will; but certainly the enmity of our judgments is wrought up to an high pitch before it rages in an open denial. *South.*

An animal, in the course of hard labour, seems to be nothing but vessels: let the same animal continue long in rest, it will perhaps double its weight and bulk: this *superaddition* is nothing but fat. *Arbuthnot.*

SUPERADVE'NIENT, *adj.* Lat. *superadveniens.* Coming to the increase or assistance of something.

The soul of man may have matter of triumph, when he has done bravely by a *superadvenient* assistance of his God. *More.*

SUPERAN'NUATE, *v. a.* & *v. n.* Lat. *super* and *annus.* To impair or disqualify by age or length of life: last beyond the year.

The dying of the roots of plants that are annual, is by the over-expence of the sap into stalk and leaves; which being prevented, they will *superannuate.* *Bacon's Natural History.*

If such depravities be yet alive, deformity need not despair, nor will the eldest hopes be ever *superannuated.* *Browne.*

When the sacramental test was put in execution, the justices of peace through Ireland, that had laid down their commissions, amounted only to a dozen, and those of the lowest fortune, and some of them *superannuated.* *Swift*

SUPERB', *adj.* Fr. *superbe;* Lat. *superbus.* Grand; pompous; lofty; august; stately; magnificent.

SUPERBUS (Lat.) the Proud, a nickname of the tyrant Tarquin II., who was deservedly banished Rome, with his wicked family. See ROME.

SUPERCARGO, *n. s.* Super and cargo. An officer in the ship whose business is to manage the trade.

I only wear it in a land of Hectors,
Thieves, *supercargoes*, sharpers, and directors. *Pope.*

SUPERCELES'TIAL, *adj.* Super and celestial. Placed above the firmament.

I dare not think that any *supercelestiel* heaven, or whatsoever else, not himself, was increate and eternal. *Raleigh.*

Many were for fetching down I know not what *supercelestial* waters for the purpose. *Woodward's Natural History.*

SUPERCIL'IOUS, *adj.* } From Lat. *super-*
SUPERCIL'IOUSLY, *adv.* } *cilium.* Haughty; dogmatical; dictatorial; overbearing: the adverb corresponding.

He, who was a punctual man in point of honour, received this address *superciliously* enough, sent it to the king without performing the least ceremony. *Clarendon.*

Those who are one while courteous, within a small time after are so *supercilious*, fierce, and exceptious, that they are short of the true character of friendship. *South.*

Several *supercilious* criticks will treat an author with the greatest contempt, if he fancies the old Romans wore a girdle. *Addison.*

SUPERCONCEP'TION, *n. s.* Super and conception. A conception admitted after another conception.

Those *superconceptions*, where one child was like the father, the other like the adulterer, seem idle. *Browne's Vulgar Errours.*

SUPERCON'SEQUENCE, *n. s.* Super and consequence. Remote consequence.

Not attaining the deuteroscopy, and second intention of the words, they omit their *superconsequences* and coherences. *Browne.*

SUPERCRES'CENCE, *n. s.* Lat. *super* and *cresco.* That which grows upon another growing thing.

Wherever it groweth it maintains a regular figure, like other *supercrescences*, and like such as, living upon the stock of others, are termed parasitical plants. *Browne's Vulgar Errours.*

SUPEREM'INENCE, *n. s.* / SUPEREM'INENCY, / SUPEREM'INENT, *adj.* / SUPEREM'INENTLY, *adv.* } Latin *super* and *emineo.* Uncommon degree of eminence; eminence above others though eminent: the adjective and adverb corresponding.

As humility is in suiters a decent virtue, so the testification thereof by such effectual acknowledgments not only argueth a sound apprehension of his *supereminent* glory and majesty before whom we stand, but putteth also into his hands a kind of pledge or bond for security against our unthankfulness. *Hooker.*

The archbishop of Canterbury, as he is primate over all England and metropolitan, has a *supereminency*, and even some power over the archbishop of York. *Ayliffe's Parergon.*

SUPERER'OGATE, *v. n.* / SUPER'OGATORY, *adj.* } Lat. *super* and *erogatio.* To do more than duty requires: performed beyond the strict demands of duty.

Supererogatory services, and too great benefits from subjects to kings, are of dangerous consequence. *Howel.*

So by an abbey's skeleton of late,
I heard an eccho *supererogate*
Through imperfection, and the voice restore,
As if she had the hiccup o'er and o'er. *Cleaveland.*

Aristotle acted his own instructions, and his obsequious sectators have *supererogated* in observance. *Glanville's Scepsis.*

There is no such thing as works of *supererogation*; no man can do more than needs, and is his duty to do, by way of preparation for another world. *Tillotson.*

SUPEREROGATION, in theology, is what a man does more than he is commanded to do. The Romanists stand up strenuously for works of supererogation, and maintain that the observance of evangelical councils is such. By means hereof a stock of merit is laid up, which the church has the disposal of, and which she distributes in indulgences to such as need. This doctrine was first invented towards the close of the twelfth century, and modified and embellished by St. Thomas in the thirteenth: according to which it was pretended that there actually existed an immense treasure of merit, composed of the pious deeds and virtuous actions which the saints had performed beyond what was necessary for their own salvation, and which were therefore applicable to the benefit of others; that the guardian and dispenser of this precious treasure was the Roman pontiff; and that of consequence he was empowered to assign to such as he thought proper a portion of this inexhaustible source of merit, suitable to their respective guilt, and sufficient to deliver them from the punishment due to their crimes. The reformed church do not allow of any work of supererogation; but hold, with the apostles, that when we have done our best, we are but unprofitable servants. See SOLIFIDIANS.

SUPEREXALTA'TION, *n. s.* Super and exalt. Elevation above the common rate.

In a *superexaltation* of courage, they seem as greedy of death as of victory. *Holiday.*

SUPEREX'CELLENT, *adj.* Super and excellent. Excellent beyond common degrees of excellence.

We discern not the abuse; suffer him to persuade us that we are as gods, something so *superexcellent*, that all must reverence and adore. *Decay of Piety.*

SUPEREXCRES'CENCE, *n. s.* Super and excrescence. Something superfluously growing

As the escar separated between the scarifications I rubbed the *superexcrescence* of flesh with the vitriol stone. *Wiseman.*

SUPERFETATE, *v. n.* / SUPERFETA'TION, *n. s.* } Lat. *super* and *fœtus.* To conceive after conception: for the noun substantive see below.

Superfetation must be by abundance of sap in the bough that putteth it forth. *Bacon's Natural History.*

If the *superfetation* be made with considerable intermission, the latter most commonly becomes abortive; for the first being confirmed engrosseth the aliment from the other. *Browne.*

The female brings forth twice in one month, and so is said to *superfetate*; which, saith Aristotle, is because her eggs are hatched in her one after another. *Grew's Museum.*

SUPERFETATION, in midwifery, is a second conception, happening when the mother, already pregnant, conceives of a later coition; so that she bears at once two fœtuses of unequal age and bulk, and is delivered of them at different times. We meet with instances of superfetations in Hippocrates, Aristotle, Du Laurens, &c.; but they are said to be most frequent in hares and swine.

SU'PERFICE, *n. s.* / SUPERFI'CIAL, *adj.* / SUPERFICIAL'ITY, *n. s.* / SUPERFI'CIALLY, *adv.* / SUPERFI'CIALNESS, *n s.* / SUPERFI'CIES. } Fr. *superficie*; Lat. *superficies.* Outside; surface: which the Lat. *superficies* also signifies: superficial is, lying on the surface; relating to, or not beyond, the surface: the derivatives all correspond.

He on her *superficies* stretched his line. *Sandys.*

You have said well;
But on the cause and question now in hand,
Have glozed but *superficially.*
Shakspeare. Troilus and Cressida.

This *superficial* tale
Is but a preface to her worthy praise.
Id. Henry VI.

That, upon the *superficial* ground, heat and moisture cause putrefaction, in England is found not true. *Bacon.*

His eye so *superficially* surveys
These things, as not to mind from whence they grow,
Deep under ground. *Milton's Paradise Lost.*

By these salts the colours of bodies receive degrees of lustre or obscurity, *superficialty* or profundity. *Browne.*

Then if it rise not to the former height
Of *superfice*, conclude that soil is light. *Dryden.*

A convex mirror makes objects in the middle to come out from the *superficies*: the painter must, in respect of the light and shadows of his figures, give them more relievo. *Id.*

Superficies, or Surface, in geometry, is the exterior face of any body. This is considered as having the two dimensions of length and breadth only, but no thickness; and therefore it makes no part of the substance or solid content or matter of the body. The terms or bounds, or extremities, of a superficies, are lines; and superficies may be considered as generated by the motions of lines. Superficies are either rectilinear, curvilinear, plane, concave, or convex. A rectilinear superficies is that which is bounded by right lines. Curvilinear superficies is bounded by curve lines. Plane superficies is that which has no inequality in it, nor risings, nor sinkings, but lies evenly and straight throughout, so that a right line may wholly coincide with it in all parts and directions. Convex superficies is that which is curved and rises outwards. Concave superficies is curved and sinks inward. See Geometry.

SUPERFINE', *adj.* Super and fine. Eminently fine.

Some, by this journey of Jason, understand the mystery of the philosopher's stone; to which also other *superfine* chymists draw the twelve labours of Hercules. *L'Estrange.*

If you observe your cyder, by interposing it between a candle and your eye, to be very transparent, it may be called *superfine*. *Mortimer's Husbandry.*

SUPERFLU'ENCE, *n. s.* Superflu'itance, Superflu'itant, *adj.* Superflu'ity, *n. s.* Super'fluous, *adj.* Su'perflux, *n. s.* Lat. *super* and *fluo*. More than is necessary: superfluitance is the act of flowing above: superfluitant is floating above: superfluity, more than enough: superfluous, exuberant; unnecessary: superflux, that which is more than is wanted.

As touching the ministering to the saints, it is *superfluous* to write. 2 *Cor.* ix. 1.

I think it *superfluous* to use any words of a subject so praised in itself as it needs no praises. *Sidney.*

When a thing ceaseth to be available unto the end which gave it being, the continuance of it must then appear *superfluous*. *Hooker.*

Having this way eased the church, as they thought, of *superfluity*, they went on till they had plucked up even those things which also had taken a great deal deeper root. *Id.*

Take physick, pomp;
Expose thyself to feel what wretches feel,
That thou may'st shake the *superflux* to them.
Shakspeare.

A proper title of a peace, and purchased
At a *superfluous* rate. *Id.*

They are as sick that surfeit with too much as they that starve with nothing; therefore it is no mean happiness to be seated in the mean: *superfluity* comes sooner by white hairs, but competency lives longer. *Id.*

A quiet mediocrity is still to be preferred before a troubled *superfluity*. *Suckling.*

The *superfluence* of grace is ordinarily proportioned to the faithful discharge of former trusts, making use of the foregoing sufficient grace. *Hammond.*

If ye know,
Why ask ye, and *superfluous* begin
Your message, like to end as much in vain? *Milton.*

Spermaceti, which is a *superfluitance* on the sea, is not the sperm of a whale. *Browne's Vulgar Errours.*

Like the sun, let bounty spread her ray,
And shine that *superfluity* away. *Pope.*

Horace will our *superfluous* branches prune,
Give us new rules, and set our harps in tune.
Roscommon.

His conscience cheered him with a life well spent
His prudence a *superfluous* something lent,
Which made the poor who took, and poor who gave,
content. *Harte.*

Superfluous Interval, in music, is one that exceeds a true diatonic interval by a semitone minor. See Interval.

SUPERGA, a mountain of the north of the Sardinian states, in Piedmont, about five miles from Turin, remarkable for its picturesque scenery, and for the elegance of a church which crowns its summit. This edifice, built by Victor Amadeus, is of a circular form, supported by pillars of beautiful marble, and surmounted by a dome: the altars are decorated with bas-reliefs, and the pavement is of variegated marble. It is the burial place of the royal family, is seen from the surrounding country to a considerable distance, and commands a most delightful view.

SUPERINCUM'BENT, *adj.* Lat. *super* and *incumbens*. Lying on the top of something else.

It is sometimes so extremely violent that it forces the *superincumbent* strata; breaks them throughout, and thereby perfectly undermines and ruins their foundations. *Woodward.*

SUPERINDUCE', *v. a.* Superinduc'tion' *n. s.* Lat. *super* and *indico*. To bring in as an addition to something else: the act of so doing.

To *superinduce* any virtue upon a person, take the living creature in which that virtue is most eminent. *Bacon.*

Custom and corruption *superinduce* upon us a kind of necessity of going on as we began. *L'Estrange.*

Father is a notion *superinduced* to the substance of man, and refers only to an act of that thing called man, whereby he contributed to the generation of one of his own kind, let man be what it will. *Locke.*

In children, savages, and ill-natured people, learning not having cast their native thoughts into new moulds, nor, by *superinducing* foreign doctrines, confounded those fair characters nature had written, their innate notions might lie open. *Id.*

Relation is not contained in the real existence of things, but something extraneous and *superinduced*. *Id.*

Long custom of sinning *superinduces* upon the soul new and absurd desires, like the distemper of the soul, feeding only upon filth and corruption. *South.*

A good inclination is but the first rude draught of virtue; the *superinduction* of ill habits quickly defaces it. *Id.*

SUPERINTEND', *v. a.* Superintend'ence, *n. s.* Superintend'ency, Superintend'ent, Super and intend. To oversee; overlook; to take care of others with authority: the derivatives correspond.

The king will appoint a council, who may *superintend* the works of this nature, and regulate what concerns the colonies. *Bacon's Advice to Villiers.*

Next to Brama, one Deundre is the *superintendent* deity, who hath many more under him. *Stillingfleet.*

Such an universal *superintendency* has the eye and hand of Providence over all, even the most minute and inconsiderable things. *South.*

The world pays a natural veneration to men of virtue, and rejoice to see themselves conducted by those who act under the care of a Supreme Being

and who think themselves accountable to the great Judge and *Superintendent* of human affairs. *Addison.*

The divine Providence, which hath a visible respect to the being of every man, is yet more observable in its *superintendency* over societies. *Grew.*

This argues design, and a *superintending* wisdom, power and providence in this special business of food. *Derham.*

An admirable indication of the divine *superintendence* and management. *Id.*

Angels, good or bad, must be furnished with prodigious knowledge, to oversee Persia and Grecia of old; or if any such *superintend* the affairs of Great Britain now. *Watts.*

SUPERINTENDENT, or SUPERINTENDANT, denotes an ecclesiastical superior in several reformed churches where episcopacy is not admitted; particularly among the Lutherans in Germany, and the Calvinists in some other places. The superintendent is similar to a bishop; only his power is somewhat more restrained than that of the diocesan bishops. He is the chief pastor, and has the direction of all the inferior pastors within his district or diocese. In Germany they had formerly superintendents general, who were superior to the ordinary superintendents. These, in reality, were archbishops; but the dignity is sunk into disuse; and at present none but the superintendent of Wirtemberg assumes the quality of superintendent general.

SUPE'RIOR, *adj.* & *n. s.* } Fr. *superieur;*
SUPERIOR'ITY, *n. s.* } Lat. *superior.*
Higher; upper; greater in dignity or excellence; preferable or preferred; above; unaffected; free from emotion or censure: a more excellent or more skilled person: superiority is, exaltation; pre-eminence.

In commending another, you do yourself right; for he that you commend is either *superiour* to you in that you commend, or inferiour: if he be inferiour, if he be to be commended, you much more: if he be *superiour*, if he be not to be commended, you much less glorious. *Bacon.*

Although *superior* to the people, yet not *superior* to their own voluntary engagements once passed from them. *Taylor.*

Here passion first I felt,
Commotion strange! in all enjoyments else
Superior and unmoved. *Milton.*

Bellarmine makes the formal act of adoration to be subjection to a *superiour;* but he makes the mere apprehension of excellency to include the formal reason of it; whereas, mere excellency without *superiority* doth not require any subjection, but only estimation. *Stillingfleet.*

Heaven takes part with the oppressed, and tyrants are upon their behaviour to a *superiour* power. *L'Estrange.*

Superior beings above us, who enjoy perfect happiness, are more steadily determined in their choice of good than we, and yet they are not less happy or less free than we are. *Locke.*

The person who advises, does in that particular exercise a *superiority* over us, thinking us defective in our conduct or understanding. *Addison's Spectator.*

There is not in earth a spectacle more worthy than a great man *superiour* to his sufferings. *Id.*

Those under the great officers of state have more frequent opportunities for the exercise of benevolence than their *superiors.* *Id.*

By the refraction of the second prism, the breadth of the image was not increased; but its *superior* part which in the first prism suffered the greater refraction, and appeared violet and blue, did again in the second prism suffer a greater refraction than its inferior part, which appeared red and yellow. *Newton's Opticks.*

He laughs at men of far *superior* understandings to his, for not being as well dressed as himself. *Swift.*

SUPERIOR LAKE, or UPPER LAKE, the largest lake in North America, and supposed to be the largest body of fresh water in the world, being computed 1500 miles in its circle. The boundary line between the United States and Upper Canada passes through the central part of it. The surrounding coast is rocky and uneven. There are in it many islands; two of them very considerable; one of them, Isle Royal, is not less than 100 miles in length, and in some places forty broad. The lake abounds with fish, particularly trout and sturgeon, which may be caught at almost any season in the greatest abundance. The trout in general weigh about twelve pounds, but some are caught that exceed fifty. This lake is as much affected by storms as the Atlantic Ocean; the waves run as high, and are equally dangerous to ships. It discharges its waters from the south-east corner, through the straits of St. Mary. See AMERICA NORTH.

SUPER'LATIVE, *adj.* } Fr. *superlatif;*
SUPER'LATIVELY, *adv.* } Lat. *superlativus.*
SUPER'LATIVENESS, *n. s.* } Implying or expressing the highest
SUPERLA'TION. } degree; rising in the highest degree: the adverb and both the noun substantives correspond.

The high court of parliament in England is *superlative.* *Bacon's Advice to Villiers.*

Martyrdoms I reckon amongst miracles; because they seem to exceed the strength of human nature; and I may do the like of *superlative* and admirable holiness. *Bacon.*

I shall not speak *superlatively* of them; but that I may truly say, they are second to none in the Christian world. *Id.*

There are words that as much raise a style as others can depress it; *superlation* and overmuchness amplifies: it may be above faith but not above a mean. *Ben Jonson.*

It is an usual way to give the *superlative* unto things of eminence; and, when a thing is very great, presently to define it to be the greatest of all. *Browne's Vulgar Errours.*

The generality of its reception is with many the persuading argument of its *superlative* desert; and common judges measure excellency by numbers. *Glanville.*

Ingratitude and compassion never cohabit in the same breast; which shews the *superlative* malignity of this vice, and the baseness of the mind in which it dwells. *South.*

Tiberius was bad enough in his youth; but *superlatively* and monstrously so in his old age. *Id.*

The Supreme Being is a spirit most excellently glorious, *superlatively* powerful, wise and good, Creator of all things. *Bentley.*

Some have a violent and turgid manner of talking and thinking; they are always in extremes, and pronounce concerning every thing in the *superlative.* *Watts.*

SUPERLU'NAR, *adj.* Lat. *super* and *luna.* Not sublunary; placed above the moon; not of this world.

The mind, in metaphysicks, at a loss,
May wander in a wilderness of moss;
The head that turns at *superlunar* things,
Poised with a tail, may steer on Wilkins' wings.
Pope.

SUPERNA, in Hindoo mythology, is a name of a celebrated bird in the legends of the east, usually employed to carry the person of the god Vishnu. Most of the Hindoo deities have animals assigned them as vehicles for journeying. They are called in Sanscrit van, or vahan; one of the commonest names of Superna is Garuda, sometimes pronounced Garoor, by which a large species of falcon, well known in all parts of India, is also called. The English usually style it the Brahmany kite; it being held in veneration by many Hindoos, who very much dislike having it killed. In this there is utility, as well as superstition; for the bird in question is very useful, in concert with the vulture, in devouring carrion, and performing the office of scavenger.

The mythological Garuda is variously portrayed, as a man with the beak and wings of an eagle, painted red, green, or blue. He is also frequently seen in casts; and as sculptured in the cavern temple at Elephanta, with Vishnu, is seated straddling, rather ridiculously in our eyes, on his shoulders; Garuda holding by both hands on Vishnu's ancles. Wherever he appears in this cave his projecting nose or beak has been broken off, as it is said, and with reason, by the iconoclastic fury of the Portuguese, while Bombay and its contiguous islands, including that called by us Elephanta, were in their possession.

The birth, life, and exploits of Garuda, are constantly referred to in Hindoo writings. One of the Puranas is called after him, Garuda Purana. Vishnu being the sun, Garuda seems, as his apparent vehicle, and in some points of family and character, to be a personification of the sky. His younger brother is named Aruna, and is the driver or precursor of the glorious car of Surya, or the sun; hence corresponding perhaps with the Aurora, or dawn, of western fable; as well as carrying Vishnu, and his consort Lakshmi. Garuda is seen also flying through the air with Rama and Sita, and sometimes with Krishna, on his back. But there are representations by sectaries of these several gods, who, each adoring the incarnation as the deity, array the object of their adoration in the attributes of the archetype.

Garuda is stated to have married a beautiful woman, when the tribe of serpents, alarmed at this marriage, lest the offspring should inherit he propensities of the fire, waged fierce war against him; but he destroyed them all, save one, which he placed in an ornament about his neck. In several parts of the Elephanta cave Garuda is seen with this appendage; and, on very ancient Hindoo coins and medals, he has snakes and elephants in his talons and beaks: for he is sometimes spread and double-headed, like the eagle of Prussia. Garuda had a son of some note, named Sunabha; and a daughter of surprising beauty, named Su-mati, who was espoused by Sagara, or the sea. If we recollect the surmise that Garuda, or Superna, as the vehicle of Vishnu, a type of the aqueous element, is a personification of the sky or visible firmament, we may discover some connexion in the allegory of an alliance between his descendant and the sea. The beauteous maiden (the meaning of her name, Su-mati) thus allied, became wonderfully prolific: she brought forth (if the Hindoo romantic language be rightly construed) a gourd, whence issued 60,000 male children. The author of the Hindoo Pantheon, in his account of Garuda, notices the extensive prevalence of serpentine forms in the mythological machinery of Egypt and Greece, as well as in India.

SUPER'NAL, *adj.* Lat. *supernus.* Having a higher position; locally above us.

That *supernal* Judge that stirs good thoughts
In any breast of strong authority,
To look into the blots and stains of right.
Shakspeare.

By heaven and earth was meant the solid matter and substance, as well of all the heavens and orbs *supernal*, as of the globe of the earth, and waters which covered it. *Raleigh.*

He with frequent intercourse
Thither will send his winged messengers,
On errands of *supernal* grace. *Milton.*

SUPERNA'TANT, *adj.* } Lat. *supernatans.*
SUPERNATA'TION, *n. s.* } Swimming above: the act of swimming above.

Touching the *supernatation* of bodies, take of aqua-fortis two ounces, of quicksilver two drams, the dissolution will not bear a flint as big as a nutmeg.
Bacon's Natural History.

Bodies are differenced by *supernatation*, as floating on water; for chrystal will sink in water, as carrying in its own bulk a greater ponderosity than the space of any water it doth occupy; and will therefore only swim in molten metal and quiksilver.
Browne's Vulgar Errours.

Whilst the substance continued fluid, I could shake it with the *supernatant* menstruum, without making between them any true union. *Boyle.*

SUPERNAT'URAL, *adj.* Lat. *super* and *natura.* Being above the powers of nature.

There resteth either no way unto salvation, or, if any, then surely a way which is *supernatural*, a way which could never have entered into the heart of a man, as much as once to conceive or imagine, if God himself had not revealed it extraordinarily; for which cause we term it the mystery or secret way of salvation. *Hooker.*

No man can give any rational account how it is possible that such a general flood should come, by any natural means. And, if it be *supernatural*, that grants the thing I am proving, namely, such a supreme being as can alter the course of nature.
Wilkins.

The understanding is secured by the perfection of its own nature, or by *supernatural* assistance.
Tillotson.

What mists of providence are these,
Through which we cannot see?
So saints by *supernatural* power set free
Are left at last in martyrdom to die. *Dryden.*

The Son of God came to do every thing in miracl to love *supernaturally*, and to pardon infinitely, an even to lay down the Sovereign while he assumed the Saviour. *South.*

SUPERNU'MERARY, *adj.* Fr. *supernume-*

raire; Lat. *super* and *numerus*. Being above a stated, a necessary, a usual, or a round number.

Well if thrown out, as *supernumerary*
To my just number found. *Milton's Paradise Lost.*

In sixty-three years there may be lost eighteen days, omitting the intercalation of one day every fourth year, allowed for this quadrant or six hours *supernumerary*. *Browne.*

Besides occasional and *supernumerary* addresses, Hammond's certain perpetual returns exceeded David's seven times a-day. *Fell.*

The odd or *supernumerary* six hours are not accounted in the three years after the leap year. *Holder.*

The produce of this tax is adequate to the services for which it is designed, and the additional tax is proportioned to the *supernumerary* expense this year. *Addison's Freeholder.*

A *supernumerary* canon is one who does not receive any of the profits or emoluments of the church, but only lives and serves there on a future expectation of some prebend. *Ayliffe.*

Antiochus began to augment his fleet; but the Roman senate ordered his *supernumerary* vessels to be burnt. *Arbuthnot.*

SUPERPARTICULAR PROPORTION, or ratio, is that in which the greater term exceeds the less by unit or 1. As the ratio of 1 to 2, or 2 to 3, or 3 to 4, &c.

SUPERPARTIENT (from super and to part), containing more than a division.

SUPERPARTIENT PROPORTION, or ratio, is when the greater term contains the less term once, and leaves some number greater than one remaining. As the ratio

of 3 to 5, which is equal to that of 1 to $1\frac{2}{3}$;
of 7 to 10, which is equal to that of 1 to $1\frac{3}{7}$, &c.

SU'PERPLANT, *n. s.* Super and plant. A plant growing upon another plant.

No *superplant* is a formed plant but misletoe. *Bacon.*

SU'PERPLUSAGE, *n. s.* Lat. *super* and *plus*. Something more than enough.

After this there yet remained a *superplusage* for the assistance of the neighbouring parishes. *Fell.*

SUPERPROPOR'TION, *n. s.* Lat. *super* and *proportio*. Overplus of proportion.

No defect of velocity, which requires as great a *superproportion* in the cause, can be overcome in an instant. *Digby.*

SUPERPURGA'TION, *n. s.* Fr. *superpurgation*; super and purgation. More purgation than enough.

There happening a *superpurgation*, he declined the repeating of that purge. *Wiseman's Surgery.*

SUPERREFLEX'ION, *n. s.* Super and reflexion. Reflection of an image reflected.

Place one glass before and another behind, you shall see the glass behind with the image within the glass before, and again the glass before in that, and divers such *superreflexions*, till the species speciei at last die. *Bacon's Natural History.*

SUPERSA'LIENCY, *n. s.* Lat. *super* and *salio*. Better written supersiliency. The act of leaping upon any thing.

Their coition is by *supersaliency*, like that of horses. *Browne.*

To SUPERSATURATE, in chemistry, to saturate a basis with excess of acid. See SALT.

SUPERSCRIBE', *v. a.* } Lat. *super* and
SUPERSCRIP'TION, *n. s.* } *scribo*. To inscribe upon the top or outside: the noun substantive corresponding.

Read me the *superscription* of these letters; I know not which is which. *Shakspeare. Timon.*

No *superscriptions* of fame,
Of honour or good name. *Suckling.*

I learn of my experience, not by talk,
How counterfeit a coin they are who friends
Bear in their *superscription*; in prosperous days
They swarm, but in adverse withdraw their head. *Milton.*

It is enough her stone
May honoured be with *superscription*
Of the sole lady, who had power to move
The great Northumberland. *Waller.*

Fabretti and others believe, that by the two Fortunes were only meant in general the goddess who sent prosperity or afflictions, and produce in their behalf an ancient monument, *superscribed*. *Addison.*

SUPERSEDE', *v. a.* } Lat. *super* and *sedeo*.
SUPERSE'DEAS, *n. s.* } To make void or inefficacious by superior power; to set aside: for supersedeas see below.

The far distance of this county from the court hath afforded it a *supersedeas* from takers and purveyours. *Carew.*

Passion is the drunkenness of the mind, and therefore in its present workings not controulable by reason, for as much as the proper effect of it is, for the time, to *supersede* the workings of reason. *South.*

In this genuine acceptation of chance, nothing is supposed that can *supersede* the known laws of natural motion. *Bentley.*

SUPERSEDEAS, in English law, is a writ that lies in a great many cases; and signifies in general a command to stay some ordinary proceedings at law, on good cause shown. It is used for the staying of an execution, after a writ of error is allowed and bail put in: but no supersedeas can be made out on bringing writ of error, till bail is given, where there is judgment upon verdict, or by default, in debt. Nor in actions for tithes, promises for payment of money, trover, covenant, detinue, and trespass: stat. 13 Car. II. st. 2, c. 2, and execution shall not be staid in any judgment after verdict (except in the case of executors) by writ of error or supersedeas thereon, unless bail be put in.—Stat. 16 and 17, Car. II, c. 8, § 3.

A writ of error is said to be in judgment of law a supersedeas, until the errors are examined, &c., that is to the execution; not to action of debt on the judgment at law. From the time of the allowance, a writ of error is a supersedeas: and, if the party had notice of it before the allowance, it is a supersedeas from the time of such notice; but this must be where execution is not executed, or begun to be executed. Where a first writ of error abates, or is put an end to by the act of the plaintiff in error, a second writ of error brought in the same court is not a supersedeas of execution as the first is: and execution may then be sued out without leave of the court. But in error of matter of fact coram vobis, which is not within the statutes requiring bail in error, the writ of error is or is not a supersedeas according to circumstances; and the court must be moved for leave

to sue out executions pending it.—8 East's Rep. 412. If, before execution, the defendant bring a writ of error, and the sheriff will execute a fieri facias and levy the money, the court will award a supersedeas, quia erronicè emanavit, and to have restitution of the money.—Stile 414. After an execution, there was a supersedeas, quia executio improvidè emanavit, &c., issued; and, there being no clause of restitution in the supersedeas, it was insisted that the execution was executed before the supersedeas awarded, and that a faulty supersedeas is no supersedeas; but the court ordered another supersedeas, with a clause of restitution.—Moor. 466.

A supersedeas, quia erronicè emanavit, lies to restore a possession, after an habere facias seisinam, when sued out erroneously; so of a supersedeas after execution upon a capias subsatisfaciend, if it be immediately delivered to the sheriff. It appearing from affidavit that there were two writs of execution executed upon one judgment, the party moved for a supersedeas, because there cannot be two such executions, but where the plaintiff is hindered either by the death of the defendant, or by some act in law, that he can have no benefit of the first; and so it was adjudged.—Stile 255. A supersedeas is grantable to a sheriff to stay the return of an habeas corpora; and if he return it afterwards, and the parties proceed to trial, it is error; and so are all the proceedings in an inferior court, after an habeas corpora delivered, unless a procedendo is awarded, in which case a supersedeas is not to be granted.—Cro. Car. 43. 350.

When a certiorari is delivered, it is a supersedeas to inferior courts below; and, being allowed, all their proceedings afterwards are erroneous; and they may be punished. If a sheriff holds plea of 40*s*. debt in his county court, the defendant may sue forth a supersedeas, that he do not proceed, &c. Or, after judgment, he may have a supersedeas directed to the sheriff, requiring him not to award execution upon such judgment; and upon that an alias, a pluries, and an attachment, &c.—New Nat. Br. 432. Supersedeas may be granted by the court for setting aside an erroneous judicial process, &c. Also a prisoner may be discharged by supersedeas; as a person is imprisoned by the king's writ, so he is to be set at liberty: and a supersedeas is as good a cause to discharge a person, as the first process is to arrest him.—Finch. 453: Cro. Jac. 379. If a privileged person is sued in any jurisdiction foreign to his privilege, he may bring his supersedeas.—Vaugh. 155. It is false imprisonment to detain a man in custody after a supersedeas delivered; for the supersedeas is to be obeyed; and in such case it is a new caption without any cause.—2 Cro. 379. There is a supersedeas where an audita querela is sued; and, out of the chancery, to set a person at liberty, taken upon an exigent, on giving security to appear, &c. And in cases of surety of the peace and good behaviour, where a person is already bound to the peace in the chancery, &c.—New Nat. Br. 524, 529, 532. So where a warrant issues against a man, on an indictment found against him, for a misdemeanor, or other bailable offence, and he, having notice of it, does, before caption, duly put in bail, to appear and traverse the indictment, &c., he is entitled to a supersedeas, to prevent a caption.

SUPERSER'VICEABLE, *adj*. Super and serviceable. Over officious; more than is necessary or required.

A glass-gazing *superserviceable* finical rogue. *Shakspeare.*

SUPERSTITION, *n. s.* } Fr. *superstition*:
SUPERSTI'TIOUS, *adj.* } Lat. *superstitio.*
SUPERSTI'TIOUSLY, *adv.* } Unnecessary fear or scruples in religion; observance of unnecessary and uncommanded rites or practises; religion without morality: addicted to superstition: the adverb corresponds with the adjective.

They had certain questions against him of their own *superstition*. *Acts* xxv. 19.

At the kindling of the fire, and lighting of candles, they say certain prayers, and use some other *superstitious* rites, which shew that they honour the fire and the light. *Spenser.*

Have I
Been out of fondness *superstitious* to him?
And am I thus rewarded? *Shakspeare. Henry VIII.*

There reigned in this island a king, whose memory of all others we most adore; not *superstitiously*, but as a divine instrument. *Bacon.*

Nature's own work it seemed, nature taught art,
And, to a *superstitious* eye, the haunt
Of wood-gods and wood-nymphs. *Milton.*

A rev'rent fear, such *superstition* reigns
Among the rude, ev'n then possessed the swains. *Dryden.*

A venerable wood,
Where rights divine were paid, whose holy air
Was kept and cut with *superstitious* care. *Id.*

Neither of these methods should be too scrupulously and *superstitiously* pursued. *Watts's Logick.*

If we had a religion that consisted in absurd *superstitions*, that had no regard to the perfection of our nature, people might well be glad to have some part of their life excused from it. *Law.*

SUPERSTITION is a word that has been used so indefinitely that it is difficult to determine its precise meaning. From its resemblance in sound to the Latin word superstes, 'a survivor,' it is evidently derived from it, and different attempts have been made to trace their connexion in signification. Balbus, in the dialogue De Natura Deorum of Cicero, says, that they who prayed and sacrificed whole days that their children might survive them, were called superstitious. Lactantius censures this etymology, and says they were not called superstitious who wished that their children might survive them (for this we all wish), but because they who survived their parents worshipped their images. Others again say that superstition is derived from superstes, because it consisted in considering the dead as if they were alive. But these etymologies are conjectural and trifling. A more probable etymology may be traced from the primitive words, super, above, and sto, I stand; for the superstitious in all ages and religions flatter themselves that they stand superior to the rest of mankind in holiness. Superstition is a word of a very extensive signification. We apply it to the idolatry of the heathens; we apply it also to the Jews, who made the will of God of no effect by

their traditions, and substituted ceremonies in place of the religion of their fathers. We say also that Christians are guilty of superstition; the Roman Catholics, who believe in transubstantiation and in the efficacy of prayers to saints; and those Protestants who esteem baptism and the Lord's supper, and the punctual performance of other ceremonies, without regard to morality, as sufficient for salvation. Those persons also are reckoned superstitious who believe, without evidence, that prophecies are still uttered by divine inspiration, and that miracles are still performed. The word is also extended to those who believe in witchcraft, magic, and apparitions, or that the divine will is declared by omens or augury; that the fortune of individuals can be affected by things indifferent, by things deemed lucky or unlucky, or that diseases can be cured by words, charms, and incantations. Through all these various superstitions, there runs one general idea, the belief of what is false and contrary to reason. But this does not prove that whatever is false and contrary to reason may be denominated superstition. It is false and irrational to say that there ever lived on earth a race of men who walked on one leg, and had their eyes in their breast; or that there were giants ninety feet high: yet we should only call the man who believes these chimeras credulous. Superstition has always a reference to God, to religion, or to beings superior to man. We do not however distinguish all false and irrational opinions in religion by the name of superstition. We do not, for instance, apply this name to the opinions which some of the ancients entertained, that God is the soul of the world, and that men are only portions of him separated for a time, or that the soul after death lives successively in different bodies. Superstition implies ignorance of the moral attributes of God; we never say a man is superstitious for entertaining erroneous opinions of the attributes of God. Some Socinians have denied the prescience of God; and M. La Metherie has not only rejected the belief that he is a spirit, but has presumed to say that he is composed of a species of crystals! The first of these opinions discovers very imperfect ideas of God, and the second is the height of impiety and absurdity; yet the Socinians are not accused of superstition, nor can this French philosopher be suspected of it. Superstition has sometimes been called the opposite of infidelity, for it always includes the idea of credulity. It consists not in falsely denying that God possesses any particular moral attributes, but in believing more than what is true concerning them; in forming mean unworthy ideas of them; in supposing that he is guided by passion like mankind, and enjoins upon his creatures commandments which are irrational and absurd. As all superstition arises from ignorance and credulity in the understanding, so it has also a seat in the passions. Fear has been commonly considered as the passion of the human mind from which it chiefly derives its origin; and there is no doubt that more superstition has arisen from fear, united with ignorance and credulity, than from any other passion. Yet we cannot exclude all other passions. We cannot account for the superstition of the Egyptians, without supposing that much of it arose from gratitude. They worshipped the Nile, because it distributed fertility and abundance over the land of Egypt; and they worshipped some animals, because they prevented the increase of other animals which were noxious. Thus they adored the ibis, because it destroyed the eggs of the crocodile. In a word, superstition respects God and beings superior to man, and extends to our religious opinions, worship, and practices; and may be defined absurd opinions and actions arising from mean and defective ideas of the moral attributes of God. Superstition involves the idea of a blameable inattention to reason, or a credulity arising from an indolence of understanding. We generally make a distinction between the imperfect opinions which a savage, from his situation, forms of the attributes of God, and those which civilized nations entertain. We ascribe the ignorance of the savage to his situation; but we call the Roman Catholic superstitious, and we blame him for not having those just ideas of God which he might obtain from his Bible, by the exercise of his understanding. Superstition then does not originate so much from the natural weakness of the human understanding, as from a misapplication or a neglect of it. We cannot therefore with propriety apply the term superstition to polytheism; for what all the ancient philosophers, after much study and reflection, concluded to be true, could never proceed from credulity and inattention, but from their situation. We very properly, however, call idolatry by the name of superstition; because there is no man so devoid of understanding as not to be capable of discovering that a piece of metal, or wood, or stone, can neither hear nor answer petitions. Superstitition was a name which the ancient philosophers gave to those who entertained mean opinions of the gods, or did foolish things to obtain their favor. Theophrastus gives a most ridiculous picture of a superstitious pagan, and of the various whimsical ceremonies performed by such persons to prevent mischief, and to avert the wrath of the gods. The superstitious opinions and practices among Jews and Christians have all equally arisen from mean and absurd ideas of the moral attributes of God; for they have generally entertained noble opinions of his natural attributes. The Jews considered God as a partial Being, who had a predilection for their nation in preference to all others, and preferred external homage and ceremony to moral purity. If the Roman Catholics think consistently, they must esteem God as a Being who can be prevailed upon by the importunity of a dead man to assist another, or as a Being whose patience would be fatigued with hearing prayers constantly. Hence their practice of praying to saints. They consider a strict adherence to a variety of ceremonies, to forms, to pomp, and show, as essential to the worship of God: this is treating God as a vain glorious Being. They thought it their duty to extirpate heretics: this was supposing God a cruel and revengeful Being. Even among Protestants, a great deal of superstition still remains; many, like the Jews, considering God, as partial to

their own peculiar sect, and as reprobating the rest of mankind. Besides those superstitious opinions and practices which entirely respect our duty to God, there are others which may be termed vulgar superstitions. These also arise from imperfect and mean ideas of the moral attributes of God. To believe vulgar prophecies, which are always the effusions of enthusiasm or knavery, is to suppose that God, who has drawn a veil over futurity, and only delivers prophecies to accomplish some great moral purpose, sometimes gives them for no purpose at all, or to gratify idle curiosity.

The belief of witchcraft, of apparitions, and the second sight, may be resolved into the same principle. To suppose that God would communicate the power of doing mischief, and of controlling his laws, to any being, merely for gratifying their own passions, is believing what is unworthy of God. The belief of apparitions is equally inconstant with the goodness of God. See SPECTRE. The same objection rises against the second sight, and may be extended to omens, astrology, things lucky and unlucky, fortune-telling, &c. A judicious history of superstition would exhibit the human character in a remarkable point of view. Superstition is most prevalent among men of weak and uncultivated minds; it is more frequent in the female sex than among men; for this reason, that by their education they have less opportunity of improving their minds. It also, for the same reason, abounds more in the rude than in the refined stages of society. It gained admission into the science of medicine at an early period. He who was endowed with superior genius aud knowledge was reckoned a magician. Dr. Bartolo was seized by the inquisition at Rome, in the seventeenth century, because he unexpectedly cured a nobleman of the gout. Diseases were imputed to fascination, and hundreds of poor wretches were dragged to the stake for being accessary to them. Mercatus, physician to Philip II. of Spain, a writer of uncommon accuracy and information, appears strongly inclined to deny the existence of fascinatory diseases; but he is constrained to acknowledge them for two reasons; 1st, Because the inquisition had decided in favor of their reality; 2dly, Because he had seen a very beautiful woman break a steel mirror to pieces, and blast some trees by a single glance of her eyes! As the opinions concerning the cause of diseases were superstitious, those concerning the method of curing them were not less so. In the Odyssey we read of a cure performed by a song. Josephus relates that he saw a certain Jew, named Eleazor, draw the devil out of an old woman's nostrils by the application of Solomon's seal to her nose in the presence of Vespasian. Many different kinds of applications were used for expelling the devil. Flagellation sometimes succeeded admirably. Dr. Mynsight cured several bewitched persons with a plaster of assafœtida. Nor was it only in medicine these superstitious opinions were entertained; they prevailed also in natural philosophy. The pernicious effects in mines, which we know now are occasioned by noxious air, were confidently imputed to the demons of the mine. Even Van Helmont, Bodinus, Strozza, and Luther, attributed thunder and meteors to the devil. Chemists were employed for centuries in search of the philosopher's stone, with which they were to do miracles. It was a common question among philosophers, in the seventeenth century, whether the imagination could move external objects? A question generally decided in the affirmative! Though superstition be generally the mark of a weak mind, such is the infirmity of human nature that we find many instances of it among men of the most sublime genius and most enlightened minds. Socrates believed that he was guided by a demon. Lord Verulam believed in witchcraft; and relates that he was cured of warts by rubbing them with a piece of lard with the skin on, and then nailing it with the fat towards the sun on the post of a chamber window. Henry the Great was rendered very uneasy, by some prophecies of his assassination before it happened; but Julius Cæsar neither believed his wife's dreams, nor the augur's prediction, by which excess of courage he lost his life, and thus both were fulfilled. What say infidels to this? See ROME. Superstition would have saved Cæsar. The enlightened Cudworth defended prophecies in general, and called those who opposed the belief of witchcraft by the name of atheists; and the predictions of Rice Evans have been supported in the present century by the celebrated names of Warburton and Jortin. Dr. Hoffman, the father of the Modern Theory and Practice of Medicine, in a dissertation published in the large edition of his works in 1747, says that the devil can raise storms, produce insects, and act upon the animal spirits and imagination; and, in fine, that he is an excellent optician and natural philosopher, on account of his long experience. Dr. Johnson, the leviathan of literature, believed in the SECOND SIGHT. See that article. With respect to the effects of superstition on the human mind, they are indeed deplorable. It chains down the understanding, sinks it into the most abject and sordid state, and keeps it under the dominion of fear, and sometimes of cruelty. The Christian religion gave a violent shock to the heathen superstition; the Reformation in a great measure demolished the superstition of the church of Rome; and the superstition which remained among protestants after their separation from that church has been gradually yielding to the influence of enlightened reason, or to the bold and daring attacks of infidelity and deism. We behold the prospect of its ruins with pleasure, and thank the deists for their zeal; but it is from the firm hope that the religion of Jesus will arise in all its beauty and simple majesty, and be admired and respected as it deserves; for, mean and contemptible as superstition certainly is, we would rather see men do what they reckon their duty from superstitious principles, than see anarchy and vice prevail, even though attended with all the knowledge and liberality of sentiment which deism and infidelity can inspire.

SUPERSTRAIN', *v. a.* Super and strain. To strain beyond the just stretch.

In the straining of a string, the farther it is strained, the less *superstraining* goeth to a note.

Bacon.

SUPERSTRUCT', *v. a.* SUPERSTRUC'TION, *n. s.* SUPERSTRUCT'IVE, *adj.* SUPERSTRUCT'URE, *n. s.* Lat. *superstruo, superstructus.* To build upon any thing: both the noun substantives signify that which is so built: superstructive, built upon something else.

This is the only proper basis on which to *superstruct* first innocency, and then virtue. *Decay of Piety.*

Two notions of fundamentals may be conceived; one signifying that whereon our eternal bliss is immediately *superstructed*, the other whereon our obedience to the faith of Christ is founded. *Hammond.*

He that is so sure of his particular election, as to resolve he can never fall, must necessarily resolve, that what were drunkenness in another is not so in him; and nothing but the removing his fundamental error can rescue him from the *superstructive*, be it never so gross. *Hammond.*

I want not to improve the honor of the living by impairing that of the dead; and my own profession hath taught me not to erect new *superstructions* upon an old ruin. *Denham.*

Purgatory was not known in the primitive church, and is a *superstructure* upon the Christian religion. *Tillotson.*

You have added to your natural endowments the *superstructures* of study. *Dryden.*

He who builds upon the present, builds upon the narrow compass of a point; and, where the foundation is so narrow, the *superstructure* cannot be high and strong too. *South.*

SUPERVENE', *v. n.* Lat. *supervenio.* To come as an extraneous addition.

That branch of belief was in him *supervenient* to Christian practice, and not all Christian practice built on that. *Hammond.*

If it were unjust to murder John, the *supervenient* oath did not extenuate the fact, or oblige the juror into it. *Browne.*

His good-will, when placed on any, was so fixed and rooted, that even *supervening* vice, to which he had the greatest detestation imaginable, could not easily remove it. *Fell.*

Such a mutual gravitation can never *supervene* to matter, unless impressed by a divine power. *Bentley.*

SUPERVISE', *v. a.* Lat. *super* and *visus.* To overlook; to oversee; to intend.

How satisfied, my lord!
Would you be *supervisor*, grossly gape on? *Shakspeare.*

I am informed of the author and *supervisors* of this pamphlet. *Dryden.*

Mr. Bayle speaks of the vexation of the *supervising* of the press, in terms so feeling that they move compassion. *Congreve.*

A *supervisor* may signify an overseer of the poor, an inspector of the customs, a surveyor of the highways, a *supervisor* of the excise. *Watts's Logick.*

SUPERVIVE', *v. n.* Latin *super* and *vivo.* To overlive; outlive.

Upon what principle can the soul be imagined to be naturally mortal, or what revolutions in nature will it not be able to resist and *supervive*? *Clarke.*

SUPERUS FLOS. See BOTANY, Glossary.

SUPINATION, in anatomy, the action of a supinator muscle, or the motion whereby it turns the hand so as that the palm is lifted up towards heaven.

SU'PINE, *adj.* & *n. s.* SUPINE'LY, *adv.* SUPINE'NESS, *n. s.* SUPIN'ITY. Lat. *supinus.* Lying with the face upward: opposed to prone: leaning backward; exposed; negligent; careless: the adverb and noun-substantive corresponding.

Who on the beds of sin *supinely* lie,
They in the summer of their age shall die. *Sandys.*

These men suffer by their absence, silence, negligence, or *supine* credulity. *King Charles.*

The fourth cause of errour is a *supinity* or neglect of enquiry, even in matters wherein we doubt, rather believing than going to see. *Browne's Vulgar Errours.*

Upon these divers positions in man, wherein the spine can only be at right lines with the thigh, arise those remarkable postures, prone, *supine*, and erect. *Id.*

The old imprisoned king,
Whose lenity first pleased the gaping crowd;
But when long tried, and found *supinely* good,
Like Æsop's log, they leapt upon his back. *Dryden.*

At him he lanced his spear, and pierced his breast;
On the hard earth the Lycian knocked his head,
And lay *supine*; and forth the spirit fled. *Id.*

If the vine
On rising ground be placed, or hills *supine*,
Extend thy loose battalions. *Id.*

What advantage hath a man by this erection above other animals, the faces of most of them being more *supine* than ours? *Ray on the Creation.*

Wilt thou then repine
To labour for thyself? and rather chuse
To lie *supinely*, hoping heaven will bless
Thy slighted fruits, and give thee bread unearned? *Philips.*

Supine in Sylvia's snowy arms he lies,
And all the busy cares of life defies. *Tatler.*

Beneath a verdant laurel's shade,
Horace, immortal bard! *supinely* laid. *Prior.*

When this door is open to let dissenters in, considering their industry and our *supineness*, they may in a very few years grow to a majority in the house of commons. *Swift.*

SUPINE, in the Latin grammar, part of the conjugation of a verb, being a verbal substantive of the singular number and the fourth declension. There are two kinds of supines; one called the first supine, ending in *um* of the accusative case, which is always of an active signification, and follows a verb of motion; abiit deambulatum. The other, called the last supine, and ending in *u* of the ablative case, is of a passive signification, and is governed by substantives or adjectives; as facile dictu, &c. They have their name, says Probus, and after him Vossius, quod ad instar supinorum et otiosorum hominum omnia habent confusa; or, according to Priscian, quod nascuntur a participiis passivis, quæ supina appellata sunt, quia, in infimo loco sita, totam conjugationis molem suscipiant.

SUPPEDA'NEOUS, *adj.* Lat. *sub* and *pes.* Placed under the feet.

He had slender legs, but increased by riding after meals; that is, the humour descended upon their pendulosity, they having no support or *suppedaneous* stability. *Browne.*

SUP'PER, *n. s.* SUP'PERLESS, *adj.* Fr. *souper.* From sup. The last meal of the day; the evening repast: wanting supper.

To-night we hold a solemn *supper*. *Shakspeare.*
I'll to my book:
For yet, ere *supper*-time must I perform
Much business. *Id. Tempest.*
The' hour of *supper* comes unearned. *Milton.*

His physicians, after his great fever that he had in Oxford, required him to eat *suppers*. *Fell.*

Suppose a man's going *supperless* to bed should introduce him to the table of some great prince. *Spectator.*

She eyed the bard, where *supperless* he sat,
And pined, unconscious of his rising fate. *Pope.*

A SUPPER of heavy food should be avoided, because the stomach is more oppressed with the same quantity of food in an horizontal posture than in an erect one, and because digestion goes on more slowly when we sleep than when we are awake. It should be eaten long enough before bed-time, that it may be nearly digested before going to sleep; and then a draught of pure water will dilute that which remains in the stomach.

SUPPER OF THE LORD, otherwise called the Eucharist, is a sacrament ordained by Christ in his church, of which the outward part is bread and wine, and the inward part or thing signified the body and blood of Christ, which the majority of Christians believe to be in some sense or other taken and received by the faithful communicants. See SACRAMENT. There is no ordinance of the gospel which has been the subject of more violent controversies between different churches, and even between different divines of the same church, than this sacrament; and, though all confess that one purpose of its institution was to be a bond of love and union among Christians, it has, by the perverseness of mankind, been too often converted into an occasion of hatred. The outward and visible sign, and the inward and spiritual grace, have equally afforded matter of disputation to angry controvertists. Many members of the church of Rome condemn the Greek church and the Protestants for using leavened bread in the Lord's Supper, contrary to the example set them by our Saviour; whilst the Greek church in general, and some Protestant societies in particular, unite with the church of Rome in censuring all churches which mix not the wine with water, as deviating improperly from primitive practice. See EUCHARIST. That it was unleavened bread which our Lord blessed and brake and gave to his disciples as his body, cannot be questioned: for at the time of the passover, when this ordinance was instituted, there was no leavened bread to be found in Jerusalem. For the mixed cup the evidence is not so decisive. It is indeed true that the primitive Christians used wine diluted with water; and Maimonides says it was the general custom of the Jews, as well at the passover as at their ordinary meals, to add a little water to their wine on account of its great strength; but that this was always done, or that it was done by our Saviour in particular, there is no clear evidence. Origen indeed affirms that our Lord administered in wine unmixed; and he was not a man to hazard such an affirmation, had there been in his days any certain tradition, or so much as a general opinion to the contrary. On this account we have often heard with wonder the necessity of the mixed cup insisted on by those who without hesitation make use of leavened bread; for, if it be essential to the sacrament that the very same elements be employed by us that were employed by our Saviour, the necessity of unleavened bread is certainly equal to that of wine diluted by water. But the mixed cup is said to be emblematical of the blood and water which flowed from the side of our Lord when pierced by the spear of the Roman soldier, while the absence of leaven is emblematical of no particular circumstance in his passion. This argument for the mixture is as old as the era of St. Cyprian, and has since been frequently urged with triumph by those who surely perceived not its weakness. The flowing of the blood and water from our Saviour's side was probably the consequence of the spear's having pierced the pericardium. But, whatever was the cause of it, how can the mixing of wine with water in the sacrament be emblematical of the flowing of blood and water separately? We urge not these objections to the mixed cup from any dislike to the practice. It is unquestionably harmless and primitive; and we wish that greater regard were paid to primitive practices than most of Christians seem to think they can claim; but let the advocates for antiquity be consistent; let them either restore, together with the mixed cup, the use of unleavened bread, or acknowledge that neither the one nor the other is essential to the sacrament. This last acknowledgment must indeed be made if they would not involve themselves in difficulties from which they cannot be extricated. If either the mixed cup of unleavened bread be absolutely necessary to the validity of the sacrament, why not wine made from the grapes of Judea? But the controversies respecting the outward part of the sign of the Lord's Supper are of little importance when compared with those which have been agitated respecting the inward part or thing signified; and of these we hasten to give as comprehensive a view as the limits prescribed to such articles will admit.

The institution of the Lord's Supper, as recorded in the gospel by St. Matthew, St. Paul, St. Mark, and St. Luke, we need not quote. That it was the bread which Christ blessed and brake that is called his body, and the wine over which he gave thanks that he styles his blood of the new testament, will admit of no reasonable doubt; but in what sense they became so has been the subject of many controversies The church of Rome, which holds that, after consecration, Jesus Christ, God and man, is really, truly, and substantially contained under the outward appearance of the bread and wine, informs us that, about the middle of the mass, when the priest, taking into his hand, first the bread, and then the wine, pronounces over each separately the sacred words of consecration, the substance of these elements is immediately changed by the almighty power of God into the body and blood of Christ; but that all the outward appearances of the bread and wine, and all their sensible qualities remain. This more than miraculous change is called transubstantiation; and has been traced to the philosophy of Aris-

totle, which resolves all bodies into matter and form (see PHILOSOPHY); for it is only the matter or imperceptible substance which supports the forms or sensible quantities of bread and wine, and is changed into the substance or matter of the body and blood of Christ, so that this divine matter, coming into the place of the former earthy matter, supports the same identical forms which it supported. Hence we are told 'that Jesus Christ, now present instead of the bread and wine, exhibits himself to us under those very same outward forms or appearances which the bread and wine had before the change.' See TRANSUBSTANTIATION. The churches of England and Scotland, in their established doctrine respecting the Lord's Supper, appear to be Calvinistical; but the compilers of the Thirty-nine Articles and of the Confession of Faith must have been much more rational divines than Beza and Peter Martyr. They agree in condemning the doctrine of transubstantiation as contrary to common sense, and not founded on the word of God; they teach that to such as rightly, worthily, and with faith, receive the sacrament, the bread which we break is a partaking of the body of Christ, and the cup of blessing a partaking of the blood of Christ; and they add that the body and blood of Christ are eaten and drank, not corporally and carnally, but only after a heavenly and spiritual manner, by which the communicants are made partakers of all the benefits of his death. In one important circumstance these two churches seem to differ. The Confession of Faith affirms that, in the Lord's Supper, there is no sacrifice made at all. The thirty-first article of the church of England likewise condemns the popish sacrifice of the mass as a blasphemous fable and dangerous deceit; but in the order for the administration of the Lord's Supper, or Holy Communion, the celebrator 'beseeches God most mercifully to accept the alms and oblations of the congregation,' and again, 'to accept their sacrifice of praise and thanksgiving:' from which petitions many have inferred that, in the Lord's Supper, that church offers a commemorative and eucharistical sacrifice. This inference seems not to be wholly without foundation. In the order for the administration of the Lord's Supper, according to the form of the book of Common Prayer set forth by act of parliament in the second and third years of king Edward VI., the elements were solemnly offered to God as a sacrifice of praise and thanksgiving; but the prayer containing that oblation was, at the review of the liturgy some years afterwards, removed from the prayer of consecration, to which it was originally joined, and placed where it now stands in the post-communion service. The English church, however, has not positively determined any thing respecting this great question: and whilst she condemns the doctrine of the real presence, with all its dangerous consequences, she allows her members to entertain very different notions of this holy ordinance, and to publish these notions to the world. Accordingly, many of their most eminent divines, particularly archbishops Laud and Wake; the bishops Poynet, Andrews, Bull, and Patrick; the doctors Hickes, Crabe, and Brett; Messrs. Bingham, Johnson, Mede, Wheatly, Scandaret, Bowyer, &c., have maintained that, in the celebration of the Lord's Supper, the elements of bread and wine are offered to God as a sacrifice commemorative of Christ's one sacrifice for the sins of the whole world: that these elements, though they undergo no substantial change, yet receive such a divine virtue, by the descent of the Holy Ghost, as to convey to the worthy communicant all the benefits of Christ's passion: that they are therefore called his body and blood; because being, after their oblation, eaten and drunk in remembrance of him, they supply the place of his body and blood in the feast upon his sacrifice; and that it is customary with our Saviour to give to any thing the name of another of which it completely supplies the place, as when he calls himself the door of the sheep, because there is no entrance into the church or kingdom of God but by faith in him. They observe that the Eucharist's being commemorative, no more hinders it from being a proper sacrifice than the typical and figurative sacrifices of the old law hindered them from being proper sacrifices: for as to be a type doth not destroy the nature and notion of a legal sacrifice, so to be representative and commemorative doth not destroy the nature of an evangelical sacrifice.

Our limits will not permit us to give even an abstract of their arguments; but the reader who wishes to see more of the subject may peruse Johnson's unbloody Sacrifice and Altar unveiled and supported; whence he may discover that their notions are totally irreconcileable with the doctrine of transubstantiation and the popish sacrifice of the mass. Other English divines of great learning, with the celebrated Hoadley bishop of Winchester, contend strenuously that the Lord's Supper, so far from being a sacrifice of any kind, is nothing more than bread and wine reverently eaten and drunk, in remembrance that Christ's body was broken and his blood shed in proof of his Father's and his own love to mankind; that nothing is essential to the sacrament but this remembrance, and a serious desire to honor and obey our Saviour as our head; that the sacrament might be celebrated without uttering one prayer or thanksgiving, merely by a society of Christians, whether small or great, jointly eating bread and drinking wine with a serious remembrance of Christ's death; that St. Paul enjoins a man to examine himself before he eat of that bread and drink of that cup, not to discover what have been the sins of his past life in order to repent of them, but only that he may be sure of remembering Christ's body broken and his blood shed; that, however, it is his duty in that as in every other instance of religious worship, to resolve to obey from the heart every precept of the gospel, whether moral or positive; and that to partake worthily of the Lord's Supper is acceptable to God, because it is paying obedience to one of these precepts; but that no particular benefits or privileges are annexed to it more than to any other instance of duty. The celebrated archbishop Tillotson advances the same doctrine in his Persuasive to Frequent Communion. Bishop Hoadley acknowledges that when St. Paul says, 'The cup

of blessing which we bless, is it not the communion of the blood of Christ? The bread which we break, is it not the communion of the body of Christ?' he has been supposed by many learned men to affirm that all the benefits of Christ's passion are in the Lord's Supper conveyed to the worthy communicant; but this, says he, is an idea which the apostle could not have in his thoughts as at all proper for his argument. The Greek word *κοινωνια*, and the English communion, signify only a partaking of something in common with others of the same society; and the apostle's meaning, he says, can be nothing more than that in the Lord's Supper we do not eat bread and drink wine as at an ordinary meal, but as memorials of the body and blood of Christ, in honor to him as the head of that body of which we are all members. That the word *κοινωνια* is not meant to denote any inward or spiritual part of the Lord's Supper he thinks evident, because the same word is used with regard to the cup and the table of idols, where no spiritual part could be thought of, and in an argument which supposes an idol to be nothing. Other divines steer a middle course between the mere memorialist and the advocate for a real sacrifice in the holy Eucharist, and insist that this rite, though no sacrifice itself, is yet a feast upon the one sacrifice offered by Christ, and slain upon the cross. The most eminent patrons of this opinion have been Dr. Cudworth, bishop Warburton, and Dr. Cleaver, bishop of St. Asaph; and they support it by such arguments as the following:—'In those ages of the world when victims made so great a part of the religion both of Jews and Gentiles, the sacrifice was always followed by a religious feasting on the thing offered; which was called the feast upon or after the sacrifice, and was supposed to convey to the partakers of it the benefits of the sacrifice. Now Jesus, say they, about to offer himself a sacrifice on the cross for our redemption, did, in conformity to general practice, institute the last supper, under the idea of a feast after the sacrifice; and the circumstances attending its institution were such, they think, that the apostles could not possibly mistake his meaning. It was just before his passion, and while he was eating the paschal supper, which was a Jewish feast upon the sacrifice, that our blessed Lord instituted this rite; and as it was his general custom to allude, in his actions and expressions, to what passed before his eyes, or presented itself to his observation, who can doubt when, in the very form of celebration, we see all the marks of a sacrificial supper, but that the divine institutor intended it should bear the relation to his sacrifice on the cross which the paschal supper then celebrating bore to the oblation of the paschal lamb?' Thus have we given such a view as our limits permit of the principal opinions that have been held respecting the nature and end of the Lord's Supper. After all a plain Christian, who is not willing to believe more than what is in Scripture, nor is fettered with the prejudices of particular sects or parties, will be apt to think that both Protestants and Roman Catholics have darkened counsel by words without knowledge, upon a very plain, simple, commemorative ceremony. The late Mr. Barclay, the Berean, often said, 'the Papists had made a god of it, and most Protestants had made it a demi-god.'

SUPPLANT', *v. a.* Fr. *supplanter*; Lat. *sub* and *planta*. To trip up the heels; displace by stratagem; overpower.

It is Philoclea his heart is set upon; it is my daughter I have borne to *supplant* me. *Sidney.*

If it be fond, call it a woman's fear;
Which fear, if better reasons can *supplant*,
I will subscribe, and say, I wronged the duke.
Shakspeare.

Upon a just survey, take Titus' part,
And so *supplant* us for ingratitude. *Id.*

For such doctrines as depend merely upon institution and the instruction of others, men do frequently differ both from themselves and from one another about them; because that which can plant, can *supplant*. *Wilkins.*

His legs entwining
Each other, till *supplanted* down he fell
A monstrous serpent on his belly prone. *Milton.*

Suspecting that the courtier had *supplanted* the friend. *Fell.*

The thronging populace with hasty strides
Obstruct the easy way; the rocking town
Supplants their footsteps; to and fro they reel.
Philips.

SUP'PLE, *adj., v. a.*, & } Fr. *souple*. Pliant;
SUP'PLENESS, *n. s.* [*v. n.* } flexible; yielding: hence fawning; flattering: to make pliant or soft: to grow soft or pliant: the noun substantive corresponding.

When we 've stuffed
These pipes and these conveyances of blood
With wine and feeding, we have *suppler* souls
Than in our priestlike fasts. *Shakspeare.*

Each part deprived of supple government,
Shall stiff, and stark, and cold appear, like death.
Id.

Knaves having, by their own importunate suit,
Convinced or *supplied* them, they cannot chuse,
But they must blab. *Id. Othello.*

The joints are more *supple* to all feats of activity in youth than afterwards. *Bacon.*

Will ye submit your necks, and chuse to bend
The *supple* knee? *Milton.*

Study gives strength to the mind, conversation grace; the first apt to give stiffness, the other *suppleness*. *Temple.*

No women are apter to spin linen well than the Irish, who, labouring little in any kind with their hands, have their fingers more *supple* and soft than other women of the poorer condition in England.
Id.

Ev'n softer than thy own, of *suppler* kind,
More exquisite of taste, and more than man refined.
Dryden.

The stones
Did first the rigour of their kind expel,
And *suppled* into softness as they fell. *Id.*

A mother persisting till she had bent her daughter's mind, and *suppled* her will, the only end of correction, she established her authority thoroughly ever after. *Locke on Education.*

If punishment reaches not the mind, and makes not the will *supple*, it hardens the offender. *Locke.*

There is something so *supple* and insinuating in this absurd unnatural doctrine, as makes it extremely agreeable to a prince's ear. *Addison.*

To *supple* a carcase, drench it in water.
Arbuthnot.

SUP'PLEMENT, *n. s.* } Fr. *supplement;*
SUPPLEMENT'AL, *adj.* } Latin *supplementum.*
SUPPLEMENT'ARY. } Addition to any thing by which its defects are supplied; supply; store: the adjectives corresponding.

Unto the word of God, being in respect of that end for which God ordained it, perfect, exact, and absolute in itself, we do not add reason as a *supplement* of any maim or defect therein, but as a necessary instrument, without which we could not reap by the Scripture's perfection that fruit and benefit which it yieldeth. *Hooker.*

We had not spent
Our ruddie wine a-ship-board: *supplement*
Of large sort each man to his vessel drew. *Chapman.*

Divinity would not then pass the yard and loom, nor preaching be taken in as an easier *supplementary* trade, by those that disliked the pains of their own. *Decay of Piety.*

Supplemental acts of state were made to supply defects of laws; and so tonnage and poundage were collected. *Clarendon.*

Provide his brood next Smithfield fair,
With *supplemental* hobby horses;
And happy be their infant courses. *Prior.*

His blood will atone for our imperfection, his righteousness be imputed in *supplement* to what is lacking in ours. *Rogers.*

Instructive satire, true to virtue's cause!
Thou shining *supplement* of publick laws! *Young.*

SUPPLEMENT, in literature, an appendage to supply what is wanting in a book. It has been generally remarked, that no literary work stands so much in need of a supplement as a dictionary of arts and sciences, on account of the successive and daily progress and improvement of the arts and sciences.

SUPPLEMENT OF AN ARCH OR ANGLE, in geometry or trigonometry, is what it wants of a semicircle, or of 180°; as the complement is what it wants of a quadrant, or of 90°. So the supplement of 50° is 130°; as the complement of it is 40°.

SUP'PLETORY, *n. s.* Lat. *suppletorium.* That which is to fill up deficiencies.

That *suppletory* of an implicit belief is by Romanists conceived sufficient for those not capable of an explicit. *Hammond.*

SUP'PLIANT, *adj.* & *n. s.* Fr. *suppliant.* Entreating; beseeching; submissive: he who begs in that manner.

To those legions your levy
Must be *suppliant.* *Shakspeare. Cymbeline.*

A petition from a Florentine I undertook,
Vanquished thereto by the fair grace and speech
Of the poor *suppliant.* *Shakspeare.*

To bow and sue for grace with *suppliant* knee. *Milton.*

The rich grow *suppliant*, and the poor grow proud:
Those offer mighty gain, and these ask more. *Dryden.*

Hourly suitors come:
The east with incense, and the west with gold,
Will stand like *suppliants* to receive her doom. *Id.*

Constant to his first decree,
To bow the haughty neck, and raise the *suppliant* knee. *Prior.*

SUP'PLICATE, *v. n.* } Fr. *supplier;* Lat.
SUPPLICA'TION, *n. s.* } *supplico,* from *supplex.* To implore; entreat; petition submissively: the noun substantive corresponding.

Praying with all prayer and *supplication*, with all perseverance and *supplication* for all saints. *Ephesians* vi. 18.

The prince and people of Nineveh assembling themselves a main army of *supplicants*, God did not withstand them. *Hooker.*

My lord protector will come this way by and by, and then we may deliver our *supplications* in the quill. *Shakspeare.*

My mother bows,
As if Olympus to a mole-hill should
In *supplication* nod. *Id. Coriolanus.*

Many things a man cannot with any comeliness say or do; a man cannot brook to *supplicate* or beg. *Bacon.*

Bend thine ear
To *supplication*; hear his sighs though mute. *Milton.*

We should testify our dependence upon God, and our confidence of his goodness, by constant prayers and *supplications* for mercy. *Tillotson.*

These prove the common practice of the worship of images in the Roman church, as to the rites of *supplication* and adoration, to be as extravagant as among the heathens. *Stillingfleet.*

Thither the kingdoms and the nations come,
In *supplicating* crowds, to learn their doom. *Addison.*

A second sort of publick prayer is, that all in a family that are members of it join in their common *supplications.* *Duty of Man.*

The wise *supplicant*, though he prayed for the condition he thought most desirable, yet left the event to God. *Rogers.*

Abraham, instead of indulging the *supplicant* in his desire of new evidence, refers him to what his brethren had. *Atterbury.*

SUPPLICATIO, in antiquity, a religious solemnity observed on account of any remarkable success against an enemy; and especially when the army had conferred the title of imperator on their general. On such occasions the imperator sent messengers, crowned with laurel, with letters to the senate, which were likewise adorned with laurel, to demand of them the title of imperator, and the honor of a supplication. The solemnity consisted in sacrificing and feasting in the temples, with giving thanks to the gods for success obtained, and praying for the continuance of their assistance. At first there were only a few days taken up in such festivals; but afterwards they were increased gradually, till they came to no less than fifty. On subduing the Sabines, in the year of the city 304, a supplication of one day only was ordained; on the taking of Veii, Camillus had a supplication of four days decreed him; Pompey had twelve on putting an end to the Mithridatic war; Cæsar had fifteen, and afterwards twenty, for reducing Gaul; Octavianus and Pansa had fifty days of supplication for delivering the colony of Mutina.

SUPPLICAVIT, a writ issuing out of chancery, for taking surety of the peace, when one is in danger of being hurt in his body by another; it is directed to the justices of the peace and sheriff of the county, and is grounded upon the stat. 1 Edw. III., stat. 2, c. 16, which ordains that certain persons shall be assigned by the chancellor to take care of the peace, &c.—F. N. B. 80, 81. When a man hath purchased a writ of supplicavit, directed to the justices of the peace,

against any person, then he, against whom the writ is sued, may come into the chancery, and there find sureties that he will not do hurt or damage unto him that sueth the writ; and upon that he shall have a writ of supersedeas, directed to the justices, &c., reciting his having found sureties in chancery, according to the writ of supplicavit: and also reciting that writ, and the manner of the security that he hath found, &c., commanding the justices that they cease to arrest him, or to compel him to find sureties, &c. And, if the party who ought to find sureties cannot come into the chancery to find sureties, his friend may sue a supersedeas in chancery for him; reciting the writ of supplicavit, and that such a one and such a one are bound for him in the chancery in such a sum, that he shall keep the peace according to it; and the writ shall be directed to the justices, that they take surety of the party himself, according to the supplicavit, to keep the peace, &c., and that they do not arrest him; or, if they have arrested him for that cause, that they deliver him.—New Nat. Br. 180. Sometimes the writ of supplicavit is made returnable into the chancery at a certain day; and, if so, and the justices do not certify the writ, nor the recognizance, and the security taken, the party who sued the supplicavit shall have a writ of certiorari directed unto the justices of peace to certify the writ of supplicavit, and what they have done thereupon, and the security found, &c.—New Nat. Br. 180. If a recognizance of the peace be taken in pursuance of a writ of supplicavit, it must be wholly governed by the directions of such writ; but, if it be taken before a justice of peace below, the recognizance may be at the discretion of such justice.—Lamb. 100; Dalt. c. 70.

At the common law it was sufficient, in order to obtain this process for surety of the peace from the court of chancery, if the party who demanded it made oath that he was in fear of some corporal hurt, and that he did not crave the same out of malice, but for the safety of his body.—F. N. B. 79, 80. But by stat. 21 Jac. I., c. 8, all process of the peace shall be void, unless granted on motion in open court on affidavit in writing.

When articles of the peace are exhibited in the court of chancery, and oath is made that the surety of the peace is not craved by the party through malice, but for the safety of his life, a writ of supplicavit issues, directed to the justices of the peace generally, or to some one justice of the peace, or to the sheriff, commanding them or him to take security in the sum thereon indorsed; and, if the surety refuses to find such security, to commit him to the town gaol until he does find such security. If there be no proceedings on a supplicavit within a year, the recognizance is of course discharged; and, if the party be committed after the expiration of that time, he shall be discharged upon very slight security.—Fitz. 268. If taken below, and the party appear pursuant to the condition, no indictment being lodged, he must be discharged.—Hardwick's Cases. But the court in discretion may refuse to discharge a recognizance, even though the exhibitant appear and consent; for a breach against any other person is equally a forfeiture.

SUPPLY', *v. a.* & *n. s.* Fr. *suppléer*; Lat. *suppleo*. To fill up as deficiencies happen; afford what is wanted; yield; serve instead of; accommodate; give or bring: the noun substantive means relief of want; cure of want or deficiency.

I mean that now your abundance may be a *supply* for their want, that their abundance also may be a *supply* for your want. 2 *Cor.* viii. 14.

Out of the fry of these rakehell horseboys are their kearn *supplied* and maintained. *Spenser.*

Although I neither lend nor borrow,
Yet, to *supply* the ripe wants of my friend,
I'll break a custom.
Shakspeare. Merchant of Venice.

They were princes that had wives, sons, and nephews; and yet all these could not *supply* the comfort of friendship. *Bacon.*

The reception of light must be *supplied* by some open form of the fabrick. *Wotton.*

Upstart creatures to *supply* our vacant room.
Milton

Burning ships the banished sun *supply*,
And no light shines but that by which men die.
Waller.

I wanted nothing fortune could *supply*,
Nor did she slumber till that hour deny. *Dryden.*

While trees the mountain-tops with shades *supply*,
Your honour, name, and praise, shall never die.
Id.

Nearer care *supplies*
Sighs to my breast, and sorrow to my eyes. *Prior.*

Art from that fund each just *supply* provides,
Works without show, and without pomp presides.
Pope.

My lover, turning away several old servants, *supplied* me with others from his own house. *Swift.*

SUPPORT', *v. a.* & *n. s.* SUPPORT'ABLE, *adj.* SUPPORT'ANCE, *n. s.* SUPPORTA'TION, SUPPORT'ER. Fr. *supporter*; Ital. *supportare*. To sustain; prop; bear up; endure: all the noun substantives, and the adjective following, correspond: the last two noun substantives are obsolete.

As great to me, as late; and, *supportable*,
To make the dear loss, have I means much weaker
Than you may call to comfort you.
Shakspeare. Tempest.

You must walk by us upon either hand,
And good *supporters* are you.
Id. Measure for Measure.

Give some *supportance* to the bending twigs.
Shakspeare.

The benefited subject should render some small portion of his gain for the *supportation* of the king's expence. *Bacon.*

The sockets and *supporters* of flowers are figured. *Id.*

More might be added of helms, crests, mantles, and *supporters*. *Camden.*

The beginning of the earl of Essex I must attribute in great part to my lord of Leicester; but yet as an introducer or *supporter*, not as a teacher. *Wotton.*

Such propositions as these are competent to blast and defame any cause which requires such aids, and stands in need of such *supporters*. *Hammond.*

Stooping to *support* each flower of tender stalk.
Milton.

Strongly to suffer and *support* our pains. *Id.*

With inward consolations recompensed,
And oft *supported*. *Id.*

We shall be discharged of our load; but you, that are designed for beams and *supporters*, shall bear.
L'Estrange.

This fierce demeanour, and his insolence,
The patience of a god could not *support*. *Dryden.*
She scarce awake her eyes could keep,
Unable to *support* the fumes of sleep. *Id.*
Love was no more, when loyalty was gone,
The great *supporters* of his awful throne. *Id.*

Though the idea we have of a horse or stone be but the collection of those several sensible qualities which we find united in them; yet, because we cannot conceive how they should subsist alone, we suppose them existing in and supported by some common subject, which *support* we denote by the name substance, though it be certain we have no clear idea of that *support*. *Locke.*

Because a relation cannot be founded in nothing, and the thing here related as a *supporter*, or a *support*, is not represented to the mind by any distinct idea. *Id.*

There is no loss of room at the bottom, as there is in a building set upon *supporters*. *Mortimer.*

The saints have a companion and *supporter* in all their miseries. *South.*

None can *support* a diet of flesh and water without acids, as salt, vinegar, and bread, without falling into a putrid fever. *Arbuthnot.*

I wish that whatever part of misfortunes they must bear, may be rendered *supportable* to them. *Pope.*

Alterations in the project of uniting Christians might be very *supportable*, as things in their own nature indifferent. *Swift.*

SUPPORTED, in heraldry, a term applied to the uppermost quarters of a shield when divided into several quarters, these seeming as it were supported or sustained by those below. The chief is said to be supported when it is of two colors, and the upper color takes up two-thirds of it. In this case it is supported by the color underneath.

SUPPOSE', *v. a.* & *n. s.* SUPPO'SABLE, *adj.* SUPPO'SAL, *n. s.* SUPPOS'ER, SUPPOSI'TION, SUPPOSI'TIOUS, *adj.* SUPPOS'ITITIOUS, SUPPOS'ITIVELY, *adv.* Fr. *supposer*; Lat. *suppono*. To lay down without proof; advance or suggest without maintaining the truth of the position; to assume; admit without proof; imagine; make to appear reasonable as a consequence: suppose, noun substantive, has been barbarously used for supposition: supposable signifies, that may be supposed or conjectured: supposal is but a synonyme of supposition: supposer, he who supposes: supposition, position or hypothesis assumed; unproved imagination: suppositious, imaginary; unreal; spurious: suppositively, upon supposition.

Let not my lord *suppose* that they have slain all the king's sons; for Amnon only is slain.
2 *Sam.* xiii. 32.

Tell false Edward, thy *supposed* king,
That Lewis of France is sending over maskers.
Shakspeare.

Young Fortinbras,
Holding a weak *supposal* of our worth,
Thinks our state to be out of frame. *Id.*
We come short of our *suppose* so far,
That, after seven years siege, yet Troy-walls stand. *Id.*

Thou hast by marriage made thy daughter mine,
While counterfeit *supposers* bleered thine eyne. *Id.*

In saying he is a good man, understand me that he is sufficient; yet his means are in *supposition*. *Id.*

The destruction of Mustapha was so fatal to Solyman's line as the succession of the Turks from Solyman is suspected to be of strange blood, for that Selymus II. was thought to be *suppositious*. *Bacon.*

Invincible ignorance is, in the far greatest number of men, ready to be confronted against the necessity of their believing all the severals of any *supposable* catalogue. *Hammond.*

When this comes, our former *supposal* of sufficient grace, as of the preaching of the word, and God's calls, are utterly at an end. *Id.*

The unreformed sinner may have some hope *suppositively*, if he do change and repent: the honest penitent may hope positively. *Id.*

Where we meet with all the indications and evidences of such a thing, as the thing is capable of, *supposing* it to be true, it must needs be very irrational to make any doubt of it. *Wilkins.*

I *suppose* we should compel them to a quick result. *Milton.*

This *supposeth* something, without evident ground. *Hale.*

Little can be looked for towards the advancement of natural theory, but from those that are likely to mend our prospect: the defect of events, and sensible appearances, suffer us to proceed no further towards science, than to imperfect guesses and timorous *supposals*. *Glanville's Scepsis, Preface.*

This is to be entertained as a firm principle, that when we have as great assurance that a thing is, as we could possibly, *supposing* it were, we ought not to make any doubt of its existence. *Tillotson.*

This is only an infallibility upon *supposition*, that if a thing be true, it is impossible to be false. *Id.*

There is a Latin treatise among the *suppositious* pieces ascribed to Athanasius. *Waterland.*

Is Egypt's safety, and the king's, and your's,
Fit to be trusted on a bare *suppose*
That he is honest? *Dryden's Cleomenes.*

Suppose some so negligent that they will not be brought to learn by gentle ways, yet it does not thence follow that the rough discipline of the cudgel is to be used to all. *Locke.*

Interest, with a Jew, never proceeds but upon *supposal* at least of a firm and sufficient bottom. *South.*

It is their opinion, that no man ever killed his father; but that, if it should ever happen, the reputed son must have been illegitimate, *suppositious*, or begotten in adultery. *Addison.*

Some alterations in the globe tend rather to the benefit of the earth, and its productions, than their destruction, as all these *suppositious* ones manifestly would do. *Woodward.*

Such an original irresistible notion is neither requisite upon *supposition* of a Deity, nor is pretended to by religion. *Bentley.*

One falsehood always *supposes* another, and renders all you can say suspected. *Female Quixotte.*

Artful men endeavour to entangle thoughtless women by bold *supposals* and offers. *Clarissa.*

SUPPOSITION, in music, is when one of the parts dwells on a note, while another part makes two or three more lesser notes equivalent to it, by conjoint degrees. Supposition is defined the using of two successive notes of the same value as to time; the one whereof, being a discord, supposes the other a concord. The harmony, Mr. Malcolm observes, is always to be full on the accented parts of the bar or measure; but on the unaccented, discords may transiently pass, without any offence to the ear. This transient use of discords, followed by con-

cords, make what we, after the French, call supposition. Concords by supposition are those where the continued bass adds or supposes a new sound below the fundamental bass; whence such concords always exceed the extent of the octave. Of these concords there are three sorts, all which are concords of the seventh; the first, when the added sound is a third below the fundamental sound; such is the concord of the ninth; and if the concord of the ninth is formed by the mediant, added below the sensible concord in the minor mode, then the concord is called the superfluous fifth. The second kind is, when the supposed sound is a fifth below the fundamental sound, as in the concord of the fourth or eleventh; and if the concord is sensible, and the tonic be supposed, this concord is called the superfluous seventh. The third kind is that where the supposed sound is below a concord of the diminished seventh; if it is a fifth below, i. e. if the supposed sound be the mediant, the concord is called the concord of the fourth and superfluous fifth: if it is a seventh below, i. e. if the supposed sound be the tonic, the concord is called the lesser sixth and superfluous seventh.

SUPPOS'ITORY, *n. s.* Fr. *suppositoire;* Lat. *suppositorium.* A kind of solid clyster.

Nothing relieves the head more than the piles; therefore *suppositories* of honey, aloes, and rocksalt ought to be tried. *Arbuthnot.*

A SUPPOSITORY is a kind of medicated cone, which is introduced into the anus for opening the belly. It is usually composed of common honey, mixed up with either soap or oil, and formed into pieces of the length and thickness of the little finger, only pyramidal. To the composition is sometimes also added powder of scammony, euphorbium, colocynthis, salt, aloes, &c, according to the case of the patient. The suppository was invented for the convenience of such as have an aversion to the taking of clysters; or to be used when the disease does not allow thereof.

SUPPRESS', *v. a.* SUPPRES'SION, *n. s.* SUPPRES'SOR. Fr. *supprimer;* Latin *supprimo, suppressus.* To crush; overpower; overwhelm; subdue; reduce to inactivity; to hide; conceal; keep in: the noun substantives corresponding.

Glo'ster would have armour out of the Tower,
To crown himself king, and *suppress* the prince.
Shakspeare. Henry VI.

Well did'st thou, Richard, to *suppress* thy voice;
For, had the passions of thy heart burst out,
I fear we should have seen decyphered there
More ranc'rous spight, more furious raging broils.
Shakspeare.

Every rebellion, when it is *suppressed,* doth make the subject weaker, and the prince stronger.
Davies on Ireland.

Sir William Herbert, with a well armed and ordered company, set sharply upon them; and, oppressing some of the forwardest of them by death, *suppressed* the residue by fear. *Hayward.*

Things not revealed, which the invisible King,
Only omniscient, hath *suppressed* in night. *Milton.*

You may depend upon a *suppression* of these verses.
Pope.

Still she *suppresses* the name, and this keeps him in a pleasing suspense; and, in the very close of her speech, she indirectly mentions it.
Broome on the Odyssey.

SUPPRESSION, in medicine, is generally used to signify a retention of urine or of the menses.

SUPPURATION is the second way wherein an inflammation terminates; being a conversion of the inspissated blood and the first adjacent parts, as the vessels and fat into pus or matter; which disorder, when it has not yet found an opening, is generally called an abscess.

SUP'PURATE, *v. a.* Fr. *suppurer;* Latin *pus puris.* To generate pus or matter.

The great physician of souls sometimes cannot cure without cutting us: sin has festered inwardly, and he must lance the imposthume, to let out death with the *suppuration.* *South.*

If the inflammation be gone too far towards a *suppuration,* then it must be promoted with suppuratives, and opened by incision. *Wiseman.*

This great attrition must produce a great propensity to the putrescent alkaline condition of the fluids, and consequently to *suppurations.*
Arbuthnot on Aliments.

This disease is generally fatal: if it *suppurates* the pus, it is evacuated into the lower belly, where it produceth putrefaction. *Id. On Diet.*

SUPPUTA'TION, *n. s.* Fr. *supputation;* Lat. *supputo.* Reckoning; account; calculation. Not used.

From these differing properties of day and year, arise difficulties in carrying on and reconciling the *supputation* of time in long measures.
Holder on Time.

The Jews saw every day their Messiah still farther removed from them; that the promises of their doctors, about his speedy manifestations, were false; that the predictions of the prophets whom they could now no longer understand, were covered with obscurity; that all the *supputations* of time either terminated in Jesus Christ, or were without a period.
West.

SUPRALAPSA'RIAN, *adj.* SUPRALAP'SARY. Lat. *supra* and *lapsus.* Antecedent to the fall of man.

The *supralapsarians,* with whom the object of the decree is homo conditus, man created, not yet fallen; and the sublapsarians, with whom it is man fallen, or the corrupt mass. *Hammond.*

SUPRALAPSARIANS, in theology, are persons who hold that God, without any regard to the good or evil works of men, has resolved, by an eternal decree, supra lapsum, antecedently to any knowledge of the fall of Adam, and independently of it, to save some and to damn others; or, in other words, that God intended to glorify his justice in the condemnation of some, as well as his mercy in the salvation of others; and for that purpose decreed that Adam should necessarily fall, and by that fall bring himself and all his offspring into a state of everlasting condemnation. These are also called antelapsaries, and are opposed to sublapsarians and infralapsarians. According to the supralapsarians, the object of predestination is, homo creabilis et labilis; and, according to the sublapsarians, and infralapsarians, homo creatus et lapsus.

SUPRAVUL'GAR, *adj.* Lat. *supra* and *vulgaris.* Above the vulgar.

SUPREME', *adj.* } Lat. *supremus*. Highest;
SUPREM'ACY, *n. s.* } highest in dignity, autho-
SUPREME'LY, *adv.* } rity and excellence: the noun substantive and adverb corresponding.

SUPREMACY. According to the Roman Catholics, St. Peter was not only the head of the apostolic college, but the pastor of the universal church. The Roman pontiff is the successor of this prince of the apostles, and, like him, has authority and jurisdiction over the whole church, all believers, without exception, owing him respect and obedience. The council of Trent declared that the sovereign pontiff is the vicar of God, upon earth, and has supreme power over all the church. The extent of the authority thus assumed by the pope, is different in different countries, and the whole doctrine of the papal supremacy is of course rejected by the Protestant, Greek and other churches. In 1534, Henry VIII. assumed the title of the only supreme head on earth, of the church of England. The *oath of supremacy* (that is, of renunciation of the papal supremacy), with the oath of abjuration, was formerly required to be taken by all persons in office, and might be tendered, by two justices of the peace, to all persons suspected of disaffection in England. Some modifications of the law requiring this oath were made in 1793 (see *Catholic Emancipation*); but it was still, with the declaration against transubstantiation, the invocation of saints, and the sacrifice of the mass, requisite for a qualification for sitting and voting in parliament, and for holding certain offices, until the passage of the Catholic relief bill. This bill repeals all former acts on the subject, and requires of a Roman Catholic peer, or member of the house of commons, &c., besides the oath of allegiance and abjuration, the following oath of supremacy: I do declare that it is not an article of my faith, and that I do reject, renounce and abjure the opinion, that princes excommunicated or deprived by the pope, or any other authority of the see of Rome, may be deposed or murdered by their subjects, or by any person whatsoever; and I do declare that I do not believe that the pope of Rome, or any other foreign prince, prelate, person, state or potentate, hath, or ought to have any temporal or civil jurisdiction, power, superiority or pre-eminence, directly or indirectly within this realm.

SUR, or SHUR, in ancient geography a desert of Arabia Petræa, extending between Palestine and the Arabian Gulf; into which the Israelites, after marching through the Red Sea, first came. —Exod. xv. 22. In Numbers xxxiii. 8, it is said that from the sea they went three days' journey into the wilderness of Etham; whence some conclude that Etham and Shur are the same wilderness; or only differ as a part from the whole, Shur being the general name, and Etham that part of it lying nearest to the place of encampment of the same name. As to the route which the Israelites followed, in their passage through the Red Sea, Mr. Bryant has given an account in his work on the Plagues of Egypt. Shur is now called Corondel.

SURA, in anatomy, the lesser bone of the calf of the leg.

SURA, in geography, a river of Norway, in Drontheim, which runs into the North Sea, opposite Christiansand.

SURADDITION, *n. s.* Sur and addition. Something added to the name.

He served with glory and admired success,
So gained the *suraddition*, Leonatus.
Shakspeare. Cymbeline.

SU'RAL, *adj.* Lat. *sura*. Being in the calt of the leg.

He was wounded in the inside of the calf of his leg, into the *sural* artery. *Wiseman's Surgery.*

SUR'ANCE, *n. s.* From SURE. Warrant; security; assurance.

Give some *surance* that thou art revenge;
Stab them, or tear them on thy chariot wheels.
Shakspeare.

SURAT, one of the largest, if not the very largest city of Hindostan, is situated on the south side of the Tuptic River, about twenty-eight miles from its junction with the sea, although its trade has unavoidably suffered by the proximity of Bombay. In 1796 one estimate, according to major Hamilton, raised the population of Surat so high as 800,000 souls; but another reduced it to 600,000, which probably exceeds the actual number. In 1807 this city contained 1200 parsees of the mobid or sacerdotal class, and about 12,000 of the behdeen, or laity parsees. Large ships do not ascend the river, but cast anchor about twenty miles below the town. The harbour, on the whole, is not commodious; it is, however, one of the best on this coast during the prevalence of the north-east and north-west winds; and the anchorage is only dangerous with winds from the south and west. A large quantity of cotton was formerly exported from Surat direct to China; but much the greater portion is now sent by the way of Bombay. The cotton trade from this part of India to China is of a recent date, and did not commence earlier than 1775, at which era there was a greater number of ships belonging to Surat than there is now to Bombay. The import and export trade which it still retains is much engrossed by the Arabian and Boras merchants.

Surat is mentioned in the Ramayuna, a Hindoo poem of great antiquity. After the discovery of the passage to the east by the Cape of Good Hope, it was much frequented by European vessels, who exported hence pearls, diamonds, amberg is, civet, musk, gold, silks, and cottons of every description, spices, fragrant woods, indigo, saltpetre, and all other objects of Indian traffic. Hence also great multitudes of pilgrims embarked for Arabia; on which account Surat was always considered by the Mahometans of Hindostan as one of the gates of Mecca. In 1612 captain Best received permission to settle an English factory here, where he left ten persons with a stock of £4000 to purchase goods. The Dutch did not visit Surat until 1617. The French carried on a considerable but losing trade with Surat during the first years of the eighteenth century; and, having contracted debts to the natives, deserted it altogether. Some time afterwards, in 1714, a company was formed at St. Maloes, which despatched ships to the East Indies; but these were seized and sequestered at Surat, to liquidate the debts of the former com-

pany. In January 1664 the Maharattas, under Sevajee, made a sudden attack on Surat, when the governor shut himself up in the castle, and the inhabitants fled. In this emergency Sir George Oxinden, the chief, and the rest of the Company's servants, shut themselves up in the factory with the Company's property, valued at £80,000; and, having fortified it as well as the time would allow, called in the ships' crews to assist in its defence. When attacked, they made so vigorous a resistance, that they not only preserved the factory, but the greatest part of the town; for which they received the thanks of the Mogul commander. Surat was attacked, and partially pillaged, by the Mahrattas in 1670, and afterwards in 1702. In April, 1707, it was again invested by them; but they were unable to make any progress. Moyen ud Deen, the ancestor of the present nabob, was an adventurer who, in 1748, possessed himself of the castle: his successors, Cuttub ud Deen in 1763, Nizam ud Deen in 1792, and Nassir ud Deen in 1800, were all invested by the East India Company. On the 13th of May, in that year, a treaty was concluded with Nassir ud Deen, the reigning nabob, by which he agreed that the management of the city and district of Surat, and the administration of civil and criminal justice, should be exclusively vested in the British: the latter engaging to pay the nabob and his heirs one lack of rupees annually, and also a proportion of one-fifth of the surplus annual revenue, deducting all charges. By the treaty of 1803 the Mahrattas were compelled to abandon all their claims on this city. Since this period the country has been much cleared of robbers, and every way improved. Travelling distance from Bombay 177 miles; from Poonah 243; from Oojain 309; from Delhi 756; and from Calcutta, by Nagpoor, 1238 miles.

SURBATE,′ *v. a.* Fr. *solbatir*. To bruise and batter the feet with travel; harass; fatigue. Not used.

Their march they continued all that night, the horsemen often alighting, that the foot might ride, and others taking many of them behind them; however they could not but be extremely weary and *surbated*. *Clarendon.*

Chalky land *surbates* and spoils oxen's feet. *Mortimer.*

SURBET′. The *part. pass.* of surbeat, which Spenser seems to have used for surbate.

A bear and tiger being met
In cruel fight on Lybick ocean wide,
Espy a traveller with feet *surbet*,
Whom they in equal prey hope to divide. *Spenser.*

SURCEASE′, *v. n.*, *v. a.*, & *n. s.* Fr. *sur* and *cesser*; Lat. *cesso*. To be at an end; stop; leave off: cease: put an end to: cessation; stop.

All pain hath end, and every war hath peace;
But mine no price, nor prayer, may *surcease*. *Spenser.*

To fly together from God, to despair that creatures unworthy shall be able to obtain any thing at his hands, and under that pretence to *surcease* from prayers, as bootless or fruitless offices, were to him no less injurious than pernicious to our own souls. *Hooker.*

It might very well agree with your principles, if your discipline were fully planted, even to send out your writs of *surcease* unto all courts of England for the most things handled in them. *Id.*

Small favours will my prayers increase:
Granting my suit you give me all;
And then my prayers must needs *surcease*;
For I have made your godhead fall. *Donne.*

Nor did the British squadrons now *surcease*
To gall their foes o'erwhelmed. *Philips.*

SUR′CHARGE, *v. a.* & *n. s.* Fr. *surcharger*. To overburden; overload: burden added to burden; overburden.

They put upon every portion of land a reasonable rent, which they called Romescot, the which might not *surcharge* the tenant or freeholder. *Spenser on Ireland.*

Tamas was returned to Tauris, in hope to have suddenly surprised his enemy, *surcharged* with the pleasures of so rich a city. *Knolles's History of the Turks.*

The air, after receiving a charge, doth not receive a *surcharge*, or greater charge, with like appetite as it doth the first. *Bacon's Natural History.*

More removed,
Let heaven *surcharged* with potent multitude,
Might hap to move new broils. *Milton's Paradise Lost.*

When graceful sorrow in her pomp appears,
Sure she is dressed in Melesinda's tears:
Your head reclined, as hiding grief from view,
Droops like a rose *surcharged* with morning dew. *Dryden.*

The moralists make this raging of a lion to be a *surcharge* of one madness upon another. *L'Estrange.*

Surcharge of Common is a disturbance of common pasture, by putting more cattle therein than the pasture and herbage will sustain, or the party hath a right to do. This injury can only happen where the common is appendant or appurtenant, and of course limitable by law; or where, when in gross, it is expressly limited and certain; for where a man hath common in gross, sans nombre, or without stint, he cannot be a surcharge. In this case, indeed, there must be left sufficient for the lord's own beasts. The usual remedies for surcharging the common are by the lord's distraining the surplus number, or by his bringing an action of trespass, or by a special action on the case, in which any commoner may be plaintiff. The ancient and most effectual method of proceeding is by writ of admeasurement of pasture.

Surcharge of the Forest is when a commoner puts more beasts in the forest than he has a right to do. See Forest.

Surcharge, Writ of Second, de secunda superoneratione, is given by the stat. of Westm. 2. 13. Edw. I. cap. 8, when, after the admeasurement of pasture hath ascertained the right, the same defendant surcharges the common again; and thereby the Sheriff is directed to enquire by a jury whether the defendant has in fact again surcharged the common; and, if he has, he shall then forfeit to the king the supernumerary cattle put in, and also shall pay damages to the plaintiff.

SUR′CINGLE, *n. s.* Lat. *sur* and *cingulum*. A girth with which the burden is bound upon a horse; the girdle of a cassock.

Justly he chose the *surcingle* and gown. *Martial.*

SUR'CLE, *n. s.* Lat. *surculus.* A shoot; a twig; a sucker. Not in general use.

It is an arboreous excresence, or superplant, which the tree cannot assimulate, and therefore sprouteth not forth in boughs and *surcles* of the same shape unto the tree. *Browne.*

The basilica dividing into two branches below the cubit, the outward sendeth two *surcles* unto the thumb. *Id.*

SUR'COAT. *n. s.* Old Fr. *surcot.* Sur and coat. A short coat worn over the rest of the dress.

The honourable abilaments, as robes of state, parliament-robes, the *surcoat* and mantle. *Camden.*

That day in equal arms they fought for fame;
Their swords, their shields, their *surcoats* were the same. *Dryden.*

The SURCOAT is a coat of arms worn over the body armour. It is properly a loose thin taffety coat, with arms embroidered or pointed on it; such as worn by heralds; and was anciently also used by military men over their armour to distinguish them.

SURCULI, in botany, the middle ramifications of the ribs of a leaf.

SURCULUS, a shoot; a set or slip; a scion or graft; a young twig or branch of a tree.

SURD NUMBER, in arithmetic and algebra, any number or quantity that is incommensurable to unity; otherwise called an irrational number or quantity. See ALGEBRA.

SURE, *adj.* & *adv.* SURE'FOOTED, SURE'LY, *adv.* SURE'NESS, *n. s.* Fr. *sur;* of Lat. *securus.* Firm; certain; unfailing; infallible: hence confident; undoubting; steady: it is also used adverbially for certainty; without doubt: surefooted is of firm or steady feet or tread: the adverb and noun substantive correspond with sure.

In the day that thou eatest thereof thou shalt *surely* die. *Genesis.*

He that walketh righteously, walketh *surely.* *Psalms.*

The testimony of the Lord is *sure,* and giveth wisdom unto the simple. *Id.* xix. 7.

Thy kingdom shall be *sure* unto thee, after that thou shalt have known that the heavens do rule. *Dan.* iv. 26.

Friar Lawrence made them both;
Him he knew well, and guessed that it was she:
But being masked, he was not *sure* of it. *Shakspeare.*

Thou the garland wearest successively;
Yet though thou standest more *sure* than I could do,
Thou art not firm enough. *Id. Henry IV.*

I wish your horses swift and *sure* of foot,
And so I do commend you to their backs. *Id. Macbeth.*

Something, *sure,* of state
Hath puddled his clear spirit. *Shakspeare.*

I wrapt in *sure* bands both their hands and feet,
And cast them under hatches. *Chapman.*

True earnest sorrows, rooted miseries,
Anguish in grain, vexations ripe and blown,
Surefooted griefs, solid calamities. *Herbert.*

The subtle ague, that for *sureness* sake
Takes its own time the assault to make. *Cowley.*

The youngest in the morning are not *sure*
That 'till the night their life they can secure. *Denham.*

Who knows,
Let this be good, whether our angry foe
Can give it, or will ever? How he can
Is doubtful; that he never will, is *sure.* *Milton's Paradise Lost.*

Let no man seek what may befall;
Evil he may be *sure.* *Milton.*

Thou *surely* hadst not come sole fugitive. *Id.*

Virtue, dear friend, needs no defence;
The *surest* guard is innocence. *Roscommon.*

They have a nearer and *surer* way to the felicity of life, by tempering their passions, and reducing their appetites. *Temple.*

A peace cannot fail, provided we make *sure* of Spain. *Id.*

They would make others on both sides *sure* of pleasing, in preference to instruction. *Dryden's Dufresnoy.*

Revenge is now my joy: he 's not for me,
And I'll make *sure* he ne'er shall be for thee. *Dryden.*

He bade me make *sure* of the bear, before I sell his skin. *L'Estrange.*

Our coin beyond sea is valued according to the silver in it: sending it in bullion is the safest way, and the weightiest is *sure* to go. *Locke*

Doubting thus of innate principles, men will call pulling up the old foundations of knowledge and certainty: I persuade myself that the way I have pursued, being conformable to truth, lays those foundations *surer.* *Id.*

Sure the queen would wish him still unknown;
She loaths, detests him, flies his hated presence. *Smith.*

He that created something out of nothing, *surely* can raise great things out of small. *South.*

Make Cato *sure,* and give up Utica,
Cæsar will ne'er refuse thee such a trifle. *Addison.*

Her looks were flushed, and sullen was her mien,
That *sure* the virgin goddess, had she been
Aught but a virgin, must the guilt have seen. *Id.*

He diverted himself with the speculation of the seed of coral; and for more *sureness* he repeats it. *Woodward.*

They have reason to make all actions worthy of observation, which are *sure* to be observed. *Atterbury.*

Objects of sense would then determine the views of all such, to be *sure,* who conversed perpetually with them. *Id.*

Though the chymist could not calcine the caput mortuum, to obtain it fixed salt, to be *sure,* it must have some. *Arbuthnot.*

The curious have thought the most minute affairs of Rome worth notice; and *surely* the consideration of their wealth is at least of as great importance as grammatical criticisms. *Id.*

If you find nothing new in the matter, I am *sure* much less will you in the style. *Wake.*

Surely we may presume, without affecting to sit in the seat of God, to think some very fallible men liable to errors. *Waterland.*

To prove a genuine birth,
On female truth assenting faith relies:
Thus, manifest of right, I build my claim,
Sure founded, on a fair maternal fame. *Pope's Odyssey.*

Be silent always, when you doubt your sense;
And speak, though *sure,* with seeming diffidence. *Pope.*

Sure, upon the whole, a bad author deserves better usage than a bad critick. *Id.*

SURENAS, a celebrated Parthian general, who defeated the Romans under Crassus, the father and son, and gave the old avaricious Roman what he merited. See PARTHIA.

SURENHUSIUS (William), a learned Hebræan, of the university of Amsterdam, who flourished in the end of the seventeenth and beginning of the eighteenth centuries. He published an edition of the Mischna, with notes of his own, and a Latin version, in 1703, in three volumes folio. It contains also the commentaries of the rabbins Maimonides and Bartenora.

SURETY, *n. s.* } Fr. *sureté*, From SURE.
SURE'TYSHIP. } Certainty; indubitableness; ratification; confirmation; security against loss or damage: hence a hostage; bondsman; pledge: the office of a surety; the act of being bound for another.

Know of a *surety* that thy seed shall be a stranger. *Gen.* xv.

I will be *surety* for him; of my hand shalt thou require him. *Id.* xliii. 9.

He that hateth *suretyship* is sure. *Solomon.*

There the princesses determining to bathe, thought it was so privileged a place as no body durst presume to come hither; yet, for the more *surety*, they looked round about. *Sydney.*

She called the saints to *surety*,
That she would never put it from her finger,
Unless she gave it to yourself. *Shakspeare.*

There remains unpaid
A hundred thousand more, in *surety* of the which
One part of Aquitain is bound to us. *Id.*

That you may well perceive I have not wronged you,
One of the greatest in the Christian world
Shall be my *surety*. *Id. All's Well that ends Well.*

Idly, like prisoners, which whole months will swear
That only *suretiship* hath brought them there. *Donne.*

Yet be not *surety*, if thou be a father;
Love is a personal debt; I cannot give
My children's right, nor ought he take it. *Herbert.*

All, in infancy, are by others presented with the desires of the parents, and intercession of *sureties*, that they may be early admitted by baptism into the school of Christ. *Hammond.*

If here not cleared, no *suretiship* can bail
Condemned debtors from the' eternal gaol. *Denham.*

We our state
Hold, as you yours, while our obedience holds;
On other *surety* none. *Milton.*

Hath not the greatest slaughter of armies been effected by stratagem? And have not the fairest estates been destroyed by *suretiship*? *South.*

SURETY OF THE PEACE AND GOOD BEHAVIOUR is considered by Blackstone as a species of preventive justice; by obliging persons, whom there is a probable ground to suspect of future misbehaviour, to stipulate with, and to give full assurance to the public, that such offence as is apprehended from them shall not happen; through the means of pledges or sureties for keeping the peace, or for their good behaviour. —4 Comm. c. 18.

I. By the Saxon constitution these sureties, by means of king Alfred's wise institution of decendiaries or frankpledges, were always at hand, the whole neighbourhood or tithing of freemen being mutually pledges for each other's good behaviour. But this great and general security being now fallen into disuse, and neglected, there hath succeeded to it the method of making suspected persons find particular and special securities for their future conduct; of which we find mention in the laws of king Edward the Confessor; 'tradat fidejussores de pace et legalitate tuendâ,' cap 18.

This security, therefore, at present consists in being bound with one or more sureties, in a recognizance or obligation to the king, entered on record, and taken in some court, or by some judicial officer; whereby the parties acknowledge themselves to be indebted to the crown in the sum required (for instance £100) with condition to be void and of none effect, if the party shall appear in court on such a day: and in the mean time shall keep the peace; either generally towards the king, and all his liege people; or particularly, also, with regard to the person who craves the security. Or, if it be for the good behaviour, then on condition that he shall demean and behave himself well (or be of good behaviour), either generally or specially for the time therein limited, as for one or more years, or for life. This recognizance, if taken by a justice of the peace, must be certified to the next sessions, in pursuance of the stat. 3 Hen. VII. c. 1, and if the condition of such recognizance be broken, by any breach of the peace in the one case, or any misbehaviour in the other, the recognizance becomes forfeited or absolute; and being estreated or extracted (taken out from among the other records), and sent up to the exchequer, the party and his sureties, having now become the king's absolute debtors, are sued for the several sums in which they are respectively bound. —4 Comm. c. 8.

II. Any justices of the peace, by virtue of their commission, or those who are ex officio conservators of the peace, may demand such security according to their own discretion: but a secretary of state, or a privy counsellor, is not, ex officio, such conservator, and therefore cannot bind to the peace or good behaviour.—11. St. Tr. 317. Or it may be granted at the request of any subject, upon due cause shown, provided such demandant be under the king's protection, for which reason it has been formerly doubted whether Jews, Pagans, or persons convicted of a præmunire, were entitled thereto.—1. Hawk. P. C. Or, if the justice is averse to act, it may be granted by a mandatory writ, called a supplicavit, issuing out of the court of king's bench or chancery: which will compel the justice to act, as a ministerial and not as a judicial officer; and he must make a return to such writ, specifying his compliance, under his hand and seal. But this writ is seldom used; for, when application is made to the superior courts, they usually take recognizances there, under the directions of the stat. 21, Jac. I. c. 8. And indeed a peer or peeress cannot be bound over in any other place than the courts of king's bench or chancery; though a justice of the peace has a power to require sureties of any other person, being compos mentis, and under the degree of nobility, whether he be a fellow justice or other magistrate, or whether he be merely a private man. Wives may demand it against their husbands: so peeresses against their lords; or husbands, if necessary, against their wives. But feme coverts, and infants under age, ought to find security by their friends only, and not to be bound themselves: for they are incapable of en-

gaging themselves to answer any debt; which is the nature of these recognizances or acknowledgments. See RECOGNIZANCE.

If the person, against whom it is demanded, be present, the justice of the peace may commit him immediately, unless he offers sureties; and à fortiori he may be commanded to find sureties, and be committed for not doing it. But, if he is absent, a warrant for committing him cannot be granted, till a warrant is issued commanding him to find sureties; and this warrant, which must be under seal, ought to show the cause for which it is granted and at whose suit.

Any justice of the peace may, ex officio, bind all those to keep the peace, who, in his presence, make any affray; or threaten to kill or beat another; or contend together with hot and angry words; or go about with unusual weapons or attendance, to the terror of the people; and all such as he knows to be common barrators; and such as are brought before him by the constable for a breach of the peace in his presence; and all such persons as, having been before bound to the peace, have broken it and forfeited their recognizances. Also, wherever any private man hath just cause to fear that another will burn his house, or do him a corporal injury, by killing, imprisoning, or beating him, or that he will procure others so to do, he may demand surety of the peace against such person: and every justice of the peace is bound to grant it, if he who demands it will make oath that he is actually under fear of death or bodily harm; and will show that he has just cause to be so by reason of the other's menaces, attempts, or having lain in wait for him; and will also farther swear that he does not require such surety out of malice or for mere vexation. This is called swearing the peace against another: and, if the party does not find such sureties as the justice in his discretion shall require, he may immediately be committed till he does.—1 Hawk. P. C. c. 60. Surety of the peace may be demanded by a wife, if her husband gives her unreasonable correction.—Moor. 874: Godb. 215: F. N. B. 80. Surety of the peace ought not to be granted to a man for fear of danger to his servant or cattle. It hath, however, been said that a man may have the surety of the peace against one who threatens to hurt his wife or child.—Dalt. 266. The surety of the peace ought not to be granted for any past battery, unless there is a fear of some present or future danger: but the offender must, in such case, be punished by action or indictment.—Dalt. 266. The demand of the surety of the peace ought to be soon after the cause of fear; for the suffering much time to pass before it is demanded shows that the party has been under no great terror. It is said, the fear of one cannot be the fear of another: and therefore every recognizance must be separate. But in Mich. 23 Geo. II. B. R. the court allowed three women to file joint articles of the peace against three men.—R. v. Nettle, cited 1 Hawk. P. C. c. 60. § 5, Leach's note. Although the fact from which the fear arises be pardoned, the court of king's bench will receive it as a ground to grant the security upon.—Stra. 473.

At the common law, the oath of the party was a sufficient ground for the court of king's bench to grant the surety of the peace; but this cannot be done since the stat. 21 Jac. I. c. 8, unless articles of the peace are exhibited in court, upon motion in open court.

The court will not permit the truth of the allegations to be controverted by the defendant, but will order security to be taken immediately, if no objections arise upon the face of the articles themselves. But if, on application for the assistance of the court to enforce the subsequent process, the articles should manifestly appear, from the corroborated affidavit of the defendant, to have been a malicious, voluntary, and gross perjury, the court will resist the application, and commit the offender. When surety of the peace is granted by the court of king's bench, if a supersedeas comes from the court of chancery to the justices of that court, their power is at an end; and the party as to them discharged.

Justices of peace are empowered by the stat. 34 Edw. III. c. 1 to bind over to the good behaviour, towards the king and his people, all them that be not of good fame, wherever they be found, to the intent that the people be not troubled nor endamaged, nor the peace diminished, nor merchants and others, passing by the high-ways of the realm, be disturbed nor put in peril, which may happen by such offenders. Under the general words of this expression, that be not of good fame, it is holden that a man may be bound to his good behaviour for causes of scandal contra bonos mores, as well as contra pacem; as for haunting bawdy-houses with women of bad fame; or for keeping such women in his own house; or for words tending to scandalize the government; or in abuse of the officers of justice, especially in the execution of their office. Thus also a justice may bind over all night-walkers; eaves-droppers; such as keep suspicious company, or are reported to be pilferers or robbers; such as sleep in the day and wake in the night; common drunkards; whore-masters; the putative fathers of bastards; cheats; idle vagabonds; and other persons whose misbehaviour may reasonably bring them within the general words of the statute, as persons not of good fame; an expression, it must be owned, of so great a latitude, as leaves much to be determined by the discretion of the magistrate himself. But, if he commits a man for want of sureties, he must express the cause thereof with convenient certainty; and take care that such cause be a good one.—1 Hawk, P. C. c. 61: 4 Comm. 256.

III. A recognizance may be discharged, either by the demise of the king, to whom the recognizance is made; or by the death of the principal party bound thereby, if not before forfeited; or by order of the court to which such recognizance is certified by the justices (as the quarter-sessions, assizes, or king's bench) if they see sufficient cause: or in case he at whose request it was granted, if granted upon a private account, will release it, or does not make his appearance to pray that it may be continued. Such recognizance for keeping the peace, when given, may be forfeited by any actual violence, or even an assault, or menace, to the person of him who

demanded it, if it be a special recognizance; or, if the recognizance be general, by any unlawful action whatsoever, that either is, or tends to a breach of the peace; or, more particularly, by any one of the many species of offences against the public peace; or by any private violence committed against any of his majesty's subjects. But a bare trespass upon the lands or goods of another, which is a ground for a civil action, unless accompanied by a wilful breach of the peace, is no forfeiture of the recognizance. Neither are mere reproachful words, as calling a man a knave or liar, any breach of the peace, so as to forfeit one's recognizance (being looked upon to be merely the effect of unmeaning heat and passion), unless they amount to a challenge to fight.—1 Hawk. P. C. c. 60: 4 Comm. 255, 6.

By the stat. 3 Hen. VII. c. 1, beforementioned, it is enacted, 'That if the party who is called at a sessions of the peace, upon a recognizance of keeping the peace, makes default, his default shall be then and there recorded, and the same recognizance, with the record of the default, be sent and certified into the chancery, or before the king in his bench, or into the king's exchequer.' He who is bound to keep the peace, and to appear at the sessions, must appear there, and record his appearance; otherwise his recognizance is forfeited. And, although the party who craved the surety of the peace comes not to pray that it may be continued, the justices may in their discretion order it to be continued till another sessions.

But if an excuse, which is judged by the court to be a reasonable one, is given for the non-appearance of a party, it seems that the court is not bound peremptorily to record his default, but may discharge the recognizance, or respite it till the next sessions. A recognizance for keeping the peace may be forfeited by any actual violence to the person of another, whether it be done by the party bound, or others by his procurement. In support of a rule to stay proceedings in a scire facias, upon a recognizance for keeping the peace, it was said that the assault, which had been made, was not upon him at whose request the surety of the peace was granted, but upon another person. It was held that this makes no difference; and the rule was discharged. MS. Rep. Rex v. Stanley and his bail, Trin. 27 Geo. II. But a recognizance for keeping the peace is not forfeited where an officer, having a warrant against one who will not suffer himself to be arrested, beats or wounds him in the attempt to take him. So it is not forfeited, if a parent in a reasonable manner chastises his child; a master his servant, being actually in his service at the time; a schoolmaster his scholar; a gaoler his prisoner; a husband his wife.

It has been held, that a recognizance for the peace may be forfeited by any treason against the person of the king, or by an unlawful assembly in terrorem populi.—Lamb. 115, 1 Hawk. P. C. c. 60. Words which tend directly to a breach of the peace as challenging a man to fight, or threatening to beat one who is present, amount to a forfeiture of such recognizance. A recognizance is likewise forfeited by threatening to beat a person who is absent, if the party who has so threatened, does afterward lie in wait to beat him. A court of quarter-sessions cannot in any case proceed against the parties, for a forfeiture of a recognizance for keeping the peace; but the recognizance must be sent into some of the king's courts in Westminster Hall. All proceedings upon a forfeited recognizance must be by scire facias, and not by indictment; because, where a scire facias is brought, the parties have an opportunity of pleading any matter in their discharge.

The usual practice of a court of quarter-sessions is to continue a recognizance for keeping the peace from sessions to sessions until the court thinks proper to discharge it. It is the constant course of the court of king's bench to take a recognizance for twelve months; and, if no indictment is within that time preferred against the party bound to keep the peace, it may, at the expiration thereof, be discharged. This seems also to be the practice of the court of chancery. A recognizance for the good behaviour may be forfeited by all the same means as one for the security of the peace may be; and also by some others; as by going armed with unusual attendance, to the terror of the people; by speaking words tending to sedition; or by committing any of those acts of misbehaviour which the recognizance was intended to prevent. But not by barely giving fresh cause of suspicion of that which perhaps may never actually happen; for, though it is just to compel suspected persons to give security to the public against misbehaviour that is apprehended, yet it would be hard upon such suspicion, without the proof of any actual crime, to punish them by a forfeiture of their recognizance.

SURF, a term used by seamen to express a peculiar swell and breaking of the sea upon the shore. It sometimes forms but a single range along the shore, and at others three or four, behind one another, extending half a mile out to sea. The surf begins to assume its form at some distance from the place where it breaks, gradually accumulating as it moves forward, till it gain, not uncommonly, in places within the limits of the trade-winds, a height of fifteen or twenty feet, when it overhangs at top, and falls like a cascade with great force and a prodigious noise. Countries where surfs prevail require boats of a particular construction, very different from the greater part of those which are built in Europe. In some places surfs are great at high, and in others at low water; but are uniformly most violent during the spring tides. It is not easy to assign the cause of surfs. That they are affected by the winds can hardly be questioned: but that they do not proceed from the immediate operation of the wind, in the places where they happen, is evident from this circumstance, that the surf is often highest and most violent where there is least wind, and vice versâ. On the coast of Sumatra the highest are experienced during the south-east monsoon, which is never attended with such gales as the north-west. As they are most general in the tropical latitudes, Mr. Marsden, who seems to have paid much attention to the subject, attributes them to the trade-winds which prevail at a distance from shore between the parallels of 30° north and south, whose uni

form and invariable action causes a long and constant swell, that exists even in the calmest weather, about the line, towards which its direction tends from either side. This swell, when a squall happens or the wind freshens up, will for the time have other subsidiary waves on the extent of its surface, breaking often in a direction contrary to it, and which will again subside as a calm returns, without having produced on it any perceptible effect. Sumatra, though not continually exposed to the south-east trade-wind, is not so distant but that its influence may extend to it: and accordingly at Poolo Pesang, near the southern extremity of the island, a constant southerly sea is observed, even after a strong north-west wind. This incessant and powerful swell rolling in from an ocean, open even to the pole, seems an agent adequate to the prodigious effects produced on the coast; whilst its very size contributes to its being overlooked. It reconciles almost all the difficulties which the phenomena seem to present, and in particular it accounts for the decrease of the surfs during the north-west monsoon, the local wind then counteracting the operation of the general one; and it is corroborated by an observation, that the surfs on the Sumatran coast ever begin to break at their southern extreme, the motion of the swell not being perpendicular to the direction of the shore. This explanation of the phenomena is certainly plausible; but, as the author candidly acknowledges, objections may be urged to it. The trade-winds, and the swell occasioned by them, are remarkably steady and uniform; but the surfs are much the reverse. How then comes a uniform cause to produce unsteady effects? In the opinion of our author, it produces no unsteady effects. The irregularity of the surfs, he says, is perceived only within the remoter limits of the trade-winds. But the equatorial parts of the earth performing their diurnal revolution with greater velocity than the rest, a larger circle being described in the same time, the water thereabout, from the stronger centrifugal force, may be supposed more buoyant; to feel less restraint from the sluggish principle of matter; to have less gravity; and therefore to be more obedient to external impulses of every kind, whether from the winds or any other cause.

SUR'FACE, *n. s.* Fr. *sur* and *face*. Superficies; outside: accented by Milton on the last syllable.

Which of us who beholds the bright *surface*
Of this ethereous mold, whereon we stand. *Milton.*

Errours like straws upon the *surface* flow;
He who would search for pearls must dive below.
Dryden.

All their *surfaces* shall be truly plain, or truly spherical, and look all the same way, so as together to compose one even *surface*. *Newton's Opticks.*

SURFACE. See SUPERFICIES.

SUR'FEIT *v. a., v. n.*, & *n. s.* SURFEIT'ER, *n. s.* SURFEIT'WATER. French *sur* and *faire*, to do more than enough; to overdo. To feed with meat or drink to satiety and sickness; to cram: to be full; to satisfy: a surfeiter is he who so feeds; a glutton: surfeit-water, that which cures surfeits.

The *surfeited* grooms
Do mock their charge with snores. *Shakspeare.*

When we are sick in fortune, often the *surfeits* of our own behaviour, we make guilty of our disasters the sun, the moon, and stars. *Id. King Lear.*

They are as sick that *surfeit* with too much, as they that starve with nothing. *Id. Merchant of Venice.*

Now comes the sick hour that his *surfeit* made;
Now shall he try his friends that flattered him.
Id. Richard II.

I did not think
This amorous *surfeiter* would have donned his helm
For such a petty war. *Id. Antony and Cleopatra.*

Surfeits many times turn to purges, both upwards and downwards. *Bacon's Natural History.*

Why, disease, dost thou molest
Ladies, and of them the best?
Do not men grow sick of rites,
To thy altars, by their nights,
Spent in *surfeits*? *Ben Jonson.*

Peace, which he loved in life, did lend
Her hand to bring him to his end;
When age and death called for the score,
No *surfeits* were to reckon for. *Crashaw.*

Though some had so *surfeited* in the vineyards, and with the wines, that they had been left behind, the generosity of the Spaniards sent them all home. *Clarendon.*

Our father
Has ta'en himself a *surfeit* of the world,
And cries, it is not safe that we should taste it.
Otway.

They must be let loose to the childish play they fancy, which they should be weaned from, by being made to *surfeit* of it. *Locke.*

A little cold distilled poppy-water, which is the true *surfeitwater*, with ease and abstinence, often ends distempers in the beginning. *Id.*

SURFEIT, in medicine, is a sickness with a sensation of a load at the stomach, usually proceeding from some error in diet, either with regard to the quantity or quality of the food taken. Sometimes, however, a surfeit is only a plethora from indolence and full but proper feeding; in which case perspiration is defective; and eruptions form themselves on the skin. A surfeit from animal food, as muscles, putrid flesh, &c., is best remedied by the use of vegetable acids, which may be taken diluted with water, a vomit being premised, and this even though a vomiting and purging both attend. When an excess of feeding is the cause, the primæ viæ being evacuated, and the nature of the plethora attended to, that the load may be properly evacuated, the indication of the cure will be, to recover the perspiratory discharge, consistent with which diuretics may be used in preference to medicines which produce any other evacuation. But the most natural and effectual remedy for a surfeit is abstinence, and temperance afterwards.

SURFEIT, in farriery. See FARRIERY.

SURGE, *n. s.* & *v. a.* Lat. *surgo*. A swelling sea; wave rolling above the general surface of the water: to swell; rise on high.

It was formerly famous for the unfortunate loves of Hero and Leander, drowned in the uncompassionate *surges*. *Sandys.*

From midst of all the main
The *surging* waters like a mountain rise. *Spenser.*

The realm was left like a ship in a storm, amidst all the raging *surges*, unruled and undirected of any. *Id.*

The wind-shaked *surge*, with high and monstrous main,
Seems to cast water on the burning bear,
And quench the guards of the ever-fired pole:
I never did like molestation view
On the enchafed flood. *Shakspeare.*

The serpent moved, not with intended wave,
Prone on the ground as since; but on his rear,
Circular base of rising folds, that towered
Fold above fold, a *surging* maze! *Milton.*

The sulph'rous hail
Shot after us in storm, o'erblown hath laid
The fiery *surges*, that from the precipice
Of heaven received us falling. *Id.*

He sweeps the skies, and clears the cloudy north:
He flies aloft, and with impetuous roar
Pursues the foaming *surges* to the shore. *Dryden.*

Thetis, near Ismena's swelling flood,
With dread beheld the rolling *surges* sweep
In heaps his slaughtered sons into the deep. *Pope.*

Do publick or domestick cares constrain
This toilsome voyage o'er the *surgy* main? *Id.*

SUR'GEON, *n. s.* } Corrupted from chi-
SUR'GERY. } rurgeon. One who cures by manual operation; one whose duty it is to act in external maladies by the direction of the physician: the act of curing by manual operation.

The wound was past the cure of a better *surgeon* than myself, so as I could but receive some few of her dying words. *Sidney.*

It would seem very evil *surgery* to cut off every unsound part of the body, which, being by other due means recovered, might afterwards do good service. *Spenser.*

Strangely visited people,
The mere despair of *surgery*, he cures.
Shakspeare. Macbeth.

They are often tarred over with the *surgery* of our sheep, and would you have us kiss tar? *Shakspeare.*

Tho' most were sorely wounded, none were slain;
The *surgeons* soon despoiled them of their arms,
And some with salves they cure. *Dryden.*

A SURGEON, or CHIRURGEON, is one who professes the art of surgery. In England there are two distinct companies of surgeons now occupying the science or faculty of surgery; the one company called barbers, the other surgeons, which latter are not incorporated. The two are united to sue, and be sued, by the names of masters or governors and commonalty of the mystery of barbers and surgeons of London, 32 Henry VIII. c. 42. No person using any barbery or shaving, in London, shall occupy any surgery, letting of blood, or other matter; drawing of teeth only excepted. And no person using the mystery or craft of surgery shall occupy or exercise the seat or craft of barbery, or shaving, neither by himself, nor any other for his use, 32 Henry VIII. c. 42. By the same statute, surgeons are obliged to have signs at their doors. Under the old French government, the French chirurgeons, being refused to be admitted into the universities (although their art is a branch of medicine), on pretence of its bordering a little on butchery or cruelty, associated themselves into a brotherhood, under the protection of St. Cosmus and St. Damian; on which account, according to the laws of their institution, they were obliged to dress and look to wounds gratis the first Monday of each month. They distinguished between a chirurgeon of the long robe and a barber chirurgeon. The first had studied physic, and was allowed to wear a gown. The skill of the other, besides what relates to the management of the beard, was supposed to be confined to the more simple and easy operations in chirurgery; as bleeding, tooth-drawing, &c. They were formerly distinguished by badges: those of the long gown bore a case of instruments; the barber, a bason. The surgeons and barbers of Edinburgh were formerly united in one incorporation, but were disjoined about 1720. See BARBERS, and SURGERY.

SURGERY.

SURGERY, chirurgia, χειρ, manus, εργον, opus, embraces all those diseases which affect the solid parts of the human body, and which can in any way be relieved by a manual operation. In this paper we present the reader with, I. A concise history of this art; II. With a detail of those diseases, according to a classification prefixed.

PART I.

HISTORY.

The history of this now noble and important science, presents nothing calculated to awaken a very strong interest in its earlier records. In the pristine ages, when men led unvitiated lives, diseases were few, and considered, when they did occur, to be inflicted by the gods as a punishment for real or imaginary crimes. This supposition must have existed at the time of the Trojan war; for Homer describes the disorders among the Greeks, arising probably from the heat of the sun on the Trojan marshes, as destroying arrows, hurled by Apollo in his anger, thus:—

Ουρῆας μὲν πρῶτον ἐπώχετο, καὶ κύνας ἀργοὺς.
Αὐτὰρ επειτ' αὐτοῖσι βελος εχεπευκες εφιεις
Βαλλ' αιει δε πυραι νεκυων καιοντο θαμειαι.
Ἐννημαρ μεν ανα στρατον ωχετο κῆλα θεοιο.

On mules and dogs the infection first began,
At last the vengeful arrows fixed in man;
For nine long nights through all the dusky air
The pyres, thick flaming, shot a dusky glare.

These diseases, then, were to be removed only by prayer and supplication, and the cure effected through the medium of the priests. But as wounds, &c., were always liable to happen to men constantly engaged in warfare (which is to be expected in all imperfectly civilised societies), so men were naturally liable, through a desire of mitigating their companions' sufferings, to seek for and employ suitable remedies. The occupation of attending to the wounds of their fellow-soldiers was thus reckoned honorable—and even kings did not disdain to practise it. Thus Homer extols several of his heroes not more for their valor than their knowledge of the healing art: such were Chiron, Machaon, and Podalirius;

and we may estimate the value set upon such men, by the eager desire of his companions to save Machaon when he had fallen in the battle wounded by an arrow. It was not until mankind had become settled in cities, and devoted their hours to the study of science, that medicine was considered as a legitimate object of enquiry, associated with the other branches of philosophy. It is not surprising therefore that, under these circumstances, the science of surgery should not have advanced: as its true basis must ever be found in anatomical knowledge. Pythagoras, Empedocles, and Democritus, were writers on medicine and surgery who only studied it in their closets; and it was not till the time of Hippocrates that diseases were made a separate study. This great man, being in affluent circumstances, gave his whole time to the study of medicine; not in the vague manner that his predecessors had done, but by actual observation and practice; by which he was enabled to write such a clear and definite account of diseases (but more especially acute ones) that moderns still express their admiration of it. He also treated of several surgical subjects with considerable success; but, as it is doubtful whether this great master had ever an opportunity of actual dissection, except of animals, we must not be surprised that this branch did not keep pace with medicine. The surgical subjects on which he has written are, Fractures, Dislocations, Wounds of the Head, Ulcers, and Fistula. After Hippocrates, we have no existing works published till the beautiful one of Celsus, from which we merely learn the names of those who professed medicine; these were Diocles, Carystius, Praxagoras, Chrysippus, Herophilus, and Erasistratus, which last two began anatomical investigations under the auspices of Ptolemy Philopater, in whose reign the study of medicine was divided into dietetics, pharmaceutics, and surgery. This last art, says Celsus, was practised in Egypt by Philoxenes, Gorgias and Sostratus, Heron and the two Apollonii, with Ammonius Alexandrinus, who was distinguished by the name of Lithotomos. These flourished shortly before the Christian era. Whilst at Rome the principal surgeon, just before the time of Celsus, was Meges, who operated for the stone, &c.; so that surgery must have attained some progress. Celsus lived in the reigns of Augustus Tiberius, and Caligula.

After this there is again a considerable deficiency in the annals of surgery till the writings of Galen, who was born at Pergamus in Asia Minor, from which he went to Rome, in the second century, under the emperor Severus. He, however, did not practise surgery alone, preferring the study of medicine. Making comments, however, on the surgery of Hippocrates, he opened the jugular veins, and performed arteriotomy at the temples, recommended leeches, scarifications, and cupping glasses, to draw blood, and also described with accuracy the different species of herniæ, and the different methods of using bandages. In the year 500 flourished Ætius, who described many things omitted by Celsus, particularly relating to operations, and the diseases of women. His works, however, were much eclipsed by Paulus Æginetæ, who flourished in 640, and wrote a treatise on surgery superior to all the ancients.

This science was now, in common with all others, doomed to a long oblivion by the overthrow of the Roman empire. The resuscitation of surgery happened about the year 900, when the Arabians discovered the writings of the ancients, and appropriated them to their own use, making great additions, which but disgraced the original. Such are the compilations of Rhazes, Haly-Abbas, Albucasis, and Avicenna. Medicine, however, owes more to these men than surgery; for by their agency many new remedies were introduced from the east. From the eleventh century till the sixteenth, the practice of surgery was confined to ignorant priests, or still more unlearned barbers and farriers, with occasionally a quack strolling over Europe and imposing on the credulity of the superstitious by his magical rites. In the sixteenth century a new era sprung up. Fabricius al Aquapindente published his treatise on surgery, which drew from the illustrious Boerhaave the following compliment:—Ille superavit omnis; et Nemo, illi; hanc disputat gloriam; omnibus patius quam hocce, carere possumus. And now anatomy, under the celebrated Vesalius, began to shed her influence over the cultivation of our art, giving rise to the father of modern surgery, Ambrose Paré, the first of the French surgeons. Educated in the Hotel Dieu, he was appointed body-surgeon to four of the French kings successively, Henry II., Francis II., Charles IX., and Henry III. These he followed to the field, and was held in such estimation by the soldiers, that it is said his presence in a besieged town was sufficient to reanimate the drooping defenders. He was one of the very few protestants that escaped the odious massacre of St. Bartholomew, by the protection of the king himself. The works of Paré abound with interest, although disguised by the absurd matter introduced by those whom he employed to write them. But surgery owes an immortal obligation to him for the discovery and use of ligatures to restrain hæmorrhage. In this respect he was the first to break through the trammels of the ancients, who always employed the actual cautery, which of course rendered them fearful of performing operations. Beneficial as this discovery was, it met with most violent opposition from the physicians of the time, who were astonished that a surgeon should dare to publish any plan of treatment not found in the writings of the ancients; and accordingly we find the use of the ligature after his death declined. Next to Paré, in the order of illustrious surgeons, followed Petit, in the seventeenth century, who cultivated anatomical knowledge when a mere boy, and published his treatise on diseases of the bones when only a very young man. This remained the best work on this subject for nearly a hundred years: he also published several other works and treatises, and was justly considered an ornament to the French school. About his time also lived Le Dran, who wrote several able works, as did Gaungeot, Le Lat Sabatier, Levret, Desault, who has given the profession much useful information on fractures, &c., to whom may

be added La Motte, Goulard, Daniel, Poteau, and Frere Cosme the lithotomist. But the genius of surgery was not confined to France; Holland had its eminent men; foremost amongst whom stands Raw, the most distinguished lithotomist in Europe, but who had the cruelty and meanness not only to conceal his mode of operating, but deceive his professional spectators, who came from all parts of Europe, by which many lives are said to have been sacrificed. He even concealed his operation from his intimate friends and pupils, Heister and Albinus, whose merits effaced the stigma of Raw from Holland, as did the conduct of the illustrious Camper in the following century. And now we begin to trace the surgical art in England. Wiseman, surgeon to Charles II., was the father of English, as Paré was of French surgery; and in his time lived Harvey, the great discoverer of the circulation, which constituted in itself a host of discoveries. To these succeeded Chesselden, White, Douglas, the two Monroes, Sharp, Cowper, Warner, Alanson, and Percival Pott (who first gave surgical lectures at Bartholomew's Hospital in 1729) Hawkins, Smellie, and the two Hunters. It is to John Hunter that we owe our now successful treatment of aneurism. It was he who first pointed out the danger of operating on a diseased artery, too fully confirmed by experience, and showed how that might be obviated: it is to him in fact that surgery owes the greater part of her scientific reasonings. He was also the best operator in his day, having once removed a tumor from the side of the head and neck, as large, if not larger, than the head to which it belonged; and at another time dissected out a tumor which one of our best operators had declared, too hastily, that none but a madman would meddle with. He was also equally remarkable for his investigations in comparative anatomy. France has also furnished her (almost) Hunter in the person of Bichat, who gave himself up to anatomy and physiology, and died lamenting that he could not finish his labors. But, within the last twenty or thirty years, most important improvements have certainly been made in almost every branch of surgery; and it must gratify every Englishman to find that his own countrymen have acted a very leading part in effecting such an object, especially in operations on arteries. Thus this country may claim the names of a sir E. Home, an Abernethy, a sir A. Cooper, Lawrence, Guthrie, &c. France may also boast of her baron Savrey, Dupuytren, Roux, &c.; and Italy of a Scarpa.

PART II.

DETAIL OF DISEASES.

Introduction.

As little has been done towards a methodical arrangement of those diseases which come within the defined limits of surgery, the following attempt at a classification must therefore be received with candor and allowance. The utility of a classification in the method of induction, by affording appropriate divisions for the allotment of facts and phenomena, has of late been too well understood to render it necessary for us to insist upon in this place.

CLASSIFICATION.

Class.—Diseases affecting the Solids.

Order I.—Evidentes, arising from manifest causes.

Order II.—Occulti, where the cause is not apparent.

Order I.—Evidentes (comprehends three genera).

Genus 1.
Violentes. From mechanical injury.
Species.
Wounds causing hemorrhage.
Tetanus.
Emphysema.
Contusions.
Fractures.
Dislocations.
Rupture of tendon Achilles.
Sprains.
Injuries of head.
Hernia.

Genus 2.
Venenantes. From the action of poisonous matters.
Species
Syphilis.
Gonorrhœa.
Hydrophobia.
Dissecting wounds.

Genus 3.
Lethales. From the application of matters tending immediately to the destruction of vitality.
Species.
Burns and scalds.
Frostbites.
Chilblains.

Order II.—Occulti (having two genera).

Genus 1. Diffusi. Affecting the system at large.
Species.—Scrofula.
Hysteria.
Cancer.

Genus 2. Locales. Attacking particular parts.

This is the largest genus, and comprehends many species, being diseases of the

Bones and Cartilages.	Arteries.	Veins.	Nerves.	Viscera.	Skin.	Glands.	Organs of Sense.
Varieties. Inflammation Merosis Caries Exostosis Rachitis Mollities Distortion of spine Diseases of joints, viz. Inflammation Ulceration of cartilages Scrofulous diseases Loose cartilages	Varieties. Ossification Aneurism	Varieties. Inflammation Varix	Varieties. Tic doloureux Sympathetic pains	Varieties. Urinary& genital organs, viz. Testis Penis Urethra Bladder Prostate Rectum Vagina Uterus Intestines	Varieties. Inflammation Œdema Boil Carbuncle Tumors Corn Bunyon Whitlow Warts Navus	Varieties. Absorbents Salivary Mammary Thyroid	Var. Eye Nose Mouth

Chapter I.—Of Inflammation.

Most surgical writers have concurred in commencing their subject with some account of the phenomena of inflammation: and with good reason; for most diseases that come within the province of a surgeon are either immediately dependent upon, or are intimately connected with it.

The word inflammation, from *inflammo*, to burn, or kindle, conveys its own definition, on account of the burning heat experienced by the patient in the part affected by it.

Sect. I.—On the Symptoms and Terminations of Inflammation.

When inflammation attacks any part, the symptoms which indicate its presence are redness, heat, pain, and tumor, together with interruption or derangement of any function which the part attacked may have to perform; and if it be violent, or of large extent, the constitution sympathizing with it remarkably, it produces a greater or less degree of fever. It is also frequently preceded by a cold shivering, particularly when it affects important parts. But it is obvious that many of these symptoms may at times be wanting, or rather that we cannot expect to find them. Thus, for instance, if the affection be of an internal part, we cannot expect that redness should be visible, nor can we generally detect any tumor in such cases.

These symptoms require a little separate consideration; and first the pain, as the least variable, presents itself to our notice. When any part is inflamed, we observe (if external) that the capillary vessels, which were too small previously to be able to receive red globules of blood, become distended so as now to admit them with facility, and at the same time the main artery near the affected part becomes enlarged in its calibre, so that a much greater quantity of blood is admitted into an inflamed part than is natural. This will at once account for the swelling of the part, and also the pain which is evidently caused by the sudden stretching of the nerves. It is also probable that, having increased their vascularity, they may become more sensitive. It is difficult perhaps to explain exactly how the pain is produced; for as Mr. Samuel Cooper, in his excellent work called 'First Lines of the Practice of Surgery,' says, 'It is more easy to conceive than describe how any deviation from the natural state of parts must excite pain.' It is the unusual condition into which the nerves are thrown, which is to be regarded as the proximate cause. In chronic inflammation the graduality of the change allows the nerves to become adapted to it, and the degree of pain only amounts to a dull uneasy sensation; but in phlegm, or when the change is quick, the pain is considerable. The throbbing which accompanies the pain manifestly depends on the strong pulsation of the arteries. Pain then may be considered as a constant attendant on acute inflammation; but, when it is of a more chronic character, there may be either very little or (or as in some scrofulous tumors) none at all.

The *tumor* has been noticed to depend on the increased quantity of blood in the part, but it is also assisted by effusion of lymph into the cellular interstices; which takes place after inflammation has been established for a very short period. It is also probable that, in this state, absorption does not proceed so rapidly as in healthy parts.

The *redness*, when apparent, must also depend upon the inflamed vessels carrying red particles, which they could not receive in their natural state. This is particularly manifest in inflammations of the eye.

Increased heat.—This is in many cases an illusive symptom; for it is sometimes felt in internal

as well as in external parts. Its existence in external parts may be easily accounted for. The blood near the heart, and in internal surfaces, is commonly at nearly 100° of Fahrenheit, whilst the temperature of the surface of the body is materially lower, on account of the constant evaporation kept up by both the sensible and insensible perspiration; but, when any part becomes inflamed, it admits a much greater quantity of blood, and this causes an unusual sensation of heat upon the nerves accustomed to a lower temperature. It is, however, not so easy to explain the feeling of heat in internal inflammations; that such increase above the natural temperature is not real, but only imaginary, has been proved by several experiments of Mr. John Hunter, who excited inflammation in the chest of a dog, and in the abdomen, rectum, and vagina of an ass, without being able to discover any obvious rise of temperature. It may, however, be noticed that in some diseases the whole mass of blood is augmented in temperature, sometimes rising as high as 106° or 107° Fahrenheit.

There is yet one more symptom of the presence of inflammation, which, being a secondary one, has not yet been noticed. This is the buffy coat found on the blood which has been abstracted from the patient when affected by this complaint. This appearance has been well accounted for by John Hunter, in his excellent Treatise on the Blood:—He says, 'The blood, when taken out of the living vessels, spontaneously separates into two distinct parts, the serum and the crassamentum. The last is a compound substance, consisting chiefly of coagulating lymyh, and red globules, the most heavy ingredients in the blood. Blood, taken away from persons affected with inflammation, is longer in coagulating, and coagulates more firmly, than in other instances. Hence the red globules, not being so soon entangled in the lymph, descend, by their gravity, more deeply from its surface, which, being more or less divested of the red coloring matter, is, from its appearance, termed the buffy coat, or inflammatory crust. The firmer and more compact coagulation of the lymph compresses out an unusual quantity of serum from it, and the surface of the sizy blood is often formed into a hollow, the edges being drawn inward.'

Having thus briefly described the symptoms of inflammation, the terminations of it are next to be considered. These are various, as 1. Resolution; 2. Effusion; 3. Ulceration; 4. Mortification; or it may pass on imperceptibly into a chronic state.

1. *Resolution.*—This is the most favorable termination, consisting of that state of the body in which nature is able to overcome the morbid action, and restore her own regularity of function; and this is, on the whole, the most common termination. It is effected in the following manner:—'The pain becomes less, the swelling subsides, the fever, and every other symptom, gradually abate, till at last the part is wholly restored to its natural size and color. There is no formation of pus, nor any permanent injury of structure.'

2. *Effusion.*—This may be of various matters, as i. Serum. This is peculiarly liable to take place from serous membranes; as, for instance, a man receives a blow on the testicle which becomes slightly tender, and is followed by an effusion between the tunica, vaginalis, propria, and reflexa testis. This forms what is commonly called hydrosele, and is in fact a serous effusion; or a person is struck on some part where the cellular texture is very loose; as, for instance, the eye-lids, a slight inflammation follows, which is succeeded by a serous effusion into the cells. In internal cavities this is frequent, as the head, chest, and abdomen. ii. Fibrine or lymph. This generally occurs where the inflammation is very severe, and is in fact the solid part of the blood. This happens indiscriminately in all structures, as is seen in inflammations of veins or arteries which have been tied or cut across, or in all common incised wounds, causing adhesion by the first intension. It may also take place in solid or glandular bodies, causing permanent induration, as in affections of the testis or epididymes, which frequently remain during the patient's life. It is, however, less frequently met with in mucous surfaces, which seems a kind provision of nature, for as these last are canals, the stoppage of them by adhesion would be fatal. iii. Purulent effusion. This may take place in any part or structure of the body, and is often a very unfavorable termination. This is generally called suppuration, which when it happens in circumscribed cavities is generally fatal, as in the head, chest, or abdomen; it may, however, occur in parts contained within these cavities, and not necessarily terminate fatally. Thus an abscess may form in the liver which may burst and discharge its contents externally or into the biliary ducts, and eventually heal. This effused fluid pus, resembles cream in its consistence, is heavier than water, and is composed of particles nearly similar to the fibrine of the blood floating in a fluid. 'The fluid part of pus resembles serum; and, like it, is coagulable by heat; but it cannot, like milk, be coagulated by the gastric juice of animals. Healthy pus has little smell, is void of acrimony, and is of the consistence of cream, its globules are abundant, and of a lightish color. When pure, it does not readily putrify; but this quality is lost when there are extraneous additions blended with the matter. In specific diseases, cases of caries, &c., the matter is often mixed with blood, coagulating lymph, &c., and then it has more tendency to putrify and become offensive. Pus always partakes of the nature of the sore which produces it. To the surface secreting it, pus is quite unirritating, though it may greatly irritate any other. Hence, it is useless to wipe matter so completely from the surface of granulations as some are wont to do; but it is highly proper to keep the surrounding skin free from it.

'Secretions of another kind sometimes have a resemblance to pus. The following circumstances form a line of distinction. Pus sinks in water, mucus floats; pus communicates to water a uniformly troubled white color, mucus gives the appearance of stringy portions floating in it; mucus is more readily dissolved by sulphuric acid than pus. If water be added to such solutions, the pus is precipitated to the bottom,

while the mucus, instead of being completely precipitated, forms swimming flakes. A solution of caustic alkali dissolves both pus and mucus; but, when water is added, the pus becomes separated, but not the mucus.'

When an effusion of pus takes place in a solid part, or in cellular texture, it becomes surrounded by a membraneous bag or cyst, partly by condensation of surrounding texture, and partly by effusion of lymph, and forms what is commonly called an abscess, derived from abscedo, to go away, because the ancients believed it to be formed by the dissolution or departure of the solids from their natural condition. But that pus may be formed without any dissolution of the solids, was noticed first by Dr. Hunter in cases of empyema or collections of pus in the chest, and afterwards by John Hunter, in his Treatise on Gonorrhœa, wherein it is demonstrated to be secreted from the mucous surface of the urethra for a long time, without any breach of the surface in either case. 'The modern doctrine of suppuration is, that the pus is separated from the blood by the inexplicable operation of the secerning arteries, just as ordinary secretion takes place, and that the peculiar mode of action in the arteries is the reason why pus should be separated from the circulation, rather than coagulating lymph, mucus, &c. &c. It is further believed that the solids never suffer any dissolution, so as to enter into the composition of pus, and that the deficiency frequently apparent in them, arises from absorption. The arteries, in producing pus, a fluid so dissimilar from blood, and of which, at least, it must be considered a new combination, seem to assume all the power of glandular secretion.'

The symptoms of suppuration are, after a long continued inflammation, without signs of resolution, the patient has a remission of the fever (if any were formerly present) and pain; the redness also subsides round the part, but becomes more dull upon it, presenting a yellowish or whitish appearance in the middle. He has frequent shiverings (these are particularly marked in suppurations after injuries of the head), and the humor grows larger; and, if superficial, has a conical eminence, upon touching which a fluctuation is apparent. If, however, it be deeply seated, there is tenderness on pressure, and a considerable ædema of the limb; the pulse becomes soft, and in large suppurations hectic fever supervenes. The treatment of abscesses in general will be found in the treatment of inflammation and its consequences.

3. *Ulceration* is a preternatural increase in the action of the absorbents beyond the proportional power of deposition from the arteries; causing a rough surface to be formed, which, in healthy ulcers, is covered with pus, not adherent to its surface, and the roughness is caused by small projections of a conical form called granulations. These are very common sequels of inflammation, particularly if any thing have deprived the part affected of a portion of its vitality. Thus most severe bruises, where the nerves have been compressed, are liable to end in ulceration; and it is a remark of Mr. Brodie's that all extraneous morbid growths, as schirrus or other tumors, are very liable to ulcerate. The parts, too, nearer the heart are less liable than those remote. They are also of very frequent occurrence after fevers in the mucous follicles of the small intestines. Ulcers in parts of much vitality would naturally heal were it not for some foreign cause. Their mode of healing is by the granulations rising to a level with the surrounding skin, from the edges of which new skin gradually forms and spreads over the ulcer; or else, in large ulcers, a spot of new skin forms in the middle, from which portions shoot like rays.

Sir A. Cooper notices that it is a curious law, with respect to the ulcerative process, that it has a tendency to the nearest external surface of the body. This is a law which is attended with the most salutary effects; for, if it were otherwise, the body would very frequently be destroyed by the ulcerative process. In consequence of this tendency, matter formed at a depth in the body finds its way through the integuments, instead of proceeding through the more important parts. Many examples may be given of this law. One of the most remarkable is this:—Matter forms not unfrequently behind the sternum close to the pleura and pericardium, which membranes are extremely thin—not so thick as paper. From the proximity of these membranes it might be expected that the matter would generally open into the pleura, and, by discharging itself into the cavity of the chest, destroy life. Instead of this, however, the pleura undergo no other alteration than that of becoming thick, and, while they are acquiring this addition of substance, the process of absorption is going on in the inner part of the sternum, an aperture is formed through it, and the matter makes its way through the bone and integuments rather than through the pleura and pericardium. The same circumstance takes place with respect to the peritoneum. If matter be formed in the abdominal muscles, the peritoneum is very rarely absorbed to admit the matter into the cavity of the abdomen, but the matter makes its way through the integuments, and finds an outlet on the surface of the body.

Ulcers have been divided by Sir Everard Home, in his excellent treatise, into six varieties, which are, 1. Ulcers in parts which have sufficient strength to carry on the actions necessary for their recovery. 2. Ulcers in parts which are too weak for that purpose. 3. Ulcers in parts whose actions are too violent to form healthy granulations, whether this arises from the state of the parts, or of the constitution. 4. Ulcers in parts whose actions are too indolent, whether this arises from the state of the parts, or of the constitution. 5. Ulcers in parts which have acquired some specific action, either from a diseased state of the parts, or of the constitution. 6. Ulcers in parts which are prevented from healing by a varicose state of the superficial veins of the upper part of the limb.

i. Simple or healthy ulcers.—Sir E. Home remarks that, in this species of ulcer, the pus is of a white color, thick consistence, and readily separates from the surface of the sore, and when diluted, and examined in a microscope, is found to be made up of small globules, swimming in a transparent fluid. The granulations are small

florid, and pointed at the top. As soon as they have risen to the level of the surrounding skin, those next to the old skin become smooth, and are covered with a thin semi-transparent film, which afterwards becomes opaque, and forms cuticle.

In the treatment of this kind of ulcer, it is only necessary to keep the surface clean, and prevent the natural processes from being interrupted. Sir E. Home observes that this is in general best done by the application of dry lint, for the purpose of absorbing and retaining the matter, which serves as a soft covering for the granulations, and by putting over the lint a pledget of any simple ointment, in order to hinder the matter from evaporating, by which means the dressings will not become adherent, and may be easily taken off as often as requisite. Although healthy ulcers require no medicated application to be made to them, the dressings must be such as do not disagree with the granulations or surrounding skin. A roller is also often useful to support the skin and muscles, which are sometimes relaxed from the want of natural exercise of the part. When the sore, however, does not secrete enough in twenty-four hours to moisten the lint, a little simple ointment may be used, or it may be dressed only once in two days.

ii. Weak or fungous ulcers.—The granulations of these sores are larger, more round on their external surface, and of a less compact texture, than those formed on ulcers in healthy parts. Sir E. Home has also noticed their semi-transparent appearance. When they have filled up the cavity of an ulcer to a level with the surface of the body, they do not readily form skin, but, rising up in a still higher manner, often lose altogether the power of producing new cutis. When the parts are still weaker, the granulations sometimes continue gradually to fill up the hollow of the ulcer, and then, all on a sudden, are suddenly absorbed, so as to leave the sore as deep as it was before. Ulcers may be weak from the first, or become so in the progress of the case. Even granulations of the most healthy kind, if they are not skinned over in a certain time, gradually lose their primitive strength.

These ulcers appear in persons debilitated, either mentally or bodily. In the *treatment*, therefore, of this kind of ulcer, tonics are to be exhibited, particularly bark and steel, and every thing which disagrees with the constitution is to be avoided. Wine and cordial medicines are also usually prescribed. Porter, however, is deemed better than wine for working people. The local treatment is to prevent the granulations rising too high. This, says Sir E. Home, is better accomplished by keeping them down by strong stimuli than by allowing them to rise and then destroying them. Pressure also is very useful, either by bandage or a piece of sheet lead, as stimuli. A weak solution of argentum nitratum may be used, or powdered rhubarb, which, if too exciting, may be mixed with a fourth part of powdered opium. The best ointments are, the ung. hyd. nitri. or ung. nitrico. oxyd. each diluted with five parts of hog's-lard.

iii. Irritable ulcers, when well marked, have these symptoms:—The margin of the surrounding skin being jagged, and terminating in an edge, which is sharp and undetermined. The bottom of the ulcers being made up of concavities of different sizes. There being no distinct appearance of granulations, but, a whitish spongy substance, covered with a thin ichorous discharge. Every thing that touches the surface gives pain, and very commonly makes it bleed. The discharge is altered from common pus to a thin fluid, in proportion to the degree of irritability communicated to the sore by constitutional causes.

When the above-mentioned signs of an irritable ulcer are not present, we must form a judgment of the nature of the sore from listening to the history of the case, the effects of various applications, &c. When this kind of information cannot be obtained, Sir E. Home recommends the treatment to begin on the supposition of the ulcer being of an irritable nature. Irritable sores are very often situated over the lower end of the tibula, or anterior edge of the tibia.

Treatment.—All applications should be sedative. Thus steaming the part or fomenting with decoct. papav. or applying lint dipped in a solution of hemlock, or opium, will be found beneficial. Emollient poultices may be used as a continued application. But, as the patient cannot always bear their weight, it should be contrived that the part may rest on the poultice instead of the poultice on it. They are, however, to be left off, if they relax the ulcer too much, causing flabby, large granulations with a gaping wound. Powdered charcoal has been found useful, as has cold cream when the patient could not bear heat.

iv. Indolent ulcers.—The indolent ulcer forms in its appearance a complete contrast to the irritable one. The edges of the surrounding skin are thick, prominent, smooth, and rounded. The surface of the granulations is smooth and glossy. The pus, instead of being of a perfect kind, is thin and watery, being composed of a mixture of pus and coagulating lymph. The lymph consists of flakes, which cannot be easily separated from the surface of the sore. The bottom of the ulcer forms quite a level, or nearly so, and, as Sir E. Home very accurately remarks, the general aspect conveys an idea that a portion of the skin and parts underneath has been for some time removed, without the exposed surface having begun any new action to fill up the cavity. When, however, the indolence of the ulcer is not so strongly marked, the sore does not correspond to the preceding description, but resembles in appearance the ulcer which possesses an inferior degree of irritability, and can only be discriminated from it by receiving no benefit from soothing applications. These are the ulcers that most commonly occur in old persons, and so we find a great number in every hospital.

Treatment.—Solutions of lunar caustic; touching the surface of the ulcer with the caustic itself; diluted nitrous acid; the unguent. hydrarg. nitrat.; and the unguent. hydrarg. nitrat. rubr.; and supporting the sore and the neighbouring skin and muscles with a roller: are the best means which were used for healing common indolent ulcers, before Mr. Baynton laid before the

public his very successful method. This gentleman's practice consists in applying strips of adhesive plaster round the limb, so as to cover the sore, and, at least, one inch of the parts both above and below the ulcer. The strips of plaster are to be two or three inches broad, and long enough to surround the limb, and leave an end about four inches long.

The middle of the strip, so prepared, is to be applied to the sound part of the limb, opposite the inferior part of the ulcer, so that the lower edge of the plaster may be placed about an inch below the edge of the sore; and the ends are then to be drawn over the ulcer with as much gradual extension as the patient can well bear. As many strips are to be applied in this manner as will cover the whole surface of the sore, and one inch of the limb below and above it. Soft compresses are to be laid over the part, and the limb is to be rolled, from the toes to the knee, with calico bandages. The affected parts are then to be kept moist with cold, spring water, which enables the surgeon to remove the strips of plaster without hurting the patient, and, at the same time, keeps off inflammation.

v. Ulcers with specific action.—These are very various; as the scrofulous, venereal, cancerous, &c., which will be treated of under these separate articles. A few, however, may be mentioned here. 1. An ulcer noticed by Sir E. Home, particularly in servants who have led indolent lives, occurs on the instep and foot, has very thick edges, and is attended with a diseased state of the surrounding skin, so as to bear some resemblance to elephantiasis; these are to be cured by mercurial fumigations and applications. 2. Ulcers which appear on the ancle or knee with swelling of the joints.—These are generally suspected to be scrofulous, but they are more painful than strumous ulcers commonly are. These are best managed by applications of hemlock. 3. There is a kind of ulcer which does not extend more deeply than the cutis, but spreads in all directions. The specific morbid action does not continue in the parts which have ulcerated, but only affects the edge of the skin, where the ulcer is increasing; for the surface first affected heals, while the parts beyond are in a state of ulceration. For such ulcers, of which there are several varieties, a solution of the argentum nitratum is the best application.

The last specific ulcer which I shall here notice is the fungated one. It is seen on the calf of the leg and sole of the foot, shooting out a fungus from the surface. The new formed substance is extremely broad, and narrow at its root; it is tender, and bleeds from very slight causes. The disease, in its origin, somewhat resembles a scrofulous affection of the metatarsal bones, until the skin ulcerates and the fungus protrudes. One species of this ulcer contaminates the lymphatic glands in the course of absorption; another kind does not do so. The first case cannot be cured by the internal and external use of arsenic; the second may.

vi. Varicose ulcers.—These are generally situated on the inside of the leg, having somewhat the appearance of indolent ulcers, but may be known, as the name implies, by a varicose state of the saphena vein.

Treatment.—A horizontal posture is absolutely necessary to take off the weight of the superincumbent column of blood; apply lotio nigra to the wound, oiled silk or sheet lead over this, and then bandage the limb tightly from the foot upwards. Sir A. Cooper recommends bleeding from the affected veins. It is obvious that the varicose ulcer must be alleviated by any thing that will benefit the condition of the varicose veins themselves—to the article on which, this consideration must be referred.

vii. There are some ulcers which may be hindered from healing by mechanical impediment, as constant motion. Of this sort are those called fistula, which will be separately treated of; also abscesses in the lungs, or other moveable viscera; others by some irritating cause, as ulcers of the toes under the nail. These are very troublesome on account of the nail growing into the ulcer, from which a little fungus sprouts.

Treatment.—Sir A. Cooper notices that there are two modes of treating these ulcers; either the application of a blister; or introducing a piece of lint under the nail; the former brings away the cuticle and sometimes the nail along with it; the latter, however, is more lenient, and a better remedy. Pare down the nail as thin as you can, without producing bleeding; then raise it a little, and introduce a small piece of lint: in this way the irritating cause may generally be removed; but sometimes it happens that the sore is so exceedingly irritable that even lint cannot be lodged on its surface without producing increase of inflammation and pain; in such cases, I would recommend slitting up the nail with a pair of scissors, on that side where the disease exists, and then, with a pair of forceps, turn back and completely remove the divided portion. The part should be poulticed after the operation.

There is another not uncommon ulcer, which has not yet been noticed; this is the gangrenous or phagedenic ulcer. In ulcers of this kind, the surface is perfectly free from any discharge; the surrounding edges of a livid appearance, with small vesicles or blistered spots on them; and the patient suffers much from irritative fever.

In the *treatment* of these cases you must adopt constitutional as well as local remedies: the recumbent posture must first be enjoined, as it is essentially necessary to promote the separation of the dead parts; a generous diet allowed; stimulating medicines administered; and moderate stimulating applications, to promote a slightly increased action on the part; sometimes, however, when the action is excessive, you must, on the contrary, sooth the part, and lessen the stimulating nature of your constitutional treatment. The most approved constitutional treatment in these ulcers is rest and generous diet; port wine should also be allowed, and spirits may be given to those who have been in the habits of using them: by brandy and opium I have seen these wounds cured; in fact, they are our sheet anchors in the treatment of gangrenous ulcers. The best medicine to be administered is opium and ammonia; twenty drops of the tincture of opium, three times a day, with ten grains of the ammonia, in an ounce and a

half of camphor mixture, and one drachm of compound tincture of cardamoms.

When there is debility of the part, a slight stimulus should be employed; but when there is excessive action it is to be avoided. The best application for producing a slight stimulus, and checking gangrene of the part, is the nitric acid; there is none equal to this; fifty drops of it to a quart of distilled water is the average quantity; but this, however, may be increased or diminished, just as it may give pain to the part.

We come now to consider the next termination of inflammation. This is

4. *Gangrene* or *Mortification* (from γραω to feed upon, because it consumes the living flesh). This, the worst, is happily the least frequent sequel of inflammation, and occurs only when the affection has been of the most severe character; and seems to be produced by the sudden failing of nervous energy in the part attacked, in consequence of its being no longer able to continue that high state of excitement which such severely increased action demanded: as we may imagine a bow to be bent till it snaps asunder. When this happens, there ensues a loss of life to a greater or less extent in the part affected. There frequently, however, occurs a gangrene in parts which have not been previously subjected to inflammation; but which, for some reason or other, are endued with less vitality. This has been called idiopathic or dry gangrene, in contradistinction to the other, which is the humid or acute. There are besides cases of mortification, preceded by inflammation, which do not arise wholly from that as a cause, but combined with a deficiency of vitality; of this nature are carbuncle, and the slough formed in the small-pox pustule, &c.

Symptoms of gangrene.—The symptoms of mortification from inflammation take place variously, yet generally, as follows. The pain and sympathetic fever suddenly diminish, the part affected becomes soft and of a livid color, losing at the same time more or less of its natural warmth and sensibility. In some places the cuticle is detached; while, in other situations, vesicles arise, filled with a clear or turbid fluid. On touching the part, there is a crepitus perceptible, owing to the generation of air, from the decomposition of the cellular substance. As this state of things proceeds, the parts become quite black, flaccid, easily lacerable, destitute of heat, motion, and sensation. They are now said to be in a state of sphacelus or mortification. Mr. Thompson observes, in his Lectures on Inflammation, that 'the part of the body which becomes affected with gangrene does not immediately lose its sensibility; for the pain, on the contrary, is often very much aggravated by the approach of this state. The blood also still continues to circulate, at least in the larger vessels of the part, but perhaps with less force; and, from the resistance which it meets with in passing through the capillaries, in less quantity than formerly. The serous effusion into the cellular membrane continuing to increase, and the action of the absorbent and sanguiferous vessels to diminish, the part becomes at length incapable of being restored to its former office in the animal economy. It is therefore in its earlier stages only that gangrene is to be considered as an affection admitting of cure; for there are limits beyond which, if it pass, recovery becomes impossible. These limits it may not in every instance be easy to define; but they form the boundaries between incipient gangrene and the ultimate termination of that state in sphacelus.' When sphacelus, however, has taken place, it always has a tendency to spread and deprive the neighbouring textures of their vitality, and it stops only when it encounters a part which has vital energy enough to resist it. It is then that nature draws a line of separation between the living and dead matters, which last, if left to themselves, are gradually thrown off, leaving for the most part a healthy ulcer exposed.

The separation of mortified parts or sloughs would be attended with great danger from hæmorrhage, where it not kindly provided by nature that the arteries leading to a part thus affected, having no longer any circulation to carry on, become obliterated by lymph, so that the patient is secured from this terrifying addition to his sufferings.

The constitutional symptoms that occur in acute gangrene are a high degree of irritative fever, gradually assuming the form of typhus, with a quick, small, and thready pulse, generally intermitting, and often accompanied by delirium of the low or muttering character, and vomiting, together with a very uniform and important symptom, hiccough. Frequent cold sweats supervene, and the patient's countenance assumes a wild cadaverous look.

Mortifications not following acute inflammation.—These may occur from various causes: as 1. A simple diminution of vitality, which takes place in the sloughing of extraneous growths. 2. Pressure on the veins of any part obstructing the return of blood. In this case the blood-vessels become turgid, and the part swells, and becomes livid and very painful. Vesicles soon arise, and, at length, the part becomes soft, œdematous, emphysematous, cold, black, insensible, and fetid. A strangulated hernia affords an instance of such mortification. 3. Impediment to the flow of arterial blood to the supply of a part. This produces first softness and boldness of the part, which soon becomes shrivelled, black, and lifeless—parts enclosed in very tight ligatures are examples of this. 4. Pressure obstructing the general circulation. Surgeons have frequent occasion to see melancholy examples of this kind of mortification, particularly in cases of fractures, paralysis from disease of the vertebræ, &c. The mischief most readily occurs where the bones have the least flesh upon them, and consequently where all external pressure has the most effect; as, for instance, about the os sacrum, os ilium, spines of the scapulæ, &c. The disordered part always first becomes soft, livid, red at the circumference, and œdematous, afterwards losing its sensibility, and acquiring a black appearance: at length it is converted into a foul sloughing ulcer. 5. Violent concussions or contusions. 6. Extremes of heat applied suddenly. 7. Extremes of cold applied suddenly: all these three last occasion immediate loss of vitality. 8. Long

continued application of moderate cold or heat. 9. Ossification of arteries in old persons, as proved by Mr. Hodgson, though Pott has denied this. 10. A peculiar sort of mortification, beginning at the extremity of one or more of the small toes, and passing on to the foot and ancle, and sometimes a part of the leg, quite unpreceded by any inflammation. In some few instances it makes its appearance with little or no pain; but commonly the patient feels great uneasiness through the whole foot and ancle-joint, particularly in the night time, even before the parts show any marks of distemper, or while there is only a small discolored spot on the end of one of the little toes. From this spot the cuticle is always detached, and the skin underneath is of a dark red color. Sometimes it is slow in spreading from toe to toe. At other times its progress is rapid and horridly painful. It is most frequent in males, and is more often met with in the rich and voluptuous than in the laboring poor. It frequently happens to persons advanced in life; but it is by no means peculiar to old age. It is said to happen often in persons subject to gouty pains in the feet, without having regular paroxysms of the disorder. Few mortifications proceed so slowly as that now described; it spreads, however, more quickly when it invades fleshy parts. 11. Gangrene of an epidemic character. This is commonly called hospital gangrene, and is to be noticed where a great many wounded people are crowded together in a confined space. This first shows itself locally, says Mr. Thompson, by 'a more or less acute pain, and a viscid whitish exudation on the surface of the granulations, which lose their vermilion color, and present at several points spots of a grayish or dirty-white hue, resembling venereal ulcers, or aphthæ. These ulcerated points, thus engrafted (as it were) upon the original ulcer, soon spread and join together, so as to give to the whole surface of the solution of continuity a gray ash-color. The surface also becomes more or less indurated, and sometimes bleeds. A red, purplish, œdamatous circle, of a greater or less extent, is next formed in the surrounding skin. Sometimes, when the patient is of good habit, the causes of infection less active, and the constitution sufficiently strong, the disorder has now a stop put to it. Indeed, as we have already remarked, it may not even extend to the whole surface of the ulcer. But most frequently its progress is extremely rapid, and occasionally quite terrifying. The edges of the wound, or ulcer, become hardened and everted, the granulations are large and tumid, being, according to Boyer, swelled up with a considerable quantity of gas. They are afterwards detached in the form of soft reddish sloughs, which, says Boyer, very much resemble the substance of the fœtal brain when in a putrid state. From day to day, until nature alone, or aided by art, puts limits to the disorder, it invades new parts both in breadth and depth, so that its ravages extend to aponeuroses, muscles, blood-vessels, nerves, tendons, the periosteum, and even the bones themselves. Imflamed absorbent vessels are sometimes seen extending from the surfaces affected with hospital gangrene,' to the contiguous or communicating, cervical, inguinal, or axillary glands.

Artery seems to be the texture which resists most powerfully the destructive action of hospital gangrene, as well as of most other species of mortification. When adhesive inflammation does not occur, hemorrhage is liable to take place, and, in some instances, to prove fatal. Even in cases in which distinct hemorrhage does not occur, a thin, fetid, bloody sanies is often discharged, and the pus, which is secreted during the separation of the sloughs, is frequently reddened by an admixture of blood.

These are the principal causes of gangrene; the treatment will be considered when we come to speak of the treatment of inflammation in general, and its consequences.

The last termination of inflammation may be said to be its passing into a chronic form. This, however, differs little from the acute, except in the mitigated violence of the symptoms. But chronic inflammation may happen, as it very commonly does, without any previous acute attack. It is to be observed that it is this which causes or accompanies most surgical complaints.

There has as yet been noticed only one sort of inflammation, viz. common or phlegmonæus; but besides this there are various specific inflammations, either produced constitutionally, as rheumatism, gout, scrofula, schirrus; or by application of some poison, as syphilis, &c.; but of these some come within the province of the physician, others will be mentioned afterwards.

Sect. II.—Of the Causes of Inflammation.

These have been divided by most writers into remote and proximate. By the remote cause is meant both the indirectly predisposing and the directly exciting cause; and, by proximate is meant, in fact, an illustration of the modus operandi of inflammation.

1. *Remote*, considered under its two divisions: i. Predisposing. This, as the term implies, denotes all those accessary causes which render a person more liable to inflammation at one time than at another; as, for instance, a state of debility produced by any means whatever, as excessive fatigue of body or mind, want of proper nourishment, &c. &c. That some predisposing cause is necessary to produce this malady, is obvious from this, that many persons may have been equally subjected to an exciting cause, but of these a few only are attacked. ii. Exciting causes. All substances applied to the body, tending to injure the vitality of the parts that they touch. This includes chemical agents, especially stimulants, as cantharides, heat, acids, alkalies, metallic oxides, salts, and acrid vapors, as many of the gases. But the most curious though common agent is cold. This may be applied to one part and produce inflammation in another, as is seen in the production of diseases of the chest when cold is applied to the feet. It however often has a local effect, as is seen in frost-bitten parts, chilblains, or inflammations of the fauces and nostrils, from inhaling cold air. Touching a piece of metal previously cooled to a very low degree will produce a blister, and a sensation similar to that of burning; so that cold, though not considered by many

as a direct exciter of inflammation, may, however, very fairly be classed with the other causes, all of which excite it by the violent effort of nature in the threatened part, to rid herself of the noxious matter.

2. *Proximate cause.*—This has been a favorite topic of controversy amongst medical philosophers for several ages. Boerhaave supposed it to depend upon a too great viscidity of the blood, which clogged up the vessels: he also imagined that, in consequence of the perspiration being stopped, the smaller vessels were distended with it; so that the thick red globules found their way into these capillaries, forming an error loci. This created resistance to the circulation, causing heat, pain, and redness, by the accumulation of blood behind. Mr. Burns says, 'The viscidity of the blood cannot be admitted as the proximate cause of inflammation; because we have no proof that this state ever exists; or, granting that it did, it would not explain the phenomena. Were a viscidity to occur, it would exist in the whole mass of blood, would affect every part of the body alike, and could not be supposed to produce only a local disorder. How also could such a lentor be produced by causes which bring on inflammation suddenly, without there being time for changes of the fluids to take place?

'With regard to the doctrine of error loci, or of red globules going into vessels which did not formerly transmit them, the fact must be admitted, at the same time that the conclusion is denied. When the eye becomes inflamed, the tunica conjunctiva is seen with its vessels full of red blood, which in health is not the case; but this redness never appears until the inflammation has commenced, and must therefore be considered as an effect, not a cause. Nor can this error loci occasion any obstruction in these vessels; for if they be divided the blood flows freely, which shows that they are large enough to allow an easy circulation.' Dr. Cullen believed that it is produced by a spasm of the extreme vessels, with an increased action in the course of them. The inconsistencies in Cullen's theory are very glaring. The congestion or accumulation of blood, which is only an effect or consequence of inflammation, is set down as the cause of the spasm of the vessels, to which spasmodic constrictions, Cullen, strangely enough, assigns the name of proximate cause. The spasmodic contraction of the extremities of the vessels, instead of propelling the accumulated quantity of blood, would render the passage of the blood from the arterial into the venous system still more difficult. Mr. Hunter believed that inflammation is to be considered only as a disturbed state of parts, which require a new but salutary mode of action to restore them to that state wherein a natural mode of action alone is necessary.

It used to be generally considered that the pulsation of arteries causing throbbing was in consequence of the contractile action of such vessels. But Mr. Brodie has proved in recent experiments that pulsation depends upon the stroke of the heart in a great measure, if not entirely. In one experiment, to prove this, he laid bare the carotid of an ass; and, having divided it, inserted a glass tube into the lower portion, to the end of which was attached a silken tube, and he found that, when he allowed the blood to flow, the silken tube pulsated as strongly as an artery. To refute the old doctrine of spasm, or obstruction in the capillaries, Dr. Wilson, in company with Mr. Boraston, instituted some experiments. He found that in an inflamed webb of a frog's foot the capillaries, particularly the anastomosery vessels, were inordinately distended, so as to admit red globules, which they could not do previously; but at the same time the rapidity of circulation was diminished in proportion. These experiments have been corroborated by Mr. Brodie, who supposes that these vessels are dilated beyond their powers of contraction, so that they become inert tubes, and thus the circulation stagnates. It would seem probable, then, that inflammation takes place in this manner. Nature is able to repair injuries in living bodies only through the medium of the circulation, influenced no doubt by the nerves, which allow the arteries to dilate, or cause them to contract, and thus at times to receive greater or less volumes of blood. Whenever then any part is threatened with loss of vitality, from an irritating or sedative cause, the resistance which naturally takes place is the pouring of a larger volume of blood to the part; and, as the intention is that of reparation, so it would seem those arteries allow themselves to be dilated most readily which are for the nourishment of the part, whilst a stop is put to all secretions, by which, part of the blood in the organ would be drained off. It seems then probable, by observing what takes place in the frog's foot, that those arteries which would not convey red blood before, now become dilated beyond their power of recovery, as is the case sometimes with the urinary bladder, and that this is the real distinction between mere increase of action where there is no inflammation, as in pregnancy, rutting seasons of animals and growth of the stags' antlers, and the state in which real inflammation is present, this may help to show why effusions of any sort abate or cure the inflammation, it being by unloading the vessels and allowing them to recover their natural tone and calibre; this state of distension may be noticed in inflammations of the eye, especially when they assume a chronic form.

Sect. III.—Of Symptomatic Fevers.

Symptomatic fevers of different sorts are present in most inflammations, according to the nature of the part attacked. These are caused by the sympathising of the entire frame with the action that is going on in the part affected.

1. *Sympathetic inflammatory fever.*—The symptoms are, a frequent, strong, and full pulse; diminution of the secretions; a hot dry state of the skin; scanty high-colored urine; dry furred tongue; thirst; disturbance of the nervous system; loss of appetite and sleep: in some cases delirium. The febrile symptoms appear in this form when any considerable phlegmonous inflammation affects common parts, and the integuments in any situation in the body, the

disturbance of the system being in a great measure proportioned to the extent and violence of the local affection.

The effects of inflammation on the constitution, however, are not simply proportioned to the quantity of inflammation; they are influenced as much by the nature of the parts in which it is situated as by its extent. When muscles, cellular membrane, skin, &c., are inflamed, the pulse is, as we have described, strong and full. These may be said to be common structures.

If the inflammation be in tendinous, ligamentous, or bony parts, the stomach sympathises more than when muscles, &c., are inflamed. The pulse is quicker, but has not so much fulness, and the blood, not being propelled so far into the small vessels, forsakes the skin. When inflammation is in vital parts, or such as sympathise with the stomach, there is great depression blended with the constitutional symptoms, the pulse is frequent and small, and the blood is not pushed into the minute vessels. A very remarkable depression of strength very frequently attends an inflammation of the intestines, and the pulse is small and hard; whereas, when the surface of the body is the seat of the affection, there is often a temporary augmentation of tone, with a full, strong, and hard pulse. In fact, when the peritoneum and intestines are inflamed, the patient frequently seems so reduced, and his pulse so small, that the surgeon is afraid to use the lancet. Perhaps, however, he at length ventures to do so; the blood appears exceedingly sizy, and the pulse gains strength, in proportion as the disease yields to, and is benefited by, the evacuation.

It is a very curious fact, remarked by Mr. Hunter, that all inflammations of parts, which derive their nerves from the great sympathetic nerve, occasion an unusual lowness of spirits. When the constitution is good, and parts not very essential to life are inflamed, the pulse becomes increased in strength and fulness. When the same parts are affected in weak irritable persons, and in women who lead sedentary lives, the pulse is quick, hard, and small, at the commencement of the inflammation, just as if vital parts were concerned. Thus we see that all the varieties of inflammatory fever depend chiefly on four circumstances; viz. the extent of the inflammation; the structure of the parts affected; their functions; and the nature of the constitution.

Treatment.—It is obvious that by taking away the cause we must mitigate this fever, so that we ought to direct our attention chiefly to the local injury. But it is possible that the fever may run so high as to have a bad effect on the diseased part, in which case we must bleed from the arm, administer purgative medicines (so that no further source of irritation may arise from the faulty intestinal action), and diaphoretics, chiefly antimonial.

2. *Hectic fever* arises in consequence of long continued suppurations, from the inability of the system any longer to supply the constant drain without using an extraordinary exertion, and not as the old surgeons supposed from absorption of pus. Its symptoms are a soft frequent pulse, profuse sweats, particularly at night; great debility; tongue moist; urine copious, with great deposits; generally of a pinkish white color; failure of appetite; and, when the disease becomes fully formed, there are frequent attacks of diarrhœa, with sudden chills and flushes of heat. Mr. Hunter has noticed that there are two practical varieties of hectic fever. The first arising entirely from a local complaint in a good constitution, which is only disturbed by too great an irritation; and a hectic fever, arising principally from the badness of the constitution, which does not dispose the parts to heal. In the first species it is only necessary to remove the part (if removable), and then all will do well; but, in the second, nothing is gained by a removal of the part, unless the wound made in the operation is much less, and more easily put into a local method of cure; by reason of which the constitution sinks less under this state and the operation together, than under the former one. Here the nicest discrimination is requisite.

Treatment.—We cannot expect to cure this fever without first healing the abscess, and, as this is frequently impossible, we must content ourselves with mitigating it only. No medicine, not even bark itself, has any direct power of communicating strength to the human constitution. All that can be done in the treatment of hectic fever, when it is thought inexpedient or impracticable to remove the morbid part, is to combat particular symptoms, and to promote digestion. It is by bringing about the latter object that bark is useful in these cases. The infusum cinchonæ, being more apt to agree with the stomach than the decoction or powder, should generally be preferred. Nourishing food, easy of digestion, should be frequently taken in small quantities at a time. Nothing is more prejudicial to a weak constitution than overloading the stomach. Wine may also be given, but not too freely, and not at all if it should create heartburn, as it sometimes does in hectic patients. Madeira is less apt to have this disagreeable effect than port. In these cases it is likewise often found useful to administer gentle cordial aromatic draughts. But, of all medicines, opium is perhaps the most valuable to those who are afflicted with hectic fever; it alleviates pain, procures sleep, and checks the diarrhœa, which so frequently attends such cases.

When the hectic fever arises from local diseases, in parts which the constitution can bear the removal of, the morbid part should be taken away, if it cannot be cured consistently with the advice already given. When the disease arises from some incurable disease, in an extremity, all the above-mentioned symptoms cease almost immediately after the limb has been taken off. A hectic pulse, at 120, has been known to sink to ninety in a few hours after the removal of the hectic cause. Persons have been known to sleep soundly the first night afterwards, who had not slept tolerably for several preceding weeks. Cold sweats have stopped immediately, as well as

those called colliquative. A purging has immediately ceased, and the urine began to drop its sediment.

These are the principal fevers met with in surgical cases: but others do occur. Thus, in inflammations of the veins, a fever resembling typhus supervenes; and Mr. Brodie remarks that, when putrid matter is confined in an abscess, it causes symptoms of the greatest malignity, which will entirely disappear on evacuating the fluid.

Having now given some account of the phenomena it will be requisite to consider

Sect. IV.—The Treatment of Inflammation and its Sequels.

This consists in unloading the arteries of the affected part, which may be done in several ways.

1. *By diminishing the general volume of blood in the body.*—For which purpose the best and most efficacious remedy is blood letting from the arm or other large veins, or the temporal arteries. This is, however, only requisite when the symptoms are violent. It has been known and practised as a valuable remedy from the days of Hippocrates. In the repetition of general blood letting we should be guided rather by the symptoms than by the buffy appearance of the coagulum of blood.

The next method in point of efficacy is local bleeding, which may be performed either by leeching, cupping, or scarifying, the part. Inflamed parts, however, do not bear this last operation well during the early stages, but it is frequently performed afterwards with good effect, as in ophthalmics. This is a most excellent and manageable remedy, as it not only unloads the system in general, but more particularly the vessels of the affected part. It therefore will in most cases be the preferable remedy, as general bleeding need only be resorted to when the constitution is much distressed.

Another very useful auxiliary is the use of purgatives (except in cases where their employment is prohibited). These act in several ways:—1st, They remove any source of irritation in the bowels from confined matters. 2dly, They increase the secretions from the mucous surface of the intestines, and so materially assist in lessening the volume of circulating fluids by the copious watery evacuations which are produced. This at the same time does not tend to weaken the patient nearly so much as blood letting.

2. *Restoring the secretions.*—Perspiration. This end is answered effectually by the use of diaphoretic medicines, such as antimonials, either with or without calomel. This last preparation seems to have a peculiar influence over the process of inflammation, and therefore deserves our most serious consideration. This we particularly notice in cases of iritis, which seems to yield to no other remedy. Of the specific actions of calomel, as well as of very many other medicines, we as yet know little or nothing. Physiologists and others have in vain attempted to explain them. All, however, that we do know of calomel is, that it affects the absorbent system by causing an increased action in it, as indeed it does in the vascular system generally, and also acts particularly by rousing the liver and salivary glands, the secretions of which it materially augments. The last symptom indeed is a certain sign of its having affected the constitution, and is a guide for its further employment.

3. *Lessening the force of circulation.*—This may be effectually done by keeping up a constant nausea of the stomach by emetic medicines exhibited in small doses, or by remedies which act directly as sedatives to the heart's action. Such are conium, digitalis, belladonna, &c.: great caution is required in the use of these last, as they are apt to accumulate by repetition of doses, so that they act suddenly in a very powerful manner as narcotic poisons.

4. *Local applications.*—The most valuable of these is cold, in the form of lotion or pounded ice, laid over the inflamed part; which, by condensing the volume of fluid, must materially diminish its bulk, and so admit of its action in another manner, which is constringing the vessels, thereby lessening their diameter. Cold also acts as a sedative to the nerves, where the action is not too violent. In which cases cold cannot be borne. It is then that we find the employment of warm applications so serviceable, particularly combined with moisture. We see this commonly in cases of inflamed testicle or incipient acute ophthalmics. Sir A. Cooper thinks they act by producing relaxation, opening the pores, and allowing the perspiration to exude. The best mode of applying heat is by a steam bath, which may be made at the moment by placing a common strainer over a pail of boiling water, upon which the patient may rest his limb, which is then to be covered up with flannel, so as to prevent the egress of the steam; or he may have a flannel pipe leading to the spout of a boiling vessel, dilated at the end intended to be applied to the body by a circular piece of cane or whalebone. The most common way, however, of applying heat is to foment with flannel dipped into warm water, otherwise to apply a poultice made of some substance which can retain heat; for this purpose linseed meal is commonly used.

5. *Counter irritation* is often of value in checking inflammation, by drawing a quantity of blood to the part on which we produce it, and thus relieving the inflamed part of a portion of its blood. It is, however, more serviceable in chronic inflammation, or when the first violence of the acute is abated. Indurations very frequently remain after inflammations; they are to be got rid of by diminishing the circulation of the part, and promoting absorption. For this purpose the best remedies are pressure, friction, electricity, and mercury.

When all the means for subduing inflammation have been used, and fail, the most frequent sequel is suppuration; the symptoms of which having been already described, it only remains to notice the *treatment*. When we find a part beginning to suppurate it is best to use warm applications. These relieve the pain by relaxing the parts around, which thus allow themselves to become distended by the abscess without resistance. It is probable, also, that the heat may ex-

cite the absorbents to a more steady action, and thus hasten the ulcerative process. When, at length, an abscess does present itself, it becomes a question whether the surgeon should interfere or not. It will be best as a general rule to leave all abscesses to burst of themselves which by remaining unbroken can do no mischief.

The cases for the surgeon's interference are chiefly, i. Cases in which it is of consequence to save the skin from being much disfigured, as in scrofulous glands of the neck in females, which would else follow the course of all abscesses, viz., increase in size, and thus expose a greater surface to ulceration. Sir A. Cooper recommends these to be opened by a lancet transversely to the axis of the neck, as the scar will then be hidden amongst the folds of skin.

ii. All abscesses under fasciæ, which must necessarily bind them down and cause them to burrow amongst the adjacent textures, ought to be opened by the lancet or scalpel as soon as the surgeon can convince himself of the presence of matter. These are most common in the thigh, arm, and perineum.

iii. All abscesses pressing on bones should be speedily opened, as they are else apt to occasion the death or ulceration of the part. This is particularly the case with the bones of the cranium.

iv. Abscesses in parts of loose texture; where they are, on that account, very liable to spread, as near the anus, &c.

v. Abscesses pressing on either vital parts, or such as are of much importance, as the brain, eye, &c.

Surgeons used formerly to open abscesses with caustic and setons, but now these are very seldom used, the lancet or scalpel being generally far preferable. The caustic potash may be employed when the skin is sure to slough afterwards. Care should be taken in opening collections of matter to make the orifice in as depending a situation as possible; so that the pus may have a ready vent. Much, however, must depend upon the relative thinness of the skin.

After treatment.—When an abscess has burst of itself, and it is unnecessary to enlarge the opening, all that is requisite is to keep the surrounding parts clean. The continuation of the same kind of poultice, which was before used, is, perhaps, as good a practice as any; and when the tenderness, arising from the inflammation, is over, lint and a pledget may be made use of, instead of the poultice. But an abscess, opened by a cutting instrument, is both a wound and a sore, and partakes more of the nature of a fresh wound in proportion to the thickness of the parts cut. Hence it is necessary that something should be put into the opening to keep it from healing by the first intention. If it is lint, it should be dipped in some salve, which will answer better than lint alone, as it will allow of being taken out sooner. This is advantageous, because such sores should be dressed the next day, or, at latest, on the second day, in order that the pus may be discharged again. When the cut edges of the opening have suppurated, which will be in a few days, the future dressings may be as simple as possible; for nature will, in general, complete the cure.

Healing of abscesses.—This takes place by granulation. Thus when an abscess is opened, or when a wound has been produced, if the edges are not brought together, inflammation is excited; and this inflammation occasions an effusion of the fibrin of the blood upon the surface of the wound. This fibrin is poured out in a layer upon the surface, and soon becomes vascular; for blood-vessels, which are elongations of the vasa vasorum of the divided vessels, are forced by the action of the heart into the fibrin which has been deposited. The fibrin which is thrown out, besides the purulent secretion from the vessels, forms a second layer, into which the vessels shoot as before. The vessels supporting the first layer are the means of supporting the second layer, where the vessels terminate as before, by open mouths on the substance effused. In this manner layer after layer is formed, until the cavity becomes filled.

Of chronic abscesses.—These demand a little separate consideration. For, 1. Their general treatment should be directly opposed to that of acute ones; for here the patient must be allowed a generous diet and tonic medicines. 2. Their local treatment differs very materially, as they often require stimulating applications to bring them forward; such as poultices of oatmeal and yeast, or flour and vinegar wetted with a solution of common salt; or plasters, as the compound galbanum or mercurial, with ammoniacum, and soap plaster. When suppurated they are to be opened as the others. Care must be taken, however, to prevent access of air or violence to large cysts; which, under these circumstances, may inflame and produce symptoms of malignant fever. When, however, the cysts are small, as in scrofulous glands, we should take care to squeeze out all the flakes of unorganised matter, which will facilitate the healing.

It should be observed that abscesses situated over diseased substances, as bone or glands, cannot heal till these last are either removed or cured. Also when situated so as to be kept in motion they heal with difficulty. When matter has penetrated far in a longitudinal direction under the skin, we say there is a sinus. This is often observed under fasciæ or about the rectum. These may often be cured by pressure; which should, indeed, be applied gently or gradually to all cysts of chronic abscesses. When, however, pressure will not remove them, they must be laid open and dressed to the bottom.

We come now to consider the treatment of the last sequel of inflammation.

Sect. V.—Gangrene.

In treating this there are two indications. 1. To put a stop to its progress. 2. To separate the dead from living parts.

1. When gangrene is threatened from severe inflammatory action, all applications, says Mr. Hunter, should be cold till the excessive action be somewhat subdued. Cold, however, cannot be persevered in too long, as it then becomes a cause of gangrene. Whilst the constitutional

symptoms are violent, blood may be taken locally or generally; but, if they threaten exhaustion, opium with cordials must be administered and bark will now prove efficacious. When gangrene has formed, then we should endeavour to save the neighbouring parts by stimuli, which prevent the stagnation of blood in the vessels and enable them to resist the gangrenous action: for this purpose poultices of stale beer grounds with linseed meal, port wine poultices, spirituous application, yeast, vinegar, camphor, turpentine, charcoal, and carrot poultices, are all useful. Some surgeons preferring one and some another. 2. When a slough or sphacelus has formed, and the constitution has tone enough, it will be separated from the living parts; so that the surgeon need only await the result, except, indeed, it should occur under the skin, or where the egress is difficult, as in cases of effusion of urine into the scrotum. Here the surgeon must make free scarifications down to the sound parts; so as to allow it the most ready exit. In common cases, however, as in the extremities, a line is formed between the living and dead matters. We should then apply the less violent stimuli, and nature will generally make a tolerably good stump; so that all the surgeon need do, is to saw through the bone, unless the surface be left very ragged and uneven, as is sometimes the case, on account of the different degrees of vitality of parts. Thus tendons or membranes are less vital than skin and muscle, and so often slough to a greater extent. In this case the surgeon had better perform amputation when the patient is able to bear it. As a general rule amputation should never be practised whilst the mortification is spreading, as in these cases the stump is very liable to slough also. But the baron Larrey, in his Memoirs de Chirurgié Militairé, says that in cases where gangrene is the result of a mechanical cause, and puts the patient's life in danger, amputation ought to be performed without waiting till the disorder has ceased to spread guided by the maxim of Celsus; that an uncertain remedy is preferable to abandoning a patient to certain destruction.

There is another case, noticed by Mr. Sharp in his Critical Enquiry, in which amputation ought not to be performed; viz., in mortification of the toes and feet in old persons; for, as this depends on an ossified state of the arteries and consequent incapability of nourishing the lower limbs, we cannot expect the stump to be in a better condition than the toes were. In treating this loathsome complaint, Mr. Pott observes, we should avoid stimuli, as the vessels cannot bear increased action, and apply only warm and soothing dressings.

In cases of mortification from the effects of cold we must beware of too sudden a stimulus. Sir A. Cooper says, if gangrene is likely to arise from the application of cold, the treatment must be different: in these cases the action of the parts is feeble, from the diminution of nervous power, and it will be proper to restore it to a healthy state by stimulants of the most gentle kind. For this purpose the best application is the camphorated spirit of wine, accompanied with gentle friction. If you are called to a patient whose feet are benumbed from the effects of cold, you must sit by his bed-side, pour camphorated spirit into your hand, and rub it on his feet with the utmost gentleness, so that the part may not be irritated by violent friction. When the first effects of cold are removed, it will be proper to apply cold poultices; for warm applications are to be carefully avoided. When parts are frost-bitten, in colder climates, the common practice is to restore the circulation by rubbing them with snow.

Hospital gangrene must not be confounded with ulcers from scurvy, which generally occur with the other symptoms of this last disease, as, bleeding gums, blotches on the skin, &c., and are benefited by vegetable acids and fresh diet. The most efficacious treatment seems that recommended and practised by the French surgeons Boyer, Dupuytzen, &c., who make a firm, hard eschar, by the application of the actual cautery to the ulcers, which they repeat if the wounds reassume gangrenous action. These surgeons have no confidence in constitutional remedies for this complaint. When the disease is stopped, it is notified by the appearance of a phlegmonous swelling at the circumference of the ulcer, for which Boyer recommends at first a poultice, but as soon as pus is secreted this is too relaxing. He then enjoins some mild tonic, as the decoct. cinchonæ.

There is another disease which, bearing considerable analogy to phlegmon, demands our next attention. This is

Sect. VI.—Erysipelas.

Erysypelas, ερυω, to draw, πελας, adjacent, or St. Anthony's fire, derives its first name from its tendency to draw the neighbouring parts into the same state; it was known first by this name in the time of Aretæus. According to the doctrines of Pythagoras, it was supposed to be formed by bilious humor, and, as a disease, was well known to Galen. The cause of this formidable malady seems to be an inflammation of the skin and subjacent cellular structure; it differs, however, materially from phlegmon, both in symptoms, and in its not attacking alike all structures, being confined to the skin; or, as Dr. Cullen supposed, to this and mucous membrane. This disease presents itself in two very different forms, with, however, every degree of modification between them, one acute or phlegmonous, the other atonic.

Symptoms.—General. An attack of erysypelas is mostly preceded by considerable constitutional disturbance, particularly nausea and headache, with great derangement of the digestive organs, and is ushered in by a shivering. Then a red spot appears, which soon spreads rapidly, causing a little elevation of the skin, not circumscribed, but often with a well defined edge between it and the healthy parts; its color is a bright red, more or less tinted with brown, which, on pressure, vanishes, leaving a white spot, but which quickly regains its color. It is attended with a burning pain; not throbbing as in phlegmon. We shall now consider its two varieties,

1. *Phlegmonous, or acute.*—In this the constitutional symptoms assume the form of inflam-

matory fever. The eruption is of a brighter red, pulse full, urine high-colored, great pain in the head, and frequently delirium. It generally terminates favorably in four or five days by the appearance of little vescicles, or desquamation of the cuticle; or, if violent, an abscess may arise and burst. When not very severe, this disease frequently leaves the part first attacked, and settles on some other. It is particularly dangerous on the face, as the membranes of the brain then often become inflamed.

Treatment.—1. General. This must depend on the constitutional symptoms; if they are violent, bleeding generally must be resorted to. Local bleeding has been recommended, but it is apt to aggravate the irritation of the affected part, whether leeches, cupping, or scarifying, be used. Calomel, with mild purgatives and diaphoretics, seem the best remedies, and, indeed, it may be treated as any other fever. 2. Local remedies in this variety are not of so much importance. But, on the whole, cold applications are most serviceable. Greasy applications, as ointments, have been recommended, and often prove beneficial. Fine hair powder, during the vesiccation, is comfortable to the patient; it is chiefly useful in absorbing the discharge.

2. *Atonic erysypelas.*—In this variety the fever has much of a typhoid appearance. It is in general not so acute at first as the other, but more gradual in its approach, mostly, however, preceded by shiverings. There is a cold and clammy skin, pulse weak and irregular, eruption of a deep reddish brown, with vesiccation from its commencement, vomiting, and low delirium. This variety is exceedingly apt to end in sloughing and imperfect suppuration of the subjacent cellular texture, extending even under the fascia, which soon contaminates the superincumbent skin, if it be not allowed a ready exit. The cellular texture is more liable to gangrene than the skin, because it has less vitality. This state of things may be known by an œdema of the part, with a doughy feel, and crepitus.

Treatment.—On nothing have surgeons more disagreed than the treatment, both local and constitutional, of this formidable malady, which in itself must argue much inherent malignity and variety of disease. Some have recommended stimuli from the commencement, and particularly bark, but most modern surgeons prefer waiting till the violence of the fever is over before they commence with this then efficacious medicine. In the early treatment an emetic seems of much benefit when there is disturbance of stomach or liver. This may be followed by gentle stimuli, as ether, camphor, ammonia, &c., in proper forms, and if the patient be very low we must admit of wine or brandy.

Local treatment.—In this variety cold is not admissible, but rather any thing which will assist in supporting the vitality, as warm spirit lotions, or, what are better, Port wine lotions, made with one part of wine and two of water, or an imitation of it thus:—R. Sp. vin. rect. ℥iv. Decoct. papav. ℥vi. Decoct. quercûs, ℥vi. mfial., lotio. sapæ tipida. applicanda. Poultices are generally too heavy to be borne without a great deal of pain.

When sloughs or pus have formed under the skin, the sooner they are allowed to escape by free incisions the better, as, by this means, we avoid the constitutional irritation they would cause, and save the skin above the slough from dying. Many modern surgeons have gone so far as to make free incisions in the first instance, long before any slough can have formed, but this practice seems unnecessarily severe.

Causes of erysypelas.—There can be no specific cause assigned for its origin; but it generally attacks those whose chylopoietic viscera have lately suffered, but no constitution seems exempt. It frequently assumes a contagious character, as we see in hospitals, where at times it will attack nearly all wounds in them; and it is to be remarked that wounds seem always an exciting cause, even when of the most trivial description, as a scratch or leech bite.

Chap. II.—Of Wounds.

Wounds are solutions of continuity in the soft parts, occurring suddenly; they may be either of a simple nature, or complicated with other injuries or lodgment of foreign bodies; their danger must depend considerably on their size, and relative importance of the part. Thus, wounds of the brain, heart, or stomach, of very small size, prove fatal. Some textures also are less able to bear injuries than others: of this nature are joints, of which all wounds are attended with danger. But a point of great consideration, in the estimation and treatment of wounds, is the degree of violence done to the parts, besides their mere separation.

Wounds may be healed in two manners, 1. Union by first intention; 2. Suppuration.

1. *Union by first intention.*—Is the natural process of uniting divided surfaces, and is effected in the following manner:—The sides of the wound must be in immediate contact; with no foreign body intervening (in this case even a clot of blood which has been long extravasated becomes a foreign body by having thus lost its vitality). Then there takes place an effusion of coagulating lymph from the adjacent parts, which from non-exposure, being yet vital, soon becomes vascular, from the neighbouring vessels being elongated into the clot, which thus becomes the living bond of union between the cut surfaces.

2. *Suppuration.*—Is a much slower process, and consists of an effusion of pus from the sides and bottom of the wound, which thus becomes an ulcer and heals by granulation.

Wounds may be simple or incised, punctured, lacerated, contused (comprising gunshot wounds), or poisoned.

Sect. I.—Simple or Incised.

The simple or incised wounds are, cæteris paribus, the least formidable of all; they are also least liable to the presence of foreign bodies, except such as are cut by glass. These should always be attempted to be healed by the first intention, having previously removed any foreign body (if any be present). They may, however, be complicated with other injuries; thus they may extend into a joint, which is known by the es-

cape of synovia and their position, in which case, if it do not heal by the first intention, the joint swells, violent inflammatory fever supervenes, and, if the patient survive the violence of the attack, an abscess is formed in the joint which often destroys those cavities. In very favorable cases, however, the secretion of pus gradually diminishes, and the joint recovers its function. In treating these cases, it is obvious that we should endeavour to get union by the first intention, and to this end the surgeon should be very careful not to irritate by over officious probing. If, however, inflammation supervene, we must use the most active means already recommended for the subduing of inflammations, viz. repeated bleedings, both general and local, and keeping the patient in a constant state of nausea and depression. If abscess form, its treatment does not differ from common abscesses: we should allow it to burst and offer no violence to it. If anchylosis be threatened, we should try to place the limb in the most favorable posture for use; and if long continued suppuration supervene, which is gradually wearing away the patient's health, we must have recourse to amputation.

Another most serious and common complication of wounds is the occurrence of

1. *Hæmorrhage*, of αιμα, blood, and πεω, to flow. This is always more formidable when occurring from an artery than a vein; for the latter may generally be secured by pressure, unless it be from a very deep and large trunk, in which case it will be necessary to tie it with a ligature of silk. When an artery, however, is wounded, it bleeds with much greater velocity than a vein, as it comes direct from the heart. It may be known by the florid color of the blood. If a wounded artery be small, it will often cease bleeding spontaneously; this happens through the contraction of the wounded artery, and a coagulum forming in the end of it. This then being the natural process of stopping bleedings from small arteries, it is obvious that if the artery be divided only partially or punctured, it cannot contract, and so will continue to bleed; in this case it will be best, if the artery be small, to divide it entirely. This was known to and advised by Ambroise Paré, the father of modern surgery. But, when an artery of larger size be wounded, the force of the circulating fluids prevents its contraction, and, having no valves like the veins, it will bleed from both its upper and lower ends, by its anastomosing branches, enlarging and bringing the blood again into the trunk below the wound. To stop arterial bleeding many remedies are practised. Styptics are of very little service, except for small vessels and from veins; lint should be dipped in saturated solutions of them, and applied to the parts. They are, however, useful after operations in checking the oozing of blood, which might exhaust a patient already enfeebled by loss from larger vessels. But in these cases they are not admissible, where union by the first intention is attempted.

2. *Pressure* is a remedy of great value, especially in wounds of many smaller arteries, which either cannot, or would occupy too much time and space to be tied. In this case we should not fill up the wound as the older surgeons did. But this is executed by applying a bandage, and compresses in such a manner that they mechanically stop the effusion of blood. Formerly surgeons used to fill the cavities of wounds with lint, and then make pressure on the bleeding vessels, by applying a tight roller over the part. The moderns understand too well the utility of not allowing any extraneous substance to intervene between the opposite surfaces of a recent wound, to persist in the above plan, except in a few instances. They know that the sides of the wound may be brought into contact, and that compression may yet be adopted, so as both to restrain particular hemorrhages, and rather promote, than retard, the union of the wound. When the blood does not issue from any particular vessels, but from numerous small ones, compression is preferable to the ligature. The employment of the latter would render it necessary to tie the whole surface of the wound. In order to make effectual compression, in this case, the wound is to have its opposite surfaces brought into contact; compresses are then to be placed over the wound, and a roller is to be applied as tightly as can be done, without hazard of stopping the circulation in the part.

Pressure is also sometimes made on very small openings into larger sized arteries when they run near bones on which they can be compressed. this is often practised in wounds of the humoral artery from bleeding; in which case the wound may heal, but in most instances the artery will be obliterated; but not necessarily so, as Dr. Jones proved. If, however, this plan do not succeed, then we must cut down, expose the artery, and tie both ends.

3. *Ligature* must be used in all cases of wounded large arteries, which cannot be compressed against bone, where there is time to apply them. They must be applied both above and below the wound, and should be of silk, drawn tightly so as to rupture both the inner and middle coats of arteries. This causes inflammation of the vessel, and effusion of lymph, which prevents hæmorrhage when the ligature comes away by ulceration, which happens in from two to fourteen days, depending on the size of the artery. Care should be taken in tying large arteries not to detach them too much from their surrounding connexions. When a ligature has been applied, one end should be cut off close to the vessels, leaving only one portion of extraneous matter in the wound instead of two. Some have recommended a very fine ligature to be used, and cut off close to the vessel, and the wound healed over it; but this is generally found to cause suppuration—sometimes, however, not of large extent or importance.

4. *Actual cautery* was in very common use amongst the ancients. It is very painful and inconvenient; but its chief disadvantage is, that the part to which it is applied must slough, causing a tedious suppurating wound which, on the separation of the slough in the first instance, is liable to bleed again. There are some cases, however, in which even this is serviceable; such as bleeding from the mouth, or parts where the

vessel cannot be got at and tied. In these cases it should be applied through a canula, so as to protect the surrounding parts. It must also be used in extirpating large tumors where the surgeon has not time to tie the vessels on account of their number and size, and the deluge of blood which they are pouring out; such are fungous growths from the dura mater, &c.: or, again, when it is wished that the parts adjacent to the removed part should slough, as in malignant tumors, when it is difficult to extirpate the whole of the disease otherwise.

Further Remarks.—i. When a hæmorrhage takes place from arteries, if left alone, it will continue till the patient faints, in which case, as the heart ceases to propel the blood, no more escapes, whilst the faintness continues; and now a coagulum often forms in the mouth of the divided artery, of sufficient size and firmness to stop the exit of blood when the heart may resume its action, and thus the patient's life is saved. This often happens, on the field of battle, in sabre wounds; for, were it not for this beautiful provision of nature, every one with a wounded artery of any size must perish.

ii. When an artery is torn, and not cut, it is found that the disposition to hæmorrhage is materially diminished; and very often, as in gunshot wounds, even when a main artery of a limb is torn across, there follows scarcely a drop of blood. Mr. C. Bell explains this phenomenon as follows:—He believes that the fluidity of the blood depends upon its contact with the inner coat of arteries; and there are many circumstances which would make this appear probable. In lacerations, then, of arteries, it must happen that the inner coat, being the least elastic of the three, is torn away to greater or less extent, leaving the outer one projecting; the blood then, being in contact with the outer coat, coagulates, and stops the bleeding.

iii. When a hæmorrhage takes place from ulcerated morbid growths, it is sometimes impossible to stop it without removing the tumor; for, if the bleeding vessels be even tied, they will (through partaking of the disease) presently ulcerate, without producing adhesion, and the bleeding returns: if however the tumor be removed, we then come to the artery in its healthy state, and tying can now be safely practised.

Having now considered hæmorrhage, we come to the means by which incised wounds are to be united.

1. The position of the part should be attended to. This is to be regulated on the principle of relaxing the wounded integuments and muscles. If the extensor muscles be injured, the joints which they move ought to be placed in an extended posture; if the flexor muscles be wounded, the limb is to be bent. When the integuments alone are cut, the same posture which relaxes the muscles situated immediately beneath the wound, also serves in general to relax the skin. In transverse wounds of muscular fibres it is astonishing what immense effect the observance of a proper posture produces. This is never to be neglected, whatever may be the other means adopted.

2. Adhesive plaster is generally applied in strips, between every two of which an inter space is recommended to be left for the purpose of allowing discharge to escape. To bring the edges of the wound effectually together, and at the same time to cover as little of the wound as possible, are the objects to which we ought to attend in using adhesive plaster. Hence, when the strips are broad, it is not unfrequent to cut out an oval piece of each strip, just where it crosses the wound.

3. Bandages are often serviceable, besides the mere adhesive plaster; for they support the parts around, and hinder them from gravitating on the wound; and so keeping up a constant tendency to separation of the lips.

4. Sutures. One only is employed by most modern surgeons, viz. the interrupted, which consists of one or more separate stitches, taken with a curved needle and ligature, each stitch being tied, and the ends cut off close. These are only used to assist the adhesive plaster in cases where there is much opposition to the contact of the lips of the wound, and where a bandage will not have the effect. It is generally used where there has been loss of structure. Their employment is always regarded with a jealous eye by modern surgeons, as they naturally irritate the wound, and sometimes seem to produce erysypelas.

Sect. II.—Of Punctured Wounds.

Mr. S. Cooper says punctured wounds are not only dangerous on account of their frequently extending to a considerable depth, and injuring important blood-vessels, nerves, and viscera, they are also dangerous inasmuch as they frequently give rise to very extensive inflammation. It is not uncommon to see formidable collections of matter follow wounds of this description, especially when the instrument with which they have been made, has penetrated any aponeurosis, or fascia. Stabs, and all other punctures, are not simple divisions of the fibres of the body, they are attended with more or less contusion and laceration. Hence there is not the same readiness to unite, which we observe in wounds made with sharp cutting instruments; and, when ligamentous expansions are among the objects of injury, both the structure of the wounded parts, and the nature of the wound itself, often produce a train of severe local and constitutional symptoms. When an artery of consequence is punctured, the hæmorrhage must be suppressed either by exposing the vessel and tying it, or by applying graduated compresses and a bandage. Punctured wounds are frequently very difficult and tardy of cure, on account of their being attended with the formation of deeply-seated abscesses and sinuses. The narrowness of their orifices also renders the extraction of any extraneous bodies by no means easy of accomplishment.

Treatment.—It has been recommended by many writers, who erroneously confounded these recent wounds with true fistula, to lay them open, pass setons through them, and irritate them by stimulant applications; but this treatment is quite contrary to the true practice, when we consider the inflammation is almost

sure to follow, without any additional irritation, which then can only do mischief. In our treatment then, in the first stage of a punctured wound, the indication is to guard against the attack of violent inflammation. When no considerable quantity of blood has been lost, general and topical bleeding should be practised. In short, the antiphlogistic plan is to be followed. As no man can pronounce whether such wounds will unite or not, and as no harm can result from the attempt, the orifice ought to be closed with strips of adhesive plaster, and gentle compression applied along the whole course of the puncture. Perfect quietude is to be observed. When the pain is very severe, opium is to be administered. Sometimes, under this treatment, the surgeon is agreeably surprised to find the consequent inflammation mild, and the wound speedily united by the first intention. More frequently however, in cases of deep stabs, the pain is intolerable; and the inflammatory symptoms run so high as to leave no hope of avoiding suppuration. In this condition an emollient poultice is the best local application: and, when the matter is formed, the treatment must conform to the principles already noticed in the chapter on suppuration.

Sect. III.—Lacerated and Contused Wounds.

Lacerated wounds are those in which the fibres, instead of being divided by a cutting instrument, have been torn asunder by some violence, capable of overcoming their force of adhesion. The edges of such wounds, instead of being straight and regular, are jagged and unequal. The term *contused* is applied to those wounds which are occasioned by some blunt instrument, or surface, which has violently struck a part of the body. These two species of wounds greatly resemble each other, and, as they require nearly the same kind of treatment, writers usually treat of them together.

Both these sorts of wounds are much more perilous than incised ones. Wounds made with sharp instruments are frequently attended with vast retraction of the divided parts, and profuse hæmorrhage; but it is known, at the same time, that they are generally capable of being united by the first intention. It is almost a constant effect of lacerated and contused wounds to pour forth very little blood, even when important blood-vessels have been injured. Whole limbs have been torn from the body without the occurrence of bleeding. The experienced practitioner is not deceived by the absence of this symptom; for he knows that, in proportion as the bleeding from large contused and lacerated wounds is trivial, the violence applied to the injured parts has been great. The pain is generally in an inverse ratio to the extent of mischief done.

Treatment.—In a lacerated wound, not caused by gunshot, we cannot expect that total adhesion by the first intention will take place, but rather inflammation and suppuration, notwithstanding which we should approximate the edges by sutures or plasters, and let it take its chance, treating it afterwards as its appearance may indicate. But in contused wounds, as gunshot, we know that the surrounding parts have received so much injury that they must of necessity slough to a greater or less extent. In treating them, we should first remove any extraneous body, if this can be accomplished without much force; then endeavour to abate the inflammation around, which will necessarily arise; for this, we may bleed locally or generally, as the symptoms demand. The best application to the part is a poultice, till the sloughs come away, after which the simplest dressings possible. It is seldom, if ever, good practice to dilate openings caused by bullets; nor should we use violence in attempting to extract them. When they have wounded a large artery, we must then cut open and tie it. But in severe lacerations, when it is obvious we cannot save the limb, from the amount of injury done, we must amputate as soon as possible. In many gunshot wounds also this is necessary; and baron Larrey enumerates several cases in which it should be performed at the time of the injury without delay, in which he has been borne out by Mr. Guthrie in his excellent treatise on Gunshot Wounds. They are, 1. A limb carried away by cannon-shot, leaving an irregular stump. 2. A limb shattered by the same cause, which will else be succeeded by gangrene. 3. A ball carrying away soft parts containing the main artery of the limb without fracturing the bone. 4. Soft parts with the principal nerve. 5. Extensive fracture and injury to soft parts without lesion of skin. This is generally caused by a ball striking the part very obliquely, which was formerly considered the wind of a ball, or else by a spent ball. 6. Fractures of articulating ends of bones by balls or lodgment in joints. 7. When a bone is extensively denuded without fracture. 8. A large wound of a ganglymoid joint with effusion of blood into it. 9. Fractures of the thigh from gunshot wounds.

Sect. IV.—Gunshot Wounds demanding Amputation consecutively.

1. Spreading mortification. 2. Convulsions of wounded limbs threatening tetanus. 3. Bad state of discharge, with hectic fever happening in fractures from shot.

Wounds of the abdomen.—If large, these admit of protrusion of viscera, which must be returned either without, or by means, of dilatation of the external wound When small, it becomes a matter of doubt whether the wound has penetrated, this must be ascertained by the finger. When a man is stabbed, or shot in the belly, the surgeon can seldom do any good by being very officious; and the wisest conduct that he can in general adopt is to keep his patient as quiet as possible, have recourse to bleeding, prescribe anodynes, and the lowest fluid diet, and content himself with applying superficial dressings. In the event of severe pain and swellings of the belly coming on, leeches, fomentations, and emollient poultices will be necessary, and nothing will now avail except the most rigorous antiphlogistic means.

Wounds of the chest are always dangerous, but may be considered less so when the pleura is penetrated alone without containing any fo

reign body injurious to the lungs, or hæmorrhage into the cavity of the thorax. When a wound is known to have entered the pleura, and there is no symptom leading to a suspicion that the lungs, or any large vessel, is wounded, the injury is to be dressed according to common principles, and the more superficially the better. Authors also usually direct us, just before we close the opening, to tell the patient to make a deep inspiration, for the purpose of expelling as much of the air as possible, which may have got into the cavity of the pleura. At the end of such inspiration the edges of the wound in the skin are to be brought together, and kept so with sticking plaster compresses, and a roller applied round the body. The other grand indications in the treatment are to avert inflammation of the pleura and lungs, by a rigorous adoption of the antiphlogistic plan, copious bleeding, in particular, not being forgotten.

Wounds of intercostal arteries are manifest by the hæmorrhage, where the external wound is ample, or may be ascertained by putting the finger on what we suspect to be the artery, and seeing if that commands the bleeding; but, when the wound is small, the artery bleeds into the cavity of the thorax, and cannot yet be known. When it can be ascertained, most modern surgeons (condemning the old practice of putting compresses into the thorax) simply recommend cutting across the artery, and closing the external wound.

Emphysema.—This is a term applied to a swelling arising from a diffusion of air among the cells of the cellular substance. This symptom may occur in wounds which just enter the cavity of the chest; in others that extend more deeply, so as to wound the lungs; and also in cases in which these organs are wounded by the spiculæ of a broken rib, or clavicle, while there is no outward wound whatever. I believe emphysema is never very extensive, unless the air vesicles of the lungs are injured, and there is no outer wound, through which the air can freely make its escape. Hence we find that emphysema is a more common consequence of fractured ribs, and narrow stabs, than of large penetrating wounds; because, in the latter cases, the air readily passes outward through the opening.

When the chest becomes expanded in the act of inspiration, some of the air, which enters through the trachea into the wounded lung, instead of distending this organ, now passes through the breach in it, so as to get into the space between the pleura pulmonalis and pleura costalis. Dr. Halliday has very accurately remarked that, in the living body, the whole of the inspired air will not be thus effused; but that, as it must pass through the lung, it will at first distend it, more or less, according to the size of the opening in the pleura pulmonalis. This partial dilatation of the wounded lung will always happen while air continues to be inspired on that side.

When the thorax is next diminished in the act of expiration, the effused air is compressed against the wounded lung; but none of it can enter this viscus again, because the whole of the air contained in the lung must be forced out, and the effused air makes equal pressure on every part of the organ, as this becomes collapsed, so that it cannot separate any particular part, and make a passage for itself towards the trachea. In this manner fresh air accumulates in the space between the pleura at every inspiration, while none can escape during expiration. This case may produce suffocation from the pressure of the collected air on the diaphragm, mediastinum, and opposite lung. However as emphysema commonly follows narrow stabs, or fractures of the ribs, attended with injury of the lungs, the pleura costalis and intercostal muscles are at the same time wounded or lacerated, so that part of the air also usually gets through the above wounded membrane and muscles, into the cellular substance on the outside of the chest, and thence is sometimes diffused through the same substance, over the whole body, so as sometimes to inflate it in an extraordinary degree. The inflation of the cellular substance has been considered the most dangerous part of the disease; but Mr. Hewson very ably shows that this is a very erroneous supposition.

From what has been stated, it is evident that, in cases of emphysema, the danger does not depend so much on the degree of external swelling, as on the degre of compression produced on the mediastinum, diaphragm, and the lung of the opposite side.

Treatment.—When there is no wound of the lungs, and not as yet much air confined in the pleura, the wound had better be closed with adhesive plaster at the end of a powerful expiration. But, if the emphysema increases, we must then conclude that the lungs are wounded, and allow the air to pass and repass through the wound till the lung can heal; but, if the wound be too small, it must, if conveniently situated, be enlarged, or else another opening must be made in the chest; if on the right side, between the fifth and sixth; if on the left, between the seventh and eighth, to avoid the pericardium, and at the upper margin of the ribs, to avoid the artery. The use of making this opening is to cause the wounded lung to collapse, and so, not being used, no more air escapes from it, and the wound has time to heal, which it generally does in five or six days, and the remaining air is absorbed. Bandages round the chest are, generally speaking, improper. When the emphysema is large, it is always proper to give an outlet to the air, by making small punctures in various situations, and promoting its exit by frictions. Indeed the surgeon is always to be content with this practice, unless the symptoms of compression on the diaphragm and opposite lung, and the approach of suffocation, denote that the air cannot get out of the cavity of the pleura so quickly as it finds its way into it; in which case a small but direct opening is to be made into that side of the chest on which the wound is situated.

Extravasation in the thorax.—This is liable to happen in all cases in which the lungs, the intercostal, or internal mammary arteries are wounded. The symptoms of blood thus effused are, great oppression of the breathing; inability to stand or sit up, owing to the weight of the fluid on the diaphragm; the most easy posture is on

the affected side; but the patient cannot lie on the opposite side without great aggravation of his oppressed breathing; the respiration is short, frequent, and interrupted; the countenance is particularly pale. Together with these symptoms, which are indeed very inconclusive, the extremities become cold; a clammy perspiration takes place; and, if the lungs are wounded, frothy blood is spit from the mouth, and air often escapes from the wound. It is to be regretted that these symptoms are very fallacious.

Treatment consists in evacuating the blood. Several things which promote this end have been practised. 1. Placing the patient in such a posture is as favorable to the exit of blood from the wound. 2. Drawing the blood out by a syringe. 3. Enlarging the wound. 4. Making use of injections. 5. Making an opening at a depending part of the chest.

1. We can only expect to afford relief, by mere posture, when the wound is large, and direct in its course, and the blood is in a fluid state.

2. Syringes, to exhaust the blood out of the chest, are seldom necessary; when the blood is fluid it will escape spontaneously, on a depending opening being made; and; when coagulated, it cannot be drawn out by a syringe.

3. The wound should only be enlarged when its situation is favorable for the escape of blood.

4. When the blood is coagulated, the injection of warm water is extremely proper. It should not be done with too much force; and it may be repeated every day, till the fluid returns untinged with red globules, and quite free from coagula.

5. When the wound is narrow, and situated either at a fleshy part of the chest, or at its upper part, a counter opening should be made in a depending situation.

Poisoned wounds.—The most frequent are those caused by animals or insects, such as the bee, wasp, hornet, &c., in this country. These often cause a great deal of heat, redness, swelling, and pain near the wound. The best cure, if too late to evacuate the poison by sucking, is by applying vinegar, lemon juice, Goulard's lotion, cold water, hartshorn, or oil; if stung in many places, bleed, and keep the antiphlogistic regimen.

Bite of the viper.—The bad symptoms usually commence in about twelve or fifteen hours. An acute pain and a burning heat are experienced in the part affected, which begins to swell. The tumefaction, tension, heat, and pain, gradually spread over the whole limb, and in some cases the whole body is said to be swollen. Dejection of spirits, smallness and weakness of the pulse, headache, nausea, and vomiting ensue. A fixed pain is felt in the region of the heart, and all the surface of the body assumes a yellow tinge. The urine seems as if it were impregnated with bile. Cold perspirations and convulsions take place, and death sometimes finishes the tragedy.

Treatment.—Prevention of the spreading or absorption of the poison is the only plan from which the surgeon can ensure safety; for this various plans have been proposed, the most efficacious of which certainly is the removal of the bitten part by excision, taking care not to leave any of the bite; or by the actual cautery. Oil has been recommended by some, which must act by insinuating itself between the poison and the wound. Also cantharides, which may act by washing away the poison in the profuse discharge. Lately, however, it has been proposed to apply a cupping glass over the wound, which has a constant tendency to draw out the poison, and this has appeared to answer very well.

Constitutional treatment.—Emetics have been very much extolled by Dr. Mead, for the relief which they afford, in bringing to a conclusion the nausea and sickness arising from the bite.

But the testimony of almost all writers decides in favor of medicines which possess the faculty of allaying irritability and promoting perspiration. The volatile alkali has obtained the greatest celebrity. Ten drops of the aq. ammon. pur. may be given every hour. Opium, musk, and camphor, are other medicines, to which one may advantageously resort.

Tetanus (from τεινω, tendo; τετανος, distended) demands notice in this place, from being commonly induced by wounds, particularly lacerated ones. This is commonly called traumatic (τραυμα, a wound) to distinguish it from the idiopatic form, which does not fall under the dominion of the surgeon.

Symptoms.—A stiffness is first experienced about the back of the neck.—The muscles of the lower jaw next become hard, and incessantly contracted, so that some difficulty is experienced in moving the part. At length the patient cannot open his mouth at all. The muscles concerned in deglutition are oftentimes the next affected, and the difficulty of swallowing makes the complaint bear some resemblance to hydrophobia. All the muscles of the neck, back, and indeed of the whole body, become successively affected with the most rigid spasm. The limbs are stiff and immoveable, and, the muscles of respiration being prevented from performing their office, the patient dies. The fingers often retain their motion till the last, as does the tongue, which is sometimes thrust out of the mouth, and dreadfully lacerated by the teeth. This disease is seldom accompanied by fever, and the patient retains the vigor of his mind till nearly the last. The occurrence of this formidable disease is more common in hot than in temperate climates. The causes of tetanus remain yet unknown; and though, in some instances, inflammation of nerves or the spinal marrow have been found; yet in so many others have they been wanting that we cannot assign these as the true, though they might have been the accidental causes.

Treatment.—On this head, also, surgery must deplore its ignorance, no remedy having been yet discovered. Tobacco and opium have been used in alarming quantities without the slightest relief; mercury, bark, camphor, and musk, have proved equally inefficient; even amputating the wounded limb has been practised with no better result. In some cases, indeed, performed by baron Larrey, the symptoms were checked, but always returned and proved fatal. There is one remedy, however, which has proved useful as a mitigatory in several late cases, which is dashing cold water over the body, but this by frequent repetition becomes of no effect.

Sect. V.—Contusions

Are the consequence of forceable contact of blunt substances with the body, which cause a great deal of injury to the parts underneath, without a breach of continuity on the surface.

The consequences of such violence are a diminution of the tone of the injured fibres and a rupture of an infinite number of small vessels. The bruised muscles are weakened, and cannot be exerted without pain; and the extravasation of blood causes swelling and discoloration of the skin. Sometimes vessels of considerable size are ruptured by the force, and very copious accumulations of effused blood are the result. In contusions of the head we often see the scalp enormously elevated by hemorrhage beneath it, and large collections of blood are frequently found extravasated in the cellular substance of almost any situation in the body.

The mischievous effects of a contusion are not always proportioned to the force applied; they often depend on the nature of the injured part. If the bruise take place on a bone which is thinly covered with soft parts, the latter always suffer very severely in consequence of being wounded, at the time of the accident, between two hard bodies. Hence bruises of the skin so frequently cause sloughing and troublesome sores.

Treatment.—We must endeavour to abate the inflammation by leeches, or, if it be violent, by general bleeding and cold lotions applied to the part: these last should have some stimulating power to promote the absorption of the effused blood. When muscles are bruised they should be kept quiet and in a relaxed position. When the tenderness has quite abated, but a swelling and discoloration are left, we may apply friction with the camphor or other liniments, and make pressure by bandages. Sometimes, however, there remains a tumor containing congealed blood, which may be known by its peculiar fluctuation, and which will often not be reabsorbed in spite of all our endeavours. This had better be laid quite open with a bistoury and the blood turned out, and so healed up by granulation. This is particularly to be done when an imperfect suppuration takes place in the tumor, forming a bloody pus, which irritates the constitution wonderfully.

Chap. III.—Of Fractures.

Fractures are solutions of continuity in the bony structures, and always the consequence of violence done to the limb; but this need not have been inflicted at the exact spot where the fracture exists, but very frequently (as in the cylindrical bones) at the end of the limb, in which case the weakest part of the bone gives way, which accounts for the frequent occurrence of fracture near the middle of long bones. The flat bones are far less often fractured than the long ones, with the exception of the skull, which, as it produces peculiar symptoms from its affecting the brain, will be noticed particularly hereafter. It is not however to the middle that fractures of the long bones are confined; for their extremities are often found so to suffer, which is always to be regarded as more unfavorable. There are two ways in which a long bone may be broken; viz. transversely or obliquely. It is more particularly in this last case that the surgeon finds great difficulty in keeping the ends of the bone in opposition, as in all fractures there is a spasmodic action of the muscles, to a greater or less extent, which draws the lower end of the bone over the upper.

A fracture may or may not be complicated with an external communicating wound; if which be present it is called a compound fracture, otherwise it is said to be simple.

Sect. I.—Of Simple Fractures.

The symptoms are pain, inability to move the part, with swelling after a longer or shorter period. Crepitus on handling, with an indefinite shortening of the limb (if it be one), together with a deficiency of the bone when the surgeon traces it with his fingers. But where a limb has two bones there will be no shortening if only one has suffered; for the other will act as a splint. In these cases we must trust to the other symptoms, of which the most unequivocal is the crepitus. It often happens that there is deformity of the limb produced, in which case we need no other mark.

Treatment consists in bringing into and keeping the ends of the bone in perfect opposition and quietude; for which purpose Mr. Pott has insisted strongly on the necessity of putting the limb into such a posture that the muscles, which are inserted into the broken end or limb below it, may be relaxed; upon this principle, that when such a severe injury as fracture of bone takes place, the soft parts around are necessarily more or less injured by the ends of the bone, which it is, in fact, that causes the pain. The muscles then, either from being included in the injury, or from sympathy of the nerves which move them, are thrown into a state of spasmodic action, which, in some cases, will last for a long period, constantly shortening the limb, and thus drawing one end of the bone over the other. The position by which this indication can be best answered is one between flexion and extension in most cases. The rest of the local treatment consists in keeping the bones in opposition by means of splints and bandages, interposing a thin soft cushion between the splint and limb, which last had better be supported by a many tailed bandage. If there be much swelling and pain leeches may be applied previously, and the limb may be kept wet with cold lotion even after it is put up in splints. In this manner the limb wil unite; if an upper one in about a month, a lower one six weeks, but this may be influenced by circumstances.

Manner of union.—This is effected by a deposit of bony matter called callus, which surrounds the ends of the bones and confines one to the other, and which is formed thus. Mr. Brodie, and afterwards Mr. Mayo, found, on breaking the bones of chickens and rabbits, that in a few days after the injury there was a deposit of coagulable lymph round the broken ends, which after some lapse of time began to contain specks of ossific matter, which gradually shot into each other, and at last became quite bony, enclosing the fractured ends, so that no union is

accomplished till nearly the end of the time, the gradual preparation consuming by far the greatest portion. In recent union, then, the bone is surrounded by an irregular substance, which is gradually absorbed upon using the limb; so that ultimately no such great projection is found. This explanation will account for the union of fractures when put up after a lapse of some weeks after the accident.

Some fractures however do not unite at all, and others not by bone, and in general it is in consequence of insufficient vascularity in the neighbouring textures; of this nature are fractures completely within joints. When those in limbs not in joints do not unite, they will, if left to themselves, form a false joint capable of much motion, which entirely takes away the use of such limb from want of muscles to fix it. When this is the case, or is threatened, we should endeavour to bring on irritation by rubbing the ends of the bones against one another. Besides this several other means have been employed. Mr. C. White recommended, when there is a complete joint formed, cutting down to it and sawing off the ends of the bones, which he practised in several instances and with considerable success; but it has often failed, and in some cases proved fatal. In December, 1802, a new method was proposed by Dr. Physic of Philadelphia, which was the passing of a seton through the limb and between the ends of the bone, and practised by him there and tried since by several eminent surgeons here. It succeeded in many cases, but has failed in nearly as many, which induced Mr. Aymesbury, very lately, to propose a new plan; which was that of keeping the ends of the bone constantly pressed against each other by an immoveable apparatus. This has raised considerable expectations, which, as yet, do not seem likely to be disappointed. Sometimes, however, the causes of non union are old age or motion in the fractured limb. In the former case we must allow it to remain a longer time in splints; in the latter our remedy is obvious. Our limits will not admit our entering fully into each particular fracture, but we shall briefly notice a few of the most importance, or which differ in treatment from the general rules.

The *lower jaw* is very difficult to retain in opposition, as the fore portion always sinks from the posterior; for all the muscles of the former running to the os hyoides tend to depress it, whilst the temporalis and masseter elevate the latter. It has been recommended to keep it in position by twisting wire round the molar teeth across the fracture. This keeps the ends from riding, but does not hinder the dropping of one portion. To remedy which we should put a piece of stiff pasteboard under the jaw, and bind the jaws together by a bandage from the head, coming under the chin. The patient must be content to live on liquids, which must be introduced into the mouth through any deficiency of the teeth if there be one, or else the mouth need not be quite closed, but wedged tightly a little way open.

The *vertebræ*, when fractured, cause paralysis of every part whose nerves come off lower than the injury. Respiration is often carried on entirely by the phrenic nerve: they are always fatal at a sooner or later period. When the spine suffers violent concussion it produces symptoms like those of fracture, in a less degree, but by antiphlogistic treatment these generally do well.

Ribs.—These generally happen near the greatest convexity of the bones, several of which are often broken together. The first rib being protected by the clavicle, and the lower ribs being very flexible, are less liable to be fractured than the middle ones. See *Emphysema.*

When a spicula of a fractured rib is beaten inward it may lacerate the pleura, wound the lungs, and cause the dangerous train of symptoms attendant on emphysema.

As a broken rib cannot suffer displacement on account of its anatomical relations, it is often difficult, particularly in fat people, to ascertain it. This may be assisted by making the patient cough, when the crepitus will be more liable to be felt, and he will complain of a pricking sensation; but when there still remains much doubt most surgeons prefer treating it as if fractured.

Treatment consists in preventing any movement of the ribs, and guarding against the occurrence of peripneumony, which is indeed very likely to supervene. The first may be accomplished by rolling the ribs tightly with a flannel bandage, or sewing a piece of linen round the chest; for the latter the strict antiphlogistic means must be used.

Ossa innominata frequently prove fatal from the quantity of injury done to the pelvic viscera. The treatment consists in applying a laced belt round the pelvis, and obviating the effects of inflammation.

Neck of the femur may occur in three places. 1. In the middle of the cervix, or close to the head, always transverse. 2. At the junction with the trochanter major, extending externally; in which case the upper part is sometimes wedged in the lower, as was found by Dessault. 3. Fracture of the trochanter beyond the joint.

Within the ligament.—The symptoms are sometimes very obscure; but Sir Astley Cooper says, 'Under this accident the leg is from one to two inches shorter than the other; the foot and knee are everted. There is little pain when at rest in the recumbent posture. But on rotation a pain is felt, from the rough end of the bone grating against the synovial membranes lining the capsular ligament. The thigh may be perfectly extended, but flexion is more difficult and attended with pain; this is increased if the thigh be directed towards the pubes, and lessened if carried outwards. A crepitus is also discoverable when the limb is drawn down, so as to be of the same length as the opposite one, and then rotated, but not so when the patient is lying on his back with the limb shortened.'

This fracture generally occurs in people of from fifty to eighty years old, and not in young persons; so that a very slight violence is often sufficient to produce the accident.

Treatment.—If there be any doubt it is best to give the patient the chance, and treat it as common fracture. But if this do not succeed then adopt Sir Astley Cooper's method:—

Finding the patient's health suffer from the necessary confinement, what I now direct to be done is that a pillow be placed under the limb, throughout the whole length, and another be put under the knee, and the limb be in this way extended for ten days or a fortnight, until the inflammation has subsided. Then let the patient get out of bed, and sit on a high chair, to prevent being too much bent, afterwards walk with crutches, bearing gently at first on the foot, then increase the pressure more and more, until the ligament becomes thickened and the power of the muscles increased. Next let him use a shoe with a high heel, which would very much diminish his lameness.

The patient treated in this way walks after a day or two with a crutch, then with a stick, and in a few months requires no additional support. This is a fracture which is thought by most never to unite by bone.

Fractures external to the capsule generally occur in younger persons; in these the leg is only from half to three quarters of an inch shorter. The foot and toe are everted, much pain is felt at the hip, and on the inner and upper part of the thigh, and the usual rotundity of the joint is lost; crepitus is easily produced by a slight motion of the limb, and it is not necessary in this accident to draw the leg down to feel the crepitus, as the retraction is not so great as in the former accident. There is also usually great extravasation into the surrounding parts, and this swelling is quickly followed by a great tenderness to the touch; also violent pain is produced upon slight motion of the joint, followed by a high degree of constitutional irritation; and many months elapse before the patient recovers a proper use of the limb. The accident is usually the result of very severe injury.

Treatment consists in pressing the ends of the bone together and extending the limb. The first may be performed by applying a broad leather strap round the pelvis, including the trochanter major; the latter by placing the limb on a double inclined plane.

Fractures through the trochanter major are generally oblique, and may happen without injury to the neck.

These fractures occur at any period of life, and are marked by the following symptoms:—The limb is very little and sometimes not at all shortened; there is a numbness in the foot; the patient cannot turn in bed without assistance, and the attempt is productive of great pain. The trochanter is sometimes drawn forwards towards the ilium, sometimes it falls towards the tuberosity of the ischium, but is generally widely separated from that portion of bone remaining in connexion with the neck. The foot is greatly everted, and the patient cannot sit, as any attempt to do so produces very great pain. You can feel a crepitus with great difficulty, if the detached portion of the trochanter be either much fallen or much drawn forwards.

That for *treatment* is the same as the last fracture.

Fractures into joints cause great swelling and inflammation, and, if not properly attended to, often produce anchylosis.

Treatment consists in abating the inflammation at first, then applying a pasteboard splint; but after four or five weeks we should commence a gradual motion of the joint to prevent anchylosis.

Patella is very often caused by violent spasm of the extensor muscles; as when a person endeavours to prevent his falling after tripping. In treating them we must relax the muscles attached to it, by extending the limb on a plane inclined upwards, and bending the body on the thigh; then bring the bones together by bandages or straps.

Clavicle is generally treated by placing a pad under the axilla, and then applying one bandage round the shoulders and armpits, behind the back in the form of the figure 8, and another supporting the arm from the front, going from the bent elbow to the opposite shoulder.

Sect. II.—Of Compound Fractures.

These differ from simple in having an external wound communicating with the fracture, which makes a great difference in symptoms, treatment, and process of healing. If the wound be not very large, and be caused by the ends of the bone, or any sharp instrument, we should merely put a piece of lint over, and it will most likely heal, thus at once converting it into a case of simple fracture.

But there are other complications which render the management truly critical, and call forth all the powers and skill of the surgeon, and in nothing more so than the important question of when it is necessary at once to deprive the patient of his limb; or when the surgeon, having duly considered and weighed all his reasons for and against it, determines to try and save it, at the greater hazard of his patient's life: but, before considering this, it will be better to explain the mode of union and symptoms of compound fractures.

When the wound of a compound fracture does not unite, then a suppuration must come on, attended with more or less disturbance of the constitution; then, if the patient have been of robust health and no bad symptoms intervene, the discharge of pus is gradually abated; granulations arise from the surface of the abscess, which surround the bone; these are gradually converted into cartilage, in which ossific deposits take place; and thus the bones are united, the granulations fill up the external wound, and the patient recovers. But if the accident be severe, and the patient's health not able to bear the shock, the wound inflames, puts on an erysypelatous appearance, matter burrows amongst the muscles, forming considerable lodgments, attended by hectic fever in its worst form, the discharge is profuse and fetid, and, the powers of the patient being unable to sustain all this, he sinks and dies. Or the case may be still worse; for gangrene may seize the affected limb, in which case amputation is his only chance of escape.

Cases in which amputation is necessary. These are not so easily reduced to rule now as formerly, when the surgeons enumerated a list of cases in which this operation was to be performed at once.

But, if any cases seem to demand it more than

others, it must be when the injury to the soft parts is extensive, or when a large joint is lacerated and fractured. Formerly it was held as a maxim that when a large artery was wounded, with a compound fracture, the limb must mortify. But Sir A. Cooper recommends tying the artery at the wound if possible, or, if not, taking it up higher in the limb, and giving the patient his chance of recovery, which he has seen take place in several instances. In old people, who cannot sustain a suppuratory process, it is fit to amputate. As to amputating the limb afterwards, we must be guided by our own judgment, and, if we find the patient sinking, perform the operation.

Treatment of compound fracture.—Our first step must be to reduce the bones, which are often found protruding. If we cannot do this without a great deal of violence, we had better enlarge the external wound. If, however, the fracture be very oblique, sawing off the ends is preferable. If there are many splinters of bone they must be removed. Sometimes, in spite of all the surgeon can do, there are violent spasms of the muscles, in which case we must amputate. The rest of the treatment consists in keeping the parts immoveable by an eighteen tailed bandage, and splints or fracture boxes, dressing the wound lightly, and treating the constitutional symptoms as they arise; but above all endeavouring to heal the wound.

Sect. III.—Of Dislocations.

These consist of a separation of the articulating surfaces of bone from one another, and may be divided, like fractures, into simple, when there is no communicating wound; and compound, when such complication is present. They may also be combined with fracture, as at the ancle, where the fibula is mostly broken. A dislocation is said to be partial when it is not entirely separated from its articulation. These injuries are commonly the result of violence, but may arise independent of direct force, as in ulceration of the cartilages of the hip joint, where the head of the femur is drawn by the muscles into the dorsum of the ilium; or, in dislocation of the patella, from too much distension of the knee joint by synovia.

Symptoms are an alteration in the length of the limb, as also in its axis. It becomes unnaturally fixed, capable of being only slightly moved by another person, painful and swelled, the appearance of the joint much altered from that of its fellow. There is also sometimes a crackling to be felt on motion, that may be mistaken for the crepitus of fracture; but the former is caused merely by the escape of synovia into the surrounding cellular membrane, becoming thicker by absorption. It is obvious that in dislocations, the neighbouring parts must suffer considerable injury by the pressure of the head of the bone; and it is remarkable that, if a limb or joint be left unreduced, a condensation of the parts around happens, and a new synovial membrane is formed, whilst a cavity is at the same time prepared to receive the dislocated end by the bone on which it rests.

Treatment should be to reduce the dislocation to its natural position, which in most cases is to be performed by making extension of the dislocated limb, having previously either fixed the limb above, or else making counter-extension at the same time. This may be undertaken by manual aid in recent cases; but, when long-continued force is required, it will be better to use pullies as counter-extensors. The obstacles to reduction are—

1. The muscular power of the patient, constantly, though involuntarily exerted in opposition to the surgeon. These, then, it should be our fixed endeavour to relax, by attending to the position of the limb, and if that fail, by bleeding and nauseating the patient; for now, when the strength is exhausted, the muscles can be readily overcome by constant but gradual extension. This was the great doctrine laid down by Mr. Pott, which, before his time, was not sufficiently attended to.

2. Difficulties in reduction, likewise arise from the head of the bone catching against the articulating cavity. As in the dislocation of the thigh bone into the foramen ovale, and ischiatic notch, where it is necessary to raise the head before it can be returned; or where the head of the bone is larger than its cervix, as in dislocations of the radius.

3. The peculiar ligaments of the joints sometimes prevent the reduction of dislocations. This is particularly to be noticed in the knee, where the bone should be moved in such a direction as to relieve that ligament which remains entire. The ligaments of the ancle joint are of extraordinary strength, and the bones of this joint will often rather break than their ligaments give way.

4. Length of time elapsed is another impediment; for, after a lapse of time, the bone is retained in its new position by adhesion.

After we have succeeded in reducing dislocations, we must keep the limb bandaged, perfectly immoveable, and subdue the inflammation of the joint, which will in all probability supervene. Then, after a short period allow the patient to exercise his limb by degrees.

Compound dislocations.—Having previously noticed that any wound of a joint was dangerous, it would be almost fruitless to expatiate on the increased risk when a joint is not only wounded, but forcibly torn open or lacerated with displacement of the articulating ends. In such cases, then, all the nice discernment of the surgeon is again (as in compound fracture) called into activity. The degree of violence and laceration done to the soft parts, the great or little chance of healing the wound by the first intention, and the youth or advanced age of the patient, are circumstances which ought to influence the judgment in this difficult part of surgery. In the country, also, many cases would recover, which in town would not do so, without amputation.

Treatment consists in reducing the dislocated bones with as little violence as possible; and if one end is found projecting, and cannot be managed without force, it is better to saw it off than offer such violence to the already ruptured ligaments as its reduction must occasion. The rest of the treatment to be adopted is the keeping the parts perfectly motionless, so giving the torn li-

gament, an opportunity of healing, and endeavouring as soon as possible to close the external wound. The symptoms of inflammation must then be treated as they arise; and, if suppuration take place, we must follow the rules already laid down.

Particular dislocations are of the lower jaw, and may be caused by violent gaping or yawning, particularly by a blow on the chin while in the latter act.

Symptoms.—When the jaw is completely dislocated, both its condyles are advanced into the space between the surface of the temporal bone and zygomatic arch. The jaw is known to be completely dislocated, by the mouth being opened, and the patient not being able to shut it by any pressure which you may make on the chin. The lower teeth will be found in a line anterior to the upper. You may depress the jaw a little, but to a very inconsiderable extent. The appearance is just that of a person when yawning. The pain, though severe, is not attended with danger. The saliva is very much increased in quantity, in consequence of the irritation of the parotid glands, and it dribbles over the mouth; or the dislocation may be only of one side, in which case the symptoms will be present only on that side, giving the jaw a ludicrous twisted appearance.

Treatment.—They are generally reduced by wrapping a handkerchief around the thumbs; placing them on the coronoid processes, and depressing the jaw, you force it backwards as well as downwards, and the bone suddenly slips into its place. But if it be of longer duration we should place two corks behind the molar teeth, and then, keeping these for fulcra, elevate the jaw.

Clavicle.—Sternal end. This may be dislocated in two ways, forward and backward. The latter is very uncommon, and generally the result of distorted spine, consequently nearly irremediable. The former, however, is more common, and may be readily distinguished by the swelling over the sternum and sensation to the fingers.

Treatment.—We need only apply the figure of 8 bandage, without supporting the arm.

Clavicular end.—This dislocation may be detected by putting the finger on the spine of the scapula, and tracing it forwards towards the acromion, where the finger will be stopped by the projecting portion of the clavicle. The shoulder will be depressed and drawn inwards towards the sternum, and from the projection of the clavicle it will appear flattened, something like the dislocation into the axilla.

Treatment.—Let the knee be put between the patient's shoulders, and draw them backwards and upwards, and the clavicle immediately is brought into its place; then put a thick cushion into each axilla, to keep the scapula from the side, to raise it, and to prevent the axilla from being injured by the bandages. Then the clavicle bandage is to be applied, and its straps should be broad enough to press upon the clavicle and scapula. The arm should be supported in a short sling, so as to keep the scapula well up.

The *humerus* may be dislocated in four directions. 1. Downwards, into the axilla, resting on the inner edge of the inferior costa of the scapula. In which case there is a projection of the acromion, natural rotundity of the shoulder lost by a flattening of the deltoid muscle, which is dragged with the head of the bone; downwards the elbow is always projected from the side and semiflexed.

Treatment.—Fix the scapula well by one bandage, or long towel, held by assistants, passing above the acromion down to the opposite side, and another passing under the scapula up to the opposite side; then, raising the arm to a right angle, make gradual extension, by fastening a towel round it by what is called a clove hitch, and which will not slip; making, at the same time, a slight rotatory motion which relaxes the muscles. When the extension has been made sufficiently long, the surgeon may elevate the head of the bone by any handy means, and it will slip into its natural cavity. The shoulder should then be bandaged by a figure of 8, and the arm confined to the body. If a surgeon have no assistant at hand he may make the patient lie down and extend the arm, fixing his heel in the axilla, for the counter-extension; and this often succeeds in recent cases.

2. Forwards under the pectoral muscle and upon the second rib, when the projection of the acromion is very great. Depression of the deltoid more considerable. There is more pain; and the prominence of the head of the bone may be felt and seen beneath the clavicle. The elbow is thrown from the side and backwards.

Treatment.—The extension must first be made obliquely downwards and backwards, until the head of the bone has passed the coracoid process; then it may be raised in an horizontal direction, and, by the pressure of the heel in the axilla, the bone will be easily returned.

3. Backwards on the dorsum of the scapula, just beneath the spine. This may be known by the projection of the head of the bone. The reduction is the same as for that in the axilla; but the head should be rotated inwards.

A *partial dislocation* is a very frequent accident. In this dislocation, the head of the bone is thrown forwards against the coracoid process; there is a hollow at the back part of the shoulder joint; the axis of the arm is thrown inwards and forwards; the under motions of the arm are still performed, but it cannot be raised, from its striking against the coracoid process. The head of the bone may be felt to rotate.

The reduction of this dislocation is the same as that for the dislocation forwards: but the shoulders should also be drawn backwards, to bring the head of the bone to the glenoid cavity. After the reduction the shoulders must be secured by the clavicular bandage, or the bone will again slip forwards, against the coracoid process.

There are several accidents which are liable to be mistaken for dislocations of the humerus. These are, 1. Fracture of the acromion; in which the shoulder loses its roundness and the head of the bone drops towards the axilla; but the joint recovers its shape on elevating the head of the bone. There is also a crepitus on raising and rotating the elbow.

Treatment.—Elevate the fractured piece of bone by the head of the os humeri, placing a pad between the elbow and side; support the elbow

in a tight sling, placing the forearm across the chest, and preventing all motion by binding the humerus to the side.

2. Fracture through the neck of the scapula is more likely to be mistaken for dislocation than any other; but by carrying the hand over the shoulder, and resting the finger on the caracoid process, and then rotating the arm, a crepitus will be felt. Again, place your arm under the arm of the patient, and, by raising it a little, you will restore the natural appearance of the joint; but, when you take away your support, the shoulder will again sink.

The *treatment* of this fracture is to place a thick pad in the axilla, to carry the humerus, and with it the glenoid cavity, outwards; to support the humerus in a short sling, to preserve the parts in apposition. The clavicular bandage will assist in keeping the head of the bone outwards, and the motion of the arm may be prevented, by confining it to the chest by a roller. It requires from ten to twelve weeks for its recovery, and continues weak for three weeks after.

3. Fracture through the neck of the humerus, may be distinguished from dislocation in the same manner as the accident just mentioned, and by passing the hand over the shoulder-joint, and fixing the head of the humerus with the fingers, whilst at the same time having raised the elbow, and carried the upper part of the humerus a little outwards, you will feel a crepitus on rotating the elbow, but the head of the bone does not follow the rotation of the arm. In this accident you are to apply a roller, from the elbow to the shoulder joint, and put a splint on the inner and outer side of the arm, to be confined by another roller; a thick pad is to be placed in the axilla, and the arm gently supported in a sling. The principal difficulty is to prevent the pectoral muscle drawing the body of the bone forwards; but, if the inner splint be properly applied, its influence will be counteracted. It requires from three to six weeks to unite, according to the age of the patient.

Dislocations of the hip.—1. And most frequent. Upwards and backwards on the dorsum of the ilium.

Symptoms.—The limb is from one inch and a-half to two inches and a half shorter than the other. The toes are turned inwards and rest on the tarsus of the other foot. The knee a little advanced on the other; abduction of the limb is prevented; but adduction is still practicable to a small extent. This accident may be confounded with fracture of the thigh bone, within the capsular ligament, but is known by the toes turning inwards, not outwards, as in the latter.

The amputation at the hip joint has been so often performed with success that it may now be considered as one of the established operations of surgery; but, for my own part, I do not consider it should be done when you can saw through the trochanter major. When the acetabulum is laid open, great constitutional irritation is produced by the suppurative process; abscess after abscess arises, and the life of the patient is put into imminent danger; whereas the amputation through the trochanter major is attended with very little risk.

Treatment.—Extension must be made by assistants or pulleys (the latter are generally necessary), and at the same time counter-extension, by passing some strong girt between his thighs round the pelvis, which must be well secured. Then, when the head is brought nearly to a level with the acetabulum, we should rotate the bone and it will slip into its place; but we must not expect in this case to hear the sudden snap, as the muscles are previously so much exhausted as to be unable to act spasmodically. This, however, is not all that is necessary. For, unless the subject be naturally weak, we must begin the treatment by bleeding and nauseating to reduce the muscular power.

2. Downwards into the thyroic foramen.

Symptoms.—The dislocated limb, in this case, is two inches longer than the other. By making pressure with the hand on the upper and inner part of the thigh, you can, in thin persons, distinctly feel the head of the thigh bone. There is a flattening of the hip on that side; the body is bent forwards, owing to the psoas magnus and iliacus internus being put upon the stretch. If you desire the patient to stand upright, you find that the knee is considerably advanced towards the trunk. It is widely separated from the other knee, and it cannot be brought to touch it without much difficulty and pain. The foot is generally turned outwards or inwards, but the toes point to the ground.

Treatment.—If the accident be recent, place the patient on his back, separate the thighs as widely as possible, and place a girt between the pudendum and upper part of the thigh; fix the girt to the staple in the wall, then take hold of the ancle of the dislocated side, and draw it over the other leg, or, if the thigh be very large, behind the sound limb, and the head of the bone usually slips into the socket.

When of longer standing, in these cases, it is better to place the patient on his sound side, and fix the pelvis by one bandage, and carry another under the dislocated thigh, to which the pulleys are to be affixed perpendicularly; then draw the thigh upwards, and, at the same time, press down the knee and foot, to prevent the lower part of the limb being carried with the thigh, and you thus use the limb as a lever of considerable power. But take care not to advance the leg too much, as the head of the bone will be forced behind the acetabulum into the ischiatic notch, from which it would be extremely difficult to remove it.

3. Backwards, into the ischiatic notch, is the most difficult of all the dislocations of the thigh to detect, because the length of the limb differs but little, and its position is not so much changed, as respects the knee and foot, as in the dislocation upwards.

In this dislocation the head of the bone is placed on the pyriformis muscle, between the edge of the upper part of the notch and the sacro-sciatic ligaments. The limb is from half an inch to an inch shorter than the other, but usually not more than half an inch, and the toe rests against the ball of the great toe of the opposite foot. The natural prominence formed by the trochanter major is lost, but it still remains

nearly at right angles with the dorsum, but it has a slight inclination towards the acetabulum. Except in very thin persons, you cannot feel the head of the bone, and then only by rolling it a little forwards. The knee and foot are turned inwards, but less so than in the dislocation upwards: the knee is only very slightly bent, and therefore is not so much advanced as in that dislocation. The toe touches the ground when the patient is standing, but not so the heel. Flexion and rotation are in a great degree prevented from the limb being so firmly fixed.

Treatment.—Lay the patient on his side; make extension and counter extension; and, at the same time, lift the thigh outwards by a bandage placed as near the head of the bone as possible.

4. *Dislocation in the pubes* is the most easily distinguished of any.

Symptoms.—The limb is an inch shorter; knee and foot turned outwards, incapable of rotation inwards, and the head of the bone may be felt on the pubis, outside the ingiunal artery.

Treatment.—Place the patient on his side; make extension and counter extension; and, after a little time, lift the head of the bone forwards over the pecten and acetabulum.

Pott's dislocation or fracture is a dislocation inwards of the ancle joint, attended with fracture of the fibula, about three inches higher up, and laceration of the internal or deltoid ligament. This is a very serious injury; often causing permanent lameness. It is to be reduced as soon as possible, and protected by splints or junks. The limbs should be bent to relax the muscles, and the leg laid on its outside.

Rupture of tendo Achillis happens mostly in persons advanced in life, and usually upon making some sudden or unusual exertion. It has been known to happen to old men when, after a lapse of years, they attempt to dance. The symptoms by which it may be known are these:—The patient, whilst making this exertion, feels as if struck with a whip or stone at the back of his leg, and often hears a loud crack, and falls down from inability to use his foot. The gastroenemii muscles act spasmodically and pull the upper away from the lower portion, which can readily be felt on examination.

Treatment.—Formerly the patient was laid up, and the foot kept extended for four or five weeks; but surgeons are now content to let them wear a very high heeled shoe, and hobble about with sticks, till it is well.

Sprains are caused by forcing a joint in any direction beyond what the ligaments will allow; consequently these latter are more or less put on the stretch or ruptured, depending on the relative degree of violence offered. They are always attended with pain and swelling, and the motions of the joint very much impaired. They are most frequently met with in the wrist and ancle.

Treatment.—If the inflammation and pain be excessive, leeches must be applied; when, however, they are only moderate, we may be content with applying cold to the part and keeping it perfectly quiet; and, when the violence of the symptoms has abated, we should support the parts by adhesive straps and rollers, which will be found very much to assist motion.

Chap. IV.—Of Injuries of the Head.

Mr. Pott has remarked that the scalp cannot be considered in the light of a common integument; for, from its intimate connexion with the skull and brain, it deserves particular notice. When any part of it is cut we may treat it as a simple wound. But when it is lacerated by a stroke of a stick, or any instrument which must have been applied with some violence, we then no longer consider the mere wound as the grand object of our treatment, but keep a strict watch for the symptoms which may arise of injury within the head.

Contused or lacerated wounds of the scalp should be treated like other wounds, but we should not be too anxious to heal them quickly at one part, leaving another to suppurate; by which a collection of matter may take place, pressing on the bone, and often lifting the pericranium from it, in which case there is always a tendency in the dura mater (which acts as an internal pericranium), to separate also, thus entirely depriving a portion of bone of its nourishment, so that it dies and exfoliates. It is the duty of the surgeon then to open all collections of pus in the scalp as soon as possible. When the scalp is much lacerated and jagged, the surgeon should avoid cutting off the irregular portions, as they have always a chance of living, and so covering the skull, and, if they slough, it will then be time enough to remove them; but exposure of the skull is always to be avoided. When the scalp has been bruised there frequently takes place an effusion of fibrine and serum, making a swelling, which, on pressure, allows the finger to sink a little way, but then gives the sensation of a distinct acute edge, and so may be mistaken for a fracture of the skull with a piece of bone driven in. It may be known by its want of symptoms of depression, or by the acute edge also subsiding on pressure. An erysypelatous inflammation, says Mr. Pott, is very liable to occur after scalp wounds, which, though alarming in appearance, is not so dangerous in reality; it occurs generally in bilious subjects, and is to be treated by bleedings, saline purges, and cold lotions.

There are three sorts of accidents that affect the head; 1. Blows without symptoms of concussion; 2. With symptoms of concussion at the time of the injury; 3. Compression of the brain.

Sect I.—Of Blows without Symptoms of Concussion.

It is to Mr. Pott that the profession owes the earliest account of the first injury, viz. a person receives a blow on the skull which may or may not produce a wound; he is a little stunned at the time, but it goes off in a moment, and he thinks no more of it. In a few days he returns to his medical attendant, having had one or more shiverings, with nausea, pain, at first confined to the spot, afterwards extending over the head, languor, restlessness, quick and hard pulse, and a flushed face, a puffy tumor, tender, but not painful, arises on the stricken part. If this were cut into and examined, the pericranium would be found either partially or totally separated

from the bone, and containing a small quantity of black colored ichor. The color of the bone also is found altered. From this time the symptoms advance more rapidly, the fever increases, the pulse becomes quicker, the skin hotter, the sleep more disturbed, and the shiverings more frequent, not followed by perspiration. It is now that matter becomes smeared over the dura mater, and after this the symptoms are exasperated every hour, convulsive motions come on, attended, in some, by delirium, in others by paralysis, coma, and death. If there had been a wound of the scalp, in this case, it would also have sympathised, and become pale, glassy, and flabby.

Treatment.—If called to the patient early, our endeavour should be to hinder suppuration; and for this purpose we should bleed, and use strict antiphlogistic regimen, especially keeping the patient quiet; but, if we find by the symptoms that matter has formed between the skull and dura mater, we cannot let it out too soon, by perforating the bone with a trephine (of which hereafter), and the place where it should be applied will be indicated by the puffy tumor. If the collection is found extensive, and the symptoms do not yield to one perforation, we must remove another portion of skull. In our after treatment, we must guard against increased inflammation of the dura mater, using the most powerful antiphlogistics, of which bleeding and cold applications will be found most serviceable. The cause of all this mischief seems to be a laceration of the fine vessels, running from the dura mater and pericranium into the bone, by the vibration of the blow, so that a trifling inflammation is set up, which, from the susceptibility of the parts concerned, soon becomes aggravated, and gives rise to the above-mentioned symptoms.

Sect II.—Of Concussion of the Brain.

To produce this, a greater degree of violence must have been offered, and in this case, as in the former, there may or not be a wound of the scalp. The symptoms are these: the person who receives such injury, is at once deprived of sensation and motion, but which return in some measure almost immediately, and the surgeon finds him lying down, apparently insensible, but he is capable of being aroused, and giving coherent though peevish answers, relapsing immediately into his former state; his face is pale, the pulse, not much hurried at first, but very weak and thin, and sometimes even intermitting; he generally vomits in a few minutes after the accident, which the surgeon considers as a sign of nonexistence of compression; the pupil is also capable of motion, when exposed to a strong light. If the case is favorable, these symptoms gradually subside, and the patient thinks himself cured; but the well informed surgeon, knowing the liability of the occurrence of secondary inflammation, keeps a watchful eye over him for several days, enforcing a light diet, and perfect quiet.

There are two great dangers to be apprehended in cases of mere concussion: One is the occurrence of hemorrhage within the skull in a short time after the injury, and upon the establishment of re-action; for not only may very small vessels be lacerated by the severe shock, but some of great size, and particularly the middle artery of the dura mater, which does not bleed whilst the patient lies in that state of syncope into which he is at first thrown; but, when the heart resumes its strong action, the blood is propelled from this vessel into the surface of the brain, causing gradual symptoms of compression. The other great danger is the supervention of inflammation of the meninges of the brain. This occurs at various times, but commonly in three or four days after the accident. The symptoms of this inflammation differ from idiopathic inflammation of the the brain, the fever being of a much lower type; the face is a little flushed, the eye particularly sensible to light intolerance of noise; pain in the head, particularly in the forehead; much restlessness, and muttering delirium; the pulse is quick but not so full as in idiopathic phrenitis. If these symptoms cannot be checked, suppuration will supervene, causing compression. It is marked by an attack of shivering delirium, ptosis of the upper eyelid, convulsions, and death.

Treatment.—In the first instance the powers of the patient are very much depressed; whilst he is in this state the surgeon need not interfere; but, as soon as the pulse rises, he should be bled largely for two reasons; one, to prevent internal hemorrhage: the other, to render the supervention of inflammation less probable. If the headache continue, with restlessness, &c., we should repeat the bleeding, preferring small quantities, taken oftener, to large ones at once, giving free purgatives and diaphoretics; and, if symptoms of inflammation come on, we should shave the head, and apply bladders filled with ice to the scalp, and repeat our large bleedings, with other remedies for inflammation. If symptoms of compression supervene, either from hemorrhage or pus effused, we should trephine the part where the puffy tumor exists; or, if there be none, we must then choose the point where the violence was inflicted. If the suppuration has occurred between the dura mater and bone this may be successful; but it too frequently occurs between the dura mater and arachnoid, in which case it is out of the reach of art.

Sect. III.—Of Compression of the Brain.

We have already noticed cases in which this may arise, but it is caused most frequently by a fracture and depression of a portion of the skull. Its symptoms are a total state of stupor, stentorous breathing, immobility of the pupil (which is nearly always dilated) when irritated by light, face tinged, pulse slow, full, and laboring, convulsions or paralysis, retention of urine, and constipation of the bowels, or else involuntary discharges from the bladder and rectum; and these symptoms do not abate but increase.

Treatment.—When a piece of the skull is fractured and driven in, it must be removed by the operation of trephining, which is to be performed in the following manner:—The integuments are to be divided by a crucial incision, to give freedom to the operation, provided there be not a sufficiently large wound of the scalp; and

now the surgeon can examine the injury; if there be comminution of bone, the pieces may sometimes be taken away by forceps and elevators, but if a piece is wedged in, we must then remove a sound piece by the trephine to get at the depressed portion; the operator then (without tearing, rasping, or scraping, the pericranium, as was recommended formerly) fixes his trephine in the sound bone, and makes several turns. Having now established a groove for the free play of the teeth, he withdraws the central point, which being projected would otherwise pierce the bone earlier than the sawing part, and so wound the dura mater, the endeavour to avoid which must regulate every movement of the operator, who now proceeds slowly and cautiously, withdrawing the trephine at short intervals; to find out by probing (for which purpose a piece of quill is generally used), whether or not he has perforated any part of the circle; for the thickness of the skull, varies considerably both generally and in small spots, so that it is very common, even in the small bit enclosed by a trephine, to find three or four different degrees of thickness. When he finds the instrument has penetrated one part, he must remove all farther pressure at that point by an inclination of his hand and wrist, still sawing the part not yet accomplished; when he finds that his task is nearly finished, he need not wait for the division of every little portion, but, having found no further resistance to his probe at several points, introduces an elevation or forceps into the sawed fissure, and forcibly breaks up the circular bit, which, being now accomplished, leaves him at liberty to elevate the depressed portion; but it is sometimes necessary to take out another piece by the trephine before he can accomplish it: or an obstruction may be caused by a projecting piece of the skull, which will be found to be more easily removed by the saw recommended by Mr. Hey of Leeds.

When the operation is concluded, the wound is to be dressed with lint dipped in oil, coming to a level with the skull, and the integuments brought over it; or if the opening has been made to let out congealed blood; or at other times, when the termination of the case is clear, the scalp may be brought at once over the dura mater, and confined by sutures, leaving a depending opening for the escape of pus, which must form in order that the wound may granulate, which it does from the surface of the dura mater. It was formerly supposed that all fractures of the skull required this treatment, whether there were depression or not. But modern surgeons, following the advice of Dessault, John Bell, and Abernethy, totally disregard the presence of a mere fissure, and shape their treatment entirely by the symptoms: so that if those be only of concussion, and the skull be fractured, or even slightly depressed, the case is merely to be treated as a severe one of concussion.

There was also great stress laid formerly on the parts of the skull which we should not trephine; such as the part over the frontal sinuses; longitudinal sinus over the middle artery of the dura mater, &c. But surgeons now find they can, by using caution and care, trephine in even these parts. For if there be hæmorrhage from the artery, or sinus, they may be stopped by moderate pressure, or the artery tied.

It is to be noticed that fissures often run for a considerable extent beyond the part where the injury was inflicted, causing perhaps extravasation in their whole course. Thus, the forehead being struck, a fissure is often found quite across the orbitary plate of the os frontis; and in violent falls on the top of the head, or injuries of the temple, fissures run along the base of the brain; in either case they are mostly fatal.

There yet remains one source of mischief from wounds of the head and skull: fungus cerebri. This arises when the dura mater becomes ulcerated or sloughy, either from wounds, or as a consequence of the operation, not having been then indeed wounded; but the pulsation of the brain pressing it continually against the sharp edge of bone left by the trephine. This disease should be attempted to be subdued by pressure and mild stimuli; but there have been instances of its being cut off without proving fatal.

Chap. V.—Of Hernia.

Hernia, ερνος, germen-ramus, from its shooting forward, though applicable to all protrusions of viscera, has yet been appropriated to those of the abdomen, from their greater frequency. Of these there are three principal varieties, viz. the inguinal, femoral, and umbilical. Their causes seem to be a sudden straining of the diaphragm and abdominal muscles, as in some sudden exertion, which violently thrusts out some viscus.

1. Inguinal hernia presents itself at the groin, at the external abdominal ring, sometimes descending into the scrotum of males, or labium pudendi of females. It is much more common in males. Its symptoms are, a hard tumor in the groin following the course of the spermatic chord, and descending into the scrotum; suddenly augmented on coughing; capable of being returned into the abdomen when the patient is recumbent, with a gurgling noise, and again appearing on his resuming the erect posture. It is not transparent, and the testicle can generally be felt distinctly below the tumor. This hernia may or not be contained in a bag of peritoneum, which it pushes before it; in the latter case it is called a congenital hernia, from its occurrence at the time of birth, or very soon after, before the opening from the abdomen into the tunica vaginalis is closed, and so is in contact with the testicle.

Sect. I.—Treatment of Reducible Hernia.

In the common inguinal hernia the patient should, after reduction, apply a truss, which, if the patient be old, must be worn for life; if young, the complaint may be cured in three or four years, by producing obliteration of the opening through which it protrudes. The danger to be apprehended in all hernia is that the gut, or omentum contained in them, may become strangulated, which, if not relieved by art, will prove fatal. In congenital hernia, we cannot apply a truss on such young children on account of its inconvenience; it is better, therefore, to put a compress over the opening, and strips of

sticking plaster round the pelvis to retain it, and it may, by changing the dressing every week, be generally cured in three or four months. But there is one caution necessary in this case: it is that the testicle may not have descended; so that in this case we must not obliterate its passage, but wait till it appears, and then commence our treatment. This caution will sometimes be found necessary, even in adults.

2. Femoral hernia appears under Poupart's ligament at the femoral ring; has a sac like the first species, and is more common in women. It is likewise more liable to strangulation, though generally of small size. But this last circumstance has been noticed by Sir A. Cooper to predispose to strangulation, as it argues a less capacity in the opening. Its treatment does not differ from that of inguinal hernia, except that the pad must be more at right angles with the truss.

3. Umbilical hernia presents itself, as its name implies, at the umbilicus, and does not differ from the others in its mode of treatment.

Sect. II.—Irreducible Hernia.

Hernia not congenital often contains omentum as well as intestine, which is a frequent cause of their becoming irreducible, either by growing into a solid fatty substance, too large to be returned, or by forming adhesions to the peritoneal sac, which last may happen to either intestine or omentum. When a hernia becomes irreducible, it has always a tendency to grow larger, so that in some old men scrotal hernia have contained the bulk of the intestines.

Treatment.—The patient should wear a truss with a hollow pad, with a spring not strong enough to give pain; but in very large scrotal hernia a suspensory bandage, fastened round the loins or neck, will be found to answer better. A person with irreducible hernia should be always on his guard against strangulation, and so should avoid all violent exercise, and be particularly careful to guard the tumor from blows, or other injuries, and attend to the keeping up a free action of the alimentary canal.

Sect. III.—Strangulated Hernia.

This name is applied when either after the sudden appearance of a hernia, or from extraneous cause, in an old one, the patient finds himself unable to reduce it; has an obstinate costiveness, pain, and redness in the tumor, with vomiting, gradually becoming more severe, at last bilious or feculent; pain being felt also in the abdomen, especially about the umbilicus; the pulse weak, frequent, and thready, with hiccup and anxious countenance; and, if not relieved, cold sweats come on. The hiccup becomes more severe, the eyes glassy, pulse softer and fuller, but intermitting; a sudden cessation of pain ensues: the tumor becoming of a dull leaden color and mephysematous. In short the tumor has mortified, and the patient, deceived by the cessation of pain, often fancies that he is about to get better, whilst he is expiring.

These symptoms are caused by the circulation of the contents of the hernial tumor being stopped, either by a thickening of the neck of the sac, a spasm of the abdominal muscles causing a stricture at the point of exit; an extra portion of intestine or omentum wedging itself in the point of exit; or an augmentation of bulk in the part already descended, particularly an inflammatory affection of that part.

Treatment.—The first remedy which suggests itself to the surgeon is the operation of the taxis, or an attempt by manipulation to return the hernia into the abdomen. For this purpose, the muscles near or affecting the part must be relaxed by position; and the surgeon gently lays hold of the tumor, and does not attempt to return it by pushing it straight back, but rather pulls it downwards, at the same time pressing it to expel its contents, and, when successful, a portion of the air contained in the intestine escapes through the stricture with a gurgling noise, which is followed slowly by the hernia itself. In using this means of cure, we should avoid using too much violence, as instances of the tumor bursting have been known.

If the tumor is so much inflamed as not to bear the taxis, and the symptoms are not urgent, cold should be applied for some time. If we fail in our attempt at reduction, after using the taxis for a quarter of an hour or twenty minutes, the patient should be bled largely, or to syncope, being previously placed in a warm bath, which materially assists the supervention of syncope; and now, whilst he is in that state, with every fibre of the body relaxed, we should renew our taxis, and it often succeeds; if it does not, we should give a tobacco glyster, infusing one drachm of tobacco in a pint of boiling water for a quarter of an hour, of which it is best to give only one-third at once, as it produces different effects in people. It makes the pulse small, the skin cold and pallid, and relaxes the fibres generally, particularly muscular ones; so that it succeeds oftener in hernia near muscles, as inguinal or umbilical, than in the femoral. If, after waiting a short time and again trying the taxis, the symptoms become urgent, we must proceed at once to the operation; and, as this is a little different in each hernia, we must describe each separately.

Sect. IV.—Operations for Hernia.

1. *Bubonocele or inguinal hernia.*—The patient should be laid on a table with his legs hanging over the end, and, the hair having been removed from the pubes, the incision should commence at the upper part of the tumor, and be continued to its lower part; but, if large, it need not quite reach so low. We should now secure any bleeding vessels. The division of the skin brings the fascia of the chord into view, which must be carefully lifted up with a pair of dissecting forceps, and perforated into this opening; a director must be introduced, and the fascia may be safely slit up, bringing the cumastic muscle into view, which must be treated like the last fascia; and we shall now in recent hernia come to the sac, of a blue semitransparent appearance (but in old hernia there may be many layers of condensed cellular membrane). This must be carefully divided, being previously lifted up, as the others were, and on puncturing it fluid generally escapes, if there be intestine in it not adherent. If there be both omentum and intestine, the for-

mer is before the latter behind, and now commences the difficulty. You must ascertain the seat of the stricture, and in recent hernia it will be likely to be at the external ring. This is to be ascertained by the little finger, and if it be there a director is to be introduced and the stricture divided, for a small distance, by a probe pointed bistoury. But this is not the common seat of stricture; it is generally at the internal ring or neck of the sac, in which case Sir. A Cooper recommended dividing the stricture leaving the sac entire; but this has been justly condemned by Mr. Lawrence in his valuable treatise on Hernia, who prefers the old method of dividing both sac and stricture at once; in this manner introduce the finger as far as the stricture, and on it the bistoury invented by Sir A. Cooper, which is quite straight and blunt, except half an inch, situated at a quarter of an inch from the top which has a cutting edge. This is to be kept flat till it reaches the stricture, but we then turn its cutting edge upwards and divide both sac and stricture. We must beware of cutting inwards, as we then run a great risk of wounding the epigastric artery, which is contained in the inner pillar of the internal ring. The stricture having been freely divided, we reduce the intestine first piece-meal, handling it carefully and tenderly, and then the omentum, if there be any. But the intestine is sometimes found to have formed adhesions. These, if slight, may be torn with the fingers, but, when more dense, they must be separated from the sac by cutting; and, if they are very short, we must cut off small portions of the adherent sac and return altogether in the abdomen. But sometimes the intestine will be found gangrenous, when it will be found of a deep brown or chocolate color, covered with a layer of brown coagulated lymph, fetid, and interspersed with purple or leaden-colored spots, which readily break down under the impression of the finger. If only a portion of the cylinder be gangrenous, we need not, says Mr. Lawrence, put a ligature round the attached mesentery to keep it to the mouth of the sac, for its natural adhesions, which it has formed, will prevent it going far, and there is no danger of extravasation of feces into the abdomen, as was stated by de la Faye and Dessault, and the ligature will only increase irritation. In this case there must be a discharge of feces from the wound; but they have been often known to recover their natural passage after some time by the aperture of the intestine becoming agglutinated or healed by granulation. The next case is when the whole cylinder is found gangrenous, when our treatment must be, the slitting up the diseased portion, to let out its contents, and give an exit for fecal matter from the rest of the intestine, to facilitate which the stricture should be divided. The gut should then be left to slough away, and if the patient does not sink under this injury, he recovers with that loathsome disease an artificial anus, which, however, does not prove fatal if the bowel have been part of the colon or even ilium; but, if it have been a portion situated high up in the alimentary canal, the patient dies of inanition, there not being sufficient length of intestine to absorb nutriment. But this complaint if not fatal is productive of great misery from the continual discharge of feces, which, however, do not smell so offensive as when retained longer. It is best treated by causing the patient to wear a slightly elastic truss, with a pad, which must be taken away when the patient feels a desire to discharge his feces

When the omentum is found adherent we may use more freedom in separating it, by tearing up the adhesions; and if any vessels bleed, securing them. If the quantity be large, or indurated, we may cut off a great portion of it and tie all the vessels, which do not stop on being lacerated with a pair of forceps, leaving the ligatures hanging out of the wound, and reduce the rest to the mouth of the sac. When the omentum is mortified we should pursue the same plan of excision, &c; we may know it by the blood in the veins coagulating. Its color, however, is not like that of intestine, black or green, but of a livid dull red; and when pressed by the fingers it gives a sensation of sickness.

Treatment after the operation.—After the operation for strangulated hernia, there are two things from which danger is to be apprehended; the first, that the intestines may not perform their office, and the feces not pass in their natural course; secondly, and principally, that peritoneal inflammation may come on, and produce the same effects as if gangrene were present. The object consequently should be, as soon as the hernia is returned, to close the wound as completely as possible, by means of sutures, and to employ gentle pressure. But, if the hernial sac remains open, the integuments should be brought together by means of sutures, slight pressure should be made by dossils of lint, and the parts should be supported in a suspensory bandage.

The horizontal posture must be strictly ordered; and, in five or six hours after the operation, give a little sulphate of magnesia or castor-oil; the more motions your patient has, the better. We must not be satisfied if the patient have three or four motions on the following day, but keep up a constant discharge from the bowels; on the next day the abdomen will become tense, with constipation and constant vomiting, in which case we must bleed or purge freely. If hiccup now supervene, it need not be a sympton of gangrene, but peritoneal or intestinal inflammation. When the inguinal hernia is very large we need not lay open the sac, nor endeavour to reduce it; for its adhesions will be too extensive, but must content ourselves with cutting down to and dividing the stricture, leaving the hernia incarcerated

2. *Direct, or ventro inguinal hernia,* comes down inside the epigastric artery through the outer ring, but not the inner one. The difference in the operation is, that it has another covering, viz. a portion of the fascia transversalis; and the artery lies to the outside of its abdominal aperture.

3. *Congenital hernia.*—In this the testicle cannot be felt at the lower part, and there is no peritoneal sac, or rather the sac is formed by what is to be the tunica vaginalis, which remains yet enclosed. There is no difference in the operation.

4. *Femoral hernia* is seated deeper and more laterally than inguinal. The symptoms of strangulation are more urgent than those of the latter, on account of the smallness and inelasticity of the aperture.

In operating for femoral hernia, you make your first incision in the course of Poupart's ligament, along the tumor, extending from one side to the other; the second you may make at right angles to the first, towards the umbilicus, so that the two incisions resemble the letter ⊥ inverted. The angular flaps are to be next dissected off, and reflected, so as to allow of greater room. By this incision you expose the superficial fascia, which you next divide, and the hernial bag, called by some fascia propria, is brought into view. This is next cut through, and the hernial sac, or peritoneal covering, makes its appearance. The next point is to make an incision into the hernial sac with the greatest possible care, and then introduce a director to ascertain the seat of stricture. Having opened the hernial sac, and exposed the intestine, divide the stricture directly upwards and inwards, a little inclined to the umbilicus. The seat of stricture in femoral hernia is at the crural arch, just where the intestine leaves the abdomen; therefore, in dividing the stricture, after introducing the director, a bistoury, blunted at the point, is to be put on it, and placed against the stricture; in this way there is no danger of wounding the intestine. The bistoury is next to be gently raised, and with a slight touch of the instrument, the fibres will give way, and by a little pressure the parts are easily returned.

5. *Umbilical hernia* must be treated like the others. There is no difference in the operation. In dividing the stricture we should cut upwards, and afterwards endeavour to heal the wound as soon as possible to prevent the liability to peritoneal inflammation.

PART III.

Order.—VENENANTES.

Chap. I.—Of Syphylis.

Is the consequence of a specific poison applied, and absorbed into the system, producing at first an ulcer, called a chancre, at the place where it was so applied, generally on the organs of generation; the matter of which, being absorbed, gets into the glands of the groin and produces a bubo, and, continuing onwards, is received into the circulating system; when it produces eruptions and ulcerations of various parts of the body, particularly affecting the throat, skin, periosteum, and bones.

Sect. I.—Of Chancre.

The average time for its appearance is from four to seven days after connexion; but there appears reason to believe that the poison may be dormant for a much longer time. It begins first as a red spot which ulcerates, or as a pimple with a white head that falls off, and then ulcerates, or it may appear only as a vesicle; these all, however, form ulcers, having hard and ragged surrounding edges with a yellow surface and inflamed margin, also a hardness to be felt by the fingers underneath it. But its appearances are also various; for it may consist of a solid gristly substance with very small ulcers; sometimes a sore on the broad surface of the glands, burrowing deep, with no surrounding inflammation. Sometimes it spreads quickly by ulceration or sloughing, and often bleeds.

Chancre situated on the frænum, or external meatus, is very difficult to heal, on account of the constant dribbling of urine on it; when it is situated on the edge of the prepuce it will make the part swell and cause phymosis. When the matrix of a chancre becomes indurated, the patient is more liable to secondary symptoms. There are other sores appearing on the penis of suspicious appearance, but which are not chancres, and not followed by secondary symptoms. Such are little ulcers on the prepuce, reaching as far back as the verona glandis; deep, irritable, and painful, presenting a honeycombed appearance, often attended by discharge from a swelling of the prepuce. These generally get well by stimulating them and several others.

Treatment of chancre.—It has been proved that chancres may now be cured without mercury; but nevertheless this is not so safe, as the patient is more liable to secondary symptoms, so that we should put him on a mild mercurial course, giving five grains of blue pill, with a quarter of a grain of opium night and morning, and so keep up a gentle action on the mouth, and dress the chancre with mild applications, the black wash is one of the best. But, if it be very indolent, we may touch it with the caustic. If the chancre heal quickly, we should nevertheless still continue the mercury for three weeks at least. Sometimes during the treatment a chancre becomes very irritable and much inflamed all round it. This may often have been produced by the action of mercury: in any case we must suspend all mercurials, apply poultices and sedatives, give opium internally combined with salines; and, when the irritation has subsided we may return to our mercury, giving also the compound decoction of sarsaparilla. Sometimes a chancre may take on the sloughing action, so as if not stopped even to destroy the penis. This may proceed from the patient's intemperate habits, or from the bad use of mercury. In this case the mercury must be stopped, and a lotion applied of from thirty to fifty drops of nitric acid to a quart of water, or warm spirits of turpentine, or strong solutions of opium with poultices. The patient must be allowed a generous diet and stimulant medicines, of which one of the best is ammonia with musk, or what is still better opium in one grain doses three or four times a day.

Chancres in women are often worse than in men; they attack the labia and nympha, and are to be cured by the same means.

Phymosis is induced by a great swelling of the prepuce, which causes the orifice to contract, so that it cannot be drawn back over the penis, allowing a lodgment of secreted matters which are unable to escape. They cause great irritation; and, if let alone, the prepuce will slough, allowing the passage of the glands through the opening.

The *treatment* consists in mitigating the inflammation, and if mercury be the cause it must be suspended, otherwise we must apply cold lotions, inject black wash under the skin, purge the patient and give him opium. If all these fail, we must introduce a director under the prepuce as far as the corona glandis, and slit it up with a bistoury; then make the internal and external parts correspond, (otherwise the internal will not be so freely divided as the external), and put a stitch into each side, which hinders the inner and outer edges from being so much separated by the swelling which takes place; dress it lightly that the patient may be able to readjust it when he makes water. Sometimes when the prepuce is very long it is better to cut a circular piece off.

Parophymosis is applied to the state when a patient has retracted his prepuce behind the glands, but that swells and he cannot get it back again, so that there is a tight ligature round the glands, which, if it continued, would effectually strangulate it.

Treatment.—We must endeavour to reduce the size of the glands by pressure, and after some time push it back with our thumbs, drawing forward the prepuce with our fingers. If after several trials this do not succeed, we must introduce a director or probe under the stricture, then passing a sharp pointed bistoury along it divide the stricture. After this apply poultices.

Warts, though formerly considered venereal, are now not treated as such; any mild stimulus will remove them if soft, such as the liq. plumb. subacet. dil. when they are hard they should be poulticed, and then touched with an ointment made of arsenic, ʒi, cerate, ℥i, and this will make them slough.

Sect. II.—Of Buboe.

When syphylitic is commonly confined to one gland (on either or both sides) situated high in the groin, which distinguishes it from those caused by irritation alone, when a chain of them is affected. It produces the same symptoms as a common abscess, and must be treated as such, but at the same time we should give mercury; except when it assumes a chronic form, in which case we should act on the bowels, and try to diminish it by leeches, lotions, &c.

Sometimes a buboe takes on a sloughing action, in which case we must treat it as sloughing chancre, but there is great danger of its opening the femoral artery.

A buboe often leaves a sinus, which must be injected with a solution of oxymuriate of mercury; and, if that fail, laid open.

A chronic buboe often presents a diseased gland at its base, which must be destroyed with irritating troches or the potassa fusa.

A buboe sometimes becomes a phagedenia ulcer. It had then better be dressed with a solution of nitrate of silver. Give bark, ammonia, and opium internally.

Secondary symptoms, may appear in a fortnight after contamination; but it is generally six or eight weeks, or sometimes even months before their occurrence. They make their appearance either by a sore throat, when it appears as if a piece had been dug out of the tonsils, leaving a foul ulcer, not very painful, or eruptions preceded or not by fever. These are of various characters; the most common is the venereal lipra, consisting of copper colored blotches, circular, and little elevated; or a crop of either pimples or pustules may come out; or there may be red and conical tubercles, or the elevated brown rupia, shaped like a limpet shell, which falls off, leaving a deep painful ulcer. When the throat is affected, the eustachian tube often becomes blocked up, causing permanent deafness, which is only to be remedied by puncturing the membrana tympani. But the bones and periosteum become shortly after affected, causing nodes and caries, particularly of the bones of the nose and palate, both of which may be perforated by it. Another part liable to be attacked is the eye, in which a violent iritis appears, and syphilitic pains may attack any other parts of the body.

Treatment.—Mercury may be considered as the great remedy, but it must be discontinued if it disagrees with the patient. If there be much fever we may bleed. When the pains are severe, use the warm bath, give Dovers' powder, guiacum, or colchicum. For eruptions, the warm bath is the best remedy; when there is mild sore throat it should be gargled; but, when severe, we must bleed or leech and blister it. Foul ulcers in it may be touched with the linimentum eruginis. Indolent ones with solution of argentum nitratum. When irites supervenes, we must throw in mercury as quickly as possible, cup in the back of the neck or temples, and blister, and apply extract of belladonna to prevent adhesions of the pupil. When the bones are affected give sarsaparilla, or mercury. If the nodes are very painful cut them through down to the bone.

It not unfrequently happens that an opening is made in the bony palate, causing a disagreeable snuffling when the patient speaks. This after healing the ulceration may be stopped up with lint or cork, or an instrument invented by Mr. Weis of the Strand.

It is often of importance to know how mercury may be made to affect the system soonest. This indication is answered by the hyd. oxymur. internally, and mercurial fumigations externally, which is effected by exposing the patient to the fumes of cinnabar, thrown on to a red hot iron. When complaints arise from the use of mercury, we should give sarsaparilla or nitric acid, which prove very efficacious in stopping them.

Sect. III.—Of Gonorrhœa.

(From γονη, semen, and ρεω, to flow). The derivation would imply that this disease was a flow of semen, but it is a flux of purulent matter from the urethra, formerly supposed to come from ulceration, but Mr. Hunter proved that there is no breach of surface, but that it is a secretion from the vessels of the urethra.

The *symptoms* generally arise in three or four days after infection, very rarely exceeding seven days, but may arise earlier than three. The patient first experiences a sense of titillation in the urethra, as if a drop of urine were contained in

it. This directs his attention to the part, and he finds that the lips of the urethra are red, and that there is a slight mucous discharge. Afterwards the urethra begins to be affected with considerable heat, and pain is experienced in voiding the urine, which state is called ardor urinæ. The pain increases till it becomes, in many cases, excessively severe; there is an appearance of threads mixed with the urine, which arises from the adhesive inflammation in the lacunæ of the urethra. The next effect is a considerable diminution in the stream of urine, the swollen state of the urethra contracting the size of the canal. The urine is often discharged in two, three, or more streams, in consequence of the contracted and irregular state of the urethra. At first the discharge from the urethra is mucous, but after a little time it assumes a purulent appearance. The matter becomes yellow, and, if the inflammation is very considerable, green; and it is often intermixed with blood, so as to give it a sanious appearance. The glands of the groin are generally sympathetically affected, and, in a first gonorrhœa, seldom fail to become enlarged and painful. They very rarely go on to the formation of matter, if proper attention is paid on the part of the surgeon.

Chordee is a not unfrequent accompaniment to gonorrhœa. It is a painful erection of the penis, which feels bound down and is either curved or bent considerably to one side, being caused by inflammation and effusion of lymph into the corpus spongiosum. There is often a great irritation of the muscles of the perineum, producing violent spasmodic contractions. If any constitutional disease, as a fever, occurs during a gonorrhœa, the discharge will be suspended till the constitutional symptoms abate, and will then re-appear.

Treatment.—If it be a first attack there is always more irritation, so that it will be advisable to begin with saline purgatives, and afterwards to use colocynth and calomel as mere aperients. The patient should at the same time use diluent drinks, such as nitre, subcarbonate of potassa, or soda dissolved in mucilage. When any of these increase the irritability of the bladder they are to be discontinued. If the penis be much inflamed with chordee we may apply leeches; and, if the constitution sympathises, a general bleeding will be very useful. Hanging the penis in warm water mitigates the difficulty of micturation, and when the ardor urina and pain from chordee are very great, we may give twenty drops of the liq. potassæ, with from three to five grains of conium. After the first week we may apply cold saturnine lotion to the penis; and, when the inflammatory symptoms have abated, give the balsam of copaiba in doses from twenty to thirty drops, morning and evening, and when this has made an impression on the discharge we may begin injections, of which one of the best is the liq. plumb. subacet. dil., afterwards made stronger by the addition of sulph. zinci.

In subsequent attacks we need not be so cautious, but begin at once, if there is not too great an irritation, with doses of copaiba and cubibs, and shortly after to commence with the same or various other injections, such as half a grain of the sulphate of copper in an ounce of rose water, or one grain of oxymur. hydr. in twelve ounces of water: these two are very powerful, but the strength of injections must depend on their effect. If there remains much gleet we should introduce bougies, which will stop it. The treatment of women does not differ from that of men, except that we need use less caution. During the latter stage of gonorrhœa it often happens that the bladder becomes very irritable, so as to cause desire to make water every quarter of an hour, which when voided is often mixed with blood.

Treatment.—Opium should be given in doses of from one to two grains, with a view of allaying the pain and irritation; and, with the same object, five or six grains should be introduced into the rectum in the form of suppositories. The liquor potassæ with opium or some bitter tincture is also recommended; castor oil as a purgative; and, after shaving off the hair, a blister should be applied over the region of the pubes: the counter irritation thus produced will prove of infinite service.

Swelled testicle, or hernia humoralis, is a frequent result of the use of the bougie, or shows itself in from ten to fourteen days after the discharge. When confined to the epidydymis there is little pain; but, when it extends to the body itself, the unyielding nature of the tunica albuginea causes much pain. We may first foment them, and purge the patient; and, if this does not succeed, apply leeches, cold lotions, &c.; and it is sometimes necessary to give anodynes at night.

Bubo may arise from gonorrhœa, but rarely suppurates. It must be treated as other buboes.

Gleet may be only a symptom of stricture; but if it be the sequel of gonorrhœa it is often difficult to cure, and, to accomplish it, we must use both constitutional and local remedies. Balsams, turpentines, and cantharides, are useful, but generally produce their effect in five or six days, so that space of time may be considered as a fair trial. When the whole system is weak we may prescribe cold baths, bark and steel. The local applications may be either injections or passing bougies. Gleets have also been cured by counter irritants, as a blister under the urethra, &c.

Chap. II.—Of Hydrophobia.

From *υδωρ*, water, and *φοβος*, fear. This most melancholy and dangerous disease is the consequence of bites by rabid animals, particularly dogs, cats, and wolves. The poison resides in the saliva of the mad animal, and so is introduced into a wound by the teeth. This disease is generally some time in showing itself after infection, hardly ever earlier than a fortnight or three weeks, and in some instances as late as several months.

Symptoms.—At some indefinite period, and occasionally long after the bitten part seems quite well, a slight pain begins to be felt in it, now and then attended with itching, but generally resembling a rheumatic pain. It soon extends from the wound up to the arm, and affects the situation of the trapezius muscle, and the neck,

on the same side as the bite. The cicatrix, in the mean while, begins to swell, inflames, and at length discharges an ichorous matter. There are often pains of a more flying, convulsive kind, felt in various parts of the body. As the disease advances the patient complains of the pain shooting from the situation of the bite towards the region of the heart. Lassitude, a dull pain in the head, and a vertigo, soon come on: the patient is commonly melancholy, though not always, mutters, is forgetful, and drowsy; his mind seems disordered; his temper irritable and irregular; his slumbers disturbed, and convulsive agitations immediately follow his waking; a deafness is sometimes complained of; the eyes are watery; the aspect sorrowful; the face pale and contracted; sweat breaks out upon the temples; and an unusual discharge of saliva is made from the mouth. From the beginning a peculiar stricture and heaviness on the breast, occasional involuntary sighing, and nausea take place. There is often a bilious vomiting. The idea of drinking any kind of fluids creates considerable alarm and agitation, and the attempt to do so generally brings on most afflicting pains and convulsions, attended with a dreadful sense of suffocation and choaking. These soon come on without any attempt to swallow; the patient becomes delirious, and dies, exhausted by continual and furious ravings. The time in which the attack proves fatal varies from thirty-six hours to three or four days.

Treatment.—There has yet been nothing discovered that can contribute to the relief of this formidable malady. It has lately been proposed to inject warm water into the veins, and at the same time abstract blood: its success is as yet doubtful. There is, however, one thing that lies in the surgeon's power. It is to exeise or destroy the bitten part as soon as possible after the accident, not allowing the smallest portion to remain which will ensure the patient's safety. But all people who are bitten are not affected by the complaint, especially if the bite has taken place through much clothing, so that the saliva of the animal may have been wiped off from the teeth. When, however, symptoms do come on. they are next to certainty fatal.

Chap. III.—Of Dissecting Wounds.

These have lately attracted the serious attention of surgeons especially, from the number of fatal events caused by them within these last few years. The violence of their symptoms seems to depend on the particularly noxious qualities of putrid, applied to live animal substance. These, however, differ from the last mentioned disease by affecting persons with every degree of violence, sometimes very lightly, at others fatally; they, however, resemble the last in not contaminating alike all persons, seeming to attack most vigorously those who have been previously debilitated. When a person innoculates himself with dead animal matter it produces these symptoms: the wound becomes painful and inflamed; the inflammation spreads up the arm, affecting especially the absorbents, which is demonstrated by indurated red lines over their course; the glands of the axilla become affected; a symptomatic typhus seizes the patient; the arm swells, or becomes erysypelatous; matter forms under the fascia, or in the glands of the axilla; and the patient often sinks under symptoms of the most malignant putridity. But, when the disease attacks a person of more robust constitution, it puts on quite another appearance, being then a mere inflammation of the absorbents, which may stop at any period of its course. Its treatment must depend then on the form it assumes. When it is inflammatory it is to be treated like other inflammations; but, when it puts on the putrid form, it is better to take a small quantity of blood from the system first; then apply warm and soothing applications to the wound and arm; give the patient cordials with doses of opium; and, if matter forms, give it a ready exit.

There is a form in which this disease appears in persons who are much in the habit of handling offals. This consists of an erysypelatous blush over the hand, with considerable swelling and running from one finger to another, remaining a long while. This may be cured by mercurials, particularly the oxymuriate in small doses.

Chap. IV.—Of Lethales, from application of substances tending to direct destruction of vitality.

Sect. I.—Of Burns and Scalds.

These may affect persons in very different degrees, which are visible directly after the accident, as they produce three distinct effects. These are, 1. Mere vesication. 2. Desquamation. 3. Mortification of the skin.

1. *Vesication.*—This form is not dangerous, although it be of considerable extent; it is usually produced by scalding water. We should not open them in the first instance, but allow the inflammation to subside first, and then they may be opened with advantage. The best applications are cooling and sedative ones first, but when we open them, they heal best by being sprinkled with a little very finely levigated chalk, or calamine.

2. *Desquamation.*—In this the cuticle separates at once, leaving the cutes exposed and inflamed, and ready to slough. This is the most painful variety of burn, and dangerous in proportion to its extent. Patients who die of large burns are found to have sometimes inflammation of the lungs, at others ulceration of the intestines: various remedies have been proposed for this form of burn. But the best seem the following:—When the patient is chilly or much exhausted by its violence, give stimuli internally, as opium and wine, &c. But as soon as reaction takes place, we must take care it be not too violent, to mitigate which we must employ our means for inflammation, and even bleed if necessary. Our local treatment must be to prevent the tendency to sloughing, for which purpose we must keep up an irritation by means of lime-water and oil, or milk spread over the part, or, what is still better, spirits of turpentine; but, if this last gives too much pain, we may dilute it with oil, &c. This must be continued till re-action takes place, when we apply milder dressings. When contiguous parts are burnt, we must interpose dressings to prevent adhesions.

3. *Mortification.*—When this is produced at once, the patient feels no pain; but it is the most dangerous, either killing the individual by the sudden, severe, shock to the nervous system, or else on the separation of the sloughs causing such violence of re-action that it proves fatal. The treatment is the same as for common gangrene. Poultices, in the first instance, are sanctioned by the highest authorities, as no stimuli can act on the dead matter. We must give wine, opium, and ammonia to support the constitution. When burns heal they leave large cicatrices which keep gradually contracting. It has been proposed to divide them longitudinally, and let them heal so, or to cut out the whole cicatrix and bring the sides together; this last, however, can seldom be necessary, as it is always in the surgeon's power to heal them at first in this manner.

Sect. II.—Of Frostbites.

Frostbites affecting particular parts have been already noticed under the head gangrene. It remains now, to treat on that state in which the whole body has been affected with cold. In this case the patient experiences a drowsiness steal over him, followed by an irresistible desire to sleep; which, when he gratifies by lying down, proves fatal; for, so long as he continues any exercise, heat enough is generated to preserve life, but as soon as he ceases his exertions, there is no longer a sufficient supply for the rapid abstraction, his senses desert him, the brain can no longer furnish the body with sufficient vital energy, and he dies quietly and insensibly. When, however, a person is discovered before the fatal termination, we must use every exertion to re-animate him, by restoring warmth in the most gradual manner; and for this the best plan is to rub the body, or envelope it in snow or ice water, which will gradually thaw it. Sternutatories are to be applied to the nostrils, and cordials introduced to the stomach. But, above all, artificial respiration is to be carried on, either naturally or by opening the trachea. The body is now to be laid between two blankets and rubbed constantly, augmenting the temperature as gradually as circumstances will permit, and this treatment will often succeed in restoring persons apparently lost. If the frozen parts are incautiously heated they will mortify.

Sect. III.—Of Chilblains.

Chilblains are a less violent effect of cold, consisting of an inflammation with diminished vitality, and thus liable to slough when severe. The symptoms when mild are, swelling, with heat and itching, after a time spontaneously disappearing. In a more severe form, the tumor is larger and redder, sometimes of a dark blue color. The heat, itching, and pain so vehement that the patient cannot use the part. In a third form small vesicles arise, which burst, leaving ulcers which penetrate deeply, and secrete a thin matter; they are very slow in healing. In the worst cases, the inflammation ends in mortification.

Treatment.—One of the best applications to chilblains of the first and second sort is ice-cold water. The part affected is to be immersed in it a few minutes, two or three times a day, until the complaint quite disappears. This event usually happens in less than four days. After every application the part is to be well dried, and covered with leather socks.

In some cases tonics and astringents have had the best effect. Such are diluted muriatic acid; the saturnine lotion; spir. vini. camph.; tinct. myrrh; the alum lotion, vinegar, &c. In other instances, oleum terebinthinæ mixed with the balsam copaivæ; and a mixture of two parts of spir. vini camph. and one part of aq. litharg. acet. have proved the best applications. Suppurated chilblains require topical stimulants, such as warm vinegar; a mixture of aq. litharg. acet. and aq. calcis; or a salve containing the hydrarg. nitrat. rub. It is frequently necessary to touch the ulcers with the argentum nitratum. Gangrenous chilblains must be treated according to the rules explained in the chapter on mortification.

Chap. V.—Occulti, cause not apparent.

Sect. I.—Diffusi, affecting the system at large.

1. *Scrofula*, scrofa, a sow, because supposed to affect swine. This disease shows itself more particularly in young people or children than in adults, and has been noticed to exist in those, especially females, of florid complexion, light hair and eyes, long eyelashes, and dilated pupils, with a thick upper lip, and adune nails, generally of precocious intellect and lively dispositions. The forms in which it manifests itself are various, but attacks chiefly the absorbent glands and joints. When a part suppurates it does not contain pure pus; but this last is mixed up with flakes of unorganized lymph looking like curd, or sometimes thick like cheese. The ulcers which it produces are always very indolent with livid purple margins. This disease seems to be hereditary, and more common in cold climates.

Treatment.—There is no one medicine that has specific influence over this disease; but our object must be to strengthen the patient, and give a firmer tone to the body. If it be a child the diet should be nutritious, but not stimulating; and meat plainly cooked should not be allowed more than once a day, the rest should be farinaceous. There are indeed exceptions to this; for when a child is very much emaciated, or does not improve upon the light diet, we must then allow it animal food often, and but a little at a time, in preference to vegetables, and also a slight stimulant, as good beer or wine, if it does not prove too irritating. The patient should not be exposed to change of weather, and his clothing should be attended to. But air and exercise will prove of the greatest utility, particularly sea air and bathing, which, however, should not be continued for more than six months at a time and then varied. The bowels should be kept open, giving occasionally a purgative of calomel and rhubarb: and courses of bark. Steel, sarsaparilla, or liq. potassæ may be given, varying them also, and persisting for several months.

2. *Hysteria*, ὑστερα, the womb, because this is thought to be the cause of it, is a diseased state of the nerves to which women are subject, though many surgeons have seen positive cases of it in men who lead sedentary lives. It does not show itself till puberty, and therefore there is reason to suppose it connected with the genital organs. It appears especially in young and unmarried females who do not take sufficient exercise, and consequently are often stout ; but it is not confined exclusively to either of these states. The symptoms it produces are, fits of convulsions, with laughing and crying, &c.; but these are generally treated by the physician, and it is only the anomalous symptoms that fall under the province of the surgeon. These are very various, but it is of consequence that they should not be confounded with real diseases.

Thus we find difficulty of swallowing, loss of voice, retention of urine, pains in various parts, as the breast, knee, spine or sides, particularly the left. These pains come on gradually, and after some time occasion a little puffy swelling, which is marked by being as tender when touched very lightly as if pressed heavily; these are sometimes very severe, and last for months or years; but still they do not impair the patient's health or disturb her rest. They are very common in the joints, as was noticed by Mr. Brodie; they sometimes leave one part and attack another.

Treatment.—If originating from want of exercise or other constitutional causes, such as an impaired menstruation, the remedies will be obvious; but these are often not to be detected, in which case, when the pain is severe, we must apply a lotion of sp. rosmar. ℥iß. mixt. camph. ℥vi., or a belladonna plaster. The best constitutional remedies are valerian and ammonia.

3. *Cancer.*—Cancer, Latin, a crab; because the tumor with the surrounding enlarged veins has a distant resemblance to a malignant disease which attacks indiscriminately all the structures of the body, particularly glandular, beginning by a hardening, and ending in ulceration and sloughing. There are two varieties: 1. The common hard cancer: 2. The soft cancer, or fungus hæmmatodes.

1. *Common cancer* is known in two distinct states. 1st, before it has ulcerated, when the name schirrus has been applied to it, from Σχιρροω, to harden. 2dly, After ulceration, then called open cancer; but these are but stages of the same disease.

Symptoms.—In incipient schirrus there is nothing more apparent than an indurated cartilaginous tubercle, affected by acute lancinating pains, though these do not come on sometimes till later in the disease. Ligamentous bands may often be felt intersecting each other, leaving spaces mostly filled with fluid; the skin becomes puckered over it; discolored; and, by and by, ulcerates; the ulcer having thick wetted edges, discharging a thin ichor, not pus, extremely fetid; the progress of it is generally slow, but it sometimes spreads quickly, sloughing at times and causing profuse hæmorrhages; fungous growths often sprout up; it contaminates every part near it, and so increases in size. This indeed happens some time before the morbid growth shows itself. Then it affects the neighbouring chain of absorbent glands, which are also converted into cancerous structure; and, at last, the patient dies emaciated and exhausted. Fungus hæmmatodes is a white, soft, medullary substance, having sometimes ligamentous bands, and a feeling as if there were water in it. It is generally contained in a cyst; there is no structure or age exempt from it, whereas cancer is a disease of advanced life. It does not contaminate the absorbent glands, and is not so painful as cancer, but it spreads by contaminating the parts around.

Treatment.—No medicines of any sort have the least power of cure over these formidable diseases, but they may be removed by an operation; though even this is not always successful, as the disease often exists in the constitution; but by it the patient is saved for a time, and enjoys a few years more of valuable life; or he may in the mean time die of some other, and not so terrible a disease. If the operation be not successful, in removing every portion of disease, it will aggravate it, and the symptoms will re-appear with increased violence, so that we should in some cases hesitate to operate; for instance, where the disease exists in two places at once, or in very old people, or where it is indolent and may last for years, or when the skin is contaminated and much ulcerated; for in this case the malady will mostly re-appear either on the matrix or some other part. In cases where the operation cannot be done, keep the patient quiet; apply cold lotions, low diet, and occasional purgatives. If there be ulceration, a carrot or hemlock poultice, or black wash, or oxyd of bismuth ointment.

Chap. VI.—Locales.

Sect. I.—Diseases of Bones.

Inflammation may exist in either an acute or chronic form, but generally the latter, producing an enormous swelling of the limb, with pain and more or less fever. This may produce two effects, 1. Suppuration; 2. Necrosis.

1. *Suppuration* in bones has received the odd name of spina ventosa. If it be acute the pain is excessive, on account of its unyielding structure; but it gradually swells and bursts, generally forming several sinuses in the skin and soft parts, which require a long time for healing, as the bone mostly exfoliates. This inflammation is to be treated as any other in the first instance, and, as soon as matter is suspected in the bone, an opening should be made with a trephine. If it is long in healing, the patient's strength must be supported by tonics and generous diet.

2. *Necrosis*, νεκρος, dead.—By this is implied the death of bone that takes place, either in consequence of inflammation or from separation of the periosteum. It has been used improperly by many writers as synonymous with caries, but the latter is analogous to ulceration, the former mortification of soft parts. Necrosis attacks dense bones most frequently, as they have least power to resist injury, and so die; when this takes place in long bones, or where the perios-

teum is not destroyed, the latter forms a bony case round the dead portion, which is now called a sequestrum. This generally separates into several portions, each of which may have an external opening by means of a fistulous sinus, from the mouth of which there mostly arises a fungous granulation, and, if left alone, each portion of separated dead bone is brought by the action of the live parts to present itself at the external opening; but this is a very tedious process, and wastes the patient's health and strength by the constant discharge, with occasional febrile attacks.

Treatment consists in supporting the patient's strength, and leaving the rest to nature in most cases; taking care to prevent the lodgment of matter, giving free opening to the discharge, and dressing the sores lightly; and, when a piece of bone is to be felt, separated, we must take it away by enlarging the wound; but, if the case does not go on favorably, and there seems no separation of the dead parts, then the surgeon should cut down upon the new shell, and remove a portion by a trephine or mallet and gouge, and draw out the dead pieces from the opening. But there are also cases in which the patient's health is rapidly sinking, and then we must amputate the limb to save his life.

3. *Caries*, from κειρω, to abrade. An ulceration in bones, similar to that in soft parts, is often caused by matter locked up in bones, as between the tables of the skull, but is often caused by other diseases, as syphilis, scrofula, &c.; in which cases it attacks the soft or spongy bones, some of which have been mentioned, and others will be hereafter. When a caries is accessible, Boyer recommends touching it with the actual cautery, which changes it to a necrosis, and stimulates the parts underneath to throw it off. If a carious portion is contained in the canulli of long bones, we should trephine them.

4. *Exostosis*, from εξ, out, and οστεον, a bone, is a morbid growth of matter from a bone, generally not painful in itself, but occasionally by its size pressing on the neighbouring nerves, and thus giving a great deal of pain. There are two sorts, one hard and bony, generally arising from the periosteum, into which spicula of bone shoot; the other a fungous growth from the canulli, surrounded by a shell of bone. The first sort often becomes inconvenient from its size and pain by pressure on nerves; and, when it is situated in accessible parts, it may be removed by a saw, or gouge and mallet; but otherwise the limb must be amputated: the latter affection cannot be removed by an operation, on account of its malignant tendency; so that amputation is here our only resource: and it should be noticed that, if the disease exists at any part of a limb, we cannot ensure the rest of the bone being healthy; so that it is adviseable to remove the whole limb if possible.

5. *Rachitis*, from ραχις, the spine of the back. Weak, and particularly scrofulous children, are subject to this disorder, in which the bones, in consequence of a deficiency of lime in their structure, cannot bear the weight of the body, and become distorted. In infants, who are too young to walk, the action of the muscles is sufficient to make the bones, particularly those of the lower extremity, deviate from their natural figure. There are various mechanical contrivances sold in London for supporting rickety bones, and gradually restoring them to a straight figure. It is not necessary to offer here a description of any apparatus for the purpose. Bark, tonic medicines in general, and cold sea-bathing, improve rickety children by strengthening the system; for, in proportion as this happens, the phosphate of lime becomes secreted in a more regular manner, and, with the aid of mechanical contrivances, very great deformities are gradually removed.

6. *Mollities ossium*.—The bones sometimes in adults become remarkably soft and flexible from a deficiency of phosphate of lime, and so are bent by the action of the muscles. No means of cure or prevention are yet known.

Distortion of the spine may exist in two ways, 1st, there may be a single or double lateral curvature without caries of the bones; 2dly, a projection of the spinous processes caused by caries: the lateral curvature is caused by the weakness of the muscles supporting the spine being overcome by the weight of the head and shoulders, forming a bend to one side, generally near the loins, in which case the patient is obliged to make another bend near the shoulders to allow the head to rest perpendicularly on the pelvis; and there is generally a prominence of the hip, usually the left. It may be produced, however, by other causes besides mere weakness, as a constant unvaried position; for, in this complaint (which mostly occurs in young females), not only are the muscles weak, but also the ligaments allowing of considerable elongation.

Treatment.—Strengthen the system generally by tonics, air, and exercise, particularly on horseback; change the position often; attend to the function of menstruation that it is performed rightly, and exercise gradually the muscles of the spine, allowing the patient to rest in the horizontal posture after such exercise. But sometimes this disease is combined with rickets in which case the patient must wear some instrument when she is not being exercised, to take off the weight of the head, and give a moderate support to the spine; such a one has been made by a Mr. Laurie of Bartholomew's Close Smithfield.

Caries of the spine, causing absorption of the bodies of the vertebræ, and projection of the spine, with pressure on the spinal marrow, generally exists as a symptom of scrofula, and may attack either the bones or cartilages, producing, when it shows itself, paralysis, total or partial, of all the parts below the disease: its symptoms vary a little, according to the part attacked; thus, in the loins, the patient first begins to feel a loss of motion in his legs and thighs, causing him to trip, succeeded by a numbness or pain; there is also pain in the lumbar vertebræ, quick pulse, shiverings, and an abscess takes place in the psoas muscle, presenting itself under Poupart's ligament, or in the loins: the surgeon, upon examination, also finds a projection of the spinous processes, which are tender when struck or pressed.

Treatment.—We must, in the early stage, endeavour to prevent suppuration, by keeping the patient in bed, cupping on the loins, and the application and continuation of caustic issues near the affected part. If, however, abscess does present itself, we should open it, and let it heal up again, taking care not to use violence to it, or we shall bring on inflammation of the cyst, which produces symptoms of the worst typhus, from the matter in it becoming putrid. In this case we must open the abscess, and give wine, ammonia, and bark, and the inflammation may subside in a few days. When a psoas abscess has continued open, the patient becomes hectic, and seldom recovers.

Caries of the back.—In this, as in the other, there is difficult motion below, with pain on pressure; and the patient soon becomes unable to walk at all, not from complete paralysis but from violent spasms of the muscles. There is not much tendency in this case to form abscess.

Neck.—When this is diseased, the upper extremities are paralysed as well as the lower ones; there is also difficulty in breathing, and the bladder is often paralysed.

Treatment.—If ever this disease is cured, it is by anchylosis of the bones taking place, and in children this is not uncommon, but adults have not so good a chance of escape, as it then mostly proves fatal. This may be assisted by perfect rest and abating the internal inflammation by counter irritants, as caustic issues.

8. *Diseases of joints.*—Inflamed synovial membrane, as described by Mr. Brodie, is either a constitutional or local disease, and acute or chronic. When local it produces pain in the joint, exasperated by motion, soon followed by swelling of the joint spreading under the extensor muscles and on each side; and fluid may be felt to fluctuate, which is effused synovia. If acute, there is a symptomatic inflammatory fever. In treating this form we must bleed both generally and locally; and if the pain be violent we may apply warm fomentations and poultices; if not, cold lotion will be more serviceable. When the acute stage has subsided it leaves a swelling of the joint from, 1st, thickened capsule; 2dly, effusion of lymph into the surrounding skin; 3dly, effused synovia in the joint. And now we are to apply either one blister, keeping it open, for some time, or a succession of blisters; and then, if there remains any swelling or stiffness, we must use stimulating liniments. When it proceeds from gout or other causes, give colchicum; if rheumatic calomel and opium, or Dover's powder. When we have subdued the disease, Mr. Brodie strongly recommends the use of plasters and bandages to support the joint. Sometimes the disease assumes a chronic form; and, if neglected, the synovial membrane becomes altered in structure, appearing like a medullary sarcoma, which suppurates and ulcerates, extending first to the cartilages, then to the bones themselves; abscess forms in the joint, bursts, and the patient dies of hectic fever if the limb be not amputated. This then should be attacked vigorously in the early stage by rest, leeches, blisters, and cold lotions, and a milder climate may be tried if other remedies do not succeed.

9. *Ulceration of the cartilages* may be brought on by other diseases, but when it exists as an idiopathic disease, unconnected with scrofula, it produces these symptoms:—1st, When it attacks the hip joint there is at first pain referred to the knee, which gradually increases, when it may still be referred to the knee or sole of the foot, and is more severe during the night. It is aggravated by moving the limb, particularly pressing the head of the femur into the acetabulum. The nates become flattened and appear wider; the limb wastes, and in the early stage appears longer but in an advanced period shorter, and the toes are turned in; but, as yet, there is no real difference, the appearances being caused by the twisting of the pelvis. But at last the bone becomes dislocated by the absorption of the acetabulum and its own head, so that the muscles pull it into the dorsum of the ilium, but the capsule remains entire. Abscess now forms in the joint, marked by rigors, which shows itself externally, often at some distance, and is followed, when it bursts, by hectic fever.

When this disease exists in the knee joint there is pain in the knee which keeps increasing; it becomes a little swollen from effusion of lymph outside the joint, and the muscles, both above and below, waste away; matter soon forms in the joint, bursting at the inner or outer side of the knee, which may also be dislocated into the ham.

Treatment.—A most essential remedy for this disease is perfect rest. If there be much inflammation and fever we may bleed, cup, or leech. Issues should then be made near the joint with potassa fusa. When there is an abscess presenting we should puncture it, and allow the matter to escape, and the abscess to take its chance of either healing or remaining open; and give the patient tonics, and place the limb in the most favorable position for anchylosis, if this favorable event should take place; but in older persons this is rare, and they will die of the complaint unless the limb can be amputated.

10. *Scrofulous joints.*—This differs from the last in this respect, that whereas in the former the disease commenced in the cartilage extending to the bone, in the scrofulous disease, it commences in the cancellous structure of the bone, which (says Mr. Brodie) first becomes very vascular, then the earthy matter is absorbed, causing the bone to become soft, then a yellow cheesy substance is deposited in the cancelli; the morbid affection now spreads to the cartillages, causing them to ulcerate, and an abscess is formed, making its way outside the joint amongst the muscles, and sometimes a small portion of bone exfoliates into the articular cavity. This is a disease of early life, and sometimes exists in more joints than one in the same individual.

The *symptoms* which this disease produces do not differ in the later periods from those of the last affection; but in the first instance there is swelling of the joints of some duration, with little or no pain; this, with the aspect of the patient, enables the surgeon at once to decide upon the case.

Treatment consists in applying antiphlogistic remedies when there is pain, and putting the

joint into splints to keep it perfectly quiet. We must be cautious how we use counter irritants, as they frequently aggravate the disease; they, however, are admissible when the pain is severe. We should trust, however, chiefly to rest and the constitutional treatment recommended for scrofula.

Loose cartilages are generally found in the knee joint, and often exist without any traceable cause. They are at first connected with the synovial membrane, but soon become detached. Their size varies considerably.

Symptoms.—They sometimes give no pain, but this is rare; for in general they slip down into the articulation, giving a sudden and severe pain, causing the person to fall down; followed by inflammation and swelling of the joint, which lasts for some days and even weeks. Sometimes they become fixed in the joints, hindering all motion for some time.

Treatment.—We should endeavour to secure it in any part of the joint by pressure, which may cause it to adhere to that part, and so remove the inconvenience; but if this fails, which it generally does, we may remove it by an operation, if the joint be not otherwise diseased, which is not however unattended with considerable risk, from making a wound into a joint, so that it is only to be done in urgent cases.

When we set about removing it we must previously fix it by the fingers, if possible, at the inside of the joint, for there the parts are thinnest; and, drawing aside the skin, cut at once upon the body and seize it with a tenaculum. By this retraction of the skin the external wound is made valvular into the joint, which, by excluding the ingress of air, materially diminishes the risk of inflammation. It is almost needless to add that the patient must be kept in bed, and very quiet, till the wound has quite healed.

Sect. II.—Diseases of Arteries.

1. *Ossification* frequently takes place in persons of advanced age, but does not generally produce many symptoms of itself, though it lays the foundation of other diseases, as ossified arteries are liable to rupture. In this way are produced apoplexy or hæmatocele; but they act in another manner, by not allowing themselves to be filled with blood, or by a diminution of calibre, depriving the parts which they ought to supply of their proper nourishment, as is manifested in the gangrene of the toes in old people, and angina pectoris, caused by ossification of the coronary arteries of the heart. These, however, are diseases that cannot be remedied by art.

Aneurism (ανευρυνω, to dilate) may be defined to be a pulsating tumor, containing blood and coagulum, communicating with the inner coat of an artery, which, if left to itself, gradually becomes thinner, till at last it bursts and proves fatal by the profuse hæmorrhage. Aneurisms are met with chiefly on the larger arteries, and may be produced by various causes; but the most frequent is a diseased state of the inner coat causing it to ulcerate, or burst suddenly, on an extraordinary exertion being made. They may also be caused by wounds of arteries. Aneurisms used formerly to be divided into true and false; the true one being considered a dilatation of the coats, the false one a wound in the artery which caused a condensation of the surrounding parts to form a sac. But professor Scarpa has denied that aneurism ever can take place without rupture of at least the inner coat of the artery; and to which assertion, when a little modified, few modern surgeons have dissented. The formation of an aneurism is as follows:—The inner coat of an artery being diseased, either ulcerates or bursts from sudden violence, and the muscular coat, being unable to bear the impetus of the blood, gives way also. Thus all its force is borne by the cellular coat, which, being distensible, causes a tumor which resists for some time, but at length yields also, and the blood is received into the cellular membrane, condensed by the previous pressure of the tumor. And now the blood becomes coagulated, and forms successive layers of febrine, inside the sac, which still increases in size by the force of the pulsation of the contained blood. But this increase in size is attended with a diminution of thickness of the layers of lymph, which at last give way at one point; the sac bursts also, and the patient dies of internal or external hæmorrhage.

Symptoms.—These differ as the disease is situated in internal or external parts. When externally there is a small tumor pulsating strongly which may be reduced in size by pressure, on ceasing which it again returns, producing a numbness and spasms in the limb. It increases in size and becomes of a dark color. A small slough of the skin is produced, which bleeds alarmingly on separation, and may either kill the patient at once or by repeated bleedings. Internal aneurisms cannot be known at first; they produce disordered function in any part to which they are near, and absorption of all bony and hard structures that they touch. Tumors sometimes are situated over arteries; in which case you may feel them pulsate; but they may be known by not pulsating in every part as an aneurism does, but only directly over the artery which vibrates through them. They may also be sometimes moved from the artery, in which case there is no pulsation in them. In some very thin persons the abdominal aorta may be felt to pulsate through the integuments, and this may be mistaken for aneurism.

Aneurism, however, may be produced by other methods; there may be a dilatation first of the whole calibre of an artery, as described by Mr. Hodgson, which in time bursts, and so forms an aneurism.

Aneurism is also caused by wounds of arteries, when it may either condense the cellular structure round it and form a common aneurism, or extravasation may take place into the whole limb, which, being constantly augmented, may press on every part so severely as to cause gangrene; in which case the limb must be amputated.

Treatment.—Aneurisms, in about one case out of twenty or thirty, undergo a spontaneous cure by pressing on the artery above till it becomes obliterated, so no more blood passes into the sac and it is absorbed. But as this is so rare it is never relied on; and it is the duty of the sur-

geon to cure the disease by an operation. This was formerly practised by cutting into the tumor, turning out the coagulum, and tying the artery at both ends; but this was a severe and bloody operation, and often failed, because the artery was diseased where the ligature enclosed it, so that secondary hæmorrhage came on. This attracted the notice of Mr. J. Hunter, who, seeing the process that nature established for a cure, proposed imitating it by tying the artery before it came to the sac and at some distance from it, to have a healthy artery to operate upon. This was accordingly done in popliteal aneurism, by taking up the artery in the thigh where it passes under the edge of the sartorius muscle; and it succeeded and is the operation now practised, that is to say, the surgeon must tie an artery, for aneurism, as far from the tumor as he well can, taking care that he does not separate the artery more than he need from its connexions; and that no large branches are given off immediately before the ligature, as in this case there will be no room for the formation of a coagulum, and there will be hæmorrhage when the ligature comes away, and he should on no account use a broad ligature. After the operation the wound is to be brought together by adhesive plaster, leaving one end of the ligature hanging out, the other being previously cut off, leaving also between the strips of plaster small spaces for the escape of matter. Care must be taken in cold weather to preserve the warmth of the limb, which if it were suffered to lose too much heat would mortify. The ligature generally comes away in from twelve to fourteen days.

There are, however, many cases in which the surgeon must operate close to the tumor, as subclavian, carotid, inguinal, or hiar aneurisms, all which arteries have been tied successfully. Also in cases where there is a recent wound of an artery, with extravasation, the surgeon had better cut down upon the wound through the coagulum and tie the vessel above and below. In aneurisms on the scalp, from a blow, the surgeon had better cut it quite through and then apply firm pressure.

Varicose aneurism occurs from a puncture of an artery through a vein, which openings become permanent whilst the external ones heal. This causes an enormous dilatation of the vein over the artery, by the rushing of the blood from the artery into the vein, which also renders the color of the vein more arterial; and there is not a distinct pulsation but a feeling of whizzing. This, if the artery and vein are in contact by the formation of adhesions between the two wounds, becomes stationary after a time, and does not require any interference; but it more commonly happens that an intermediate sac forms between the artery and vein, which may increase so as to render an operation necessary.

Aneurism by anastomosis.—This is the term which Mr. John Bell, of Edinburgh, has given to a species of aneurism which resembles such bloody tumors (nœvi materni) as appear in newborn children, grow to a large size, and, ultimately bursting, emit a considerable quantity of blood. We find clear descriptions of this disease in writers, though, before the publication of Mr. John Bell's Principles of Surgery, it was not classed with aneurisms. Thus, Desault has recorded a case of this affection for the express purpose of proving that pulsation is an uncertain sign of the existence of an aneurism.

The aneurism from anastomosis often affects adults, increasing from an appearance like that of a mere speck, or pimple, to a formidable disease, and being composed of a mutual enlargement of the smaller arteries and veins. The disease originates from some accidental cause; is marked by a perpetual throbbing; grows slowly, but incontrollably; and is rather irritated than checked by compression. The throbbing is at first indistinct, but when the tumor is perfectly formed the pulsation is very manifest. Every exertion makes the throbbing more evident. The occasional turgid states of the tumor produce sacs of blood in the cellular substance, or dilated veins, and these sacs form little tender, livid, very thin points, which burst from time to time, and then, like other aneurisms, this one bleeds so profusely as to induce extreme weakness.

'This aneurism,' observes Mr. John Bell, 'is a mere congeries of active vessels, which will not be cured by opening it; all attempts to obliterate the disease with caustics have proved unsuccessful, nor does the interrupting of particular vessels, which lead to it, affect the tumor; the whole group of vessels must be extirpated. In varicose veins, or in aneurisms of individual arteries, or in extravasations of blood, such as that produced under the scalp from blows upon the temporal artery, or in those aneurisms produced in schoolboys by pulling the hair, and also in those bloody effusions, from blows on the head, which have a distinct pulsation, the process of cutting up the varix enables you to obliterate the vessel and perform an easy cure. But in this enlargement of innumerable small vessels, in this aneurism by anastomosis, the rule is 'not to cut into, but to cut it out.' These purple and ill-looking tumors, because they are large, beating, painful, covered with scabs, and bleeding, like a cancer in the last stage of ulceration, have been but too often pronounced cancers! incurable bleeding cancers! and the remarks which I have made, while they tend in some measure to explain the nature and consequences of the disease, will remind you of various unhappy cases, where either partial incisions only had been practised, or the patient left entirely to his fate.'

Sect. III.—Diseases of Veins.

1. *Inflammation* is generally the consequence of injury, though it is sometimes idiopathic as in the phlegmasia dolens. When it happens from wounds it is always acute, the inflammation extending in both directions from the wound, but is most severe towards the heart. There is violent constitutional disturbance, and if the disease run into suppuration in large veins it is accompanied by the worst symptoms of typhus, and the patient dies; but, when it ends more favorably, it is by effusion of lymph obliterating the vein.

Treatment must be the same as for other inflammations, but we must be cautious of bleed

ing if the disease originates from that, and employ leeches repeatedly, &c.

2. *Varicose veins* occur mostly in tall persons or pregnant women, or when the blood meets with any obstruction in its way to the heart. They are caused by an over-distension of the vein, so that the valves cease to act, and are either absorbed or thickened, producing a swelled and knotted appearance and feel of the veins, whose coats now become thicker to support the column of blood instead of the valves giving the veins a cartilaginous feel. There is no pain at first, but after some time the veins become more distended, lengthened, coiled up, and tortuous, and the patient feels first an itching, then a heavy numbness, and sometimes a very acute pain, and in many cases the limb becomes œdematous. Strings of coagulable lymph are now effused into the veins, and in a few instances have even caused obliteration, or at other times the blood becomes coagulated in the veins when they are hard to the feel, and often inflame and ulcerate. The ulcers are generally oval shaped in the direction of the veins; very painful; and have an ichorous discharge. Their color is dark blue when the patient is standing; of a livid red when lying down, and they are liable to bleed. In cases where there is no coagulation they sometimes burst and bleed alarmingly.

Treatment.—Put the limb into the horizontal posture, apply a bandage or laced stocking; if there is much pain apply cold lotions or blisters. When there are ulcers, heal them by pressure and sticking-plaster. When a particular cluster gives pain by pressing on a nerve, or hinders an ulcer from healing, we should cut them across with a convex bistoury, sharp at the convex side, which is to be introduced under the skin at a little distance, keeping the instrument flat; then, when it is over the veins, the cutting edge is to be turned towards them, and divides them as the instrument is withdrawn. Thus we have a valvular opening, which heals more readily, and is not so liable to inflammation. This is a much preferable operation to the old one of tying the vein, which was very dangerous.

Sect. IV.—Diseases of Nerves.

1. *Tic douleureux* is a most painful disorder, existing in the nerves of the face, especially the divisions of the fifth pair; but it is found occasionally in other parts of the body. The cause of this malady is quite unknown: in a few instances it has depended on a diseased state of the nerve itself either within or without the cranium, but in most cases nothing can be discovered. It generally attacks adults, and seems a disease of debility. The symptoms come on gradually, beginning at first with a slight pain, which increases progressively, till it becomes suddenly intolerable, making the patient scream with agony. It is at first limited, but soon extends over the whole face. The pain, however, is not permanent, but occurs in paroxysms, which last only for a few minutes at a time, but return several times a day, being brought on by any mental emotion, any sudden draught of air upon the face, &c. It is the peculiarity of all nervous pains that they cease when the person is asleep. These pains do not necessarily impair the patient's health, and they often recover.

Treatment.—We must first ascertain that the disease is not produced by a deranged state of health; if it be we must direct our attention to that; but, if not, we should give tonics, as carbonate of iron, arsenic, bark, &c. In some instances large bleedings have cured the disease, but are not to be relied on. If these remedies fail, we may give the patient a temporary state of ease by dividing the nerve at its exit from the skull into the face, simply cutting it across with a bistoury or scalpel.

2. *Nervous pains* frequently affect persons with disordered digestive organs, as described by Mr Abernethy in his treatise, and may be cured by attending to this circumstance; but they may exist independently, in which case we should give tonics, and apply a belladonna plaster to the part affected.

Sect. V.—Viscera

Urinary and Genital Organs. 1. *Testicle inflammation*, when idiopathic, is generally acute. There is much swelling, retaining the oval shape of the testicle; and it is very much hardened, with a painful feel of tension, even producing sickness. The pains often extend along the course of the spermatic chord to the loins, generally accompanied by symptomatic fever. It seldom goes on to suppuration.

Treatment is the same as that recommended to inflamed testicle from gonorrhœa.

Chronic inflammation may be merely a sequel of the acute, or come on spontaneously. It is generally met with in persons whose health has been previously impaired.

Its first symptom is a dull pain in the back and loins, extending towards the testicle; then, shortly after a pain is felt in the testes itself; then a swelling occurs, being at first irregular and knobby, but afterwards becomes oval; then if the disease be not checked, an abscess forms secreting a yellow cheesy matter, and, when it bursts, a fungus protrudes, which looks like the body of the testicle, sometimes covered by granulations, and having this cheesy matter on its inner side.

Treatment.—Put the system gently under the influence of mercury, either by calomel and opium, or the oxymuriate, or by rubbing mercurial ointment with camphor into the part. This must be continued for five or six weeks; but, if the disease arise from syphilis, or the previous exhibition of mercury, we should then give only very small doses, combined with the use of sarsaparilla. If an abscess forms, and sprouts out, we must sprinkle the surface with red precipitate, and keep the patient in bed; and, when it begins to granulate, dress it with some stimulant application.

There is another chronic enlargement, which arises from the irritation of a stricture in the urethra; the cure of which is therefore obvious, viz. to cure the stricture; but if it does not then subside we must give mercury for it as for the former.

Schirrus testicle is not of common occurrence, but when it does appear it is first in the body of

the testicle, producing a hard swelling which feels like a marble body in the scrotum, and is irregular and knobbed on the surface. It is attended with severe pain, which becomes more intolerable as the complaint advances. It next attacks the epididymis, and spreads up thes permatic cord, which becomes enlarged and tuberculated. In true schirrus the testicle itself does not grow to any considerable size.

Treatment.—The only remedy for this disease is extirpation, which must be performed before the neighbouring glands become contaminated, if we wish for success, as otherwise the disease is sure to return. Incision of the testicle is to be performed in the following manner:—

This is one of the most simple operations in surgery; but, before it is undertaken, be cautious that the disease does actually require to be removed, and particularly bear in mind the circumstances which should regulate its removal.

You grasp the testicle in your left hand; begin your incision at the upper part of the abdominal ring, and extend it to the lower extremity of the testicle. Lay bare the spermatic cord completely at the abdominal ring; and put a needle and ligature through it and the artery of the vas deferens. Having divided the cord, you draw it towards you, and detach the cellular membrane behind it: in this consists the whole of the operation. The spermatic artery, the artery of the vas deferens, and several in the scrotum, are the vessels which require securing.

In making your first incision, you must not leave any part of the scrotum undivided; for, if it is not carried to the lower part, a bag of matter will form, and the healing process be thus prevented.

Fungus Hamatodes.—This disease is much more common than the last; it begins, like true scirrhus, in the body of the testicles; but, unlike that disease, it almost immediately affects the whole body of the testicle at its first commencement.

In a very short time, the epididymis becomes affected; next the spermatic cord; and, in the course of a very few weeks, a tumor forms in the loins. The disease is at first unattended with pain; but, when the spermatic cord and the tumor in the loins become of great magnitude, the patient suffers considerably.

The fungoid swelling of the testicles sometimes increases to the weight of several pounds; and usually occurs between the age of seventeen and thirty-five.

The appearance of the surface is somewhat livid; the spermatic cord is loaded with blood, and in some parts you may feel a fluctuation, as if there was a cyst within it: it also becomes covered with tubercles of considerable size.

The tumor has a soft pulpy feel, readily yielding to pressure; and, on the first examination, you might suppose the disease to be hydrocele.

It may be distinguished from hydrocele in the following manner:—in the first place, it is flattened on the fore part, whereas in hydrocele it is pyriform; if you squeeze any of the fungoid tumor, the patient will complain of the pain arising from the compression of the testicles, which he will not do in hydrocele, unless you squeeze the posterior part of it: the fungoid tumor rather yields to the pressure of the finger than fluctuates from one side to the other, as in hydrocele; and, lastly, the great weight of the swelling when you lift up the sides, and the livid appearance of the scrotum, mark the malignant characters of this disease. The treatment is the same as for schirrus.

Varicocele, or varicose veins of the spermatic cord, are most common in persons of costive habit of body, and occur more frequently on the left side. They are sometimes annoying from the pain which they create, or, what is worse, from an absorption of the testis on that side. They may be mitigated by wearing a suspensory bandage, blistering over them, and keeping the bowels open. They are sometimes liable to be mistaken for rupture, but may be distinguished thus:—make the patient lie down and the tumor will subside on pressure upwards; but on continuing the pressure, reappears, which a hernia does not.

Hydrocele may exist in two forms, first in the tunica vaginalis; second, in the spermatic cord.

Tunica vaginalis has two varieties, the common and consenital. The common may occur in consequence of a slight inflammation, or without being traceable to any cause.

Symptoms.—The symptoms of this complaint are, a colorless, smooth, roundish, pyriform, sometimes oblong swelling, which slowly and gradually extends upward from the lower part of the scrotum. The tumor does not disappear on pressure. At first, it is soft and fluctuating; and, on the fingers being removed, it immediately rises to its former level. The swelling cannot be diminished, nor pushed into the cavity of the abdomen, by any artifice of the surgeon. When the disease is more advanced, and has attained a larger size, the tumor becomes oblong, heavy, and hard, though much less so than in the case of an enlarged testicle. At the same time, the fluctuation grows less distinct. If the fluid contained in the tunica vaginalis be clear, this membrane not much thickened, and a candle be placed behind the tumor, the scrotum has a semi-transparent appearance. At last the hydrocele so conceals the testicle that this body can only be distinguished, at the upper and back part of the tumor, by a certain hard feel. The spermatic cord, however, is still quite obvious to the touch. Though the swelling may have acquired its greatest size, and the scrotum be considerably distended, the corrugations of the latter part are seldom so obliterated as in the anasarcous hydrocele. The penis seems small, and, as it were, sunk in the tumor. The integuments of the scrotum also acquire an increased thickness; the veins appear large, and there is rather a sense of elasticity than of fluctuation, communicated to the surgeon's fingers. The spermatic cord itself even becomes somewhat concealed, when the hydrocele has ascended very far. In these cases, the tunica vaginalis always becomes more and more thickened, which change is common to all membranes, when they are long distended.

Treatment.—In young persons we may endeavour to obtain an absorption of the fluid by

using a suspensory bandage for the scrotum, and giving internal remedies, as calomel, scammony, and jalap; at the same time applying discutient lotions. But this often fails, and when it does, we must either adopt a palliative or radical treatment; the palliative consists in merely introducing a trocar and canula, and so drawing off the water, which may be required to be done usually once in six months, but in some cases in one, two, or three months. In performing this operation we must remember the situation of the testicle, to avoid wounding it; it is at the posterior part two-thirds of the way downwards. The radical cure may be performed by causing the inner surfaces of the hydrocele to adhere, by inflammation and effusion of lymph; or we may make an incision into the tumor, and heal it by granulation. This last is preferable when we suspect a diseased state of the testicle itself, but should not be attempted in old persons, as in them it often produces very violent symptoms. To produce adhesions there are commonly two ways employed, one the passage of a seton through the tumor, which is preferable in young people, though more tedious, as it generally requires ten or fourteen days. This was the method recommended by Mr. Pott. The other, and commonly the best manner, is by injecting the cavity with a stimulating fluid, and is generally performed thus:—a common trocar and canula is introduced, the water is drawn off, and an India rubber bottle, filled with injection, and provided with a tube and stopcock, is now fixed into the canula; the contents emptied into the sac by pressure, and the stopcock closed till the patient feels an uneasy sensation or pain in the loins, which generally happens in about four or five minutes. The bottle is now to be taken away, and the stopcock turned so that the injected fluid may run out. The patient must then be kept quiet for some days. Care must be taken in this operation that the fluid is injected into the sac and not the cellular membrane of the scrotum, as in that case sloughing must take place, endangering the patient's life.

Congenital hydrocele occurs in those children whose tunica vaginalis remains open from their birth, communicating with the cavity of the abdomen, and in which the serous secretion of the peritoneum is accumulated by gravitation. These hydroceles may be distinguished from common ones by our being able to empty the fluid from the sac into the abdomen by pressure.

Treatment.—The patient should wear a truss to prevent the formation of a rupture, and close the passage from the abdomen, which it does by the formation of adhesions, through the pressure and the communication being stopped; the effused fluid will be absorbed, if the patient be in good health; but if the swelling does not diminish it causes wasting of the testicle, or other inconvenience; then we may inject the tumor, taking care to prevent the passage of any portion into the abdomen by pressure on the abdominal ring. This was recommended and practised successfully by Desault; for it does not produce universal inflammation of the peritoneum as was apprehended.

Encysted hydroceles may occu between the tunica vaginalis and albuginea, or in the spermatic cord; in the former case the testicle feels like a double one; there is no pain; the latter is also not painful, and is oval shaped. It is likely to be mistaken for hernia, but is distinguished from it by its semitransparent appearance, by its not being able to be returned into the abdomen, and by the edge between it and the latter being well defined.

Treatment.—In boys they may generally be dispersed by stimulant lotions; but this is not the case with adults, in whom they may be injected when of large size; but when small should be laid open and dressed to the bottom with lint or flour.

Hæmatocele.—This signifies a swelling of the scrotum, or spermatic cord, occasioned by blood. The disease is of four kinds, two of which have their seat in the tunica vaginalis; one within the albuginea, and the fourth in the membrane investing the spermatic vessels.

1. In letting out the water of a hydrocele a vessel is sometimes wounded. After the operation, the blood insinuates itself partly into the tunica vaginalis, and partly into the cellular substance of the scrotum, so as to form in a very short time a tumor nearly equal in size to the original hydrocele. The blood colors the fluid of the hydrocele, when it is flowing through the canula.

2. Another species is when the blood is effused in consequence of a spontaneous rupture of a vessel after the operation, and it is entirely confined to the cavity of the tunica vaginalis. The fluid of the hydrocele is not tinged with blood, when discharged.

3. In the third kind of hæmatocele, the blood is extravasated within the tunica albuginea, from the vessels of the glandular part of the testicle.

4. The fourth arises from a rupture of a branch of the spermatic vein.

Treatment.—The first two cases may generally be cured by opening the cavity of the tunica vaginalis, removing the effused blood, and applying dry lint to the inside of the membrane. If the quantity of blood were very small, discutients might disperse it, and do away all necessity for operating.

The two other cases are less frequent. The third arises from a morbid state of the substance of the testicle, and can only be cured by castration.

The last species of hæmatocele, or that arising from a rupture of the spermatic vein, is generally caused by great or sudden exertions, contusions, &c.

When the case is clearly distinguished from a hernia, attempts must be made to promote the absorption of the extravasated blood, by applying to the tumor the sal ammoniac lotion, or even camphorated liniments. About twice a week, a purgative should also be exhibited.

If the case should obstinately resist such treatment, a thing which can hardly occur, an incision must be made into the tumor, and, the bleeding point being discovered, it should either be tied, or stopped with a dossil of lint.

2. *Diseases of the penis.*—The penis is subject to a variety of herpes, called herpes preputii. It is of consequence to recognise this, as it may else be mistaken for chancre. Its appearances are first two or three little vesicles, or one large

one, which soon become pustules; these break about the fourth or fifth day, and leave little ulcers, which have a white base, and a slightly elevated edge; and, if any escharotic be applied, it leaves a hard base like a true chancre. In treating it we should avoid all stimulating applications at first; and, if they do not heal, we may then touch with the nitrate of silver.

The penis is also liable to be attacked by cancer, which must be treated as other cancerous diseases; but there is one variety which deserves notice, this is

Cancer scroti.—The peculiar and distinguishing character of this disease from common cancer is, that it is nearly or entirely unaccompanied by pain. It is a disease which always makes its first attack on, and its first appearance in, the inferior part of the scrotum; where it produces a superficial, painful, ragged, ill-looking sore, with hard and rising edges: the trade call it the soot wart. I never saw it under the age of puberty, which is, I suppose, one reason why it is generally taken, both by patient and surgeon, for venereal, and, being treated with mercurials, is thereby soon and much exasperated: in no great length of time, it pervades the skin, dartos, and membranes of the scrotum, and seizes the testicle, which it enlarges, hardens, and renders truly and thoroughly distempered; whence it makes its way up the spermatic process into the abdomen, most frequently indurating and spoiling the inguinal glands: when arrived within the abdomen, it affects some of the viscera, and then very soon becomes painfully destructive. The only plan of treating this dreadful malady is by extirpating it before the ulceration has attained any considerable magnitude.

3. *Stricture of the urethra* sometimes exists at the orifice caused by recent ulceration and cicatrisation. This must be dilated with a bistoury, and then a piece of bougie must be constantly worn till it heals over it. Other strictures mostly take place on the membranous portion of the urethra, and may be produced by a thickened state of the membrane itself, or a mere chasm of the surrounding muscles, or by a union of both, which is most common. But a spasmodic stricture will lay the foundation of a permanent one, and permanent strictures vary very much; for one day it produces a great deal of distress, but another the patient is scarcely sensible of the disease. The symptoms of a permanent stricture are often liable to be mistaken for those of a gonorrhœa, there being difficulty in making water, sometimes pain, with a divided or fine stream, and discharge of mucus from the urethra. Then the bladder becomes irritable in proportion to the resistance the stricture offers. So that when we wish to ascertain what the disease is, we must pass a full sized bougie (as a smaller might be caught by the lacuna) which, if there be a stricture, will be stopped by it. Then we may try to pass to a metal sound. If a stricture be neglected the bladder becomes inflamed, and so irritable that it will not hold an ounce of urine, secreting a thick ropy mucus, which clogs up the passage. Sometimes from the effort of straining, sacculi are formed in the bladder, which grow larger and larger; and if the patient is subject to stone, these form receptacles for them. When there is great difficulty of passing the urine, the bladder becomes constantly distended; then the ureters become dilated, and the urine accumulating, the pressure is continued up to the glandular stricture of the kidneys, causing it to be absorbed; but urine is still secreted by the cortical part. It is generally accompanied by pain in the loins, and the constitution is generally affected. In permanent stricture an abscess often forms in the perineum behind the stricture, accompanied with much constitutional disturbance, the fever being inflammatory, if no urine finds its way to it, but more commonly there is a communication behind the stricture with the urethra, in which case the fever assumes a typhoid appearance, till the abscess bursts or is opened; which should be done as soon as the complaint is detected. Then the abscess is kept open by the constant dribbling of urine through the wound, round which is generally a little fungous growth, forming a fistula in perineo.

Treatment of stricture.—This consists in dilating it gradually, by the long continued use of bougies or catheters. Bougies generally give least irritation, when made of wax or plaster, but in old cartilaginous strictures, whose absorption we wish to promote by pressure, we should employ metallic ones; or, if they are very inveterate and contracted, we may destroy them by bougies, armed with nitrate of silver. A small bougie only can be passed at first, but the size may be afterwards gradually increased. If the passage of a bougie in a recent stricture gives much pain, or causes bleeding, we should omit its use for some days.

In passing all instruments into the urethra, we should be cautious of using violence, as the instrument may then be pushed through the urethra between the bladder and rectum, making what is called a false passage, and is known by the want of urine following it, in which case we should endeavour to find the true one, and keep a catheter in the urethra till the wound has healed. In cases where there is violent pain and irritation in the urethra, we should not attempt to pass an instrument, but bleed the patient and give him sedatives. When there is a spasmodic stricture, it may generally be relieved by the bougie aided by sedatives or the warm bath.

In cases of fistula in perineo, we should endeavour to pass instruments through the stricture; in which, if we succeed, the wound will probably heal, but in many cases this is impossible, even a probe not being admitted into the stricture. In this case we should cut down across the stricture, previously introducing a probe into it if possible; if not, we must be guided by our anatomical knowledge. Having divided the stricture, we should pass a catheter into the bladder, and heal the stricture over it.

4. *Bladder.*—Chronic inflammation. When this exists, which is not uncommon in old persons, there is a constant desire to make water, and pain after making it; the urine deposits a thick ropy mucus; it is often accompanied by febrile symptoms; the patient's countenance looks anxious, and he has a urinous smell.

Treatment.—Cup on the loins or perineum, or apply leeches; keep the patient quiet, give him opiate suppositories every night, and warm water injections to bring them away in the morning. The best medicines are uva urie; small doses of Cubeb's mercurials, or balsam of copaiba. It is seldom that we succeed in curing the disease, but these remedies mitigate it considerably.

Calculus.—This complaint may exist in two states: 1. Gravel in the urine; 2. Stone in the bladder.

Gravel may be of two sorts; the lethic acid, which is of a yellow color, or phosphate of ammonia and magnesia, which is of a whiter color. It produces a frequent desire to make water, blood sometimes accompanying it, and pain in the urethra.

Treatment.—Attend to the state of the general health, and if acid prevail in the urine, give a dose of calomel and rhubarb occasionally, with alkalies constantly. Let the patient avoid all acid substances, and take a vegetable diet. When the alkali prevails, give acids, as the citric or muriatic.

Calculi of three sorts are formed in the kidney. 1. Lithic acid; 2. The triple phosphates; 3. Oxalate of lime, or mulberry calculus; when the latter are voided, the disease is not likely to return, but the two former may always recur. A calculus in the kidney keeps on increasing in size, dilating the pelvis, and causing abscess; also pain in the kidney and outside the hip, which is very intolerable. These symptoms may be relieved, but not cured, by alkalies, which hinder the growth of the calculus, keep the urine only a little acid; when calculi descend into the ureters, they cause pain there and in the testicle, and after a time it becomes swollen and hard; but when they drop into the bladder the pain suddenly ceases, but the bladder becomes a little irritated. If they be very small they may pass through the urethra; but, if not so, they may lodge in it, causing retention of urine. For this the patient must use a warm bath, have an opium glyster, and then a strong purgative, which may make it pass more easily; or, it may, if small enough, be extracted by forceps made for the purpose; or this plan will sometimes answer: give the patient diluent, and diuretic drinks, after dilating the urethra for a fortnight, then let him keep a bougie in the passage as long as he can possibly bear the distended state of his bladder, and, when it is withdrawn, the calculus may be forced out by the gush of urine.

Stone in the bladder may arise from any substance lodging in the bladder, and forming a nucleus, round which fresh matter is deposited. The most common cause is a kidney calculus. Children and old men, with diseased prostate gland, are most liable to it. It is composed generally of lithic acid, but sometimes of the triple phosphate of ammonia and magnesia, or the oxalate of lime. In general a small stone produces no serious inconvenience except in diseased bladders; but, when of larger size, there is a pain in the glans penis, sometimes dull, sometimes burning, with pain in the bladder. Frequent desire to make water, coming on suddenly when the patient moves; after having made water, the pain becomes more severe, often excruciating. There is mostly blood in the urine at some time or other, often whilst making water the stream suddenly ceases, or the patient at times can only make water in one position. The sediment is a reddish mucus. These symptoms are all produced by the rough substance irritating the sensitive neck of the bladder; so that when there is an enlarged prostate, the symptoms are less violent. When a stone is very large, it presses on the rectum and causes pain, or piles, or frequent desire to void the fæces, when in reality the gut is empty. Stone often produces an inflammation of the bladder, and even of the kidneys, and sometimes ulceration of the bladder.

Treatment.—Stone may be hindered by proper remedies from growing larger, but by no plan hitherto proposed can it be dissolved when once formed, so that our only remedy is to remove it by an operation, except where the general health is bad, or there exists some other disease in the bladder. The pain may be relieved by an horizontal position, opiate glysters. When the bladder is diseased give demulcent drinks, and small doses of copaiba or culules. Females should seldom be operated on, as the urethra may in general be sufficiently dilated to admit of its extraction. An instrument has been invented for this purpose by Mr. Weiss.

5. *Acute inflammation of the prostate gland.*—This complaint is not confined, like the chronic enlargement, to late periods of life, but attacks persons of any age, and generally terminates in suppuration. The most prominent symptom which characterises this complaint is violent pain immediately after discharging the urine, and in this respect the disease resembles stone. As the inflammation advances, an abscess will be produced in the gland, and retention of urine the consequence.

Our treatment, in this case, must consist of blood-letting, and administering mild laxatives, together with antimonial medicines. The catheter it is also necessary should be used. We therefore pass a common catheter, and about the fourth day you will perceive that matter escapes through it; so that this, coupled with other circumstances, stamps the nature of the complaint. Rigors do not attend the formation of this matter.

Chronic inflammation, or enlargement of the prostate gland. This is the consequence of age, and not of disease; and is characterised by a number of symptoms sufficiently particular to distinguish it from stone. In these cases there is sometimes partial retention of urine; the patient is a long time voiding his urine, which has a particularly powerful smell, arising from its being ammoniated in consequence of its long continuance in the bladder. The next symptoms observable are pain and numbness in the glans penis; the prepuce not possessing its usual sensibility; there is a sense of weight and uneasiness in the perineum, relieved by pressure with the finger; pain in the back of one or both thighs, in the loins, and at the origin of the sciatic nerve, and course of the ureters; and the fæces are flattened from the pressure which is

made upon the rectum by the swollen gland. The urine finally acquires a highly offensive ammoniacal smell, and at length becomes white or milky, and, when long retained, brown, and even bloody.

If the enlargement of the prostate gland continues to proceed for a length of time, it will, in many cases, occasion a complete retention of urine.

Treatment of enlarged prostate.—Your object of treatment may be to endeavour to act upon the gland, by means of small doses of the oxymuriate of mercury, when the enlargement is the only complaint; but, if there is retention, you must relieve this symptom, and afterwards guard against its return. When no urine passes whatever, and when there is great pain at the neck of the bladder, you should take away blood from the arm, apply leeches to the perinæum, administer purgatives, and put the patient into a warm bath. If these means should succeed in procuring relief, the best medicine that can afterwards be given for the purpose of preventing a return of the retention, and, at the same time of lessening the inconvenience which sometimes attends the complaint, is composed of fifteen drops of the liquor potassæ, five drops of the balsamum copaibæ, and an ounce and a half of the mistura camphoræ. This is the best medicine you can use; it will afford considerable relief, which is all that you can expect; for you must not dream of making a cure.

When you are called upon to relieve retention of urine, from enlarged prostate, by the introduction of a catheter, the instrument should be fourteen inches in length, and a quarter of an inch in diameter. In consequence of the pressure within, a broad instrument will answer better than a narrow one, but, being bulbous at the end, it will readily ride over the enlargement.

When the difficulty of introducing the catheter is great, it is better to leave it in the bladder.

Retention of urine may arise from two causes: 1. Spasmodic stricture. 2. Diseased prostate gland. The former then is the case with young, the latter with old persons; this must be treated as recommended in diseased prostate. Spasmodic stricture generally occurs after a fit of intemperance and drunkenness, and is generally so complete that with all his efforts, the patient can barely squeeze out a single drop of urine. He becomes alarmed, his pulse rises, the bladder becomes more and more distended, and the patient's efforts proportionally increased. The countenance becomes anxious, the pain of the bladder excessive; but after the patient has been in this state for two days, or a little more, the pain abates, and a few drops of urine begin to flow. The sufferer now flatters himself that he shall be soon relieved, as he finds his clothes wet with urine; but this dribbling is caused by the full and violent distension of the bladder, which, not being able to hold another drop, forces out, by its tension, the urine which continues to be secreted by the kidneys. In a short time after this the patient feels something give way, or else feels himself suddenly relieved, and now thinks in earnest that he is well; but is miserably deceived. The bladder, from a continued state of inflammation, has sloughed, forming a round aperture in the perineum. into which the urine cannot flow for its dense fascia, but makes its appearance in the cellular membrane of the scrotum, penis, and above the pubis, and, if he be not relieved, the patient dies of the mortification of these parts.

Treatment.—In the early stage we must try to introduce a very small catheter or bougie without using violence, for that will aggravate matters. If we cannot succeed, we must put in practice every method for overcoming spasm, such as by the warm bath, particularly opium glysters, which succeed in nine cases out of ten. Doses of tinct. ferri. muriatis, as recommended by Mr. Cline, and the tobacco glyster. If these fail we may try a bougie armed with linen caustic, which will sometimes succeed; but if all fail we must then have recourse to puncturing the bladder.

Puncturing the bladder.—The operation of puncturing the bladder above the pubes is very simple, and is founded on the following anatomical circumstances:—in the natural formation of the parts, the peritonæum falls from the inner side of the rectus, over the upper part of the bladder, and is reflected backwards to the fundus, leaving a space filled with cellular tissue, between the pubes and the reflected peritonæum. This is the space in which the operation is performed, and all that is required, is to make your incision through the integuments, to the extent of an inch above the pubes. It is best to open the integuments in the first instance, because the trocar will afterwards enter the bladder with more ease, and because, if there should be any extravasation of urine by the side of the instrument, it will more readily escape. The incision should extend as far as the linea alba. With respect to the direction in which the trocar is to be passed, you must not, on any account, direct the point downwards towards the anus, but obliquely from the penis to the back of the pelvis, just towards the basis of the sacrum. The trocar and canula being introduced, the water passes through the canula; and an elastic gum catheter should be introduced through the canula, and may be left in the bladder for a great length of time without producing any injurious consequences.

In the female it is absolutely necessary this operation should be performed in cases of retention of urine, from retroverio uteri, and from a cancerous disease affecting the meatus urinarius. Operating through the vagina ought never to be performed.

Operation through the rectum.—This operation is performed in the triangular space formed by the meeting of the vasa deferentia, constituting the apex; the sides from the vasa deferentia as they diverge in their passage backwards; and the basis of the triangle, by the peritoneum, as it is reflected from the posterior part of the bladder to the upper part of the rectum. When you pass your finger into the rectum, you will feel the bladder projecting into it. It is elastic, and yields with difficulty to the pressure of the finger; you will readily feel the fluctuation.

This leads you to the spot where the trocar is to be introduced; the triangular space above-mentioned is directly presented to the point of the instrument. You introduce your finger about an inch (never less than half an inch) behind the prostate gland, and then upon the upper part of the finger pass the trocar, which may be either curved or straight, to the posterior part of the bladder. When the point of the instrument rests upon the upper part of the rectum and the posterior part of the bladder, you pass the trocar into the bladder obliquely upwards and forwards by a slight and sudden motion of the hand. An elastic gum catheter is then to be employed. On the whole, however, though an easy operation, there are many objections, and I would not recommend it to be performed.

But Sir A. Cooper says, In cases of accumulation of urine in the bladder, for which many would have recourse to puncturing that organ, I have found opening the urethra only, a better and safer course. All I do is this, I desire the patient to draw up his legs as if he was going to be operated on for stone; I then make my incision into the urethra, according to the seat of the stricture, and the result is, that the urine is passed by the perinæum, and the bladder is relieved, without being in the slightest degree injured.

If we are not called to the patient before the bladder has given way, we must make an incision into the urethra, through or behind the stricture, and scarify the swollen parts freely to let out the urine and sloughs; then we must apply poultices to promote their separation, and when the wounds begin to look clean, dress them.

6. *Rectum.*—Piles are caused by varicose veins of the rectum; they are situated either above or below the splenetic muscle, but not on it. When they are situated externally, they often swell and inflame, becoming very troublesome; but, when internally, they produce first an itching of the rectum and scrotum, then a sensation of some foreign body in the rectum, which subsides and returns alternately; then when at stool the patient notices something protruding, which becomes more and more every time; they will return spontaneously at first, but presently the patient is obliged to press on them; and at length it is with great difficulty and length of time, that he can get them up at all; now there is a great discharge of mucous; pain when they protrude; they inflame and often bleed profusely; the patient becomes pale and feeble, and has a voracious appetite; they often lay the foundation of a prolapsus ani, and at last they make large fleshy tumors, which ulcerate, or form abscesses, causing fistula in ano.

Treatment.—Keep the bowels moderately open; when they are in a mild form, wash them with cold water, and inject this every morning after a stool. If they are more severe, add to the injection alum, or a muriated tincture of iron, and give the patient Ward's paste. If they are very severe, and bleed, we may remove them by an operation. If seated externally they may be snipped off with knife-edged scissars; but this is not safe where they are internal, on account of the profuse hæmorrhage. These are to be tied thus:—The patient must be made to sit over warm water, and strain; and when the piles come down, run a needle, armed with a double ligature, through them, and tie one on each side tightly round the base. This is not very painful and soon sloughs away.

Fistula in ano.—This name has been improperly applied to all abscesses about the rectum, but it is only applicable to those which do not heal but leave a sinus, lined with a cartilaginous matter and secreting not pus but ichor. These sinuses may or may not communicate with the rectum, and can generally only be cured by an operation.

Treatment.—It is of great importance to give such medicines as will bring the fistula into a healthy state. With this view the balsam of copaiba may be given with great advantage: if there is much irritation give soda, which has great efficacy in diminishing the irritability of the rectum. Aromatic medicines should be given, especially the confectio piperis nigri of the London Pharmacopœia. This medicine in a very short time brings the fistula into a healing state; healthy granulations arise from the surface, and the discharge, instead of being serous or bloody, consists of good pus. Submuriate of mercury, with saline purges, should be occasionally given during the use of aromatics, with a view of promoting the secretion of the liver and intestines. The operation of dividing the sphincter ani is simply in proportion as you find a ready opening into the rectum. You introduce a small probe-pointed bistoury into the fistula, pass your finger up the rectum to meet the instrument, and, carrying the point downwards, divide the intervening parts. If the fistula is very extensive, you will be under the necessity of putting your finger on the extremity of the instrument, drawing the knife downwards. If the fistula does not open into the rectum to meet the knife, place it along the end of the knife, and move the rectum for some little time with your finger nail, and then, cutting through the cellular tissue, bring the point of the instrument into the rectum. A very copious bleeding generally follows the division of the intestine; you must not, therefore, leave your patient, but endeavour to stop the hæmorrhage by introducing a portion of lint into the wound. No union of the sphincter ani will take place until granulations have arisen at the parts of the wound most distant from the rectum. You should not change the lint for several days, but apply poultices, and merely introduce a probe from day to day, to see that there is no improper adhesion.

Ulcers of the rectum, give the patient a great deal of pain and mental anxiety; causing an unpleasant discharge and a gradual decay of the health. They may often be cured by mild laxatives, then stimuli, as copaiba, cubebs, or Ward's paste; but when they do not heal it is generally owing to their being constantly agitated by the splenetic muscle; so that division of this, in a backward direction, will accomplish the cure.

Prolapsus ani is common in children of costive habit; in whom purgative medicines alone will generally succeed in removing it; but if not we may support the rectum by a compress and use

of astringent injections. In adults, it generally depends upon internal piles, upon the cure of which the disease ceases.

Sect. VI.—Diseases of the Skin.

1. *Œdema* is a preternatural accumulation of aqueous fluid in the interstices of the cellular substance of a part. The tumor is uncircumscribed. The skin of the swollen part retains its natural color: if at all changed it is rather paler. The part has a cold feel, and the pressure of the finger occasions an impression, or pitting, which remains some time, and disappears slowly. There is no acute pain; but there is an uneasiness or sense of weight, and tightness. When the œdametous limb is in a depending posture, the magnitude of the tumor is increased, et vice versâ.

Œdema may depend on constitutional, or on local debility. Contusions, sprains, the long-continued use of relaxing poultices, and washes, are often local causes of œdema. A part which has undergone acute inflammation often remains œdematous for some time afterwards. In all these instances the tone of the vessels being impaired is the cause of the disease. The complaint is very often owing to some impediment, preventing a return of blood to the heart. The pressure of the gravid uterus on the iliac veins often renders the lower extremities œdematous. Aneurisms frequently compress the chief veins of an extremity, and bring on this affection. Œdema must frequently be a mere symptom of other diseases, which operate as a cause. It accompanies ascites, hydrothorax, deeply seated abscesses, &c.

Treatment.—No cure can be expected till the particular cause has been removed. To promote the absorption of the extravasated fluid, and to re-establish the original tone of the vessels, are always, however, grand indications. The limb should be kept in an horizontal position. Frictions made on the part with flannel, fumigated with aromatic vapors; the application of camomile flowers, and preparations containing camphor; and a moderately tight roller; tend strongly to rouse the absorbents into action. The operation of these means is considerably assisted, by giving internally purgatives, diuretics, and emetics. If the tumour should not soften under this plan, but become so tense as to occasion pain, inflammation, and the danger of gangrene, the fluid may be discharged by means of small punctures. These, however, are not void of danger; for all wounds, in dropsical constitutions, and parts, easily become gangrenous. The punctures, therefore should be as small as possible. It is chiefly, however, in cases of anasarca, or those attended with a general dropsy of the whole body, and an extensive extravasation of water in the cellular substance, that scarifications become necessary, and not for the local swelling, implied by the term œdema.

2 *Boil.*—This does not differ from common abscess, except in containing a small slough at the bottom, which is commonly called the core; this should be squeezed out and it will heal up. Persons are often troubled with a course of them after illnesses; in these cases country air will be serviceable, and a course of liq. potassa or bark, &c.

3. *Carbuncle* occurs in persons of broken down constitution, either from free living or other causes; it may be called a malignant or gangrenous boil. It is always attended by considerable constitutional disturbance. The swelling is not much elevated above the level of the surface of the body, the skin, over the middle of the disease, assumes a dull brown, red color; and, what is always very remarkable, it becomes so hardened and thickened, that, when handled, it feels like brawn. As the complaint advances, several apertures generally form in the tumor. Through these openings, a yellow, greenish, bloody, irritating discharge flows out, while the great mass of the matter, and sloughy cellular membrane, still continues confined, and the gangrenous mischief, in consequence of an early, free opening, not being made, often spreads to such an extent that the patient perishes. Indeed, the ravages attendant on carbuncles are at their deepest part, or their base which always occupies a much greater extent than the superficial portion of the disease.

Treatment.—We must lay them open by a crucial incision, and poultice till the sloughs have separated; then stimulate them. Give the patient cordials and tonics, and, if he have several in succession, sarsaparilla or mercury, with generous diet, country air, and exercise.

4. *Tumors, encysted,* occur mostly in the substance of the skin, and are composed of a cyst, analogous to a serous membrane, which secretes a pulpy cheesy substance, very offensive and rancid. They are situated very commonly in the scalp. They sometimes inflame and burst, leaving a little orifice, from which matter flows and is incrusted, sometimes in the shape of a horn.

Treatment.—It is seldom, if ever, that we can discuss these tumors, but we may check their growth by cold and stimulating lotions; the only cure is by removing them. In doing this we take care to avoid opening the cyst; but, by dissecting round it, turn it out entire, without much difficulty. If we should accidentally wound it we must then take hold of the cyst by a pair of dissecting forceps, and care must be taken not to leave any of it remaining, or else fungus granulations often rise from it, hindering the wound from healing. The wound may otherwise be healed by the first intention.

Fatty tumors are either contained in a fine cyst or not; the former is the most common. It gives the patient no pain but continues to increase. If it gets beyond a certain size it is liable to inflame, and either suppurate or ulcerate.

When it ulcerates, the growth of the tumor is more rapid, and discharges a thin watery pus with flakes of fatty matter floating in it. This may be distinguished from other tumors by the feel, it being soft, elastic, and possessing no fluctuation; they sometimes run into more malignant tumors. The only method of curing these is to dissect them out when they become troublesome. It is generally a very easy operation. We must cut into the middle of them, and can mostly separate them from the surrounding parts by the fingers.

There are several other varieties of tumors, not contained in cysts, and not of malignant nature, such are the sarcomatous or fleshy tumors de-

scribed by Mr. Abernethy. These require the same treatment.

5. *Corns and bunyons* are caused by a laminated induration of the cuticle from constant pressure or friction, and are generally produced on the feet by wearing tight shoes; when the disease is more severe, or in that form which is commonly called bunyons, 'a buva mucosa,' says Mr. Brodie, 'is formed under the part which often inflames, though it seldom ends in abscess, but causes a great deal of pain.'

Treatment.—We may either palliate or radically cure them; the first may be done by causing the patient to wear looser shoes; paring the corn; soaking it in warm water; defending it from pressure by wearing a felt sole with a hole cut to receive the corn, or applying pieces of diachylon plaster spread on leather over the corn, but, leaving a little aperture in the middle, which just allows the greater part of the corn to enter; these will generally succeed in quieting them, but when they inflame, we must leech them, and apply cold lotions. If they suppurate they will burst and cure themselves radically; otherwise this may be accomplished by rest, soaking the feet every day, and then paring away as much as possible, till we can dig out the little heart in the middle, or else we may pare it very thin, and then touch it with lunar caustic. Mr. Brodie says they may be cured by blistering.

6. *Whitlow*, is an abscess situated at the root of the nail, very often burrowing under it, causing a great deal of pain and death of the nail. It should be opened as soon as possible, and, if there be matter under the nail, we should let it out by scraping the nail with a piece of glass till it is quite thin, and then slit it up; when the nail dies it acts as a foreign body and irritates the abscess, so we should bring it away as soon as possible.

7. *Warts* have been already mentioned as occurring about the pudenda, the treatment of which will apply to common warts; but these last may be safely removed, by nitric acid or ligature.

8. *Navus.*—These are spots in the skin which have grown with the child, and consist of a plexus of small arteries and veins, which sometimes spontaneously enlarge, and are apt to bleed; if the application of cold does not succeed in checking them, they must be treated as aneurisms by anastomosis which they very much resemble.

Sect. VII.—Diseases of Glands.

1. *Absorbents.*—Inflammation of these does not differ from common inflammations, except that there are lines seen running from one to the next above it; this is particularly the case on the arm, but this disease is generally caused by extraneous matter, which has already been noticed under the head of *poisoned wounds, and dissecting wounds*. But the most common affection of these glands is the scrofulous affection of them, in which case they proceed to suppurate very slowly; they must be treated as recommended in scrofula.

2. *Salivary glands.*—Ranula is a tumor of the sublingual gland, which is very annoying to the patient, as it hinders the motions of the tongue. It is caused by an obstruction of the duct, so that the saliva accumulates in it, and then becomes inspissated; it is not painful, and may be treated by making an artificial opening into the mouth, either by cutting a piece out or opening the tumor, and preventing it from healing.

3. *Salivary fistula.*—When a salivary gland inflames and suppurates, it may break externally, through which opening, the saliva pours in incredible quantity, so that the patient is constantly annoyed, particularly at meal times; these may be best cured by running a seton through the external opening into the mouth.

4. *Thyroid gland* is liable to schirrus as well as other glands; but this is very rare, the most common affection of it, being a preternatural growth of its own substance, so that it forms a monstrous tumor in front of the neck; this has been termed goitre, and is very common in mountainous countries; so much so, that in some districts of Switzerland they are considered ornamental; they are more frequent in scrofulous persons. These tumors cannot be removed from the quantity of blood vessels, but they may be diminished or even cured by the exhibition of iodine, internally or externally.

5. *Diseases of the breast.*—This gland is liable to inflame, especially when nursing; it is generally accompanied by acute pain, and mostly ends in suppuration, forming an abscess, which, when deeply seated, breaks by several openings, forming sinuses between them.

Treatment.—The antiphlogistic means must be used the first instance; but, if the pain be violent, warm applications must be used instead of cold ones. If it suppurates it is generally better to allow it to break. If sinuses form they must be laid open; and Mr. Hey recommends that, if any portion of breast is contained between two sinuses, it should be removed.

Schirrus breast never happens under puberty, seldom under twenty-seven years of age, but mostly when menstruation begins to cease. It is sometimes situated at the nipple, sometimes it forms a substance superadded to the gland, but mostly attacks the latter, causing its structure to become altered. There is frequently in the first instance a bloody discharge from the nipple; then comes on a round tumor, hard knobbed and irregular, with lancinating pain, but not always at the commencement; then the nipple is tucked in, the skin adheres and ulcerates, having every character of the cancerous ulcer as already described. After some time it becomes adherent to the pectoral muscle, and the affection spreads to the glands of the axilla or behind the clavicle.

Treatment.—This, like all other cancers, can only be cured by an operation, and this should not be performed if the neighbouring parts are much contaminated, or if the patient be old. The operation of removing this or most other cancerous tumors is a mere piece of dissection. The incision is generally double and semi-oval, to include the portion of diseased or superfluous skin, thus ( ); the apex should point to the

axilla, so that if we find a gland diseased near the breast, we may extirpate it by this first incision; several small arteries are generally wounded, and may be compressed by an assistant. The dissection should now be continued on both sides, and then the base may be removed when we expose the pectoral muscle and meet with the mammary arteries. These are to be tied, and the ligatures left hanging out at the lower aperture. The wound is now to be closed by adhesive plaster, &c.

There are other diseases of the female breast not schirrus. One which grows to a very large size, the pancreatic sarcoma, which is not likely to return when removed, or there may be tumors containing hydatids, also to be removed.

SECT. VIII.—DISEASES OF THE ORGANS OF SENSE.

1. *Eye.*—Our limits will not admit of even a description of most of the disorders incident to this beautiful and complicated organ; we must therefore be content to describe one or two most interesting to the surgeon.

Fistula lachrymalis, which consists, in the first instance, of an obstruction of the lachrymal duct, so that the tears become accumulated in the sac, and after some little time flow over the face; then the tears lodging in the sac become inspissated, create irritation and inflammation of the sac, which however does not suppurate at first, but furnishes a thin mucus of a pale color, which, as the disease advances, gradually assumes a more purulent appearance; at last the skin over the sac, by repeated attacks of inflammation, becomes thin and bursts; and now the tears flow freely over the face, being extremely troublesome: the eye also becomes more or less inflamed, and the bones of the ductus ad nosum not unfrequently carious.

Treatment.—In the first stage it is best to inject some bland fluid, as milk or whey, into the nose from the punta lachrymalia, by means of Anel's syringe. Having thus cleared a passage for the tears, a slightly astringent and stimulating collyrium may be dropped into the eye, from which it will naturally find its way to the sac, and this is often successful; but, when the duct is quite closed, we may make an opening into the sac, or, if there be one already, dilate it; then pass a probe down the duct, and withdraw it, leaving in its place a silver style, with a small flat head, to prevent its slipping into the nose; this should be taken out and replaced once a day for about a week, and then less often: it may be discontinued in about a month or five weeks. But when the sacculus is quite obliterated, or the bones carious, a new passage altogether must be made; and for this purpose it is usual to perforate the os unguis which divides the posterior part of the sac from the cavity of the nose; this is effected by a small trephine, or a curved trocar, and into the aperture a style is to be introduced, as in the former case, for fear of the opening healing.

Extirpation of the eye may be required in cases of cancer, &c., and is to be performed thus:—The eyelids are to be divided at the outer canthus, to give freedom to the operation, and the conjunctiva to be separated above and below; then the eye may be seized by a tenaculum, and a straight knife introduced above, and to the inner side of the ball, which thus divides the optic nerve and muscles at once. It may then be passed round under the eye to free it; a good deal of hæmorrhage generally occurs, but may be stopped by pressure: the inner surface granulates, and so heals.

2. *Nose.*—Polypus. There are two sorts which affect the nostrils, generally growing from the superior spongy bone; the more common one being transparent and gelatinous, and more liable to return; the other being fleshy, and not so liable. These occasion great uneasiness by plugging up the nostril, and sometimes deafness, by pressing on the opening of the eustachian tube; or one may even press on the jugular vein, causing giddiness, headache, and other signs of venous obstruction upon the brain. These are to be removed by an operation which consists in passing a curved pair of forceps as near the root as possible, and then pulling them away; but, as they depend upon a diseased state of the bone or membrane of the nose, they are liable to return; so that, when we have removed them, we should endeavour to cure or alleviate the disease by touching the part with some stimulating application, as the ung. hyd. nil. mitius.

Ozæna generally occurs in scrofulous people, but is met with occasionally in others. It begins with a sense of fulness in the nostrils, and discharge of mucus, as if the patient were affected by a common cold. This is caused by the membrane being thickened, which thus contracts the nostrils: this goes on increasing, till at last the patient cannot breathe at all through the nostrils, and he wakes in the morning with a dry tongue as hard as a board, giving him great uneasiness: this goes on for some time, till at last the membrane ulcerates, discharging a very fœtid matter, and the bone dies and exfoliates. In the latter stage the patient feels pain in the nostrils, and at the root of the nose, on the forehead.

Treatment.—In the early stage we should employ stimulating and astringent lotions, or snuff; when the disease is more advanced, we may dip a camel's-hair pencil in the following liniment, and apply it all over the nostril internally: ung. hyd. nil. mitius: ol. olivæ, ā ā partes æqualis. Sometimes it is useful to give the oxymuriate of mercury and sarsaparilla. Ulcerated openings in the septum may often be cured by touching it with the ung. hyd. nil. mitius, or solution of argentum nitratum.

Abscess of the antrum highmorianum is occasioned by obstruction of the duct leading into the nose. It occasions the antrum to swell enormously, disfiguring the face; the bone grows as thin as paper, and there is very great pain. An opening must be made by drawing the third molar tooth, and perforating its socket into the cavity; or, what answers better, is to cut away with a curved knife a piece of the projecting tumor under the upper lip, where the bone is so thin that it may be cut easily.

3. *Mouth.*—Enlargement of the tonsils occurs often after common quinzy, especially in scro-

fulous persons. It alters the sound of the voice by obstructing the nose. It renders deglutition uncomfortable and obstructs the breathing, particularly during sleep, and sometimes causes deafness. This enlargement generally subsides spontaneously soon after the age of puberty.

Treatment.—If it is very troublesome we must endeavour to mitigate it by giving burnt sponge or iodine, steel bark or sarsaparilla, and send the person to the sea side. If this treatment does not succeed we may remove the whole or greater portion by ligature, or what answers better, as it is less inconvenient, is to cut off about three-fourths of it with a curved pair of knife-edged scissars, having probe points. The bleeding is not considerable and the pain trifling.

Some persons are affected with an elongation of the uvula, which thus drops down into the fauces, causing a constant cough and irritation. In this case we may snip off a portion and gargle the throat with astringent substances.

The lip is peculiarly liable to cancer, especially the lower one; in which case we should remove it, and by bringing the edges together, and retaining them by hare lip pins, we shall get them to heal without much deformity.

4. *Hare lip.*—This is a malformation of children, there being a fissure or longitudinal division in one or both lips. It most commonly exists in the upper lip, and the fissure may be double with a little portion of lip between them. It commonly affects only the lip, but sometimes extends along the bony palate as far as the uvula.

This deformity may be remedied by an operation, which is merely paring off the opposite edges, by a knife or scissars, in a straight direction, and bringing them together; and in order to retain them in apposition it is usual to employ one or more silver pins, at one end of which is a moveable point. These are thrust through the opposite parts and the points withdrawn. Then silk is to be twisted round them to retain them.

This wound being a clean cut unites by the first intention, but it is not prudent to take out the pins too early; they should be left for about four or five days, then sticking plaster will be sufficient. When there are two fissures we should operate on one at a time. When the bone is deficient it obstructs the voice and swallowing; a piece of sponge or metal plate may be adapted to fit it and will remedy these inconveniences.

PART III.

VARIOUS SURGICAL OPERATIONS AND OBSERVATIONS.

Sect. I.—Of Amputation.

Amputation, derived from ab and puto (the *b* becoming *m* by vocal assimilation), implies the pruning off or severing from the body a diseased limb; and thus, by removing the offending part, allowing the constitution, which has become affected by sympathy, liberty to recover its pristine health and soundness. Something terrible associates itself in the imagination of mankind with the idea of cutting off a portion of the human frame, so that the application of the knife was looked upon as the last resort; according to Ovid, 'incurabile vulnus ferro encindendum est, who has at the same time very well expressed the motive which renders an operation of this kind necessary. But, till within the last two centuries, the art of securing a lappet of flesh to cover and prevent the protrusion of the truncated bone was unknown. In the year 1679 it was proposed by Jacob Young, an English surgeon, in a treatise which bore the title of Currus Trimphalis est Terebintho to preserve a flap of flesh and skin which might be folded over the bone, and, by coalescing, effectually prevent the inconveniences of excoriation or rawness which might otherwise be apt to take place. We might antecedently conjecture that the first attempts were unsuccessful, owing to our ignorance of a method of healing the wound by the first intention, to an inaptitude of the instruments, and to an awkward manipulation in the operator.

Amputation may be rendered necessary either when a member is so much diseased as to be useless, or when it puts life in danger. The general causes rendering this operation necessary are bad compound fractures; extensive lacerated and contused wounds; part of the limb being carried off by a cannon ball or otherwise; the bones being unequally broken and not properly covered; extensive mortification; white swellings of the joints; large exostoses; ulcers attended with extensive caries; cancer or other incurable ulcers; varicose kinds of tumors; particularly distorsions of the bones.

Amputation may also be sometimes necessary from violent hæmorrhages of some principal artery during the cure of a fractured limb, or from such a profuse discharge of matter taking place that the strength of the patient is exhausted. Lacerated and contused wounds may require amputation on account of hæmorrhage ensuing which cannot be stopped. Extensive mortification may take place, and such large quantities of matter be formed that the patient will be unable to bear up under the discharge. Where part of the limb is carried off it is necessary to amputate higher up, so as to cut the bone, as well as the soft parts, in such a manner as may admit of a much speedier and safer cure. When mortification occurs every thing ought to be done for the support of the patient till this symptom be stopped; the first sign of which is the appearance of an inflamed circle between the diseased and sound parts. As soon as the diseased begin to separate from the sound parts, amputation of the limb ought to be performed, and no time ought now to be lost, lest the patient suffer from the absorption of putrescent matter.

No part of surgery is brought to greater perfection than the manner of performing amputation. Before the invention of the tourniquet, and the method of securing the vessels by ligature, the operation was seldom undertaken; and a great proportion of those upon whom it was performed died soon after. In the present improved method one death does not happen in twenty, or even thirty cases. In performing the operation particular attention is to be paid to the spot where the incision is to be made; the quantity of skin and cellular substance necessary to be saved, so as to cover the muscles and bone

completely without being stretched; cutting the muscles in such a manner that they may unite with each other and entirely cover the end of the bone; the prevention of hæmorrhages during the operation; the tying of the arteries alone, without including the nerves or any of the contiguous parts; securing the integuments so as to prevent them from retracting after the operation; and a proper subsequent treatment of the case.

The following are the general steps of the operation:—The patient being properly placed, with assistants to attend, and the apparatus in proper order, the flow of the blood to the limb is to be stopped by the tourniquet. The first incision is to be made through the skin and cellular substance by one or two circular strokes of the amputating knife. These are next to be separated from the muscles as far as may appear sufficient for covering the stump. The separated skin or flap should be strongly drawn up, or, what perhaps answers better, turned up all round the limb, leaving this part of the muscles quite bare. The flap is to be kept in this situation by an assistant, while the operator makes the next incision at the edge of the reflected skin, and cuts till he comes to the bone. This incision should be begun on the lower side of the limb, that the blood may not prevent the eye from readily following the edge of the knife during the whole cut. The muscles are now to be separated from the bone as high as may enable them afterwards completely to cover it. The soft parts in general are then to be drawn up by retractors, which may be either of leather or metal. The periosteum is to be divided at the place where the saw is to be applied; but no part of the bone is to be denuded of this membrane, which is afterwards to cover the stump, otherwise troublesome exfoliations may ensue. At this place the saw is to be applied, and the bone divided with long steady strokes. In this part of the operation a good deal depends upon the steadiness of the assistant who holds the limb; for, if it be held too high, the motion of the saw will be impeded; while the bone may be splintered if it be not sufficiently raised. Any points or splinters which may be left should be immediately removed with the pincers. The retractors are now to be laid aside, and the principal arteries separated from the nerves, and secured by the tenaculum, or forceps, and ligatures.

The tourniquet should next be a little slackened, to allow the different branches to be discovered. The clotted blood is to be cleared away with a warm sponge. The patient should get some warm cordial drink, and all the arterial branches which can be discovered ought to be taken up. The ends of the ligatures are then to be cut of such a length as to allow them to hang without the lips of the wound. The muscles and skin are now to be drawn down and brought into close contact, that the stump may be completely covered. The parts are next to be secured by proper bandaging; and, if the operation has been properly performed, the cure will commonly be made by the first intention, and may be completed in the course of three or four weeks, and sometimes in a shorter period. This, however, must depend much upon the constitution of the patient, as well as the manner of performing the operation.

Of amputation of the arm and fore-arm.—Amputation of the arm is performed according to the rules already laid down. No more of it should be removed than is diseased; for the longer the stump is the more useful it proves. The tourniquet is to be applied a little above the part where the operation is to be performed: as much of the integuments should be saved as may be perfectly sufficient for covering the sore. In taking up the artery, after the bone has been divided, the operator ought to be attentive not to include the radial nerve, which may be readily discovered and separated, as it lies close upon the fore part of the artery. The fore-arm is to be amputated nearly in the same manner as the leg; only that the stump may be covered by amputating with the double incision, without the assistance of a flap, which it is necessary to form in the leg.

Of amputation of the thigh.—In performing this operation the patient ought to be placed upon a table of ordinary height, with the diseased limb supported and secured by an assistant seated before him, while other assistants take care of the other leg and the arms. The course of the blood is to be stopped by applying the tourniquet over the trunk of the femoral artery, near the upper part of the thigh. No more of the thigh ought to be removed than is rendered necessary by the disease, as the more of it is left the more useful it will be to the patient. An assistant should grasp the limb with both hands a little above the place where the skin is to be divided, and draw it up as far as possible; while the operator, standing on the outside of the limb, makes a circular incision down to the muscles by one or two strokes of the knife. As much of the integuments is then to be dissected with a scalpel from the muscles as may cover the stump completely; and this part of the skin may either be turned back or drawn tightly up by an assistant. The muscles may then be divided quite across to the bone by the edge of the skin, in the common way, or cut obliquely upwards, according to the method of Allanson, so as to lay the bone bare two or three fingers' breadth higher than is done in the common way. The muscles are next to be separated from the bone with a scalpel a little way, that a sufficient quantity may be left for covering the end of it. The rest of the operation is to be performed exactly according to the general rules laid down in sect. I. The muscles and integuments are to be drawn over the end of the bone, and applied closely together, that the skin may completely cover the stump, and retained in this situation by an assistant till a a flannel or cotton roller, according to the season of the year, which has been previously fixed round the body, be applied in such a manner as to support and fix them. For which purpose it should be passed two or three times, in a circular direction, round the top of the thigh, and should afterwards, with spiral turns, be brought down near to the end of the stump, and fastened with pins; and it should not be tighter than may be sufficient to assist the plasters in preventing retraction.

The ends of the divided muscles are now to be laid exactly over the bone; and the edges of the skin are to be brought into contact, either so as to form a straight longitudinal line, according to the method of Mr. B. Bell, &c.; or they are to be placed horizontally, 'that the wound may appear only in a line with the angles at each side,' as advised by Allanson. The ligatures may either hang over the edges of the wound, or be brought to the angles. After the edges of the skin are in this manner exactly applied to each other, either a few slips of adhesive plaster are to be laid across the face of the stump, or two large pieces of adhesive plaster, with several pieces of tape fixed to them, are to be applied to the surface of the skin. The tapes are then to be tied with a running knot immediately over the wound; by which the parts will be kept so closely together as to prevent any collection of matter from being formed. The whole surface of the stump should next be covered with a large pledget spread with an emollient ointment, over which a compress of fine tow is to be put, and retained in its place by a broad cross strap of old linen, passing some way up the thigh, so as to be secured by the roller, which is now to be passed two or three times round the stump; and the pressure formed by the cross strap may afterwards be increased or diminished at pleasure, by drawing it with more or less tightness, and fixing it with pins to the roller. While the stump is dressing the tourniquet is removed, but replaced again loosely to enable the attendants to check any hæmorrhage which may afterwards ensue.

The patient is now to be laid to rest, and the limb is to be placed upon a little tow covered with linen, or upon a thin soft pillow; and to prevent the patient from involuntarily moving the limb, and to guard against spasmodic startings, which frequently happen after this operation, it may be fixed to the bed by two straps. A basket or hooped frame ought to be placed over the stump to protect it from the bed-clothes. The patient should immediately get an anodyne draught, which will generally procure ease through the rest of the day. For this purpose no more light should be let into the room than is merely necessary for allowing the attendants to pay attention to the stump. As hæmorrhages sometimes appear several hours after the operation, the person who takes the charge of the patient should watch this circumstance with the greatest attention. If there be only a slight oozing of blood there is no occasion for being alarmed; but whenever it appears to proceed from a large artery it must be secured. The spasmodic affections which frequently occur after amputation are seldom troublesome, unless some nerve has been included in securing the arteries; but, when they do appear, laying the limb in the easiest posture, and giving opiates, are the principal means of procuring relief.

To prevent inflammation as much as possible, the patient is to be kept upon a strict antiphlogistic regimen, and his bowels kept open by laxative clysters till the inflammatory stage is over, which will generally be in a few days. If, notwithstanding this treatment, the stump swells, and the patient complain of pain and tightness, we ought to endeavour to discover from what cause the uneasiness originates. If it be owing to the straps being too tightly fixed they must be slackened. If the stump be found much swelled, a saturnine solution should be applied by means of several folds of linen; and if the patient be young and plethoric he ought to lose a few ounces of blood from the arm; but if he is weak and emaciated a different mode of treatment must be followed.

At the end of the third or fourth day, at farthest, the stump should be examined; and if it appear somewhat open and flaccid, the parts must be brought closer together and secured more firmly. After this time the dressings should be renewed every day, or every second day. In about a week after the operation the ligatures may generally be removed with ease; but if they do not separate readily they may be gently pulled at every dressing, when they will, in a short time, be brought away, and the wound will be soon healed by the first intention. The roller should be cleaned and renewed as often as it is found sullied; nor should it be laid entirely aside till the end of the third or fourth week after the operation. When the roller is removed, we may depend upon the straps or tapes for keeping the parts together till the cure be quite accomplished. When the inflammatory symptoms are entirely gone, no medicines ought to be given which would debilitate the patient, nor is any thing more necessary than to keep the bowels gently open till a complete cure be made.

Of amputation of the leg.—The leg may be amputated for a disease in the foot at two different parts; the one a hand-breadth under the knee, the other a little above the ancle. The former makes a sufficient support for the body to rest upon an artificial leg, but the latter does that equally well, and likewise preserves the motions of the knee.

In performing the operation a little way under the knee, the patient is to be placed and secured in the same manner as in operating upon the thigh. The tourniquet is to be placed a little above the knee, with the cushion upon the artery in the ham. The surgeon places himself upon the inside of the leg, and makes a circular incision through the integuments down to the muscles. The place where the incision should be made must depend upon the length of the limb; but in general it may be between six and seven inches under the top of the tibia in an adult, or far enough down upon the limb to save as much integuments as will cover the stump. After the integuments are cut through, in the manner already directed, as much of the muscles are to be divided by the knife as can be done by a circular incision; and the interosseous parts are to be divided by a scalpel or catlin. The retractors are then to be applied, and the bone sawed off immediately below the insertion of the tendons of the flexor muscles. In sawing, the operator ought to begin upon both bones at the same time, that he may finish upon the tibia, lest splinters should be formed. The vessels are next to be secured; the soft parts drawn over the bones; the adhesive plasters and other bandages

applied in the same manner as directed for amputating the thigh, only that here the roller need not be applied so high as in the former operation. Two or three turns above the knee, however, are necessary to prevent the dressings from slipping down.

In amputating upon the ancle, the operator should fix upon that spot which will leave the stump of such a length as may be most convenient for being fitted with an artificial machine resembling the other leg. Nine inches from the joint of the knee, in a leg of ordinary length, was found by Mr. Wilson, a late ingenious artificial limb maker in Edinburgh, to be the best part suited to this purpose, on account of the equal pressure it makes upon the surface of the leg, without making any upon the end of the tender stump. The operation is performed in the same manner as that a little below the knee.

Of amputation at the joints of the extremities.—The circumstances most to be attended to in performing amputation at the joints are, first to stop the circulation by the tourniquet; or, where that is impracticable, to take up the trunk of the artery by a ligature; to make a circular incision in such a place as may, after the operation is over, be sufficient to cover the wound; then a longitudinal incision is to be made upon the opposite sides of the limb, extending from the joint to the circular cut, and as deep as the bone, by which two flaps will be formed to cover that part of the joint which remains after the operation is finished. The ligaments of the joint are next to be divided, and the affected limb or part of the limb removed. After this part of the operation, it was formerly a frequent practice to scrape off the remaining cartilage, to unite the parts more firmly together. But this is now found to be unnecessary; for, when the flesh is applied properly to the bone, if it do not grow to it, the union at least is so close that it afterwards gives no inconvenience to the patient. Any branches of arteries which may have been cut during the operation are now to be secured; clotted blood is to be removed; and the muscles and skin are to be brought into close contact with the ends of the ligatures hanging out of the wound. The parts are to be retained by adhesive plasters, or twisted suture, or both; and proper bandages applied in such a way that a cure may be made by the first intention.

Amputating the arm at the shoulder joint has always been considered as a dangerous as well as a difficult operation. It should never be attempted, when the same purpose can be accomplished by operating lower down. But cases occasionally occur where the life of the patient cannot, in any other manner, be saved.

Amputation may become necessary here in consequence of abscesses of the joint; caries of the humerus reaching to the joint; compound fractures, especially those from gun-shot wounds, extending to the head of the bone; and of mortification.

In performing the operation, the patient should be laid upon a table of convenient height, covered with a mattress. He is then to be brought as near to the edge of it as possible, and secured by assistants. The circulation of the blood in the arm is next to be stopped, by an assistant pressing strongly with a firm compress over the subclavian artery, where it passes over the first rib; or an incision may be made along the course of the artery, which may be secured after separating from it the contiguous nerves. When the artery is compressed, it will readily be known whether the compression proves effectual, by observing when the pulse at the wrist is entirely stopped. As soon as this is the case, a circular incision is to be made through the integuments at the insertion of the deltoid muscle into the humerus. An assistant then draws the skin a little back, and at the edge of the retracted skin the muscles are to be cut in a circular direction to the bone. If the artery has not been taken up at the beginning of the operation, it is now to be secured, as well as any branches which come in the way.

The amputation knife is now to be laid aside, and the rest of the operation finished with a strong scalpel. A perpendicular incision is next to be made at a little distance from the outside of the artery, beginning at the acromion, and terminating in the circular incision, cutting as deep as the surface of the bone. A similar incision is to be made upon the back part of the arm, so that the flaps may be nearly of an equal breadth. The arterial branches are here to be secured; the flaps are to be separated from the bone, guarding against wounding the trunk of the artery; the flaps are to be supported by an assistant; and the capsular ligament of the joint is to be cut from the scapula: and thus the arm will be entirely separated.

After the arm has been separated, any arteries which appear about the joint are to be tied, and all the ligatures brought over the edges of the wound. The parts are to be cleared of clotted blood, and the two flaps drawn over the wound, and secured by the twisted suture. A pledget of any emollient should then be applied, and a sufficient cushion of lint, with a compress of old linen, put over the whole. A moderate pressure is next to be applied by a flannel roller: by which the parts will be supported, their union facilitated, and matter most likely prevented from being lodged. The treatment is then the same with that after amputation in other parts of the extremities. For two or three days after the operation, it is necessary that an assistant sit with the patient to compress the artery in case a bleeding should ensue.

When it is necessary to amputate the whole hand, the operation may be performed at the wrist, so as to leave as much of the member as possible; and the same rules hold here as in amputating at any of the rest of the joints. The tourniquet is to be applied to the artery in the arm, and the cure is to be completed by the first intention. When any of the carpal bones are affected, the sore will not heal till they either work out by suppuration, or are cut out by the knife. When the middle of any of the metacarpal bones is diseased, while their extremities are sound, the trepan may be applied, and the diseased parts removed, while the remaining sound parts are preserved. But if the whole bodies of one or two of these bones be affected, while the rest remain sound, all the affected bones ought to be removed. In performing the

operation, an incision is to be made along the course of the part affected; and, if the operator have it in his choice, the incision should be made upon the back part, so as to save the great vessels and nerves situated in the palm. The integuments are then to be dissected, and turned to each side; after which the diseased bones or parts of bones are to be removed, guarding as much as possible against wounding the principal arteries or nerves which lie near them.

The diseased parts are next to be separated; any arteries which happen to be cut are to be secured; and, on account of the free communication which they have with neighbouring branches, they ought to be tied at both cut ends. If, after this, a bleeding still continue, compresses, styptics, and other remedies proper for stopping blood, are immediately to be used. The sides of the wound are to be brought together, and an attempt made to cure them by the first intention.

In amputating the fingers, it was formerly the practice to operate upon the bodies of the bones in the same manner as in the larger extremities; but at present the removal at the joints is more frequently practised. In performing the operation, it is necessary to save as much skin as may cover the stump, and this ought to be done upon the side next the palm, so as to guard against the effects of friction. The general steps of the operation are the same with those for amputation of the larger joints.

A circular incision is to be made on the finger by a crooked bistoury, about the middle of the phalanx, and it may be carried at once to the bone. Another incision is to be made with a common scalpel at each side of the finger, beginning at the circular one, and continuing it to the joint, by which two flaps will be left to cover the stump. The ligaments of the joints are now to be divided, and the bone removed. The blood vessels are to be secured by ligature, and the flaps exactly applied to each other; but, in order to protect the end of the bone completely, a small portion may be cut from the uppermost flap. The flaps are to be retained by adhesive plaster, or by the twisted suture; but if the latter be used, the tendons ought to be avoided. Over the sore an emollient pledget is to be applied, and then a compress and roller. If the disease be so situated that, instead of amputating at the cavity of the joint, the surgeon shall think proper to operate upon the body of the bone, flaps are to be formed as above, and the bone is to be divided by means of a small spring saw.

The amputation of the thigh, at the hip-joint, has always been considered as one of the most formidable operations in surgery; so much so, that very few cases appear on record of its having ever been put in practice. In the Medical Commentaries of Edinburgh an instance is recorded where the thigh was amputated at this joint, and where the patient survived the operation eighteen days, and then died from a different cause, when all risk of hæmorrhage was over, and when the sore had even a favorable appearance, which shows at least that the operation has been done with safety. It certainly ought never to be done, however, unless as the last resource, and when the life of the patient is in absolute danger; and then only when as much skin and muscles can be saved as will cover the sore, and when there is also a probability of being able to stop the hæmorrhage, and prevent it from returning.

When the operation is to be performed, the patient is to be laid upon his back on a table, and properly secured by assistants; one of whom should be ready with a firm cushion to press, if necessary, upon the top of the femoral artery, just after it passes from behind Poupart's ligament to the thigh. A longitudinal incision is now to be made through the skin, beginning immediately under the ligament, and continuing it downwards along the course of the artery for about six or seven inches. The aponeurosis of the thigh is then to be divided by gentle scratches till a furrowed probe can be introduced, when the opening is to be dilated by means of a scalpel, till two or three inches of the artery be laid bare. A strong ligature is now to be put under the artery by the assistance of a curved blunt-pointed needle.

The part where the ligature should be passed is immediately above the origin of the arteria profunda; for, if that artery be not affected by the ligature, the patient might suffer by the loss of blood during the rest of the operation. The ligature is now to be secured by a running knot: another ligature is to be introduced a little below the former, and likewise secured; the artery is then to be divided between the ligatures. A circular incision is now to be made through the integuments of the thigh, about six inches from its upper end. The retracted skin is then to be pulled at least an inch upwards, and at the edges of it the amputating knife is to be applied, so as to cut the muscles down to the bone. This being done, a cut is to be made upon the posterior part of the thigh, beginning a little higher than the great trochanter, and continuing it down to the circular incision, and as deep as the joint. A similar cut is to be made on the anterior part of the thigh, at a small distance from the artery, and this reaching likewise down to the bone. The two muscular flaps are to be separated from the bone and joint, and held back by an assistant. Every artery which appears is now to be secured. Then the capsular ligament, and next the round one, are to be separated from the acetabulum; by which means the limb will be removed from the body. The acetabulum and neighbouring bone are next to be examined; and, if they appear sound, the case will be more favorable; but, at any rate, a cure is to be attempted by the first intention. For which purpose, after removing all the clotted blood from the surface of the wound, and bringing the ligatures over the edges of the skin, the muscles are to be placed as nearly as possible in their natural situation; and, drawing the flaps together so as to cover the wound in the most accurate manner, they are to be kept in this situation by adhesive plaster, and by the twisted suture and other dressings, as in amputating at the under part of the thigh. The dressings are to be retained by a broad flannel roller passed three or four times round the body, and spirally over the stump, and se-

cured. The patient is then to be laid in bed on the sound side, and treated as for amputation in other parts of the body; only that greater attention is necessary, as there is no assistance from a tourniquet. Uncommon attention will also be necessary to prevent inflammation, and every symptom of fever which may succeed to the operation.

When the foot is so much diseased as to require amputation, the operation might be performed at the point of the ancle; but, for the reasons given when treating of amputation of the leg, it is found better to do it above the ancle. When a considerable part remains sound, it ought to be saved. If any of the tarsal bones are affected, these are to be removed. When the middle or whole body of any of the metatarsal bones are diseased, they are to be removed in the same manner as directed for similar operations in bones of the hand; and, if even two of them remain sound, provided they be so placed as to support the toes, they ought to be preserved, as it is known that, by proper treatment, an osseous matter may afterwards fill a considerable part, if not the whole, of the void; or, if any cavity remain, it may be so stuffed that the use of the foot may still be enjoyed.

In performing an operation of this kind, the patient should be laid upon a table, and the tourniquet applied in the ham to prevent hæmorrhage. An incision is then to be made along the affected part; and, if the seat of the disease admit it, the incision should be made upon the upper side of the foot, so as to save the sole. The integuments are to be separated and turned to each side, to allow the affected parts to be completely removed. The principal vessels and nerves are to be saved as much as possible; but, if any particular artery be cut, it is to be secured, and the part treated as after the removal of similar parts of the hand. The amputation of the toes is exactly similar to that of the fingers.

Of removal of the ends of carious bones in the joints.—In compound fractures, the ends of bones, when they protruded in such a manner that they could not otherwise be returned, have frequently been sawed through, and their place has frequently been supplied by a renewal of bone, so as to preserve the ordinary use of the limb. Many cases have likewise happened where a large part of the body of the bone has been thrown out by suppuration, and its place supplied; and a few are upon record where either the whole of a bone, or that end next the joint, has been thrown out, and its place filled up with callus, so that no inconvenience has been felt. From these circumstances, Mr. White of Manchester was led to preserve an arm by sawing off the head of a diseased humerus; and Mr. Park of Liverpool to save a limb, by sawing off the ends of the bones, in a case of white-swelling of the knee. When therefore it happens that the end of a bone is diseased, while the other parts are sound, the diseased part may be removed, and the sound one saved, so as, in a great measure, to preserve the free use of the limb.

In performing the operation, the first step should be to use such means as may enable the operator to have a full management of the circulation of the part affected. Then a longitudinal incision of sufficient length, and perhaps another across it, may be necessary to be made through the soft parts of the joint; and this opening ought to be at a distance from the large blood-vessels, that they may be in no danger of being injured. After the end of the diseased bone is sufficiently laid bare, it is either to be brought out of the joint, or a spatula or some other proper substance is to be introduced between the bone and soft parts, so as to defend the latter in time of sawing the bone. After the diseased part of the bone is removed, the arterial branches are to be secured, and the wound treated like any other wound of equal size.

During the cure, the limb ought to be kept in the posture most favorable for the removal of the bone, and afterwards for the preservation of the natural motion of the joint. In this way a limb may sometimes be saved which would otherwise have been removed. But, though the removal of the diseased end of one bone may be readily effected, the removal of all that part of the bones which enters into the composition of a joint must be attended with so much inconvenience that it can seldom be useful, unless it be where the ends of bones are destroyed by external violence; for then it appears that this operation may be performed with considerable success.

Sect. II.—Of Ophthalmia, and its Treatment.

Ophthalmia is generally understood to mean the inflammation of the eye, but since this term is derived from οφθαλμος, the eye, without any adjunctive to specify on what account the eye is alluded to, there is nothing prescriptive in the sense, and we may extend its signification so as to make it embrace all those diseases which have their origin and seat in parts of the eye. The disease of which we are about to treat may be induced by a variety of those causes which operate in producing inflammation in other situations; a severe cold in the eyes, if it should be contemporaneous with some affection in the pituitary sinuses, fauces, and trachea, will occasion the disease in question. Other exciting causes have been enumerated, such as a change of weather, sudden transition from heat to cold, the prevalence of cold winds; residence in damp or in sandy countries, during the seasons of summer's drought, exposure of the eyes to the glaring light of the sun, &c. Since from the nature of things a multitude of similar causes are likely to happen at the same time, it ought not to seem extraordinary that the ophthalmia should sometimes put on the appearance of an epidemic and afflict persons of every age and sex. Mr. Green has presented us in Castle's Manual with such an excellent arrangement and description on the indications and treatment of the various modifications of diseases affecting the different parts of the eye, that we cannot do better than avail ourselves of a portion of such valuable materials, beginning with the simple inflammation of the conjunctiva.

1. *Simple inflammation of the conjunctiva.*—Simple inflammation of the conjunctiva may be divided, like other inflammations, into acute and chronic; and first of the acute.

(1.) *Acute ophthalmia.*—The symptoms of the affection in question do not differ from those of chronic inflammation of other parts of the body, except in so far as they are modified by the structure of the part, and by the function of the organ. We will speak of the local appearances, and afterwards of the constitutional derangements.

The first symptom is redness of the part, which is very remarkable, because the blood naturally conveyed by the vessels to this part is colorless. The vessels become injected with red blood. When the irritation continues the vessels become still more apparent, and at length all the interlacements and anastomoses of the vessels of the conjunctiva partake of the inflammation, and present almost one uniform appearance of redness. During this time more or less pain is experienced; at first, as the vessels become filled, an uneasy sensation is felt; this increases, and at length, upon the admission of light, a sharp lancinating pain is experienced; the patient is under the necessity of keeping the eye closed, and, indeed, has some difficulty in raising it not only from the pain he suffers, but from the degree of fulness and swelling with which it is accompanied. This pain goes on increasing, and at length the patient complains of a burning heat and a sensation as if some extraneous body were lodged in the conjunctiva of the lid. At this time the admission of the least light or air produces such lancinating pain that the eye is spasmodically closed. The affection is also attended with a more abundant secretion of tears, which, at the highest stage of excitement, is suddenly diminished, and there is a preternatural dryness of the eyes, producing painful sensations. A considerable degree of swelling takes place, the conjunctiva becomes turgid from the quantity of blood admitted by the vessels, and effusion follows. Although the swelling is pretty equally diffused over the whole surface of the conjunctiva, it seems to be the greatest at the transparent cornea, because here the coat is more tightly adherent. The conjunctiva is here elevated in a circular fold, and this appearance is called chemosis. The eye-lids are in general more or less swollen. Not only is pain experienced in the eye, from the causes I have mentioned, but also a sense of weight and fulness in the globe of the eye, as if the ball were too large for the socket. The neighbouring parts also, the forehead and temples, partake of the pain; there will be a shooting pain to the maxillary bone, or more deeply seated in the head; and these pains are in some instances extremely violent.

The local symptoms, as we have already hinted, are attended with considerable constitutional effects. There will be a greater or less degree of constitutional irritation; great lassitude; prostration of strength; chillness or rigor followed by heats. The skin will often be hot and dry, pulse quick and hard, stomach affected, and vomiting produced. The patient will also complain of pain in the back, and in short, of all the symptoms which indicate a considerable fever of the sympathetic kind, arising from local irritation. The degree in which the symptoms of this disease occur, will very much depend on the constitution of the patient.

(2). *Chronic ophthalmia.*—The term chronic, to inflammation of the conjunctiva, is not applied merely with reference to duration of time; it is not only applied to signify that state of congestion and debility of vascular action produced by the acute stage; but it is also applied to that state of inflammation which from the commencement has a character of atony and debility. As this is the most frequent form in which you will find this inflammation, whether primary or following the acute stage, it is necessary to attend particularly to the symptoms by which it is distinguished, as the mode of treatment is very different from that which is required in acute inflammation. The symptoms of chronic differ from those of acute inflammation of the conjunctiva rather in degree than in kind; so that after they have existed for some time in the acute stage, you find the disease gradually passing into the chronic stage. The redness will be less intense, the pain which accompanies it less acute, the intolerance of light will be less, the chemosis and swelling will be diminished, the effusion of tears less considerable, the constitutional irritation will in a great degree have subsided, and, in short, all the acute symptoms will be mitigated. There will still, however, remain a considerable degree of irritability in the eye, on exposure to light; some artificial defence to exclude the light will be necessary, and the person will still be incapable of applying the organ to the ordinary purposes of vision. The causes of chronic inflammation, both exciting and predisposing, are very similar to those of acute inflammation; but there are many causes which tend to produce this inflammation, accompanied with atony and debility in the very onset, which distinguish it from acute inflammation. Chronic inflammation of the conjunctiva is very apt to take place, where the patient has for a long time been laboring under disorder of the digestive organs. It is not unfrequently the concomitant of dentition, the measles, or small pox; it sometimes accompanies rheumatism and gout. Frequent intoxication and various other causes may predispose to it. It is also very apt to arise from, or to be kept up by exposure to acrid fumes or smoke in particular trades. In general, inflammation of the conjunctiva is a very manageable complaint. It passes into chronic inflammation after the acute stage has continued for a certain time, and it not unfrequently subsides of itself. A spontaneous cure must not, however, be depended on, and we ought on no account to neglect or relax in the proper mode of treatment, from any reliance upon such a cure; because by simple inflammation of the deeper seated tunics of the globe of the eye, suppuration may be induced, the organ may at length become permanently disorganised, and the sight of the eye irretrievably lost. The consequences of inflammation of this membrane are very similar to those of inflammation in other parts of the body; namely, effusion, adhesion, suppuration, ulceration, and mortification. It sometimes terminates in effusion, the serum or blood under the conjunctiva rising in a roll above the cornea. It sometimes produces the adhesive process; and, when it terminates in this manner, the adhesive matter is deposited

under the conjunctiva, which covers the transparent cornea, and is recognised by a hazy appearance at the part. The adhesion is various, both in extent and quantity; it is sometimes so slight as only to produce a simple clouded appearance over a certain part of the cornea, which is technically called nebula; it is at other times more considerable in quantity, and produces an appearance of considerable opacity in the cornea, which is usually called albugo or leucoma. The inflammation sometimes proceeds to the suppurative process; indeed, the tunica conjunctiva appears to be of a nature very analogous to the mucous membranes of the body, and, like these, is exceedingly prone to the suppurative stage of inflammation. The suppuration generally proceeds from the surface of the conjunctiva, as from the surface of any mucous membrane in a state of inflammation. In other instances, the formation of pus is circumscribed; a deposit of lymph takes place where the conjunctiva covers the cornea, or in its immediate vicinity, and a little abscess or pustule arises from the centre. Ulceration is sometimes produced, and this usually occurs in the cornea in consequence of laying open the pustule just alluded to, probably from the denudation or exposure of the cornea. Lastly, sloughing and mortification of the cornea is not an uncommon effect of a high degree of suppurative inflammation.

Treatment.—In the treatment of simple inflammation of the conjunctiva it will be necessary to adopt at once, with vigor, antiphlogistic remedies, as the best mode of diminishing the action of the heart and arteries; and with this view the use of the lancet should be freely resorted to in the commencement. You ought not to be satisfied with taking away a certain quantity of blood; as, for instance, eight, ten, or sixteen ounces; but you should in this, as in all other cases of acute inflammation, accompanied with hardness of the pulse, make a free orifice in a large vein, and take away a quantity of blood, until some manifest effect is produced upon the action of the heart and arteries; keep your finger on the pulse of the patient, in order to ascertain how the heart is affected, and carry on the bleeding even to faintness. This may prevent the necessity of again having recourse to the lancet; or, if it should be necessary to do so, blood may be taken away in much smaller quantities. You will of course be guided by the state of the patient's pulse, as the only criterion.

When you have diminished the pulse, by general bleeding, leeches may be afterwards conveniently applied, and other resources made beneficial. The application of leeches in the first instance, except in very large numbers, is seldom sufficient in acute inflammation; three or four will scarcely produce any effect upon it. Opening the temporal artery has been recommended, and it is attended with very good effect. Some practitioners advise the practise of dividing the vessels of the part by scarifying the conjunctiva, but it is a plan we do not recommend.

Great benefit is derived from treatment directed more especially to the body at large; such as diaphoretic medicines; and the constitutional irritation may be materially abated by keeping up the secretions from the intestines, by altering them and rendering them more healthy.

The tartarised antimony should be used with the first view. The bowels should be freely acted upon by doses of calomel, combined with jalap, scammony, or cathartic extract; and the effects of these medicines should be kept up by the exhibition of neutral salts, so as to produce a considerable number of watery stools. At the same time the diet of the patient should be low, and he should be kept in a state of perfect rest and quietude. When an impression has been produced on the symptoms, by the treatment we have laid down, it will then be proper to adopt other measures.

For instance, where blood has been taken to a considerable extent, the application of a blister to the nape of the neck will be attended with beneficial effects. The treatment of the part should also be considered, the head should be raised, and the access of air or light should also be prevented, by keeping the room darkened. With respect to local applications, both warm and cold remedies may be used with benefit, but the choice should depend entirely on the feelings of the patient; if he does not find relief from warm, you should then try the effects of cold applications.

Such is the plan of treatment you would adopt in acute inflammation of the conjunctiva; but, when the chronic stage has commenced, you must pursue a different course. The evacuating plan may to a considerable extent be laid aside; the diet, though not stimulating, may be generous; there will be no necessity for continuing the diaphoretic medicines, as the skin will generally be sufficiently moist; nor will it be necessary to evacuate the bowels so freely, though every attention should be paid to their due action; alterative medicines will often be found beneficial.

The local applications which are used for the chronic inflammation should be entirely different from those used in the acute. They ought to be moderately astringent and stimulating, as your object now is to excite some degree of action in the vessels, and to get rid of their relaxation and atony, care being taken not to stimulate the parts too much. Various collyria or eye-waters are used for this purpose, all of them moderately astringent or stimulating; such as the solution of alum in water, solutions of the sulphate of zinc or the sulphate of copper, or the liquor plumbi subacetatis. These solutions at first should be very much diluted, and afterwards gradually strengthened in proportion to their action on the part, and the degree of stimulus which may be produced. To judge how far the stimulus may be carried, the criterion is exceedingly simple; if you find that a certain degree of smarting and pain is produced, which soon subsides, and leaves the patient much more easy than before, you may be convinced that the collyrium is beneficial; if, on the other hand, the patient experiences a great degree of pain, which does not subside speedily, and the vessels become turgid, you may be assured that the collyrium is doing harm, and that the quantity of stimulus ought to be diminished. Among the numerous applications recommended in this

complaint, we will speak of those most frequently employed, and the manner of using them. Those commonly employed are the solution of alum in water, solutions of the sulphate of zinc, or the sulphate of copper, or the liquor plumbi subacetatis; and the best mode of applying these eye-washes is to inject them by means of a silver or ivory syringe, introduced under the lids every three or four hours. In this way, you may be certain that the solution is diffused over the whole surface of the conjunctiva. An eye-cup will answer the purpose very well, if the person, after immersing his eye in the cup, has the courage to open it. They will succeed better with the chill off than otherwise. The vinum opii seems to be one of the best stimuli which can be employed in chronic ophthalmia; it acts as a mild astringent, and at the same time, by its soothing quality, sheaths the effect of the stimulus, so that no pain is produced; it may be employed in the quantity of one drop, or even of two or three drops, two, three, or four times a day. It will be best to drop it into the inner canthus of the eye, with a camel-hair pencil; the patient should then shut his eye, and move it about, so that the fluid may be diffused over the whole surface. The patient should wear no bandages, have no other protection than a shade, and, if he can bear a moderate degree of light; it should be freely admitted.

In addition to the local treatment we have gone through, you must give those medicines which will act on the morbid state of the constitution.

Of purulent ophthalmia.—Suppurative inflammation of the conjunctiva is the most severe form of inflammation in that membrane. It is exceedingly acute, very rapid in its progress, and often very destructive in its ultimate effects; consequently requires very active treatment.

The symptoms of purulent ophthalmia are so manifest that there can be no doubt of the nature of the complaint, its prominent character being the formation of a considerable quantity of purulent matter. In other respects the symptoms are not very different from those which characterize inflammation generally. The patient at first feels an uneasy sensation about the eyes; next some degree of pain on the admission of light; redness, and swelling of the part; eyelids swollen; conjunctiva, where it covers the fore part of the globe of the eye, is tumid; considerable chemosis, and often such tergescence of the upper lid as to prevent the patient from raising it. The lids are often so much tumefied as to become everted, so that a sort of roll of the lid is formed. These are the symptoms which precede the discharge of matter. A fluid first appears which is not opaque, and has the character of tenacious mucus; in the course of twenty-four hours it assumes the appearance of pus. It is thick, yellow, sometimes green, and poured out in considerable quantity. The tunica conjunctiva has the appearance of a villous membrane highly injected.

The acute stage of purulent ophthalmia is of very short duration; it has a tendency to pass rapidly into the atonic stage, in which there is action without power, and congestion of the vessels of the part. At this time the violence of the acute symptoms is mitigated, but the patient labors under considerable prostration of strength. Purulent ophthalmia has a great tendency also to terminate in sloughing. Sometimes the sloughing commences in a small portion, and gradually lamella after lamella is destroyed, until the aperture assumes a funnel-like shape; at other times a slough forms in a considerable portion of cornea at once, and opens into the anterior chamber.

The causes of purulent ophthalmia are various: it is often occasioned by the violent degree of inflammation produced by some highly irritating substance; and it occasionally occurs in new-born infants. In the last case it is doubtful whether it arises from the first exposure of the eye to the light, or, as is commonly supposed, from the vaginal secretions to the eyes of the child on its passage into the world. It generally takes place in the first week or month after the birth of the child, and seldom later than three months. Another, and one of the most violent forms of purulent ophthalmia, is that which is called gonorrhœal, from its being produced by the application of gonorrhœal matter to the conjunctiva. This of all others produces the most intense degree of inflammation; and, although it is said upon good authority to be depending on a metastasis of the gonorrhœal symptoms from the urethra to the conjunctiva, I have never seen a case in which I could entertain the least suspicion that the complaint was produced in that way, and I do not think that there is sufficient evidence to establish such an opinion.

There is another form of ophthalmia, which has been called the epidemic or Egyptian. Although we cannot correctly ascertain the cause of this affection, there can be no doubt that it arises spontaneously, and often attacks epidemically a number of persons in the same district.

Treatment.—The treatment of purulent ophthalmia must obviously very much depend on the stage of the complaint. During the first stage, when all the indications of acute inflammation are present, you must bleed largely from the arm of the patient; topical bleeding is out of the question except with children. All the other antiphlogistic remedies, which I before enumerated to you, are to be put in practice in this case. Purgatives should be administered so as to produce a considerable quantity of watery stools; diaphoretic medicines, and especially the tartarised antimony, in doses of a quarter to half a grain, should be given at such intervals as to keep the patient in a state of nausea; and topical applications should be employed very much in the same manner as in simple inflammation. During the first stage of the complaint, moist warmth in the form of fomentations and poultices, will be found beneficial: the acute stage, however, is of very short duration, and they are not to be continued beyond that period.

The extent to which the antiphlogistic plan should be carried, must vary according to the violence of the complaint and the constitution of the patient. You must not in any constitution be deterred from adopting an active plan of treatment until you have produced a manifest

effect on the system of the patient; until the pulse becomes soft; the skin moist; the pain, swelling, tension, and throbbing of the eyes considerably abated; the chemosis diminished; and, in fact, all the acute symptoms more or less subdued. When this is the case, the subsequent treatment will in general be very easy. If it should happen that you are not called upon for this complaint until it has arrived at the chronic stage, when the conjunctiva is feebly pouring out pus; the pulse depressed; the skin cold and clammy; the countenance sallow; and, when the constitution has materially suffered from the progress of the disease, an entirely different plan of treatment will be required. Gently stimulating applications should be employed by means of a syringe, so as to cleanse the conjunctiva, and free it from the pus which has collected on its surface, and at the same time stimulate the relaxed vessels. In general it will be necessary to employ tonic remedies, such as bark, for instance; always attending to the due action of the bowels, without which tonics would be useless, and even injurious. With respect to the treatment of the sloughing cornea some nicety will be required. When you have ascertained that the sloughing process is commencing, from the hazy or opaque appearance of the cornea, the antiphlogistic must be changed for a gently stimulating and tonic plan of treatment. Weak astringent collyria should be used, to favor the throwing off of the sloughs. Observe the process of the sloughing from time to time; if there is a firm layer beneath, the patient is going on well, but if the sloughing has a flocculent, soft, ash-colored appearance, in addition to mild stimulants to the part, you should employ tonic remedies, such as bark. The errors in the treatment of purulent ophthalmia may be comprised in two words: they consist either in continuing the depleting plan too long, or not resorting to it sufficiently early.

If the antiphlogistic plan be not adopted at a very early stage of the disease, the tonic treatment will afterwards be of no service; and, on the other hand, if you continue the depleting plan too long, you will check the restorative process, and the beneficial effects which nature would otherwise assist in producing.

Strumous ophthalmia.—Strumous or scrofulous ophthalmia is so called, because it is met with in those persons who are of a scrofulous diathesis. It occurs in children and not unfrequently in adults. In this affection, the inflammation is of the chronic kind from the commencement; the patient cannot bear the least access of light; there is great difficulty of opening the lids, the orbicularis palpebrarum is spasmodically contracted, and so difficult is it for the patient to open the eyes that he can seldom do it. The only way by which this can be done is fixing the head of the patient, when it is a child, between your knees; with the fore finger of the one hand to raise the upper lid, and that of the other to depress the lower, which will give you an opportunity of seeing the eye; but in doing this great caution will be required to prevent eversion of the under lid, or any undue violence to the part. In this complaint it is of the greatest importance that the cornea should be narrowly watched; for, if the inflammation continues for a long time, ulcers are very apt to form on it. Disorganisation of the different parts of the eye often take place; the cornea, or rather conjunctiva covering it, becomes covered with an opaque capsule, with vessels shooting over the cornea, so as to give it an herpetic appearance; that is, there will be seen, over the cornea, yellow spots, which are deposits of lymph. These open into small ulcers, which are streaked with vessels carrying red blood. The eye becomes very painful, and extremely irritable, and there is often, in this state, intense redness of the conjunctiva. Under these circumstances, similar ulcers form in different parts of the cornea. The formation of these ulcers produces all the symptoms of acute inflammation of the eye, and the organ not unfrequently becomes slowly and gradually disorganised. So long, however, as the cornea continues bright, and of its natural color, there will be no danger to be apprehended from the formation of ulcers.

Treatment—Although strumous ophthalmia is of the chronic nature, there is still considerable irritation; and, as the constitution in which it occurs is of an unhealthy character, your treatment must be both general and local. First, constitutional. The mild depleting plan must be first adopted, regulated as far as the constitution will bear it; you must remove the symptoms of irritation; open the bowels freely by calomel purges, repeated more or less frequently, as they improve the secretions. Alterative mercurial medicines should then be given, and if necessary they should be combined with rhubarb and magnesia, but not so as to produce watery stools. When the fever becomes diminished, the bowels perform their natural functions, the tongue looks clean, and the skin assumes its healthy feel, you may begin with tonic remedies, and alter the diet, &c. Aromatic bitters, combined with alkalies; light and nutritious diet; warm clothing; moderate exercise; sea-bathing, &c.

As for the treatment of the part affected, it will be right to employ depletion at the onset, and mild astringent applications afterwards. Leeches should be employed; it will also be proper to apply blisters behind the ears, or to the nape of the neck; and blisters in this complaint are no ordinary remedy; warm and moist applications are beneficial; the steam of water containing opium will also prove useful. If any of these applications be used at the onset, they must not be long continued; mild astringent collyria must be had recourse to, and their strength must be regulated by the feelings of the patient. The vinum opii is particularly adapted to the purpose in question. Alteratives are also sometimes necessary.

Psorophthalmy.—Psorophthalmy is an inflammation particularly of that part of the conjunctiva which lines the lids, but it extends sometimes over the whole of the conjunctiva, covering the globe. This complaint is very nearly allied to strumous ophthalmia, because it is in general a consequence of it; it is characterised by the same intolerance of light; the inflammation is of the

chronic kind, and the patient complains of a sensation as if there were some extraneous body in the eye, grit or sand, which gives rise to an effusion of tears. At the origin of the disease there is a glutinous matter secreted on the edge of the lids; ulcers form; and there is often great difficulty in separating the lids from one another. By this means matter lodges on the lids, and tends to keep up the irritation of the whole of the part; the redness sometimes extends down the cheek, and excoriation of the cuticle takes place. There are also numerous other circumstances attending this complaint. This affection of the eye is of difficult management, and is frequently found in persons of a scrofulous diathesis; in children of large towns, who are ill fed and badly clothed, with little attention to cleanliness. It is a complaint very obstinate in its cure; and, if relieved, it generally returns and becomes as bad as ever. The affection is not, however, confined to the lower classes, but the higher and middling ranks of society are sometimes attacked with it; those who are of the scrofulous diathesis. In schools also it will be found; it frequently arises from the irritating matter being applied to the lid, which may be conveyed from one to another by using the same towel, or in some such way.

Treatment.—The treatment of psorophthalmy does not essentially differ from that of the strumous; it is an inflammation without power; one of the atonic kind. Your remedies must be both constitutional and local. Depletion must not be pursued to any extent. It will be right, when any symptoms of irritation are present, to remove them by the application of leeches, and gently opening the bowels by mild aperients, combined with mercurial medicines, such as calomel, the hydrargyrus cum cretá, or the blue pill, and in quantities so as to give tone to the system. When any febrile excitement that may have existed is removed, begin with tonic remedies; that is, when the skin is clean, and the secretions from the bowels are regular in their quantity and quality. The applications to the parts should consist of stimulants, and the best form in which they can be employed is that of ointment. Any of the milder stimulating mercurial ointments will do; and their degree of strength must be regulated by the effect on the eye. The use of the vinum opii will be attended with beneficial results, and the application of blisters will have an universally good effect, but they should always be healed immediately, and repeated again if required. The consequences of inflammation of the eye requiring distinct notice, and which are accompanied with an equal or less inflammation of the conjunctiva, and kept up or excited by attendant circumstances, are now to be spoken of.

Nebula.—This complaint is so called from the nebulous or cloudy appearance of the transparent part of the eye, which is produced by deposits of lymph into the conjunctiva covering the cornea. The membrane or layer stretched over the cornea will vary according to the more or less relaxed state of the vessels of the conjunctiva, which will be seen carrying red blood to the part. The veins corresponding to the nebulous parts will become turgid and prominent.

Treatment.—The inflammation in this affection is generally of the chronic kind, and arises from a relaxed state of the vessels, which require stimulating applications, in order that they may recover their tone and convey the blood uninterruptedly. If the vessels be stimulated, the blood will be likely to flow through the veins; the absorbents will be excited, and remove the effused lymph. If there is considerable inflammation, it must be removed by active means; and in these cases it will be proper to deplete. Care must be taken that in the treatment of this complaint, no undue degree of stimulus be employed; if there should be inflammation it will be increased, and the complaint be as bad as ever. By stimulating applications, the cornea will frequently be restored to the same transparency as before the attack. A good stimulus, which may be used, is one with the sulphate of zinc, containing about a grain to an ounce of water, gradually increased in strength.

Pustules.—Pustules are generally seated at the junction of the transparent with the opaque cornea; but they sometimes occur in the cornea itself, or on the conjunctiva covering it, or the ball. They are seated in different parts. The appearances they present, at first, are red or yellowish spots arising from a deposit of lymph in those parts, and are slightly elevated. There is considerable turgescence of the vessels around them. If they occur on the cornea, it will be nebulous and opaque; the vessels round the cornea will be seen distended, carrying red blood, and having a radiated disposition. If the lymph secreted in this complaint is not absorbed, the pustules break, matter escapes, and ulcers form in their place. Sometimes there is only one of these ulcers, frequently two, one on each side of the cornea, just at the junction of the transparent with the opaque cornea, and occasionally the cornea is encircled by them. They are very difficult to cure, and easily re-produced.

Treatment.—As for the treatment which pustules require, if there should be much inflammation you must deplete; but, as the inflammation is of the tonic kind, depletion must not be pursued to too great an extent at the outset. The system must be invigorated by tonic remedies, and tone given to the vessels of the part. First, apply leeches, not in too large numbers; evacuate the bowels by mild aperients; and attend to the secretions: blisters will be useful if the sight be affected. When the state of the bowels has been regulated, you must begin with tonic remedies, and as early as possible with astringent collyria, and the best is the vinum opii.

Fungus of the conjunctiva.—This appearance of the conjunctiva is the result of purulent ophthalmia, and occurs in diseased persons. The conjunctiva becomes loose and red, the vessels turgid with blood, and there is a fold of this membrane on the inside of the lids, which produces considerable irregularity on its surface; a morbid secretion is kept up on the part, and not unfrequently eversion of the lids is the result. Extraneous bodies often enter the eye

and disturb it considerably. To prevent this, and remedy the complaint, the loose portion of the conjunctiva should be removed, which is a very easy operation; an assistant holding the lid, you, by means of a pair of curved scissors, remove it. As to the after treatment, you must keep down inflammation, should it appear, by the means already recommended.

Granulations of the conjunctiva.—These are nothing more than loose irregularities of this membrane, where it lines the lids. These projections continue to pour out a morbid secretion, which stimulates and irritates the whole eye; the palpebral conjunctiva becomes altered in its texture, and its surface is covered with a fleshy elevation, having the exact appearance of granulations. These granulations covering the surface of the conjunctiva lining the lids, are constantly rubbed over the globe of the eye whenever it moves, producing pain and irritation, and keeping up morbid secretion, and, in fact, giving rise to chronic ophthalmia.

Treatment.—Granulations of the conjunctiva, if not removed or remedied, produce ultimate blindness. Cases of this complaint are difficult to cure; and the remedies you are to use are, caustic applications and the division of the varicose and enlarged vessels. These may be aided by setons, issues, blisters, and attention to the general health.

Encanthis.—This consists in an alteration of the structure of the caruncula lachrymalis, and neighbouring semilunar fold of the conjunctiva. In this complaint the caruncula is enlarged; at the commencement it has a granulated appearance, which it loses as it increases, and then becomes similar to a hazel nut, being ash-colored and streaked with varicose vessels. This enlargement or excrescence prevents the lids from closing, and allows extraneous matter to enter, which keeps up inflammation of the eye, and it also presses on the puncta lachrymalia, and turns them out of their place: the tears, thus prevented from getting into the lachrymal sac, are effused on the cheek.

Treatment.—The best treatment you can adopt for the cure of this complaint is the entire removal of the diseased part. The operation should be thus performed:—an assistant is to raise the lid, you then take up the tumor with a pair of forceps, and remove it with a pair of curved scissors with convex edges. When this complaint has not assumed the malignant form, it is always remediable by excision. Never operate, however, when the encanthis has become of the malignant kind, and put on the cancerous appearance. This will be known by the dull red color of the excresence, its excessive hardness, lancinating pains extending to the eye-ball and forehead, particularly when touched, foul ulcers with irregular edges, having all the appearance of cancer in other parts of the body.

Pterygium.—This is always of the triangular shape, and may be divided into the membranous and fleshy.

Membranous pterygium.—This kind has the appearance of a thin film of minute vessels converging towards the cornea. The usual seat of this affection is towards the inner canthus, that is, with the base at the canthus, and the apex against the cornea. It is always of a triangular shape, and the vessels proceed from the base to the apex.

Fleshy pterygium.—The fleshy pterygium differs from the membranous, and is more vascular. They first appear of a yellowish color; then the vessels running through them become large, and they have a red appearance; but always retain their triangular shape.

Treatment.—When a pterygium has proceeded far on the transparent part of the eye, the only treatment to adopt will be the removal of a part of the pterygium. This consists simply in raising the membrane as near as you can to the cornea, and cutting it through whilst suspended. When the pterygia are fleshy, more care must be taken in dividing them; they must be divided more to the margin of the cornea, and turned back from the apex towards the base.

2. *Inflammation and ulceration of the cornea.*—At the outset, in inflammation attacking the transparent cornea, there is a hazy appearance, the cornea loses its natural lustre, and in a short time there may be discovered on its surface vessels carrying red blood, and then the symptoms will be the same as those of inflammation in general; the patient will complain of intolerance of light, and also have effusion of tears. If the inflammation of the cornea should continue, matter very frequently forms between its lamellæ, and the appearance which it then assumes is called onyx, or unguis, from its resemblance to a nail; the matter is to be very distinctly seen in the transparent part of the eye, and gradually extends till it occupies one-third or fourth of the cornea. If you place the eye in profile you can generally observe yellow spots, which are usually seated at the anterior part of the cornea; and if you employ gentle pressure with a probe, the fluid may be felt fluctuating within. In the various positions of the head the matter does not shift its situation, but remains in the same spot. By proper treatment the matter often becomes absorbed; but it not unfrequently makes its way externally, or an opening is formed internally, and the matter then is effused into the anterior chamber of the eye.

Ulceration.—Ulceration of the cornea is the common consequence of inflammation of the cornea; but it is very frequently produced by the contact of matter in purulent ophthalmia; or, in fact, any irritating substance, mechanical or chemical, that may be introduced into the eye. The inflammation produces the formation of pus; this breaks and an ulcer is formed.

In ulcers of the cornea you will find the edges rugged, uneven, and elevated, the ulcer itself having an ash-colored appearance, and the patient complaining of great pain; there will also be a discharge of a good deal of acrid and irritating matter. In general there will be no difficulty in distinguishing ulcers of the cornea; all you have to do is to put the eye in profile and take a side view of this organ, and you will see the ulcer with the appearances I have described. The situation of ulcers of the cornea varies; as also do the ulcers vary in their appearance.

Treatment.—The treatment required in inflam-

mation of the cornea does not materially differ from that of inflammation of the conjunctiva, or any other part of the eye. You must rely upon the efficacy of a strict antiphlogistic plan, and, when the acute inflammation has been subdued, on the use of mild astringent collyria. When ulcers form in any part of the cornea it will be proper to use active means, if they are accompanied with acute inflammation; but most frequently they are accompanied by chronic ophthalmia, and have a disposition to spread rather than heal. When they are of a spreading disposition astringent lotions will be of great service; but of all remedies in ulcers of the cornea the nitrate of silver is the one on which you are to depend: it is generally used in the state of solution, about two grains to an ounce of water; or it may be better to begin with a grain to an ounce, regulating the strength in proportion to the degree of irritation it may produce. When ulcers of the cornea are attended with acute inflammation, it will be necessary to employ bleeding by leeches before the use of astringents, and at the same time to keep the bowels regular by mild aperients. During the progress of the ulcers it will be necessary to watch them very closely, and examine them frequently; but in doing so great caution must be used lest the eye-lids become everted. When ulcers of the cornea heal it is by cicatrisation, as in any other part of the body. The specks which are left upon cicatrisation are nothing more than rounded spots of coagulable lymph, and are denominated leucoma or albugo; and in these cases the rays of light are not prevented entering the eye, except when the spots are on the axis of vision.

Staphyloma.—In this disease the cornea becomes opaque, considerably elevated, and altered in texture. It frequently comes on after small pox, and is one of the sequelæ belonging to that formidable complaint. In staphyloma the eyelids are prevented from being closed; there is perpetual irritation kept up by friction of the palpebræ on the ball. By the separation of the lids extraneous bodies often enter the eye, irritation is produced by the friction of the lids and eye-lashes, and thus a considerable degree of inconvenience is produced to the patient, and the eye kept in a state of chronic ophthalmy; and the sound eye becomes sympathetically affected. The iris often protrudes; the vitreous humor is altered in texture; and the crystalline lens is projected forwards.

Treatment.—In this complaint nothing can be done for the restoration of sight; and the only plan of treatment will be to remove the staphylomatous part, so as to return the eye within the orbit, and permit the use of an artificial eye. The operation is exceedingly simple: the surgeon first passes a needle with a ligature through the staphylomatous part, in order to steady the eye; and then, with the other hand, takes the cornea knife, and removes as much of the projecting part as may be necessary; the operation gives little pain; it generally happens that the iris adheres to the cornea, and that a portion of it is removed. The crystalline lens escapes, together with a portion of vitreous humor, and the eye collapses, so that when the part is healed an artificial eye may be worn.

Iritis.—Inflammation of the iris is a peculiar and specific inflammation, attended with symptoms which, in some cases, are with difficulty recognised. In looking into the eye, you see the iris changed in color, or having a brownish hue, or rather a reddish-brown color (this however varies according to the natural color of the iris), from the increased number of vessels on its surface carrying red blood. The iris itself is altered in texture, being puckered and thickened. These appearances are soon removed, and deposits of yellow lymph, resembling yellow tubercles, will be seen on the iris, the pupil becomes irregular and altered in shape, and the pupillary margin of the iris thickened and turned back towards the posterior chamber. These are the principal symptoms by which you recognise iritis; but there are many other marked appearances.

Iritis is not unfrequently accompanied by inflammation of the tunics of the eye, which has been called *ophthalmitis*, or deep seated inflammation of the globe of the eye. But for the treatment and further description of this very usual variety, we must refer to Mr. Castle's Manual. For cataract see CATARACT.

SECT. III.—LITHOTOMY.

This operation was practised by the ancient Egyptian surgeons under the Ptolemies, especially Ammonius Alexandrinus, and afterwards at Rome by Meges, and is described particularly by Celsus. It was then a very simple operation, and performed thus:—The presence of a stone being ascertained by a strait sound, the rectum was emptied by an injection, and the patient directed to walk about, as so to make the stone gravitate to the neck of the bladder; and now the patient was secured, as at present, for the lateral operation; and the operator introduced two, or sometimes even three, fingers of his left hand into the rectum, and, feeling the stone, thrust it forward into the perineum and cut directly upon by a semilunar incision transverse, and having its ends pointing to the hips; then a smaller one, at the deepest part of the first, in the same direction, till it reached the stone, which either started out, or was brought out by a hook for the purpose. There are several objections to this operation. 1. The same parts are not always cut, as that must depend upon the degree of force with which the operator protrudes the stone. 2. The urethra may be altogether divided from the prostate. 3. If the bladder be much pushed forward, it may be divided thus transversely, behind the prostate, so including the vesicula seminales. This operation, together with surgery and medicine, was entirely lost in the dark ages, except by quacks; but it was known to and practised by La Raoux, at Paris, 140 years ago. This operation proved much too simple for the barbarous physicians and surgeons of the middle age, as it was practised by many quacks, &c., which deprived them of their fees; and it was this last reason, says Heiston, that induced them to adopt a more complicated operation, which at once increased their own dignity and saved their fees from passing into other hands. This brutal and cruel operation was invented by Johannes

de Romanis, who, it seems, did not dare to practise or publish it; but his pupil Marianus Sanctus published it in 1524, not as his own but his master's invention; and this operation, which neither dared own, was greedily seized on by the profession. It was performed all over Europe for many years thus:—'A groove-staff was first introduced; then the operator, kneeling on one knee, made an incision with a razor along the perineum, on one side the raphe, and, feeling with his little finger for the curve of the staff, opened the membranous part of the urethra; and, fixing the point of his knife in the groove of the staff, gave it an assistant to hold, while he passed a probe along the knife into the groove of the staff, and thus into the bladder. The urine now flowed out and the staff was withdrawn.'

'The operator next took two strong iron probes, called conductors; one named the female, having a groove like a modern director; the other the male, having a probe point corresponding with the groove. The grooved one was first introduced along the probe, then the latter was withdrawn, and the male passed along the groove of the female into the bladder. Then commenced the operation of dilating. The lithotomist took a conductor in each hand, and, by making their shafts diverge, dilated; or, in plain language, tore open, the prostate gland. After this a pair of strong forceps, with a large blade, were used to dilate it still more. Then these were withdrawn, and a blunt gorget introduced; upon this the vals extractors were introduced, and the stone brought out. This operation lasted for many years, till 1097, when a new operation was introduced by a wandering friar, called Frere Jocque, his real name was Jacque Beaulieu, and it appears that he had learned his operation of another quack, and had then wandered over Europe, and at length came to Paris with certificates of his success, and volunteering to operate. He took no fees, but acted for the glory of the Divinity, receiving only enough to afford himself sustenance, and keep his instruments in order. He was authorised by the government to operate in the hospitals of La Charité, and the Hotel Dieu, and, though violently opposed by the profession, seems to have been eminently successful at first; but having no knowledge of anatomy, he did not always cut the same parts, and latterly failed in several instances; so that at last his envious rivals prevailed, and he left Paris and travelled to the provinces and Holland, and, having studied anatomy, operated again with the greatest success. His operation was the

Lateral operation.—He introduced a straight staff into the bladder, and plunging his knife into the side of the perineum near the tuber ischie, about two fingers' breadth from the raphe, cut upon the staff, which served as a guide into the bladder, cutting upwards from the anus. He never withdrew his knife till he had made a sufficient opening for the stone, which he withdrew by a pair of forceps in a rough manner, using sometimes a director, but more commonly his finger. This operation was imitated and practised by Raw, Marechal, Bamber, and Chesselden, which last modified it in several ways, and at last performed it as we perform it at present.

Sir Astley Cooper says, 'In the lateral operation of lithotomy, you are to begin your incision a little on the left side of the raphe, immediately below the symphysis pubis, and carry it obliquely downwards and outwards to midway between the anus and tuberosity of the ischium, and the termination of the incision should be opposite to the centre of the anus. Before you commence the incision you should draw aside the raphe towards the ramus of the ischium on the right side. Never begin an operation without having first reflected well on what you are going to do; and, in making incisions through the skin, you should, before you apply the knife, mark out with your eye the course which such incisions should take, and the precise point where they should terminate. Well then, the first cut through the skin, made in the direction just mentioned, penetrates the skin and cellular substance, and lays bare the accelerator urinæ; you then with the fingers of your left hand push or draw the bulb of the penis under the ramus of the ischium on the right side, so that the next incision will pass between the bulb and crus penis of the left side; there is no necessity in reality for cutting the bulb, and it should therefore be avoided; well, carrying your knife forward between the bulb and crus, you divide the accelerator urinæ, and this you should do completely, for if you permit any portion of its fibres to remain undivided, particularly at the upper part, if the stone should be at all large, you will find that their contractions would very much increase the difficulty of withdrawing the stone; immediately that the accelerator urinæ has been cut through, you expose the transversus perinei; you are then to feel for the groove of the staff with the nail of the index finger of the left hand, and, having fully satisfied yourself of its situation, you are to cut through it into the membranous part of the urethra by means of the same scalpel with which you made the other incisions—and then, fixing the beak of the gorget in the groove of the staff, you are to bring down towards you the handle of the latter instrument, while at the same moment you push the gorget into the bladder, with its point directed upwards, and its handle of course somewhat depressed. I give you this last direction for the purpose of preventing the dreadful accident of the gorget slipping and passing between the bladder and rectum, instead of its entering the former viscus.'

An instrument for dividing the prostate and bladder has of late been used with success in the lateral operation of lithotomy: it is called the bistourie caché; it was invented by Cosme, a French surgeon, about 100 years since; it consists of a knife enclosed in a sheath which, after being introduced into the bladder and turned with its edge outwards and downwards, cuts its way out when withdrawn. Many operators use a knife to open the bladder, and it answers in young persons; but, in old ones with diseased prostate, it does not cut enough to admit the stone.

The high operation, lately recommended by Mr. Corpue and practised by sir Everard Home, was first made known to the world in 1561, by Pierre Franco, who, in his Treatise on Hernia,

says he once performed it on a child with very good success, but discourages the farther practice of it. After him Rossetus recommended it, with great zeal, in his book entitled Partus Cæsarius, printed in 1591; but he never performed the operation himself. Monsieur Tolet makes mention of its having been tried in the Hôtel-Dieu; but, without entering into the particular causes of its discontinuance, says only that it was found inconvenient. About the year 1719 it was first done in England by Mr. Douglas; and after him practised by others.

The patient being laid on a square table, with his legs hanging off and fastened to the sides of it by a ligature passed above the knee, his head and body lifted up a little by pillows so as to relax the abdominal muscles, and his hands held steady by some assistants; inject through a catheter, into the bladder, as much barley-water as he can bear, which, in a man, is often about eight ounces, and sometimes twelve. The bladder being filled, an assistant, in order to prevent the reflux of the water, must grasp the penis the moment the catheter is withdrawn, holding it on one side in such a manner as not to stretch the skin of the abdomen; then with a round-edged knife make an incision about four inches long between the recti and pyramidal muscles, through the membrana adiposa as deep as the bladder, bringing its extremity almost down to the penis; after this, taking a crooked knife, continue the incision into the bladder, carrying it a little under the os pubis; and immediately upon the water's flowing out, introduce the fore-finger of your left hand, which will direct the forceps to the stone. Sabatier wisely condemns making the cut in the bladder from below upward lest the knife injure the peritonæum.

Although this is one of the easiest and to all appearance the safest method of operating, several objections soon brought it into disuse. 1. The irritation of a stone often causes such a thickened and contracted state of the bladder that this viscus will not admit of being distended so as to rise above the pubes. 2. If the operator should break the stone, the fragments cannot be easily washed away, and remaining behind will form a nucleus for a future stone. 3. Experience has proved that the high operation is very commonly followed by extravasation of urine, attended with suppuration and gangrenous mischief in the cellular membrane of the pelvis. This happens because the urine more readily escapes out of the wound in the bladder than through the urethra; and also because when the bladder contracts, and sinks behind the os pubis, this wound ceases to be parallel to that in the linea alba and integuments, and becomes deeper and deeper. For the prevention of these ill consequences, says Sabatier, it will be in vain to make the patient lie in an horizontal posture and to keep a catheter introduced, as Rousset and Morand recommended: experience has evinced that the bad effects, which we have described, were neither less frequent nor less fatal. 4. The danger of exciting inflammation of the peritonæum. 5. The injection itself is exceedingly painful, and, however slow the fluid be injected, the bladder can seldom be dilated enough to make the operation absolutely secure; and, when hastily dilated, it is sometimes even burst, or, at least, its tone destroyed. We need not enumerate other inconveniences.

Some of the objections, however, do not apply to certain instances. In many men, we know by searching that their bladder is very large, so that we can run no risk of meeting with it in a contracted state, and, therefore, the objection is of no weight when we are certain that the bladder extends itself a considerable way above the pubes, and will admit a large quantity of injection. Stones are sometimes known to be of large size, and they are less likely to be broken in this than any other mode of lithotomy, so that the objection of the difficulty of extracting small calculi and fragments is less forcible. The excoriations, from the effusion of urine all over the skin near the wound, may be prevented by embrocations, ointment, &c. The abscesses and gangrenes arising from the extravasation of urine in the cellular substance, says an able surgeon, may be very much prevented by the introduction of a cannula, as practised in the puncture of the bladder above the os pubis.

Lithotomy in women.—The naturally large size and dilatable nature of the female urethra have suggested the plan of endeavouring to expand this passage by various means, so that a stone in the bladder may be taken out with a pair of forceps, without having occasion to employ any cutting instrument whatsoever. This method was proposed by Douglas nearly a century ago, who not only recommended the use of sponge for the purpose, but also dried gentian root, as being more gradual in its expansion, and better adapted to the object.

Lithotomy on females is much more easy of execution, and less dangerous, than the same operation on the male subject. It may be done in various ways; but the surgeons of the present time constantly follow the mode of making the requisite opening by dividing the urethra and neck of the bladder. A straight staff, or director, is introduced through the meatus urinarius; the groove is turned obliquely downwards and outwards, in a direction parallel to the ramus of the left os pubis; and a gorget, or knife, is thus conducted into the bladder, and makes the necessary incision. Some operators prefer the lithotome caché, which, after being introduced, is opened as far as is deemed proper, and then drawn out with its edge turned obliquely outwards and downwards.

The French surgeons Louis and Flurant, were the inventors of particular bistouries for dividing both sides of the female urethra at once. The instrument of the former effected this purpose, in passing from without inwards; that of the latter, in passing from within outwards. Flurant's bistoury bears some resemblance in principle to Frère Côme's lithotome caché, or to the cutting forceps, with which Franco used to divide the neck of the bladder. The reason assigned in recommendation of these bistouries, is, that they serve to make a freer opening for the passage of large stones, than can be safely made by cutting only in one direction. At present, however, they are never used.

Sect. IV.—Supplementary View of Diseases of the Skin.

In this part of our article we shall, after explaining a few terms of less frequent occurrence touch upon the leading diseases of this species, conceiving that though some writers have spoken of them as pertaining to medicine, they may with greater propriety be enrolled among surgical cases, since they affect the contexture of the body, and may in many occasions be relieved by a manual operation.

But it may not be amiss in the first place to present the reader with Dr. Willan's classification and definitions, which we intend to follow.

CLASSIFICATION.

Order I.—Papulæ.

Genera.
Strophulus (red gum, tooth eruption, &c.)
Lichen (spring eruption, scorbutic pimples, &c.)
Prurigo (gratelle, or universal itching of the skin).

Order II.—Squamæ.

Lepra (leprosy of the Greeks).
Psoriasis (dry or scaly tetter).
Pityriasis (dandriff).
Icthyosis (fish-skin).

Order III.—Exanthemata.

Rubeala (measles).
Scarlatina (scarlet fever).
Urticaria (nettle rash).
Roseola (rose rash).
Purpura (purple or scorbutic rash).
Erythema (red rash).

Order IV.—Bullæ.

Erysipelas (St. Anthony's fire).
Pemphigus (vesicular fever).
Pompholyx (water-blebs).

Order V.—Pustulæ.

Impetigo (running tetter).
Ecthyma (large inflamed pustules).
Variola (small-pox).
Scabies (itch).
Porrigo (scald head honey-comb-scab, &c.)

Order VI.—Vesiculæ.

Herpes (ring worm, shingles, wild fire, &c.)
Varicella (chicken pox, and swine pox).
Vaccinia (cow-pox).
Miliaria (miliary eruptions).
Eczema (heat eruption).
Aphthæ (thrush).

Order VII.—Tubercula.

Phyma (boils, carbuncles, &c.)
Verruca (warts).
Molluscum (small soft wens).
Vitiligo (white smooth tubercles).
Acne (stone-pock, red tuberculated face, &c.)
Lupus (or noli me tangere).
Elephantiasis (Arabian leprosy).
Frambæsia (yaws).

Order VIII.—Maculæ.

Ephelis (sun spots).
Nævus.
Spilus, moles, and other original marks.

1. *Papula*, pimple; a very small and acuminated elevation of the cuticle, with an inflamed base, very seldom containing a fluid, or suppurating, and commonly terminating in scurf.

2. *Squama*, scale; a lamina of morbid cuticle, hard, thickened, whitish, and opaque, Scales, when they increase into irregular layers, are denominated crusts.

3. *Exanthema*, rash, superficial red patches, variously figured, and diffused irregularly over the body, leaving interstices of a natural color, and terminating in cuticular exfoliations.

4. *Bulla*, bleb, a large portion of the cuticle detached from the skin by the interposition of a transparent watery fluid.

5. *Pustula*, pustule, an elevation of the cuticle, with an inflamed base, containing pus.

Four varieties of pustules are denominated in this arrangement, as follows:—

a. Phlyzacium, a pustule, commonly of a large size, raised on a hard circular base, of a vivid red color, and succeeded by a thick, hard, dark-colored scab.

b. Psydracium, a small pustule, often irregularly circumscribed, producing but a slight elevation of the cuticle, and terminating in a laminated scab. Many of the psydracia usually appear together, and become confluent; and, after the discharge of pus, they pour out a thin watery humor, which frequently forms an irregular incrustation.

c. Achor; and

d. Favus. These two pustules are considered by the majority of writers, from the Greeks downwards, as varieties of the same genus, differing chiefly in magnitude. The achor may be defined a small acuminated pustule, containing a straw-colored matter, which has the appearance and nearly the consistence of strained honey, and succeeded by a thin brown or yellowish scab. The favus, or κηριον, is larger than the achor, flatter, and not acuminated, and contains a more viscid matter; its base, which is often irregular, is slightly inflamed; and it is succeeded by a yellow, semi-transparent, and sometimes cellular scab, like a honey-comb; whence it has obtained its name.

6. *Vesicula*, vesicle, a small orbicular elevation of the cuticle, containing lymph, which is sometimes clear and colorless, but often opaque, and whitish or pearl-colored. It is succeeded either by scurf, or by a laminated scab.

7. *Tuberculum*, tubercle, a small, hard, superficial tumor, circumscribed, and permanent, or suppurating partially.

8. *Macula*, spot, a permanent discoloration of some portion of the skin, often with a change of its texture.

The following terms are used in their ordinary acceptation; viz.

9. *Wheal*, a rounded or longitudinal elevation of the cuticle, with a white summit, but not permanent, not containing a fluid, nor tending to suppuration.

10. *Furfur*, scurf, small exfoliations of the cuticle, which occur after slight inflammations of the skin, and a new cuticle being formed underneath during the exfoliation.

11. *Scab*, a hard substance, covering superfi

cial ulcerations, and formed by a concretion of the fluid discharged from them.

12. *Stigma*, a minute red speck in the skin, without any elevation of the cuticle. When stigmata coalesce, and assume a dark-red or livid color, they are termed petechiæ.

Order I.—Papulæ. Papulæ, or pimples, appear to originate in an inflammation of the papillæ of the skin, by which these are enlarged, elevated, and indurated, and made to assume more or less of a red color. Sometimes even a slight effusion of lymph takes place, which gives a vesicular appearance to several of the papulæ; but the fluid is re-absorbed without breaking the cuticle, and they terminate for the most part in scurf. The varieties of papulous eruptions are comprehended in this arrangement under three genera; namely, strophulus, lichen, and prurigo.

i. *Strophulus.*—This genus comprises several papular affections, peculiar to infants, which are known by the common appellations of red gum, tooth-eruption, &c. They arise in consequence of the extreme vascularity and irritability of the skin at that period of life, when the constitution is accidentally disturbed by irritation, either, in the alimentary canal, the gums, or other parts. As they are not, however, very important objects of medical practice, but interesting only from their occasional resemblance to some of the exanthemata, I shall not dwell upon them at any length. The following varieties are mentioned by Dr. Willan:—1. Strophulus intertinctus, the red gum or gown, is characterised by papulæ of a vivid red color, situated most commonly on the cheeks, fore-arms, and back of the hands, but sometimes universally diffused. 2. Strophulus albidus. 3. Strophulus confertus. 4. Strophulus volaticus: not a frequent complaint. 5. Strophulus candidus.

ii. *Lichen* is defined by Dr. Willan to be 'an extensive eruption of papulæ, affecting adults, connected with internal disorder, usually terminating in scurf, recurrent, not contagious.' The varieties of this eruption are seven.

1. The lichen simplex is an eruption of red papulæ, first appearing on the face or on the arms, and extending, in the course of three or four days, to the trunk and lower limbs. It is preceded for a few days by slight febrile irritation, which commonly ceases when the eruption appears. This is accompanied with an unpleasant sensation of tingling, especially in the night: it continues nearly stationary about a week, when its color begins to fade, and the skin soon exhibits numerous scurfy exfoliations, which remain longest about the flexures of the joints. The duration of the complaint varies considerably, however, from ten days to three weeks. 2. Lichen circumscriptus is characterised by clusters or patches of papulæ, which have a well-defined margin, and are of an irregularly circular form. 3. Lichen agrius is ushered in by febrile symptoms, which are commonly relieved on the appearance of the papulous eruption. The papulæ occur in large patches, are of a high red color, and have a degree of inflammation diffused round them to a considerable extent. They are accompanied by itching, heat, and a painful tingling, which are augmented to a sensation of smarting and scalding by the heat of the bed, washing with soap, drinking wine, or using violent exercise. The symptoms undergo a daily increase and remission: for they are all greatly diminished in the morning, and recur after dinner. Some small vesicles, filled with a straw-colored fluid, are occasionally intermixed with the papulæ; but they are not permanent. 4. Lichen lividus is distinguished by the dark red or livid hue of its papulæ, which appear chiefly on the extremities, and without any accompanying symptoms of fever. The papulæ are more permanent, however, than in the foregoing varieties; and, after their desiccation, the disorder is liable to be prolonged for many weeks by a fresh eruption.

iii. *Prurigo.*—The characteristic symptoms of this genus are, a severe itching, accompanied by an irruption of papulæ of nearly the same color with the adjoining cuticle. It affects the whole surface of the skin, under three varieties of form, as well as some parts of the body locally. 1. Prurigo mitis is accompanied by soft and smooth papulæ, somewhat larger, and less acuminated than those of lichen, and seldom appearing red or inflamed, except from violent friction. Hence an inattentive observer may overlook the papulæ altogether: more especially as a number of small thin black scabs are here and there conspicuous, and arrest his attention. These originate from the concretion of a little watery humor, mixed with blood, which oozes out, when the tops of the papulæ are removed, by the violent rubbing or scratching which the severe itching demands.

2. Prurigo formicans. This affection differs materially from the preceding, in the obstinacy and severity of its symptoms, although its appearances are not very dissimilar. The itching accompanying it is incessant, and is combined with various other painful sensations; as of insects creeping over and stinging the skin, or of hot needles piercing it.

3. Prurigo senilis. The frequent occurrence of prurigo in old age, and the difficulty of curing it, have been the subject of universal observation. The sensation of itching, in the prurigo of that period of life, is as intolerable and more permanent than in the P. formicans; and the appearances which it exhibits are very similar, except that the papulæ are for the most part larger. The comfort of the remainder of life is sometimes entirely destroyed by the occurrence of this disease.

Order II.—Squamæ. Scaly diseases.—Those opaque and thickened laminæ of the cuticle, which are called scales, are commonly produced by some degree of inflammation of the true skin, over which they are formed; but occasionally, as in the slighter forms of pityriasis, the cuticle alone, or with the rete mucosum, appears to be in a morbid condition. If the definition be carefully attended to, scales will not be confounded with the scabs succeeding confluent pustules and vesicles, or superficial ulcerations. The four genera of scaly diseases are lepra, psoriasis, pityriasis, and ichthyosis.

i. *Lepra.*—The term lepra is here appropriated solely to the leprosy of the Greeks, as described

by the more accurate of those writers. It is characterised by 'scaly patches, of different sizes, but having always nearly a circular form.'

1. Lepra vulgaris, the ordinary species of the disease in this country, commences with small, round, reddish, and shining elevations of the skin, at first smooth, but within a day or two exhibiting thin white scales on their tops. These gradually, sometimes rapidly, dilate to the size of half-a-crown, still retaining their oval or circular form, and are covered with shining scales, and encircled by a dry, red, and slightly elevated border. In some cases these scales accumulate, so as to form thick prominent crusts. If the scales or crusts are removed, the skin appears red and shining, being very smooth, and free from the cuticular lines in the beginning, but marked, in the advanced stages, with long deep lines and reticulations, not always coinciding with those of the adjoining surface.

ii. Lepra alphoides. This is a less severe form of the disease than the preceding. It differs chiefly in the small size of the patches, which seldom extend beyond the diameter of a few lines, or become confluent, in the minuteness and greater whiteness of the scales, and in its limitation to the extremities. This variety of lepra is most common in children. It is tedious and difficult of cure, like the former, and requires similar treatment.

2. *Psoriasis.*—The psoriasis, or scaly tetter, occurs under a considerable variety of forms, exhibiting in common with lepra, more or less roughness and scaliness of the cuticle, with a redness underneath. It differs, however, from lepra in several respects. Sometimes the eruption is diffuse and continuous, and sometimes in separate patches of various sizes; but these are of an irregular figure, without the elevated border, the inflamed margin, and the oval or circular outline of the leprous patches: the surface under the scales is likewise much more tender and irritable in general than in lepra; and the skin is often divided by rhagades or deep fissures. It is commonly accompanied by some constitutional disorder, and is liable to cease and return at certain seasons.

1. The psoriasis guttata is a sort of connecting link between this genus and lepra, the little patches being distinct, and small (seldom exceeding two or three lines in diameter), but with an irregular circumference, and the other peculiar characters just described. They appear on almost every part of the body, and even on the face: but in the latter situation they exhibit only a redness and roughness, without scales. This eruption is most common in the spring, at which season it is liable to recur for several years. It is preceded by general pains, and slight feverishness. In children it often spreads rapidly over the body in two or three days; but in adults its progress is gradual and slow.

2. The psoriasis inveterata is the most severe modification of the complaint, beginning in separate irregular patches, which extend and become confluent, until at length they cover the whole surface of the body, except a part of the face, or sometimes the palms of the hands and soles of the feet, with a universal scaliness, interspersed with deep furrows, and a harsh, stiff, and thickened state of the skin.

iii. *Pityriasis.*—The pityriasis is a very superficial affection, characterised by irregular patches of thin scales, which repeatedly exfoliate and recur, but which never form crusts, nor are accompanied with excoriations. It is not contagious. It occurs under three or four varieties of form.

1. The pityriasis capitis, which in infants is called dandriff, appears in a slight whitish scurf along the top of the forehead and temples, but in larger, flat, separate semi-transparent scales on the occiput. A similar affection occurs on the scalp of aged persons.

2. The pityriasis rubra occurs most frequently in advanced life, and is the result of a slight inflammation of the portions of the skin affected, somewhat resembling in this respect the psoriasis diffusa. The cuticle is at first only red and rough, but soon becomes mealy or scurfy, and exfoliates, leaving a similar red cuticle underneath, which undergoes the like process; the scaliness becoming greater as the exfoliation is repeated. This complaint is attended with a dry and unperspiring surface, a troublesome itching, and a feeling of stiffness. There is also a general languor and restlessness. When the redness and scales disappear, the patches are left of a yellowish or sallow hue. But the whole process is liable to be repeated at short intervals, and the disease to be thus greatly prolonged.

3. The pityriasis versicolor is most remarkable for the chequered and variegated discoloration of the cuticle which it exhibits. It appears mostly about the breast and epigastrium, and sometimes on the arms and shoulders, in brown patches of different shades, variously branching and coalescing, and interspersed with portions of the natural hue.

iv. *Ichthyosis.*—The ichthyosis, or fish-skin disease, is characterised by a thickened, hard, rough, and in some cases almost horny texture of the integuments of the body, with some tendency to scaliness, but without the deciduous exfoliations, the distinct and partial patches, or the constitutional disorder, which belong to lepra and psoriasis.

1. Ichthyosis simplex. In its commencement this disease exhibits merely a thickened, harsh, and discolored state of the cuticle, which appears, at a little distance, as if it were soiled with mud. When further advanced, the thickness, hardness, and roughness, become much greater, and of a warty character, and the color is nearly black.

2. Ichthyosis cornea. Several cases of a rigid and horny state of the integuments, sometimes partial, but sometimes extending nearly over the whole body, have been recorded by authors; and occasionally such a condition of the cuticle has been accompanied with the actual production of excrescences of a horny texture. These however, are rare occurrences.

Order III.—Exanthemata. Rashes. The term exanthema, efflorescence, appears to have been used by the Greek writers in a very general sense, equivalent to that of our word eruption;

and it has been employed, in this acceptation, by many modern authors. The nosologists, however, have limited it to those eruptions which are accompanied with fever, and which have their regular periods of efflorescence and decline.

i. *Rubeola.* Measles. The rash, in the measles, appears usually on the fourth, but sometimes on the third, fifth, or sixth day of a febrile disorder, and, after a continuance of four days, gradually declines with the fever. The disease commences from ten to fourteen days after the contagion has been received, and appears under three varieties of form.

1. Rubeola vulgaris. The diagnosis of this rash is thus summed up by Dr. Bateman. It first shows itself in distinct, red, and nearly circular spots, somewhat less than the ordinary areolæ of flea-bites. As these increase in number, they coalesce, forming small patches, of an irregular figure, but approaching nearest to that of semicircles or crescents. These patches are intermixed with the single circular dots, and with interstices of the natural color of the skin: on the face they are slightly raised, so as to give the sensation of inequality of surface to the finger passed over the cuticle. The whole face, indeed, is often sensibly swelled at the height of the eruption; and occasionally the tumefaction of the eyelids is so great as to close the eyes for a day or two, as in the small pox: but on the other parts of the body they are not sensibly elevated.

ii. *Scarlatina.*—The scarlet fever is characterised by a close and diffuse efflorescence, of a high scarlet color, which appears on the surface of the body, or within the mouth and fauces, usually on the second day of fever, and terminates in about five days.

1. Scarlatina simplex. The scarlatina simplex consists merely of the rash, with a moderate degree of fever. The day after the slight febrile symptoms have appeared, the efflorescence begins to show itself, about the neck and face, in innumerable red points, which, within the space of twenty-four hours, are seen over the whole surface of the body. These, as they multiply, coalesce into small patches, but, on the following day (the third), form a diffuse and continuous efflorescence over the limbs, especially round the fingers.

2. Scarlatina anginosa. A variety of the preceding, accompanied with an inflammation about the fauces.

3. Scarlatina maligna. This form of scarlatina commences like the last, but is attended with very dreadful symptoms. The eyes are dull and suffused with redness, the cheeks exhibit a dark-red flush, and the mouth is encrusted with a black or brown fur. The ulcers in the throat are covered with dark sloughs, and surrounded by a livid base; and a large quantity of viscid phlegm clogs up the fauces, impeding the respiration, and occasioning a rattling noise, as well as increasing the difficulty and pain of deglutition.

iii. *Urticaria.*—Urticaria febrilis. Attended with fever, headach, and sickness in the stomach.

Urticaria evanida. Distinguished by the alternating appearance and reappearance of the wheals, as under the influence of various causes.

Urticaria perstans. Its specific name expresses its characteristic.

Urticaria conferta. Wheals coalescing into patches.

Urticaria subcutanea. Marked by a violent and almost constant tingling of the skin.

Urticaria tuberosa. Wheals forming hard tuberosities.

iv. *Roseola.*—This efflorescence is mostly symptomatic, and occurs in connexion with different febrile complaints. It is rose-colored, without wheals or papulæ, and not contagious.

Roseola æstiva commences upon the face, and is distributed in small patches over various parts of the body.

Roseola autumnalis occurs in children in distinct, circular, or oval patches.

Roseola vaccina, Roseola miliaris, Roseola variolosa, Roseola infantilis. } The signification of these terms conveys an idea of the principal characteristics.

v. *Purpura* is known by an efflorescence consisting of small, distinct, purple specks and patches, attended with general debility, but not always with fever.

1. Purpura simplex. In this variety there is an appearance of petechiæ, without much disorder of the constitution, except languor, and loss of the muscular strength, with a pale or sallow complexion, and often with pain in the limbs. The petechiæ are most numerous on the breast, and on the inside of the arms and legs and are of various sizes, from the most minute point to that of a flea-bite, and commonly circular. They may be distinguished from recent flea-bites, partly by their more livid or purple color, and partly because, in the latter there is a distinct central puncture, the redness around which disappears on pressure. There is no itching or other sensation attending the petechiæ.

2. Purpura hæmorrhagica is considerably more severe; the petechiæ are often of a larger size, and are interspersed with vibices and ecchymoses, or livid stripes and patches, resembling the marks left by the strokes of a whip or by violent bruises.

3. Purpura urticans.

4. Purpura senilis. I give this appellation to a variety of the complaint of which I have seen a few cases, occuring only in elderly women. It appears principally along the outside of the fore arm, in successive dark purple blotches, of an irregular form and various magnitude.

iv. *Erythema* is defined by Dr. Willan to be 'a nearly continuous redness of some portion of the skin, attended with disorder of the constitution, but not contagious.' Dr. Willan has described six varieties, which will include all the ordinary forms of the efflorescence. In some of them, as will appear from their titles, the surface is more or less elevated at some period of its course, approximating to the papular or tubercular tumors; but these are obscurely formed, and soon subside, leaving the redness undiminished.

1. Erythema fugax consists of red patches, of an irregular form, and short duration, resembling the redness produced from pressure.

2. Erythema læve exhibits a uniformly smooth, shining surface, and chiefly appears on the lower extremities, in confluent patches, and is generally accompanied by anasarca.

3. Erythema marginatum.

4. Erythema papulatum occurs chiefly on the arms, neck, and breast, in extensive irregular patches, of a bright red hue, presenting not an inelegant painted appearance. For a day or two, before the color becomes vivid, the surface is rough or imperfectly papulated.

Order IV.—Bullæ. The large and often irregular vesications, which are termed bullæ, discharge a watery fluid when they break; and the excoriated surface sometimes becomes covered with a flat yellowish or blackish scab, which remains till a new cuticle is formed underneath; and sometimes is converted into an ulcer, which does not readily heal.

i. *Erysipelas*, considered under the head of *Inflammation.*

ii. *Pemphigus.*—Authors are not agreed about the distinct nature of those diseases which have been described under this appellation.

iii. *Pompholyx.*—An eruption of bullæ appearing without any inflammation round them, and without fever, and therefore, differing most materially from the pemphigus described by nosologists, Dr. Willan applied the appellation of pompholyx.

1. Pompholyx benignus exhibits a succession of transparent bullæ, about the size of a pea, or sometimes of a hazel nut, which break in three or four days, discharge their lympth, and soon heal. They appear chiefly on the face, neck, and extremities; and occur in boys in hot weather, in infants during dentition, and in young persons of irritable habit from eating acrid vegetable substances, or from swallowing a few grains of mercury.

Order V.—Pustulæ. Pustules originate from an inflammation of the skin, and the consequent partial effusion of purulent matter under the cuticle, by which the latter is elevated into small circumscribed tumors. Sometimes several of these elevations arise upon a common inflamed surface; but most frequently the inflammation of the base of each is distinct and circumscribed. They often terminate in a scabby incrustation, varying in hardness according to the various tenacity of the contained fluid; and sometimes in superficial ulceration.

i. *Impetigo*, humid or running tetter. This eruption is characterised by the appearance of the small pustules denominated psydracia. It is not accompanied by fever, not contagious, nor communicable by inoculation.

1. Impetigo figurata deserves particular notice, because in its early stages it is very apt to be mistaken for the scabies. It appears in circumscribed patches, of various figure and magnitude, which are usually smaller and more circular on the upper, and larger, oval, and irregular on the lower extremities. The patches consist at first of clusters of the yellow psydracious pustules, set close together, and surrounded by a slight inflammatory border; the whole being somewhat raised, but the pustules not very prominent or acuminated. In a few days the pustules break and discharge their fluid; the surface becomes red and excoriated, shining as if it were stretched, but exhibiting numerous minute pores, from which a considerable ichorous discharge is poured out, accompanied with much troublesome itching, heat, and smarting. The discharge soon concretes partially into thin yellowish or greenish scabs; but still continues to ooze from under the scab which it forms. In the course of three or four weeks, as the quantity of the discharge diminishes, the scabs dry and fall off, leaving the surface of the cuticle red, rough, and somewhat thickened, and at the same time extremely brittle, and liable to crack and to be excoriated; so that the ichorous discharge and scabbing are easily reproduced, and the disease is often thus much prolonged in its duration. Occasionally fresh crops of the psydracious pustules re-appear, as at the commencement; and the whole course of eruption is repeated.

2. Impetigo sparsa differs from the preceding chiefly in form.

3. Impetigo erysipelatodes.

4. Impetigo scabida. We shall insert an account of this species as observed among the natives of the Sandwich Islands, where this genus is very common.

'Pupu, a cutaneous disease common among those who neglect the cleanly state of their persons, and expose the surface to the inclemencies of the weather. The categorematic pu signifies any kind of effervescence or bubbling up, and is well expounded by Ολυω, the root of phlyzacia; but, as these pustules are not accompanied by any heat or febrile symptoms, they properly come under the denomination of psydracious, constituting a particular kind of cutaneous malady called impetigo or running tetter. This disease is often mistaken by foreign visitors for the itch; but differs from it in not being contagious, and in having the lamellated scabs, which leave large deep red aveolæ behind them. The easy method of cure always makes it obvious that this affection differs essentially from the itch on one hand, and the porrigo on the other, though my friend Dr. Pearson of Macas, judging from report, referred it to the latter; for, by keeping the body clean and covered, it gradually disappears; and since the people have adopted the European mode of culture, its appearance has become less general than formerly. I have noticed that those poor men who work a great deal in those artificial swamps called taro-patches are peculiarly exposed to its virulence, and I have sometimes thought that the origin of this disease might be attributed to an irritation which the acrid qualities of the areum, or as it is now called calladium, might have at first occasioned in the skin, till by frequent occurrence it grew, by disposing the constitution to contract this morbid habit, to its present state of violence. It often attacks the legs or ancles in form of large scaly tumors, and in its worst form cracks and emits an ichorous discharge. I have sometimes seen the legs of a dropsical person covered, as it were, with greaves of one entire scab, and was

in its worst condition whilst the water was accumulating; but, after the operation of tapping, it would scale off and present for a time only a deep red, and hardened surface.'

ii. *Porrigo.* Ringworm of the scalp, scalled head, etc.—The porrigo is a contagious disease, principally characterised by an eruption of the pustules denominated favi and achores unaccompanied by fever. The several appearances which the disorder assumes are reducible to five or six specific forms.

1. The porrigo larvalis, or crusta lactea of authors, is almost exclusively a disease of infancy. It commonly appears first on the forehead and cheeks, in an eruption of numerous minute and whitish achores, which are crowded together upon a red surface. These pustules soon break, and discharge a viscid fluid, which concretes into thin yellowish or greenish scabs. As the pustular patches spread, the discharge is renewed, and continues also from beneath the scabs, increasing their thickness and extent, until the forehead, cheeks, and even the whole face, become enveloped, as by a mask (whence the epithet larvalis), the eyelids and nose alone remaining exempt from the incrustation.

2. Porrigo furfurans. In this form of the disease, which commences with an eruption of small achores, the discharge from the pustules is small in quantity, and the excoriation slight; the humor, therefore, soon concretes, and separates in innumerable thin laminated scabs, or scale-like exfoliations.

3. The porrigo lupinosa is characterised by the formation of dry circular scabs, of a yellowish-white color, set deeply in the skin, with elevated edges and a central indentation or depression, sometimes containing a white scaly powder, and resembling, on the whole, the seeds of lupines.

4. The porrigo scutulata, popularly termed the ringworm of the scalp, appears in distinct and even distant patches, of an irregularly circular figure, upon the scalp, forehead, and neck. It commences with clusters of small light-yellow pustules, which soon break and form thin scabs over each patch, which, if neglected, become thick and hard by accumulation.

5. Porrrigo decalvans, the αλωπηξ of the Greeks.—This singular variety of the disease presents no appearance whatever, except patches of simple baldness, of a more or less circular form, on which not a single hair remains, while that which surrounds the patches is as thick as usual. The surface of the scalp, within these areæ, is smooth, shining, and remarkably white. It is probable, though not ascertained, that there may be an eruption of minute achores about the roots of the hair, in the first instance, which are not permanent, and do not discharge any fluid.

6. Porrigo favosa. This species of the disorder consists of an eruption of the large, soft, straw-colored pustules, denominated favi. These are not in general globular with a regularly circular margin, but somewhat flattened, with an irregular edge, and surrounded by a slight inflammation. They occur on all parts of the body; sometimes on the scalp alone, and sometimes on the face, or on the trunk and extremities only; but most commonly they spread from the scalp, especially from behind the ears to the face, or from the lips and chin to the scalp, and occasionally from the extremities to the trunk and head. They are usually accompanied with considerable itching. Children from six months to four years of age are most liable to this eruption: but adults are not unfrequently affected with it.

iii. *Ecthyma.*—The ecthyma (θυω, to fume) is an eruption of the inflamed pustules, termed phlyzacia. They are usually distinct, arising at a distance from each other, seldom very numerous, unaccompanied by fever, and not contagious.

1. Ecthyma luridum.
2. Ecthyma vulgare.
3. Ecthyma infantile.
4. Ecthyma cachecticum.

iv. *Scabies.*—The scabies, or itch, is an eruption of pustules, or of small vesicles, which are subsequently intermixed with, or terminate in, pustules; it is accompanied by constant and importunate itching, but not with fever; and is in all its varieties contagious. It appears occasionally on every part of the body, the face only excepted; but most abundantly about the wrists and fingers, the fossa of the nates, and the flexures of the joints.

1. The scabies papuliformis, or rank itch, consists of an extensive eruption of minute itching vesicles, which are slightly inflamed and acuminated, resembling papulæ when examined by the naked eye. They commonly arise first about the bend of the wrist and between the fingers, or in the epigastrium; on which parts, as well as about the axillæ and nates, and in the flexures of the upper and lower limbs, they are at all periods most numerous, and often intermixed with a few phlyzacious pustules containing a thick yellow matter.

2. The scabies lymphatica, or watery itch, is distinguished by an eruption of transparent vesicles, of a considerable size, and without any inflammation at their base. They arise in succession, with intense itching, chiefly round the wrists, between the fingers, on the back of the hands, and on the feet and toes: they often occur also about the axillæ, the hams, the bend of the elbows, and fossa of the nates, where they are intermixed with pustules: but they do not frequently appear, like the papuliform species, over the breast and epigastrium, nor on the thighs and upper parts of the arms.

3. The scabies purulenta, or pocky itch, is, I believe, often mistaken by those who confine their notion of the disease to the ordinary small and ichorous vesicle of the two former species. The eruption consists of distinct, prominent, yellow, pustules, which have a moderate inflammation round their bases, and which maturate and break in two or three days, and then ulcerate, with increasing pain and inflammation. These pustules commonly appear first, and attain the largest size, on the hands and feet, especially about the knuckles and roots of the toes, between the fingers, and particularly between the forefinger and thumb, and round the wrists. In these situations the pustules often exceed two lines in diame-

ter, and assume a prominent globular form: whence, from their general resemblance to the large well matured pustules of small pox (and not from any allusion to syphilis, as some have erroneously supposed), the popular term *pocky* has been applied to them.

4. Scabies cachectica. This variety of scabies exhibits, in different parts of the body, all the appearances which belong to the three foregoing species. It is occasionally also combined with patches resembling lichen, psoriasis, or impetigo, especially in adults, or young persons approaching the term of puberty; whence it assumes an ambiguous character.

Order V.—Vesiculæ.

In this order *varicella* and *vaccinia* being generally understood, we shall proceed to

i. *Herpes* (ερπω, to creep). This appellation is here limited to a vesicular disease, which, in most of its forms, passes through a regular course of increase, maturation, and decline, and terminates in about ten, twelve, or fourteen days. The vesicles arise in distinct but irregular clusters, which commonly appear in quick succession, and they are set near together, upon an inflamed base, which extends a little way beyond the margin of each cluster.

1. Herpes phlyctænodes.—This species of the eruption, including the miliary variety abovementioned, is commonly preceded by a slight febrile attack for two or three days. The small transparent vesicles then appear in irregular clusters, sometimes containing colorless, and sometimes a brownish, lymph; and, for two or three days more, other clusters successively arise near the former.

2. Herpes zoster.—Shingles.

3. Herpes circinatus.—This form of the herpes is vulgarly termed a ringworm, and is, in this country, a very slight affection, being unaccompanied with any disorder of the constitution. It appears in small circular patches, in which the vesicles arise only round the circumference: these are small, with moderately red bases, and contain a transparent fluid, which is discharged in three or four days, when little prominent dark scabs form over them. The central area, in each vesicular ring, is at first free from any eruption; but the surface becomes somewhat rough and of a dull red color, and throws off an exfoliation as the vesicular eruption declines, which terminates in about a week with the falling off of the scabs, leaving the cuticle red for a short time.

4. Herpes labialis.—A vesicular eruption upon the edge of the upper and under lip.

5. Herpes præputialis.—This local variety of herpes was not noticed by Dr. Willan; but it is particularly worthy of attention, because it occurs in a situation where it is liable to occasion a practical mistake of serious consequence to the patient. The resemblance alluded to is that of chancre on the prepuce, which has been already explained when treating of diseases of the penis.

iv. *Rupia.*—The rupia (rumporupi) is characterised by an appearance of broad and flattish vesicles, in different parts of the body, which do not become confluent: they are slightly inflamed at the base, slow in their progress, and succeeded by an ill-conditioned discharge, which concretes into thin and superficial scabs that are easily rubbed off and presently regenerated. It appears under some varieties of form which may be included under the following heads:—

1. Rupia simplex consists of little vesications, containing, on their first appearance, a clear lymph, and appearing on many parts of the body. In a short time the fluid included in them begins to thicken, and becomes at length opaque and somewhat puriform: a slight ulceration of the skin takes place, with a sanious discharge, followed by scabbing; and when this heals it leaves the surface of a livid or blackish color, as if from a thickening of the rete mucosum.

2. Rupia prominens is distinguished by elevated conical scabs, which are gradually formed upon the vesicated bases. A fluted scab is first generated, and with some rapidity (e. g. in the course of the night), as the fluid of the vesication concretes.

v. *Miliaria.*—The miliaria (milium) is characterised by a scattered eruption of minute round vesicles, about the size of millet seeds, surrounded by a slight inflammation, or rash, and appearing at an uncertain period of febrile disorders. The eruption is immediately preceded by unusual languor and faintness, by profuse perspiration, which often emits a sourish odor, and by a sense of great heat, with a prickling and tingling in the skin. It appears most abundantly upon the neck, breast, and back, sometimes in irregular patches, and sometimes more generally diffused, and remains on those parts during several days: on the face and extremities it is less copious, and appears and disappears several times without any certain order. The vesicles, on their first rising, being extremely small and filled with a perfectly transparent lymph, exhibit the red color of the inflamed surface beneath them; but, in the course of thirty hours, the lymph often acquires a milky opacity, and the vesicles assume necessarily a white or pearly appearance.

vi. *Eczema.*—The eczema (ζεω, to boil) is characterised by an eruption of small vesicles on various parts of the skin, usually set close or crowded together, with little or no inflammation round their bases, and unattended by fever. It is not contagious.

This eruption is generally the effect of irritation, whether internally or externally applied, and is occasionally produced by a great variety of irritants in persons whose skin is constitutionally very irritable.

vii. *Aphtha*, thrush. The aphthæ (απτω, to kindle), are small, whitish, or pearl-colored vesicles, appearing on the tongue, lips, and the interior surface of the mouth and throat, generally in considerable numbers, proceeding to superficial ulceration, and terminating by an exfoliation of whitish crusts.

Order VII.—Tubercula.

i. *Phyma*
ii. *Verruca*
iii. *Molluscum*
} have been treated of in an earlier part of this article.

iv. *Vitiligo.*—This is an uncommon disease, and defined to be an appearance of smooth white shining tubercles, which gradually subside to the level of the skin, creeping along and chequering the whole superfices with a veal like appearance. Wherever the disease passes all the hairs drop

out, and never sprout again, leaving a smooth polished appearance of the skin during life.

v. *Acne.*—This genus is characterised by an eruption of distinct, hard, inflamed tubercles, which are sometimes permanent for a considerable length of time, and sometimes suppurate very slowly and partially. They usually appear on the face, especially on the forehead, temples, and chin, and sometimes also on the neck, shoulders, and upper part of the breast; but never descend to the lower parts of the trunk, or to the extremities. As the progress of each tubercle is slow, and they appear in succession, they are generally seen at the same time in the various stages of growth and decline; and, in the more violent cases, are intermixed likewise with the marks or vestiges of those which have subsided. The eruption occurs almost exclusively in persons of the sanguine temperament, and in the early part of life, from the age of puberty, to thirty or thirty-five; but, in those of more exquisite temperament, even later. It is common to both sexes; but the most severe forms of it are seen in young men. There are four varieties of this eruption, which may be designated by the titles of acne simplex, punctata, indurata, and rosacea.

vi. *Sycosis* (συκη, a fig), consists of an eruption of inflamed but not very hard tubercles, occurring on the bearded portion of the face and on the scalp, in adults, and usually clustering together in irregular patches. Celsus has correctly stated that some difference takes place in the appearance and progress of the eruption, when it is seated in the chin, and in the scalp; whence he divides it into two species.

In the sycosis menti the tubercles arise first on the under lip, or on the prominent part of the chin, in an irregularly circular cluster; but this is speedily followed by other clusters, and by distinct tubercles, which appear in succession, along the lower part of the cheeks up to the ears, and under the jaw towards the neck, as far as the beard grows. The tubercles are red and smooth, and of a conoidal form, and nearly equal to a pea in magnitude. Many of them continue in this condition for three or four weeks, or even longer, having attained their full size in seven or eight days; but others suppurate very slowly and partially, discharging a small quantity of thick matter, by which the hairs of the beard are matted together, so that shaving becomes impracticable, from the tender and irregular surface of the skin. This condition of the face, rendered rugged by tubercles from both ears round to the point of the chin, together with the partial ulceration, and scabbing, and the matting together of the unshaven beard, occasions a considerable degree of deformity; and it is accompanied also with a very troublesome itching.

vii. *Lupus*, treated like ulceration in general.

viii. *Elephantiasis.*—The elephantiasis, as described by the Greeks, is principally characterised by the appearance of shining tubercles, of different sizes, of a dusky red or livid color, on the face, ears, and extremities; together with a thickened and rugous state of the skin, a diminution or total loss of its sensibility, and a falling off of all the air, except that of the scalp.

But at present by this term we understand to be meant what is vulgarly called Barbadoes' leg and constitution, a remarkable thickening of the integuments of the legs, unattended with any pain or any appearance of disease. This inconvenient disorder affects the natives of the Society Islands, and even some of the missionaries who have been resident there many years.

ix. *Frambœsia.*—The eruption of the yaws sometimes commences without any precursory symptoms of ill-health; but it is generally preceded by a slight febrile state, with languor, debility, and pains of the joints, resembling those of rheumatism. After several days minute protuberances appear on various parts of the skin, at first smaller than the head of a pin, but gradually enlarging, in some cases to the diameter of a sixpence, and in others even to a greater extent: they are most numerous, and of the largest size, in the face, groins, axillæ, and about the anus and pudenda. But the crop is not completed at once; new eruptions appear in different places, while some of the earlier ones dry off. When the cuticle is broken a foul crust is formed on the surface, from under which, on the larger protuberances, red fungous excrescences often spring up, which attain different magnitudes, from that of a small raspberry to that of a large mulberry, which fruit they somewhat resemble from their granulated surfaces.

Order VIII.—Maculæ.

i. *Ephelis*, ηλιος, the sun. The term ephelis denotes not only the freckles, or little yellow lentigines, which appear on persons of fair skin, and the larger brown patches which likewise arise from exposure to the direct rays of the sun, as the name imports; but also those large dusky patches, which are very similar in appearance, but occur on other parts of the surface, which are constantly covered.

ii. *Nævus* comprises various congenital excrescences and discolorations of the skin. These are composed of a tissue of small veins and arteries, which communicate freely with each other, and are apt at times to enlarge even to an alarming extent. The only mode of cure is complete extirpation, as recommended by John Bell in his surgical works.

iii. *Spilus*, moles. These occur in most cases at the time of birth, but have been known to supervene afterwards. It is in general not safe to meddle with them, as we reap no advantage from any kind of treatment, and they seldom occasion any trouble to the individual whom they affect.

We have thus given a brief sketch of the diseases of the skin, preserving the classification of Drs. Willan and Bateman, to which works, not forgetting also the later and more splendid publication of Alibert, we must refer those who wish to render their knowledge of this department more perfect and satisfactory. It must be lamented that more light has not been hitherto thrown on this interesting though obscure class of maladies; but we may confidently anticipate a near approach to the period when this will receive its share of that improvement which is now making such rapid strides in every other department of science.

SURINAM, a colony of Guiana in South America, settled by the Dutch. It is bounded on the north by the Atlantic, on the east by the river Marawina, on the south by a country of Indians, and on the west by the river Corentin; about 150 miles from east to west, and sixty from north to south. The rivers that belong to this settlement are the Surinam (from which the colony takes its name), Corentin, Copename, Seramica, and Marawina. The first only is navigable; the rest, not excepting the Marawina, being, though very long and broad, so shallow and beset with rocks and islands that they are of little consequence. The other branch of this large river is named Commewina, and keeps due east for about sixteen miles, with a depth of about three or four fathoms at high-water mark; but, as the tide makes a difference of twelve feet, it is not considered as navigable for any ships of burden, though its breadth may be computed at about two miles. The banks, though later cultivated than those of the Surinam, are in a more flourishing condition, and considered more healthy. Coffee is mostly planted on the estates which lie on the side of this river; and the plantations have a respectable appearance. At the distance of sixteen miles the Commewina is again divided into two branches, one of which bears the same name to the south-east for above fifty miles, and that of Cottica to the E. S. E. for more than forty miles, when this last takes a meandering course to the S. S. W. Into all these rivers, the courses of which are serpentine, are discharged a number of large creeks or rivulets, the banks of which are inhabited by Europeans, and cultivated with sugar, cocoa, cotton, and indigo; but in some places the woods, &c., are absolutely impenetrable, a small path of communication between Paramaribo and the river Seramica being the only passable road in the settlement. The rivers whose banks are uncultivated, such as the Corentin, Copename, Seramica, and Marawina, afford but little matter for description. It is therefore only necessary to remark that they are generally from two to four miles in breadth, exceedingly shallow and crowded with quicksands, islands, and rocks, which form very beautiful cascades. In the Marawina is frequently found a curious stone or pebble, which is known by the name of the Marawina diamond, and which being polished bears a very near resemblance to that most valuable gem, and is consequently often set in rings, &c. A full description of this coast will be found in our article AMERICA, SOUTH, § 208. Paramaribo is the chief town.

SUR'LY, *adj.* } Sax. run, sour; Swed. *sur-*
SUR'LING, *n. s.* § *ley.* Morose; rough; uncivil; sour; silently or gloomily; angry: a sour morose fellow.

'Tis like you'll prove a jolly *surly* groom,
That take it on you at the first so roundly. *Shakspeare.*

That *surly* spirit melancholy,
Had baked thy blood, and made it heavy thick,
Which else runs tickling up and down the veins,
Making that idiot laughter keep men's eyes,
And strain their cheeks to idle merriment.
Id. King John.

Against the capitol I met a lion,
Who glared upon me, and went *surly* by,
Without annoying me. *Id. Julius Cæsar.*

These sour *surlings* are to be commended to sieur Gaulard. *Camden.*

Thus pale they meet; their eyes with fury burn;
None greets; for none the greeting will return;
But in dumb *surliness*, each armed with care
His foe profest, as brother of the war. *Dryden*

Repulsed by *surly* grooms, who wait before
The sleeping tyrant's interdicted door. *Id.*

What if among the courtly tribe
You lost a place, and saved a bribe?
And then in *surly* mood came here
To fifteen hundred pounds a year,
And fierce against the whigs harangued? *Swift.*

The zephyrs floating loose, the timely rains,
Now softened into joy the *surly* storms. *Thomson.*

SURMISE', *v. a.* & *n. s.* Fr. *surmise.* To suspect; image imperfectly; to imagine without certain knowledge: the noun substantive corresponding.

Of questions and strifes of words cometh envy, railings, and evil *surmisings.* 1 *Tim.* vi. 4.

They were by law of that proud tyranness,
Provoked with wrath, and envy's false *surmise*,
Condemned to that dungeon merciless,
Where they should live in woe, and die in wretchedness. *Spenser.*

Man coveteth what exceedeth the reach of sense, yea somewhat above capacity of reason, somewhat divine and heavenly, which with hidden exultation it rather *surmiseth* than conceiveth. *Hooker.*

To let go private *surmises*, whereby the thing itself is not made better or worse; if just and allowable reasons might lead them to do as they did, then are these censures frustrate. *Id.*

My thought, whose murthering yet is but fantastical,
Shakes so my single state of man, that function
Is smothered in *surmise.* *Shakspeare. Macbeth.*

No sooner did they espy the English turning from them, but they were of opinion that they fled towards their shipping; this *surmise* was occasioned, for that the English ships removed the day before.
Hayward.

We double honour gain
From his *surmise* proved false. *Milton.*

Surmise not
His presence to these narrow bounds confined. *Id.*

It wafted nearer yet, and then she knew
That what before she but *surmised*, was true.
Dryden.

This change was not wrought by altering the form or position of the earth, as was *surmised* by a very learned man, but by dissolving it.
Woodward.

Hence guilty joys, distastes, *surmises*,
False oaths, false tears, deceits, disguises. *Pope.*

No man ought to be charged with principles he actually disowns, unless his practices contradict his profession; not upon small *surmises.* *Swift.*

SURMOUNT', *v. a.* Fr. *surmonter.* To rise above; conquer; overcome; surpass.

The mountains of Olympus, Atho, and Atlas. over-reach and *surmount* all winds and clouds.
Raleigh.

What *surmounts* the reach
of human sense, I shall delineate so,
By likening spiritual to corporeal forms,
As may express them best. *Milton's Paradise Lost.*

He hardly escaped to the Persian court; from whence, if the love of his country had not *surmounted* its base ingratitude to him, he had many invitations to return at the head of the Persian fleet; but he rather chose a voluntary death. *Swift.*

Though no resistance was made, the English had much ado to *surmount* the natural difficulties of the place the greatest part of one day. *Hayward.*

SURMULLET, in ichthyology, a name used both by French and English naturalists for the mullus major, a fish of the cuculus kind, and in the Linnean system the mullus cirris geminis, &c., in many things resembling the mullus barbatus, or ruber, but differing from it in that it is twice as big, being often caught of twelve or fourteen inches in length. Its fins also are yellowish, and have a slight blush of red mixed with that color. Its scales are large, and broad, and thick, and are more firmly joined to the flesh. It has also three or four straight yellow lines running parallel with one another down its sides. It is caught in the Mediterranean and in the British seas, especially on the coast of Cornwall, and is every where esteemed a very delicate fish. Pennant calls this species of mullus the striped surmullet; but he expresses a doubt whether this is not a variety, as Gronovius apprehends, of the red surmullet, or mullus barbatus. This last, he observes, was highly esteemed by the Romans, and bore a very high price. They presented it alive to their guests in a glass vessel that they might observe the beautiful changes of its evanescent colors during its expiration. Plin. l. ix. c. 17. See Hor. Sat. lib. ii. § 2. 33., and Juvenal, sat. iv. See MULLUS.

SUR'NAME, *n.s.* & *v.a.* Fr. *surnom.* The name of a family; name which one has over and above what is called the Christian name. See below. The verb active corresponding.

Another shall subscribe with his hand unto the Lord, and *surname* himself by the name of Israel. *Isaiah* xliv. 5.

Many which were mere English joined with the Irish against the king, taking on them Irish habits and customs, which could never since be clean wiped away; of which sort be most of the *surnames* that end in *an*, as Hernan, Shinan, and Mungan, which now account themselves natural Irish. *Spenser.*

He, made heir not only of his brother's kingdom, but of his virtues and haughty thoughts, and of the *surname* also of Barbarossa, began to aspire to the empire. *Knolles's History.*

Witness may
My *surname* Coriolanus: the painful service,
The extreme dangers, and the drops of blood
Shed for my thankless country, are requited
But with that *surname.* *Shakspeare. Coriolanus.*

Pyreicus, only famous for counterfeiting earthen pitchers, a scullery, rogues together by the ears, was *surnamed* Rupographus. *Peacham on Drawing.*

How he, *surnamed* of Africa, dismissed
In his prime youth the fair Ibernian maid. *Milton.*

God commanded man what was good; but the devil *surnamed* it evil, and thereby baffled the command. *South.*

The epithets of great men, monsieur Boileau is of opinion, were in the nature of *surnames,* and repeated as such. *Pope.*

SURNAME is that which is added to the proper name for distinguishing persons and families. It was originally distinguished from sirname, which denotes the name of the sire or progenitor; thus Macdonald and Robertson are sirnames expressing the son of Donald, the son of Robert. The word surname, again from Fr. sur, above or upon, and nom, name, signified some name superadded to the proper name to distinguish the individual, as Artaxerxes Longimanus, Harold Harefoot, Malcolm Canmore. From this it is evident that every sirname was a surname, but every surname was not a sirname. In modern times they are nearly confounded; and, as there is now little occasion to preserve the distinction, Dr. Johnson has rejected the word sirname altogether; in which he certainly was premature, for he has retained words much more obsolete. See NAME. Surnames have been introduced among most nations, but among many not at a very early period. They seem to have been formed at first by adding the name of the father to that of the son. Among the Hebrews Caleb is denominated the son of Jephunneh, and Joshua the son of Nun. But it is evident that these were not used as surnames. Even so late as our Saviour's time the Jews had no regular family surnames. Some had personal epithets from accidental or characteristical circumstances, as Simon Peter, Judas Lebbæus, Joseph Barsabas Justus, Judas Iscariot, &c. But none of these were hereditary, as all surnames properly are. Iscariot is thought by some commentators to have been a name taken by Judas from his landed property. We admit that in all nations, while men had but one name, it was usual to distinguish them by mentioning the name of their fathers. That the ancient Greeks as well as the Jews did so is evident from the very first line of the Iliad: Αχιλληος Πηληιαδες, Achilles the son of Peleus. This perhaps gave rise to surnames, which at last became common among most nations. The old Normans used Fitz, which signifies son; as Fitzherbert, Fitzsimmons, the son of Herbert, the son of Simon. The Irish used O, or Oy, for grandson, which is still used in many parts of Scotland; the compiler's maternal great-grandmother boasted that she had 100 oyes: O'Neal, O'Donnel, &c., therefore signify the grandson of Neal and of Donald. The Scottish Highlanders employed Mac; as Macdonald, the son of Donald. The Saxons added the word son to the end of the father's name, as Williamson. The Romans generally had three names, often four or five. The first, called prænomen, answered to our Christian name, and was intended to distinguish the individuals of the family; the second, called nomen, corresponded to the word clan in Scotland, and was given to all those who were sprung from the same stock; the third, called cognomen, expressed the particular branch of the tribe or clan from which an individual was sprung. Thus Publius Cornelius Scipio: Publius corresponded to our names John, Robert, and William: Cornelius was the name of the clan or tribe, as Campbell was formerly the name of all the duke of Argyle's clients, and Douglas of the retainers of the duke of Hamilton's progenitors: Scipio being added conveyed this information, that Publius, who was of the tribe of the Cornelii, was of the family of that Scipio who led about his aged blind father, and became a scipio or staff to him. But they had also the Agnomen, which was generally personal, though sometimes hereditary; and was derived from some particular circumstance or accident happening to individuals. See AGNO-

MEN and COGNOMEN. Du Chesne observes that surnames were unknown in France before 987, when the lords began to assume the names of their demesnes. Camden relates that they were first taken up in England a little before the conquest, under king Edward the Confessor; but he adds that they were never fully established among the common people till the time of Edward II. Till then they were varied with the father's name: if the father, e. g., was called Richard or Roger, the son was called Richardson or Hodgson; but from that time they were settled, some say, by act of parliament. The oldest surnames are those we find in Domesday-book, most of them taken from places, with the addition of de; as Godefridus de Mannevilla, Walterus de Vernon, Robert de Oyly, &c. Others from their fathers, with filius; as Gulielmus filius Osberni: others from their offices; as Eudo Dapifer, Gulielmus Camerarius, Gislebertus Cocus, &c. But the inferior people are noted simply by their Christian names, without any surnames. Some think they were first introduced into Scotland in the time of William the Conqueror by the English, who accompanied Edgar Atheling when he fled into that kingdom. These had their proper surnames, as Moubray, Lovell, Lisle, &c., using the particle de before them; which makes it probable that these surnames had been derived from the lands which their ancestors or they themselves had possessed. But Scottish historians mention some surnames in Scotland at much earlier periods; and trace the surname of Macalpine from a natural son of king Alpine, and that of Macgregor from another bastard of king Gregory the Great, who both reigned in the ninth century. See SCOTLAND. Some antiquaries date the origin of the surname of Graham so early as the fifth century from one Graham, a Scottish hero, who leaped over and demolished part of Antoninus's wall, thence called Graham's Dyke. And it is certain that in Kenneth II.'s time, in 800, the great men had begun to call their lands by their own names; and soon after the various branches of their families took their surnames from these estates. Others, as surnames increased, took their names from their offices, as Stewart; from their business, as Smith, Taylor, &c.; others from their complexion or stature, as Black, White, Red, Brown, Long, Short, &c. It was long before any surnames were used in Wales, except that of son; as Evan ap Rice, Evan the son of Rice; David ap Howel, David the son of Howel: but many of them have at length formed separate surnames, as the English and Scots by leaving out the *a* in *ap*, and joining the *p* to the father's name: thus Evan ap Rice becomes Evan Price; Griffin ap Howel, Griffin Powel.

We are told surnames were unknown in Sweden till 1314, and that the common people of that country use none to this day, and that the same is the case with the vulgar Irish, Poles, and Bohemians. Many surnames were doubtless originally bestowed on account of the qualities of mind, as Bold, Hardy, Meek; some for the qualities of body, as Strong, Low, Short, &c. But the greatest number of surnames were borrowed from the names of places, and not a few from the country at large; as Scott, Scotland, English, Inglis, England, Wales, Welsh, Ireland, &c. Camden says that there is not a village in Normandy but has given its name to some family in England. He mentions as examples Percy, Devereux, Tankerville, Mortimer, Warren, &c. They were introduced with William I. Several have been derived from places in the Netherlands, as Gaunt, Tournay, Grandison; and many from the names of towns and villages in England and Scotland, as Wentworth, Markham, Murray, Aberdeen. Many have been formed from the names of animals, as Lion, Dog, Hog, Cock, Salmon, &c.; many from vegetables and minerals, &c. Others are formed from such a variety of accidents that it would be trifling to particularise them. After the revival of learning, when most European authors wrote in Latin, it was a very general practice to Latinize their surnames, either by adding a Latin termination to them, or by a complete translation, which often disguised them entirely. Thus Francis Holyoak, author of a Latin dictionary, called himself Franciscus de Sacra Quercu; Kirkwood and Ruddiman, in their Latin grammars, called themselves Kirkwodus and Ruddimannus; and even so late as the end of last century Dr. Brown, in his Elementa Medicinæ, styled himself Joannes Bruno; whence the epithet Brunonian was applied to his doctrine and his followers. But surnames ought never to be translated; and Christian names always ought, except when borrowed from surnames. See LOUIS.

SURPASS', *v. a.* Fr. *surpasser*. To excel; to exceed; to go beyond in excellence.

The climate's delicate,
Fertile the isle, the temple much *surpassing*
The common praise it bears.
Shakspeare. Winter's Tale.

O, by what name, for thou above all these,
Above mankind, or aught than mankind higher,
Surpassest far my naming! how may I
Adore thee, author of this universe? *Milton.*

O thou! that, with *surpassing* glory crowned,
Lookest from thy sole dominion like the god
Of this new world. *Id. Paradise Lost.*

Achilles, Homer's hero, in strength and courage *surpassed* the rest of the Grecian army. *Dryden.*

His miracles proved him to be sent from God, not more by that infinite power that was seen in them, than by that *surpassing* goodness they demonstrated to the world. *Calamy.*

Under or near the line are mountains which, for bigness and number, *surpass* those of colder countries, as much as the heat there *surpasses* that of those countries. *Woodward.*

SUR'PLICE, *n. s.* Fr. *surpelis, surplis;* Lat. *superpellicium.* The white garb which the clergy wear in their acts of ministration.

It will wear the *surplice* of humility over the black gown of a big heart.
Shakspeare. All's Well that Ends Well.

The cinctus gabinus is a long garment, not unlike a *surplice*, which would have trailed on the ground, had it hung loose, and was therefore gathered about the middle with a girdle. *Addison.*

SURPLICE. By Can. 58 every minister saying the public prayers, or ministering the sacrament or other rites of the church, shall wear a decent and comely surplice with sleeves, to be provided at the charge of the parish. But by 1 Eliz. c. 2

and 13 and 14 Car. II., the garb prescribed by act of parliament, in the second year of king Edward VI., is enjoined; and this requires that in the saying or singing of matins, and even songs, baptizing and burying, the minister in parish churches and chapels shall use a surplice. And, in all cathedral churches and colleges, the archdeacon, dean, provosts, masters, prebendaries, and fellows being graduates, may use in the choir, besides their surplices, such hoods as pertain to their several degrees. But in all other places every minister shall be at liberty to use a surplice or not. For the holy communion the rubric appoints a white alb plain, which differs from the surplice in being close-sleeved, with a vestment or cope. See ALB.

SUR'PLUS, *n. s.* } Fr. *sur* and *plus*. A su-
SURPLUS'AGE. } pernumerary part; overplus; what remains when use is satisfied.

If then thee list my offered grace to use,
Take what you please of all this *surplusage*;
If thee list not, leave have thou to refuse. *Spenser.*

That you have vouchsafed my poor house to visit, It is a *surplus* of your grace. *Shakspeare.*

The officers spent all, so as there was no *surplusage* of treasure; and yet that all was not sufficient. *Davies.*

When the price of corn falleth, men give over *surplus* tillage, and break no more ground. *Carew's Survey of Cornwall.*

We made a substance so disposed to fluidity, that by so small an agitation as only the *surplusage* of that which the ambient air is wont to have about the middle even of a winter's day, above what it hath in the first part. *Boyle.*

Whatsoever degrees of assent one affords a proposition beyond the degrees of evidence, it is plain all that *surplusage* of assurance is owing not to the love of truth. *Locke.*

SURPRI'SAL, *n. s.* } Fr. *surprise*. From the
SURPRI'SE. } verb. The act of taking unawares; the state of being taken unawares: a dish, explained in the extract.

The castle of Macduff I will *surprise*,
Seize upon Fife, give to the edge o' the' sword
His wife, his babes. *Shakspeare. Macbeth.*

I set aside the taking of St. Jago and St. Domingo, in Hispaniola, as *surprizes* rather than encounters. *Bacon.*

Now do our ears before our eyes,
Like men in mists,
Discover who'd the state *surprize*,
And who resists. *Ben Jonson.*

Parents should mark heedfully the witty excuses of their children, especially at sudden *surprisals*; but rather mark than pamper them. *Wotton.*

This let him know,
Lest willfully transgressing, he pretend
Surprisal, unadmonished, unforewarned. *Milton's Paradise Lost.*

Up he starts, discovered and *surprised*. *Milton.*

People were not so much frightened as *surprized* at the bigness of the camel. *L'Estrange.*

This strange *surprisal* put the knight
And wrathful squire into a fright. *Hudibras.*

He whose thoughts are employed in the weighty cares of empire is not presumed to inspect minuter things so carefully as private persons; the laws therefore relieve him against the *surprises* and machinations of deceitful men. *Davenant.*

There is a vast difference between them, as vast as between inadvertency and deliberation, between *surprize* and set purpose. *South.*

The greatest actions of a celebrated person, however *surprising* and extraordinary, are no more than what are expected from him. *Addison. Spectator.*

If out of these ten thousand we should take the men that are employed in public business, the number of those who remain will be *surprizingly* little. *Addison.*

Few care for carving trifles in disguise,
Or that fantastick dish some call *surprise*.
King's Cookery.

How shall he keep, what, sleeping or awake,
A weaker may *surprise*, a stronger take? *Pope.*

Who can speak
The mingled passions that *surprized* his heart? *Thomson.*

SUR'QUEDRY, *n. s.* Old Fr. *sur* and *cuider*, to think. Overweening; pride; insolence. Obsolete.

They overcommon were deprived
Of their proud beauty, and the one moiety
Transformed to fish for their bold *surquedry*. *Spenser.*

Late-born modesty
Hath got such root in easy waxen hearts,
That men may not themselves their own good parts,
Extol, without suspect of *surquedry*. *Donne.*

SURREN'DER, *v. a., v. n.*, } Old Fr. *sur-*
SURREND'RY, *n. s.* [& *n. s.* } *rendre*. To yield up; deliver up: yield; give one's self up: the act of yielding or resigning.

Solemn dedication of churches serves not only to make them public, but further also to *surrender* up that right which otherwise their founders might have in them, and to make God himself their owner. *Hooker.*

He, willing to *surrender* up the castle, forbade his soldiers to have any talk with the enemy. *Knolles.*

If our father carry authority with such disposition as he bears, this last *surrender* of his will but offend us. *Shakspeare.*

Ripe age bade him *surrender* late,
His life and long good fortune unto final fate. *Fairfax.*

As oppressed states made themselves homagers to the Romans to engage their protection, so we should have made an entire *surrendry* of ourselves to God, that we might have gained a title to his deliverances. *Decay of Piety.*

That hope quickly vanished upon the undoubted intelligence of that *surrender*. *Clarendon.*

Our general mother, with eyes
Of conjugal attraction unreproved,
And meek *surrender*, half-embracing leaned
On our first father. *Milton's Paradise Lost.*

This mighty Archimedes too *surrenders* now. *Glanville.*

Recal those grants, and we are ready to *surrender* ours, resume all or none. *Davenant.*

In passing a thing away, by deed of gift, is required a *surrender* on the giver's part of all the property he has in it; and, to the making of a thing sacred, this *surrender* by its right owner is necessary *South.*

Juba's *surrender*
Would give up Africk unto Cæsar's hands. *Addison.*

Having mustered up all the forces he could, the clouds above and the deeps below, he prepares for a *surrender*; asserting, from a mistaken computation, that all these will not come up to near the quantity requisite. *Woodward.*

Surrender up to me thy captive breath:
My power is nature's power, my name is Death. *Harte*

SURRENDER, in common law, is a deed or instrument, testifying that the particular tenant of lands and tenements, for life or years, doth sufficiently consent and agree, that he who has the next or immediate remainder or reversion thereof shall have the present estate of the same in possession; and that he hereby yields and gives up the same to him, so that the estate for life or years may merge or drown by mutual agreement of the parties. Of surrenders there are three kinds; a surrender properly taken at common law; a surrender of copyhold or customary estates; and a surrender improperly taken, as of a deed, a patent, &c. The first is the usual surrender, and it is usually divided into that in deed and that in law.

SURRENDER, in deed, is that which is really made by express words in writing, where the words of the lessee to the lessor prove a sufficient assent to surrender his estate back again.

SURRENDER, in law, is that wrought by operation of the law, and which is not actual. As if a man have a lease of a farm for life or years, and during the term he accepts a new lease; this act is, in law, a surrender of the former.

SURRENDER of a bankrupt. See BANKRUPTCY.

SURRENDER OF COPYHOLDS is the yielding up of the estate by the tenant into the hands of the lord, for such purposes as are expressed in the surrender: as to the use and behoof of A and his heirs, to the use of his own will, and the like. This method of conveyance is so essential to the nature of a copyhold estate that it cannot possibly be transferred by any other assurance. No feoffment, fine, or recovery (in the king's courts) hath any operation upon it. If I would exchange a copyhold with another, I cannot do it by an ordinary deed of exchange at the common law, but we must surrender to each other's use, and the lord will admit us accordingly. If I would devise a copyhold, I must surrender it to the use of my last will and testament; and in my will I must declare my intentions, and name a devisee, who will then be entitled to admission.

SURRENDER OF LETTERS PATENT AND OFFICES. A surrender may be made by letters patent to the king, so that he may grant the estate to whom he pleases, &c.; and a second patent for years to the same person for the same thing is a surrender in law of the first patent.—10 Rep. 66. If an officer for life accepts of another grant of the same office, it is in law a surrender of the first grant; but if such an officer takes another grant of the same office to himself and another, it may be otherwise.

SURREPTION, *n. s.* Lat. *surreptus.* Sudden and unperceived invasion or intrusion.

Sins compatible with a regenerate estate are sins of a sudden *surreption.* *Hammond.*

SURREPTITIOUS, *adj.* } Lat. *surreptitious.*
SURREPTI'TIOUSLY, *adv.* } Done by stealth: gotten or produced fraudulently.

Scaliger hath not translated the first; perhaps supposing it *surreptitious*, or unworthy so great an assertion. *Browne.*

The Masorites numbered not only the sections and lines, but even the words and letters of the Old Testament, the better to secure it from *surreptitious* practices. *Government of the Tongue.*

Thou hast got it more *surreptitiously* than he did, and with less effect. *Id.*

A correct copy of the Dunciad, the many *surreptitious* ones have rendered necessary.
Letter to Publisher of Pope's Dunciad.

SURREY, an inland county of England, in the southern part of the kingdom, is bounded by Sussex on the south, by Kent on the east, by Berkshire and Hampshire on the west, and on the north is separated from Middlesex and a small part of Buckinghamshire by the river Thames. This ranks below most of the other counties of England in extent; its greatest width from north to south being about twenty-six miles, and its utmost length from east to west about thirty-eight. The best authorities compute its contents at 811 square miles, or 519,000 acres.

The *surface* consists of a gentle diversity of hill and dale, the hills in some parts rising to a considerable height, and the whole presenting as great a variety of scenery as any portion of the kingdom. In some parts naked heaths impart a wildness to the prospect, strikingly contrasted with the numberless beauties occasionally scattered over the surface by the hand of art; while the hills, aspiring to the bold character and picturesque scenery of mountains, gradually decline into richly wooded dales, and highly cultivated plains. Its extensive downs also afford extensive pastures. Across the middle of the county, the downs rise with a gentle slope from the north, and are broken in their eastern division into deep and waving valleys. Towards the northern border there are several hills, which afford an extensive view. To the south of the downs, the surface of the county above rises into hills that overhang the Weald. As we approach the Western extremity, these hills cover a greater breadth; and near Wonersh, Godalming, and Peperharrow, are covered with a rich foliage, and wave with a graceful line, into intermediate valleys, watered by the different branches of the Wey. On Leith Hill, to the south-west of Dorking, Tilbuster Hill near Godstone, and Gratewood Hill near Godalming, the views are very extensive.

Of the *soil* of this county the different species are much intermixed. They may be reduced to the general heads of clay, loam, and chalk. The most extensive and uniform tract is that which occupies the whole southern border, and forms what is denominated the Weald of Surrey; a district about thirty miles in length, and from three to five in breadth. This consists of a cold, retentive clay, upon a subsoil of the same nature; its surface flat, covered with wood, and its elevation less perhaps than any other vale district in the island. Proceeding northwards, the soil is loam, across the whole county. Near Godalming it runs to a great depth, and rests on a base of sandstone, veined with iron ore. Here commences the most remarkable district of the chalky downs, which lie nearly in the middle of the county, entering from Kent, into Surrey, by Croydon and Limpsfield, where their width is about seven miles. They, however, gradually decrease towards the west. Along the summit of the downs, particularly about Walton and Hedley, and between the Mole and the Wey, is a

large extent of heath, which for a considerable depth separates the chalk of the northern from the southern compartment of downs. From the eastern extremity of the downs, running northward, is a variety of soils, consisting chiefly of strong clay and sandy loam, with patches of gravel, reaching almost to Dulwich, from which place to the extremity of the county, near Rotherhithe, is a strong clay.

It is the general opinion that less rain falls in Surrey than in the metropolis; so that the climate may, upon the whole, be regarded as dry, as far as respects the quantity of rain; but the southern border and the low parts near the Thames are damp, from the nature of the soil, the flatness of the surface, and the immense number of trees which cover it. On the other hand, the atmosphere of the chalk hills, which run across the whole county from east to west, is dry, keen, and bracing. On the heaths about Bagshot, Aldershot, and Hind-head, a similar climate prevails. The spring is in general early, and vegetation is not so often checked by frosty mornings, and cold, raw, easterly winds, as in some of the more southern counties. The summers are commonly dry and warm, and the harvest generally commences in the first ten days of August. The wind blows most frequently from the west and south-west, seldom keeping long in any point between the north-west and north-east: but in the spring, and frequently towards the end of autumn, easterly winds prevail; and the weather is then cold and raw; but the greatest quantity of rain falls when the wind blows from the S. S. W. or south.

Iron ore is found in considerable quantities in the south-west part of Surrey, about Haslemere, Dunsfold, and Cranley; and in the south-east quarter, about Lingfield and Horne; but in consequence of the high price of fuel the works have been neglected. Fuller's earth is found both to the north and south of the downs, but the former is of inferior quality. Extensive quarries of stone are worked near Godstone and its vicinity. When first taken from the quarry it is incapable of bearing a damp atmosphere; but after being kept covered for a few months it becomes sufficiently firm to resist the heat of a common fire, and is called fire-stone. In consequence of this property it is much in demand for fire-places. The stones are of various sizes, from ten inches thickness to seventy-two superficial feet. There are large quarries of limestone near Dorking, particularly serviceable in the construction of works under water. Chalk is abundant and in general use as a manure. The sand is in great request for hour-glasses; and the brick-earth produces excellent fire-bricks.

The principal *rivers* are the Wey, Mole, and Wandle; the Thames also washes the northern border of this county. The former, after watering the county in different directions, finally discharge themselves into the Thames. A considerable branch of the Medway rises in the parishes of Godstone and Horne, and passing through Lingfield quits Surrey and enters Kent. The Loddon also skirts Surrey on its west side, and is used for the supply of the Basingstoke canal. In the western and south-eastern parts of the county are ponds, preserved as stew-ponds, to keep fish to supply the London market. The mineral waters of Surrey were at one period in high repute, but are now wholly neglected. This county is in general well furnished with springs.

As to *agricultural* improvement, the drill husbandry has not found many followers, except in the west part of the county, in some parts of which it is general. The produce of wheat is from two to five, and sometimes six quarters an acre, and that of barley, which is here a fine crop, from four to seven and a half. The climate of Surrey seems to be less favorable to oats, the produce of which is sometimes very low, not exceeding three quarters per acre. Garden peas and beans are cultivated in the neighbourhood of the metropolis, and the sandy loams near the Thames, about Mortlake; while the field varieties of both are extensively grown in most other parts, and especially on the chalk hills. Turnips are raised in large crops; and hops are largely cultivated about Farnham. Carrots, clover, sainfoin, and hops, are also extensively cultivated; and a greater quantity of land is employed in raising physical herbs, we are told, than in any other county in Britain. Those which are chiefly reared are peppermint, lavender, camomile, aniseed, liquorice, and poppy. The whole quantity of garden ground employed for the London market in this county amounts to about 3500 acres. Surrey is not celebrated for any particular breed of cattle. The Holderness, or short-horned breed of cows, is preferred; and the rearing of calves for the metropolis was once a common employment, but is now almost disused. The cattle chiefly bred are sheep, oxen, and hogs; many geese are also kept. Within the last ten years large tracts of the heath-lands have been enclosed and cultivated; before which period it was calculated that nearly one-sixth part of Surrey was in a very unprofitable state: the whole amount of waste lands is still computed at 70,000 acres. This county contains the Basingstoke canal, which runs from that place to the Wey; the Wey and Arun junction canal, which falls into the Wey about a mile above Guildford, thus opening a direct communication with the sea; the Surrey, which communicates with the Thames at Rotherhithe; and the Croydon, which commences there and enters the Surrey canal at Deptford. On the Wey the first locks used in England were erected.

According to the Roman division of England, Surrey formed a part of the province of Britannia Prima. At the Saxon heptarchy it constituted, with Sussex, a distinct state, under the title of Suth-Seaxna-rice; and on the division into shires, this district, from its southern situation, was called Suthrea, since modulated to Surrey. On the Danish invasion, and the Norman conquest, the landed property was divided and given to the followers of the victorious monarchs. In later times the history of Surrey is trivial. During the civil wars it adhered to the parliament, and petitioned them for the removal of the 'evil counsellors' who were around the king. As early as the time of the Saxons it conferred the title of earl; and Huda, the first who bore that distinction, was slain, in 853, in battle with

the Danes. Surrey is divided into thirteen hundreds, which contain one county town, fourteen boroughs and market towns, and 140 parishes, all in the diocese of Winchester, with the exception of nine parishes peculiar to the see of Canterbury. It is represented in parliament by eleven members, four for the county, and two for each of the boroughs of Southwark, Guildford, and Lambeth, and one for Reygate.

SURROGATE, Surrogatus, a person substituted or appointed in room of another; most commonly of a bishop, or bishop's chancellor.

SURROUND', *v. a.* Fr. *surronder.* To environ; encompass; enclose on all sides.

Cloud and ever-during dark
Surrounds me, from the cheerful ways of men
Cut off. *Milton.*

As the bodies that *surround* us diversely effect our organs, the mind is forced to receive the impressions. *Locke.*

SURSOL'ID, *n. s.* In algebra. The fourth multiplication or power of any number whatever taken as the root. A sursolid problem is that which cannot be resolved but by curves of a higher nature than a conic section.

SURTOUT', *n. s.* Fr. *surtout.* A large coat worn over all the rest.

The *surtout*, if abroad you wear,
Repels the rigor of the air;
Would you be warmer, if at home
You had the fabrick, and the loom? *Prior.*

Sir Roger she mortally hated, and used to hire fellows to squirt kennel-water upon him, so that he was forced to wear a *surtout* of oiled cloth, by which means he came home pretty clean, except where the *surtout* was a little scanty. *Arbuthnot.*

SURVENE', *v. a.* Fr. *survenir.* To supervene; to come as an addition.

Hippocrates mentions a suppuration that *survenes* lethargies, which commonly terminates in a consumption. *Harvey.*

SURVEY', *v. a.* & *n. s.* } Old Fr. *surveoir.*
Survey'or, *n. s.* } To overlook; have under the view; examine: a view; prospect; superintendence: a surveyor is an overseer; one placed to superintend; a measurer of land.

The husbandmen's self came that way,
Of custom to *survey* his ground. *Spenser.*

Should we *survey*
The plot of situation, and the model;
Question *surveyors*, know our own estate,
How able such a work to undergo,
To weigh against his opposite.
Shakspeare. Henry IV.

Wer't not madness, then
To make the fox *surveyor* of the fold? *Id. VI.*

Bishop Fox was not only a grave counsellor for war or peace, but also a good *surveyor* of works. *Bacon's Henry VII.*

Though with those streams he no resemblance hold,
Whose form is amber, and their gravel gold;
His genuine and less guilty wealth t' explore,
Search not his bottom, but *survey* his shore.
Denham.

Under his proud *survey* the city lies,
And like a mist beneath a hill doth rise. *Id.*

Her stars in all their vast *survey*
Useless besides! *Milton.*

With altered looks,
All pale and speechless, he *surveyed* me round.
Dryden.

Early abroad he did the world *survey*
As if he knew he had not long to stay. *Waller.*

Surveying of Land is the art of measuring, planning, and computing the contents of fields and estates. In England the unit of land measure is the acre, which contains 4840 square yards; and it is subdivided into roods and perches, or poles; four roods making an acre, and forty perches a rood.

Land is measured with a chain, called Gunter's chain, from its inventor. It is twenty-two yards long, and is divided into 100 equal links, each 7·92 in length. An acre therefore contains 100,000 square links.

The lines measured, for ascertaining the dimensions and determining the contents of fields, are generally set down, and their contents computed in links; and, five figures on the right of the contents in links being pointed off for decimals, the figures on the left are acres, and, the decimals being reduced to roods and perches, the content is exhibited in the usual denominations of acres, roods, and perches.

In measuring distances with a chain, provide ten small arrows, and give them to the person who is to lead the chain, and, holding one end of the chain in your left hand at the point at which you are to begin to measure, let the leader go forward in the required direction, holding the other end of the chain and one of the arrows in his right hand; you pointing with your right hand to the right or the left, according to the direction in which you wish him to move. When he is exactly in a line with the object which you wish to measure to, point towards the ground, to indicate that the leader must there stick an arrow in the ground at the end of the chain. The leader must then move forward another chain length, keeping the follower in a line with the object departed from, and the follower keeping him in a line with the object to be measured to; the leader and follower thus mutually checking each other, and the leader leaving an arrow at the end of each chain, which is taken up by the follower when the leader has pricked in the next. When all the ten arrows are used, they are returned to the leader to use over again, being changed at the end of every ten chains till the line to be measured is finished; and the number of changes shows the number of tens; to which the arrows in the hands of the follower, and the odd links over from the end of the last chain to the end of the line being added, the length of the line in chains and links is obtained. Thus, if there should be six changes of arrows, and the follower should have eight arrows in his hand, and there be twenty-three links over from the last chain to the mark or end of the line, then the line is in length 6823 links.

In measuring a sloping line, a small pocket level is useful to show how many links ought to be deducted from each chain to reduce the line to its horizontal length, to be used in mapping or plotting the figure; for, though the area of the surface with all its undulations is the content which it is required to exhibit in figures for the content, it is only its surface reduced to a horizontal plane that can be represented on a plan.

SURVEYING.

Fig. 1.

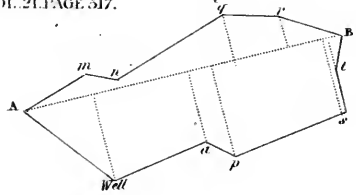


Fig. 2.

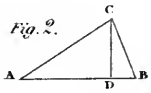


Fig. 3.

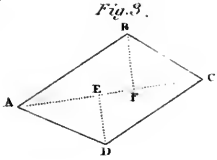


Fig. 4.

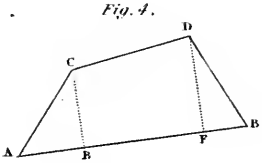


Fig. 5.

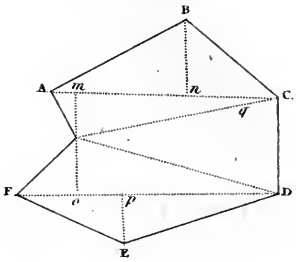


Fig. 8.

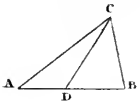


Fig. 7.

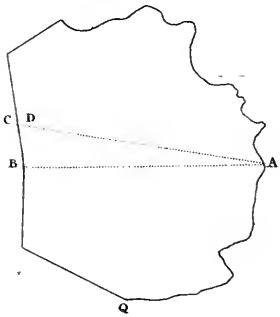


Fig. 12.

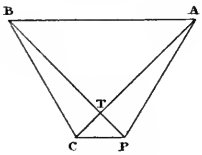


Fig. 9.

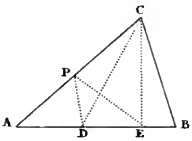


Fig. 6.

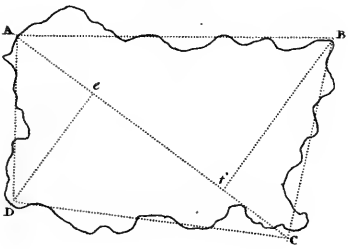


Fig. 10.

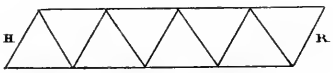


Fig. 11.

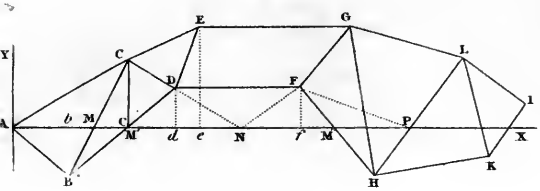
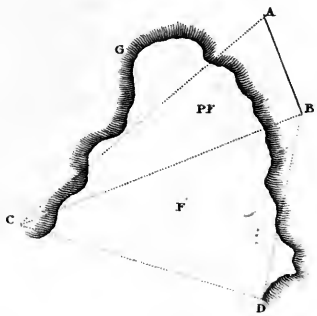


Fig. 13.



London. Published by Thomas Rigg 73 Cheapside.

J. Shury sculp.

A staff of ten links long, called an offset staff, is useful in measuring short distances from the main lines.

The cross staff too is a very useful and simple instrument for determining the places from which perpendiculars are to be measured from the main or diagonal lines, to the angles of the field or estate. It consists of two pair of sights at right angles to each other, set on a staff, with a sharp point to fix in the ground. In measuring along the line, when nearly opposite a point of which the perpendicular distance is required, the cross staff is fixed up, and turned round till both ends of the line can be seen through one pair of sights; and it is then moved backward and forward along the line, till, while both the ends of the line are seen through one pair of sights, the object whose perpendicular distance is required, is seen through the other pair; and the distance from the cross staff to the object is its perpendicular distance from the line.

In extensive surveys a theodolite is used to measure angles, and from them, conjoined with a measured base, the lengths of the leading lines are computed trigonometrically, and thus the relative positions of the more distant and principal points in the survey are determined.

But, with whatever instruments the survey may be made, a field book must be kept to register all that is necessary for computing the area, and making a plan of the field or estate surveyed.

The following is a specimen of the form commonly used in measuring along A B in fig. 1, Plate SURVEYING.

Offsets on the left.	A B.	Offsets on the right.
m 38 . .	120	
	156	. 67 Well.
n 19 . .	170	
	304	. 59 *o*
	320	. 64 *p*
q 50 . .	330	
r 43 . .	380	
	402	. 37 *s*
	422	. 18 *t*
	460	
	B	

In small surveys, such as the preceding is a specimen of, a good way of setting down the work is to sketch on a piece of paper a figure resembling that which is to be measured, and writing the dimensions as they are found against or upon the corresponding parts of the figure.

To survey a triangular field, as A B C, fig. 2, measure one of the sides, as A B, and, by means of the cross staff, find at what point the perpendicular C D will meet the case, and measure that perpendicular. Or measure the three sides of the triangle; or two of its sides and the angle which they include.

Then in the first case the area of the triangle $= \frac{AB \times CD}{2}$; in the second the area $= \sqrt{S \cdot \overline{S-AB} \cdot \overline{S-BC} \cdot \overline{S-AC}}$, where S = half the sum of the three sides; and in the third case, supposing A B, B C, and the angle B measured, the area $= \frac{AB \cdot BC \cdot \sin. B}{2}$.

Example.—Suppose A B = 1084, A C 896, and B C 738 links, the angle B 55° 2′, and C D = 605: required the area by each of the three methods?

By method first, the area $= \frac{1084 \times 605}{2} = 327910$ links = 3 A. 1 R. 4·6 P.

By the second, the area $= \sqrt{1359 \times 275 \times 463 \times 621} = 327803$ links = 3 A. 1 R. 4·4 P.

By the third, the area $= \frac{1084 \times 738 \times \text{A at sin. } 55° 2'}{2} = 327790$ links = 3 A. 1 R. 4·4 P.

These calculations will be considerably facilitated by the use of logarithms. Thus the computation by the second method will stand thus:

A B	1084		
A C	896		
B C	738		
	2)2718		
	1359	Log.	3·133219
	275		2·439333
	463		2·665581
	621		2·793092
			2)11·031225
	Links		
Area	327803	Log.	5·515612
Acres	3·27803		
	4		
Rods	1·11212		
	40		
Perches	4·48480		

To measure a four sided field as A B C D, fig. 3.

First method.—Measure all the sides, and the diagonal, and the figure will then be divided into two triangles, the area of each of which may be computed by the second of the preceding methods.

Second method.—Measure the diagonal A C, and find by means of the cross staff where the perpendiculars D E and B F from the angles D and B meet the diagonal, and measure D E and B F, and the area will be $= \frac{AC \times \overline{DE + BF}}{2}$.

Third method.—Measure the longest side, fig. 4, as A B, the several distances A E, E F, and F B; and the perpendicular C E and D F; then find the area of each of the parts, A E C, E F D C, and F D B, and their sum will be the area of the whole.

The area of the triangle A E C is $\frac{AE \times EC}{2}$;

that of the trapezoid CEFD is $\frac{EF \times \overline{EC + DF}}{2}$; and that of the triangle BFD is $\frac{BF \times FD}{2}$.

In the preceding figure the area is $\frac{AC \times \overline{DE + BF}}{2}$.

Thus if AC = 1284, DE = 326, and BF = 290 links; then the area $= \frac{1284 \times \overline{326 + 290}}{2}$ $= \frac{1284 \times 616}{2} = \frac{790944}{2} = 395472$ links =

A. R. P.
3·95472 acres = 3 : 3 : 32·7.

In the last figure suppose the annexed the field book of the admeasurements:—

Offsets left.	AB.
C 245 .	267
D 289 .	612
	843
	B

Then 612—267 = 345 = EF, and 843—612 = 231 = FB, and $\frac{267 \times 245}{2} = 32707$ links, the area of AEC; $\frac{345 \times \overline{245 + 289}}{2} = 92115$ links, the area of EFDC; and $\frac{231 \times 289}{2} =$ 33379 links, the area of BFD.

Hence 32707
92115
33379

A. 1·58201
4

R. 2·32804
40

A. R. P.
P. 13·12160, or the area is 1 2 13·1

Any field of which the sides are straight lines may be divided into triangles, the sides of which being measured, the area of each may be computed, according to the second method above given, for finding the area of a triangular. But they may in general be more advantageously surveyed in the following manner, which we shall give in the words of Dr. Hulton:

'Having set up marks at the corners where necessary of the proposed field ABCDEFG, fig. 5, walk over the ground and consider how it can be best divided into triangles and trapeziums, and measure them separately. Thus the annexed figure is divided into the two trapeziums, ABCD, GDEF, and the triangle GCD. Then in the first trapezium, beginning at A, measure the diagonal AC, and the two perpendiculars G *m*, B *n*. Then the base GC and the perpendiculars D *q*. Lastly, the diagonal DF, and the two perpendiculars *p* E, and *o* G. All which measures write against the corresponding parts of a rough figure drawn to resemble the figure to be surveyed, or set them down in any other form you choose.' Thus

Offsets Left	A C	Offsets Right
	135	130 G
B 180	410	
	550	
	C	
	C G	
D 230	152	
	440	
	G	
	F D	
120	237	
	288	80
	520	
	D	

Or the figure might have been measured by means of a diagonal form BE, and perpendiculars upon it from the angles on each side. Or, supposing the dimensions of the trapezium ABCG taken as above, the remaining part CGFED might have been measured by means of a diagonal from C to F, and perpendicular upon it from D, E, and G.

From the above field book to compute the area of the figure:—Area of ABCG = $\frac{AC \times \overline{Bn + Gm}}{2} = 85250$ links; area of GDC $= \frac{GC \times qD}{2} = 50600$ links; area of DEFG $= \frac{FD \times \overline{Go + Ep}}{2} = 52000$ links

Then 85250 + 50600 + 52000 = 187850 links, = 1 A. 3 R. 20·5 P.

Many pieces of land may be very well surveyed by measuring any base line, either within or without them, together with the perpendiculars let fall on it from every corner of them. For they are thus divided into several triangles and trapezoids, all of whose parallel sides are perpendicular to the base line; and the sum of these triangles and trapeziums will be equal to the figure proposed, if the base line fall within it, if not the sum of the parts without being taken from the sum of the whole within and without, the remainder will be the area of the figure.

In pieces that are not very large it will be sufficiently exact to find the points in the base line, where the several perpendiculars will fall by means of the cross, or even by estimating by the eye, and measuring thence to the corners for the lengths of the perpendiculars; and it will be generally better when practicable to have the diagonal within the figure, as the measuring over hedges is attended with inconvenience.

The computing of the contents of very irregular fields may often be greatly simplified, by reducing the crooked sides to straight ones upon the plan; an operation which may be easily and accurately enough performed thus:—

'Stretch a hair over the crooked sides of the figure, so that the small parts cut off by it may be equal to those taken in, an equality which by a little practice may be judged of with great nicety; then mark the ends of the hair with two points, and proceed in the same manner with the other sides till the whole is reduced to

a straight lined figure, of which the content may be found as above.

Thus, in fig. 6, let the dotted lines A B, B C, C D, D A, represent the lines which reduce the curvilinear area to an equivalent rectangular one; then if A C, measured on the scale from which the figure is laid down, be 843 links, and the perpendiculars D e and B f be 424 and 518 respectively, we have the area $= \text{A C} \frac{\text{D}e + \text{B}f}{2} =$ 3 A. 3 R. 35·28 P.

On dividing lands.—In the division of commons, after the whole is surveyed and the area cast up, the quantity due to each claimant must be assigned in proportion to the value of his claim; and, if the land be of different qualities, the quantity to be assigned to each claimant will be inversely proportional to the quality of the land assigned to him. Thus if a, b, c, and d represent the claims of A, B, C, and D to a common whose area is x, and a', b', c', and d' represent respectively the value per acre of the land, from which the allotments to A, B, C, and D are respectively to be made; then $\frac{a}{a'} + \frac{b}{b'} + \frac{c}{c'} + \frac{d}{d'} : x$. : $\frac{a}{a'}$ to A's share; and : : $\frac{b}{b'}$ to B's share, &c.

To cut off from a plan a given quantity by a line drawn from any proposed point in the side of it.

Let A, fig. 7, be the proposed point. Draw any line A B, and measure the space A B Q by the method indicated above. Let us suppose that this is found in defect by a quantity a, then erect at B a perpendicular B D, and make A $= \frac{2\,a}{\text{A B}}$, and through D draw D C parallel to A B, and join A C; then A C B Q will be the part required to be cut off.

To divide a triangle into two parts, having a given ratio, $m : n$. 1st. By a line drawn from one angle of the triangle.—Make A D : A B : : $m : m + n$ (fig. 8), and join C D; then A D C and B D C will be the parts required. Here it is plain that $\text{A D} = \frac{m}{m+n}$ A B; and D B $= \frac{n}{m+n}$ A B. 2d. By a line parallel to one of its sides. Let A B C (fig. 9) be the given triangle, to be divided into two parts, in the ratio of m to n, by a line parallel to the base A B. Make C E to E B as m to n; and at E draw the perpendicular E D meeting a semicircle described on C B as a diameter in D. Make C F = C D, and through F draw F G parallel to A B, and F G will divide the triangle in the given ratio. For C B : C E : : $m + n : n$; but $\text{CB} : \text{CE} :: \text{CB}^2 : \text{CD}^2 :: \text{CB}^2 : \text{CF}^2$, whence the triangle A B C : triangle C G E : : $m + n : n$. It is obvious that $\text{CF} = \text{CB}\sqrt{\frac{m}{m+n}}$ and $\text{CG} = \text{CA}\sqrt{\frac{m}{m+n}}$. 3d. By lines drawn from a given point in one of the sides.—Let P, fig. 9, be the given point, D the point which divides the side A B, n the given ratio; join D P, and through C draw C E parallel to D P, and join P E, which will divide the triangle as required. For A C D : B C D : : $m : n$. But the triangles P C D and P D E are equal; therefore the triangles A P E and A C D are equal; therefore A P E : A B C D : : $m : m + n$.

On geodetic surveying.—The extensive processes usually termed geodetic, or trigonometrical surveying, are usually undertaken either to determine the differences of longitude between two moderately distant and noted meridians, to give greater accuracy to maps, or to determine from the lengths of degrees of the meridian, in different latitudes, the figure of the earth.

As the foundation of the operations, a line of a few miles in length is carefully measured on some plain, so nearly level as to facilitate the determination of an actually horizontal line; and this being done upon such hills and elevated spots as are suitably situated, and visible from each other, signals are placed; and the straight lines joining those points constitute a series of triangles, of which the measured base forms a side of the first. The angles of these triangles are carefully measured by a theodolite, which is carried from one station to another; and in such a series of triangles care is taken that one side is always common to two of them; so that by the principles of trigonometry the lengths of all the sides of the triangles can be determined in terms of the measured base; and the bearing of any one of the sides, with respect to the meridian, being determined, the bearing of any other side may be found by computation. As a check on operations of this kind towards the end of the survey, another base line, called a base of verification, is generally measured, and determined also from the survey as one of the sides of the chain of triangles; and the agreement of the results is a test of the accuracy with which the operations in the survey, have been performed.

In every such series of triangles, when each angle is to be determined by the same instrument, it is desirable that, as nearly as circumstances will admit, they should be equilateral. For, if it were possible to choose the stations in such a manner that each angle should be exactly 60°, half the number of triangles in the series, multiplied by the length of one of the sides, would (as in fig. 10) give the total distance; and then also the sides of the scale or ladder constituting the series of triangles would be parallel to each other, and so also would the diagonal steps marking the progress from one extremity of the survey to another; and the first side might be found by a base crossing it perpendicularly as at H, and the last side verified by such another base as R at the other extremity.

If the earth were a sphere the length of the degrees of the meridian would be every where the same; but if it be an oblate spheroid, the degrees in receding from the equator to the poles would increase in length, and this increase would be proportionate to the square of the sine of the latitude; and the ratio of the earth's axes, as well as their actual lengths, may be ascertained by comparing the lengths of degrees in different latitudes.

Instead however of actually tracing out a me-

ridian on the surface of the earth, a construction is employed which gives the same result. Let A, B, C, D, E, F, &c., be a series of triangles carried on as nearly as may be in the direction of the meridian; these triangles are spherical or spheroidal triangles, but their curvature being extremely small they are treated as rectilinear triangles, either by reducing them to the chords of the respective terrestrial arcs, or by subtracting from each angle one-third of the excess of the sum of the three angles above two right angles, and working with the remainder and the three sides as the parts of a plain triangle, the proper reduction for the horizon and the level of the sea having been previously made. These computations being made throughout the series, the sides of the successive triangles are contemplated as arcs of the terrestrial spheroid. Suppose we know by observation and computation the inclination of A C to the first portion A M of the measured meridian, and that we find by trigonometry the point M where that curve will act the side B C. The points A, B, C, and the line A M, will be in the same horizontal plane, but the prolongation M M′ of that line will be above the plane of the second horizontal triangle B C D. If therefore, without changing the triangle C M M′, the line M M′ be brought down to coincide with the plane of this second triangle, the point M′ will describe a small arc of a circle which may be regarded as a line perpendicular to the plane B C D. Hence the operation is reduced to bending down the side M M′ in the plane of the meridian, and calculating the distance A M M′ to find the position of M′. By bending down thus in imagination one after another, and in points of the meridian, the corresponding horizontal triangles, we obtain by computation the direction and length of the meridian from one extremity of the triangles to the other.

When all the triangles which constitute such a series have been computed, the respective positions of their angular points, with respect to each other, may be determined thus:—

Let the triangles A B C, B C D, &c., make parts of a chain of triangles of which the sides are arcs of the sphere; and as we know from observation the angle C A x which measures the inclination of A C to the meridian A x; then, having found the excess e of the three angles of the triangle A C c (C e being perpendicular to the meridian) above two right angles, deduct a third of E from each angle of the triangle, and by means of the following proportion find A c and C e.

$$\sin.\left(90^\circ - \frac{E}{3}\right) : \cos.\left(CAc - \frac{2E}{3}\right) :: AC : Ac$$

$$\sin.\left(90^\circ - \frac{E}{3}\right) : \sin.\left(CAc - \tfrac{1}{3}E\right) :: AC : Ac.$$

The azimuth of A B is given at once; for B A X = C A B — C A X; and, if the spherical excess proper to the triangle A B M′ be computed, we shall have A M′ B = 180° — M′ A B — A B M′ + E.

To determine the sides A M′, B M′, a third of E must be taken from each of the angles of the triangle A B M′, and then

$$\sin.(180^\circ - M'AB - ABM' + \tfrac{2}{3}E) : \sin.(ABM - \tfrac{1}{3}E) :: AB : AM'.$$

$$\sin.(180^\circ - M'AB - ABM' + \tfrac{2}{3}E) : \sin.(M'AB - \tfrac{1}{3}E) : AB : BM.$$

In each of the right-angled triangles A b B, M′ d D, are known two angles and the hypothenuse, whence A b, b B, and M′ d, d D, are readily determined; and consequently the distances of B, D, from the meridian and from the perpendicular, are known.

Proceeding in the same manner with the triangle A C N, or M′ D N, to obtain A N and D N, the prolongation of C D; and then with the triangle D N F to find the side N F, and the angles D N F and D F N it will be easy to complete the rectangular co-ordinate of F.

The distance f F, and the angles D E N, N Ff, being thus known, we have by geometry f F P = 180° — E F D — D F N — N Ff. So that in the right-angled triangle f F P two angles and one side are known, and hence the spherical excess may be computed, and thence the angle F Pf, and the sides f P, F P. Resolving next the right-angled triangle e E P we obtain the position of the point E with respect to the meridian A X, and to its perpendicular A Y; and thus we may proceed through the whole series.

Such is a concise sketch of the method to be pursued in determining the length of an arc of the meridian comprised between two points A and X; the corresponding arc of the celestial meridian is found by determining the latitudes of each of the extremities of the meridian measured; or more commonly by finding the difference of the zenith distances of some known fixed star observed at each extremity.

To deduce from angles measured near one of the stations the true angle at the station.—When the centre of the instrument cannot be placed in the vertical line occupied by the axis of the signal, the angles observed must undergo a reduction. Let C, fig. 12, be the centre of the station, P the place of the centre of the instrument, it is required to find A C B, supposing them to be known A P B = P, B P C = p, C P = d, B C = L, A C = R.

We have here A I B = P + I A P; and A I P = C + C B P; whence C = P + I A P — C B P. But $\sin.\,CAP = \frac{d.\sin.(P+p)}{R}$; $\sin.\,CBP = \frac{d\cdot\sin.\,p}{L}$, and, as the angles C A P, C B P, are necessarily very small, we may take $C - P = \frac{d\cdot\sin.\,P+p}{R} - \frac{d\cdot\sin.\,p}{L}$; or, to have the reduction in seconds, $C - P = \frac{d}{\sin.\,1''}\left(\frac{\sin.\,\overline{P+p}}{R} - \frac{\sin.\,p.}{L}\right)$.

The space to which we are limited compels us to omit the investigation of many formulæ connected with the interesting and important application of science to practice. The following are a few of the most important of these formulæ:—

To reduce angles measured in a plane inclined to the horizon to the corresponding angles in the horizontal plane.

Let h, h', represent the altitudes of the objects, C the angle measured on the oblique plane, and

C′ the required corresponding one on the horizontal plane; then sin. $\frac{C'}{2} =$

$$\frac{\sqrt{\frac{\sin. C + h + h'}{2} - h' \cdot \sin. \frac{C + h + h'}{2} - h' \cdot \text{sect. } h \cdot \text{sect. } h'}}{\text{rad. } 2}.$$

In a spherical triangle knowing two sides and the included angle to determine the angles comprehended by the chords of those two sides.

Let A, B, C, represent the angles of the triangle; A′, B′, C′, the corresponding angles made by the chords; the spherical sides opposite A, B, C, being a, b, c, and the chords α, β, γ.

Then $\cos. A' = \cos. \frac{b}{2} \cdot \cos. \frac{c}{2} \cdot \cos. A + \frac{\beta}{2} + \frac{\gamma}{2}$.

Or $\cos. A' = \cos. \frac{b}{2} \cdot \cos. \frac{c}{2} \cos. A + \sin. \frac{b}{2} \cdot \sin. \frac{c}{2}$.

Given two sides and the included angle of a rectilineal triangle, it is required to find the spherical angle of the two arcs of which these two sides are the chords?

Let β and γ be the chords, A′ the angle which they include, and A the required spherical angle. Then

$$\cos. A = \frac{\cos. A' - \frac{1}{4}\beta\gamma}{\sqrt{1 - \frac{1}{2}\beta \cdot 1 + \frac{1}{2}\beta \cdot 1 - \frac{1}{2}\gamma \cdot 1 + \frac{1}{2}\gamma}}.$$

To compute the spherical excess, E:—

Let S=the arc of the triangle, R″=206264·8″, the seconds in an arc equal to the radius, and r the radius of the earth; then $E = \frac{R'' \cdot S}{r}$. Hence it may be noted that $S = \frac{b \cdot c \cdot \sin. A}{2}$.

Given a base, B, *measured at an elevation,* L, *above the level of the sea, to find the corresponding base,* b, *when reduced to the level of the sea?*

Let r = the radius of the earth, then

$$B - b, \text{ or the reduction} = B \cdot \left(\frac{h}{r} - \frac{h^2}{r^2} + \frac{h^3}{r^3} - \frac{h^4}{r^4} + \text{\&c.}\right)$$

From the measures M and m of a degree, or like small portions of the meridian in different latitudes L and l, to find the ratio of the polar axis c to the equatorial axis d.

$$\frac{d}{c} = \sqrt{\frac{(M^{\frac{1}{3}} \cdot \sin. L + m^{\frac{1}{3}} \sin. l) \cdot (M^{\frac{1}{3}} \cdot \sin. L - M^{\frac{1}{3}} \cdot \sin. l)}{(m^{\frac{1}{3}} \cdot \cos. l + M^{\frac{1}{3}} \cos. L) \cdot (n^{\frac{1}{3}} \cdot \cos. l - M^{\frac{1}{3}} \cdot \cos. L)}}.$$

$\frac{d}{c} - 1 = \frac{d - e}{c}$ is called the compression of the terrestrial spheroid, and it is evidently given when $\frac{d}{c}$ is determined.

Surveying of harbours.—The method of surveying harbours, and forming maps of them, depends on the same principles, and is in general conducted in the same manner as common surveying. A base line if possible is measured on shore, and, signals being erected at the principal points round the harbour, the angles which they make with the base line are determined, and then their position with respect to each other found either by computation or projection. The best instrument for measuring such angles is Hadley's reflecting quadrant or sextant, as it is the only instrument in which neither the exactness of the observation nor the ease with which they may be made is sensibly affected by the motion of the vessel, and in this department of surveying it will often be necessary to measure angles afloat. Let it be proposed to take the necessary measures for making a plan of the harbour C G D, fig. 13.

Select some convenient place, as A B, to measure a base line, and set up signals at C, D, G, &c. At A measure the angle C′ A D, and at B measure the angle C B A; then these angles with A B will give the position of C with respect to A B. At B measure the angle C B D, and at C measure the angle B C D; or going to D measure the angle B D C; these measures with C B, determined by the triangle A B C, will give the position of D. At C′ and D take the G C′ D and G D C′, which with C D′ already determined will give the position of C. Proceed in this manner till the situation of all the principal points are determined, and then either sketch in the intermediate spaces by the eye or lay them down from particular admeasurements. To find the situation of anchoring places, such as E; or rocks or sands such as F; row off to those places in a boat; and when at E measure the angles A E B and B E D, and segments of circles described in A B and B D respectively, to contain those angles will give the position of the point E. Or with a compass take the bearing of any two points as B and D, and the intersection of those lines of bearing will give the position of E, the relative bearing of the principal point on shore being previously determined. Thus may the situation of F, or any other point in the harbour, be determined and inserted in the plan.

SURVIEW′, *v. a.* Old Fr. *survoir.* To overlook; to have in view; to survey. Not in use

That turret's frame most admirable was,
Like highest heaven compassed round,
And lifted high above this earthly mass,
Which it *surviewed*, as hills do lower ground.
Spenser.

SURVIVE′, *v. n.* & *v. a.* SURVI′VOR, *n.* SURVI′VORSHIP. } Lat. *superviro*; Fr. *survivre.* To live after the death of another: survive any person or thing: the noun substantives corresponding.

Now that he is dead, his immortal fame *surviveth*, and flourisheth in the mouths of all people.
Spenser.

Your father lost a father,
That father his; and the *survivor* bound,
In filial obligation, for some term,
To do obsequious sorrow. *Shakspeare Hamlet.*

Try pleasure,
Which, when no other enemy *survives*,
Still conquers all the conquerors. *Denham.*
I did discern
From his *survivors*, I could nothing learn. *Id.*

Although some died, the father beholding so many descents, the number of *survivors* must still be very great. *Browne.*

The love of horses which they had alive,
And care of chariots, after death *survive*. *Dryden.*

Her majesty is heir to the *survivor* of the late king. *Swift.*

No longer now that golden age appears,
When patriarch-wits *survived* a thousand years,
Now length of fame, our second life, is lost,
And bare threescore is all even that can boast;
Our sons their fathers' failing language see,
And such as Chaucer is, shall Dryden be. *Pope.*

Such offices granted in reversion were void, unless where the grant has been by *survivorship*. *Ayliffe's Parergon.*

The rapsodies, called the Characteristics, would never have *survived* the first edition, if they had not discovered so strong a tincture of infidelity. *Watts.*

Survivorship is that branch of mathematics which treats of reversions payable, provided one or more particular persons survive certain others. By reversions are meant payments not to take place till some future period. Survivorship forms one of the most difficult and complicated parts of the doctrine of reversions and life annuities. It has been very fully treated of by Simpson in his Select Exercises; and brought to a state of comparative perfection by Dr. Price and Mr. Morgan, who bestowed a great deal of attention on this subject. See Annuities.

The calculations are founded on the expectation of lives at different ages, deduced from tables formed from bills of mortality, of which see examples under the article Mortality. By the expectation of life is meant the mean time that any single or joint lives at a given age is found to continue; that is, the number of years which, taken one with another, they actually enjoy, and may be considered as sure of enjoying; those who survive that period enjoying as much more time in proportion to their number as those who fall short of it enjoy less. Thus, supposing forty-six persons alive all forty years of age, and that one will die every year till they are all dead in forty-six years, half forty-six or twenty-three will be the expectation of each of them. If M. de Moivre's hypothesis were true, that men always decrease in an arithmetical progression, the expectation of a single life is always half its complement, and the expectation of two joint lives one-third of their common complement. By the complement of a life is meant what it wants of eighty-six, which M. de Moivre makes the boundary of human life. Thus if a man be thirty, the complement of his life is fifty-six. Thus, supposing a man forty, his expectation would be twenty-three, the half of forty-six, his complement: the expectation of two joint lives, each forty, would be fifteen years four months, or the third part of forty-six. The number expressing the expectation, multiplied by the number of single or joint lives (of which it is the expectation), added annually to a society, gives the whole number living together, to which such an annual addition would in time grow. Thus, since nineteen, or the third of fifty-seven, is the expectation of two joint lives, whose common age is twenty-nine, twenty marriages every year between persons of this age would in fifty-seven years grow to twenty times nineteen, or 380 marriages, always existing together. And, since the expectation of a single life is always half its complement, in fifty-seven years twenty single persons added annually to a town will increase to twenty times 28·5, or 570; and when arrived at this number the deaths every year will just equal the accessions, and no farther increase be possible. Hence it appears that the particular proportion that becomes extinct every year, out of the whole number constantly existing together of single or joint lives, must, wherever this number undergoes no variation, be exactly the same with the expectation of those lives, at the time when their existence commenced. Thus was it found that one-nineteenth part of all the marriages among any bodies of men, whose numbers do not vary, are dissolved every year by the deaths of either the husband or wife, it would appear that nineteen was, at the time they were contracted, the expectation of these marriages. In like manner was it found in a society, limited to a fixed number of members, that one twenty-eighth part dies annually out of the whole number of members, it would appear that twenty-eight was their common expectation of life at the time they entered. So likewise, were it found in any town or district, where the number of births and burials are equal, that a twentieth or thirtieth part of the inhabitants die annually, it would appear that twenty or thirty was the expectation of a child just born in that town or district. These expectations, therefore, for all single lives, are easily found by a table of observations, showing the number that die annually at all ages out of a given number alive at those ages; and the general rule for this purpose is to divide the sum of all the living in the table, at the age whose expectation is required, and at all greater ages, by the sum of all that die annually at that age and above it; or, which is the same, by the number (in the table) of the living at that age; and half unity subtracted from the quotient will be the required expectation. Thus, in Dr. Halley's table, the sum of all the living at twenty and upwards is 20·724, which, divided by 598, the number living at the age of twenty, and half unity subtracted from the quotient, gives 34·15 for the expectation of twenty. In calculating the value or expectation of joint lives, M. De Moivre fell into various mistakes, which we need not enumerate; as Dr. Price and Mr. Morgan have given tables of the value of lives, not founded on any hypothesis, but deduced from bills of mortality. Mr. Morgan has likewise given rules for calculating values of lives in this manner. Dr. Price, in the third essay of the first volume of his Treatise on Reversionary Payments, has also given proper rules for calculating these values, the most important of which are comprehended in the following paragraphs.

I. Suppose a set of married men to enter into

a society in order to provide annuities for their widows, and that it is limited to a certain number of members, and constantly kept up to that number by the admission of new members as the old ones are lost; it is of importance, in the first place, to know the number of annuitants that after some time will come upon the establishment. Now, since every marriage produces either a widow or a widower, and since all marriages taken together would produce as many widows as widowers, were every man and his wife of the same age, and the chance equal which shall die first; it is evident that the number of widows that have ever existed in the world, would in this case be equal to half the number of marriages. And what would take place in the world must also, on the same suppositions, take place in this society. In other words, every other person in such a society leaving a widow, there must arise from it a number of widows equal to half its own number. But this does not determine what number, all living at one and the same time, the society may expect will come to be constantly upon it. It is, therefore, necessary to determine how long the duration of survivorship between persons of equal ages will be, compared with the duration of marriage. And the truth is, that, supposing the probabilities of life to decrease uniformly, the former is equal to the latter; and, consequently, that the number of survivors (or, which is the same, supposing no second marriages), of widows and widowers alive together which will arise from any given set of such marriages constantly kept up, will be equal to the whole number of marriages; or half of them (the number of widows in particular) equal to half the number of marriages. Now it appears that in most towns the decrease in the probabilities of life is in fact nearly uniform. According to the Breslaw Table of Observation, almost the same numbers die every year from twenty years of age to seventy-seven. After this, indeed, fewer die, and the rate of decrease in the probabilities of life is retarded. But this deviation from the hypothesis is inconsiderable; and its effect, in the present case, is to render the duration of survivorship longer than it would otherwise be. According to the London Table of Observations, the numbers dying every year begin to grow less at fifty years of age; and hence to extreme old age there is a constant retardation in the decrease of the probabilities of life. Upon the whole, therefore, it appears that, according to the Breslaw Table, and supposing no widows to marry, the number enquired after is somewhat greater than half the number of the society; but according to the London Table a good deal greater. This, however, has been determined on the supposition that the husbands and wives are of equal ages, and that then there is an equal chance who shall die first. But in reality husbands are generally older than wives, and males have been found to die sooner than females, as appears incontestably from several of the tables in Dr. Price's Treatise on Reversions. It is therefore more than an equal chance that the husband will die before his wife. This will increase considerably the duration of survivorship on the part of the women, and consequently the number which we have been enquiring after. The marriage of widows will diminish this number, but not so much as the other causes will increase it. II. If the society comprehends in it from the first all the married people of all ages in any town, or among any class of people where the numbers always continue the same, the whole collective body of members will be at their greatest age at the time of the establishment of the society; and the number of widows left every year will at a medium be always the same. The number of widows will increase continually on the society, till as many die off every year as are added. This will not be till the whole collective body of widows are at their greatest age, or till there are among them the greatest possible number of the oldest widows; and therefore not till there has been time for an accession to the oldest widows from the youngest part. Let us, for the sake of greater precision, divide the whole medium of widows that come on every year into different classes according to their different ages, and suppose some to be left at fifty-six years of age, some at forty-six, some at thirty-six, and some at twenty-six. The widows, constantly in life together, derived from the first class, will come to their greatest age, and to a maximum, in thirty years, supposing, with M. de Moivre, eighty-six to be the utmost extent of life. The same will happen to the second class in forty years, and to the third in fifty years. But the whole body composed of these classes will not come to a maximum till the same happens to the fourth or youngest class; that is, not till the end of sixty years. After this, the affairs of the society will become stationary, and the number of annuitants upon it of all ages will keep always nearly the same. III. If a society begins with its complete number of members, but at the same time admits none above a particular age; if, for instance, it begins with 200 members all under fifty, and afterwards limits itself to this number and keeps it up by admitting every year at all ages between twenty-six and fifty, new members as old ones drop off; in this case, the period necessary to bring the maximum of annuitants will be just doubled. To determine the sum that every individual ought to pay in a single present payment, in order to entitle his widow to a certain annuity for her life, let us suppose the annuity £3 per annum, and the rate of interest four per cent. It is evident that the value of such an expectation is different, according to the different ages of the purchasers, and the proportion of the age of the wife to that of the husband. Let us then suppose that every person in such a society is of the same age with his wife, and that, one with another, all the members when they enter may be reckoned forty years of age, as many entering above this age as below it. It has been demonstrated by M. de Moivre and Mr. Simpson that the value of an annuity on the joint continuance of any two lives, subtracted from the value of an annuity on the life in expectation, gives the true present value of annuity on what may happen to remain of the latter of the two lives after the other. In the present case, the value of the annuity to be enjoyed during the joint continuance of two lives, each

forty years of age, is by Table II. 9·826, according to the probabilities of life in the Table of Observations, formed by Dr. Halley from the bills of mortality of Breslaw in Silesia. The value of a single life forty years of age, as given by M. de Moivre, agreeably to the same table, is 13·20; and the former subtracted from the latter, leaves 3·37, or the true number of years' purchase, which ought to be paid for any given annuity, to be enjoyed by a person forty years of age, provided he survives another person of the same age, interest being reckoned at four per cent. per annum. The annuity therefore being £30, the present value of it is 30 multiplied by 3·37, or £101 2s. IV. If, instead of a single present payment, it is thought preferable to make annual payments during the marriage; what these annual payments ought to be, is easily determined by finding what annual payments during two joint lives of given ages are equivalent to the value of the reversionary annuity in present money. Suppose, as before, that the joint lives are each forty, and the reversionary annuity £30 per annum. An annual payment during the continuance of two such lives is worth 9·82 years' purchase. The annual payment ought to be such as, being multiplied by 9·82, will produce £10·1 the present value of the annuity in one payment. Divide then 101·1 by 9·82, and 10·3 the quotient will be the annual payment. This method of calculation supposes that the first annual payment is not to be made till the end of a year. If it is to be made immediately, the value of the joint lives will be increased one year's purchase; and, therefore, in order to find the annual payments required, the value of a present single payment must be divided by the value of the joint lives increased by unity. If the society prefer paying part of the value in a present single payment on admission, and the rest in annual payments; and if they fix these annual payments at a particular sum, the present single payment paid on admission is found by subtracting the value of the annual payment during the joint lives from the whole present value of the annuity in one payment. Suppose, for instance, the annual payments to be fixed at five guineas, the annuity to be £30, the rate of interest four per cent., and the joint lives each forty: the value of the annuity in one present single payment is £101·1. The value of five guineas or 5·25 per annum, is (5·25 multiplied by 9·82, the value of the joint lives) 51·55; which, subtracted from £101·1, gives 49·5, the answer. V. If a society takes in all the marriages among persons of a particular profession within a given district, and subjects them for perpetuity to a certain equal and common tax or annual payments, in order to provide life annuities for all the widows that shall result from these marriages; since, at the commencement of such an establishment, all the oldest, as well as the youngest, marriages are to be entitled equally to the proposed benefit, a much greater number of annuitants will come immediately upon it than would come upon any similar establishment which limited itself in the admission of members to persons not exceeding a given age. This will check that accumulation of money which should take place at first, in order to produce an income equal to the disbursements at the time when the number of annuitants comes to a maximum; and therefore will be a particular burden upon the establishment in its infancy. For this some compensation must be provided; and the equitable method of providing it is, by levying fines at the beginning of the establishment on every member exceeding a given age, proportioned to the number of years which he has lived beyond that age. But if such fines cannot be levied, and, if every payment must be equal and common, whatever disparity there may be in the value of the expectations of different members, the fines must be reduced to one common one, answering as nearly as possible to the disadvantage, and payable by every member at the time when the establishment begins. After this, the establishment will be the same with one that takes upon it all at the time they marry; and the tax or annual payment of every member adequate to its support, will be the annual payment during marriage due from persons who marry at the mean age at which, upon an average, all marriages may be considered as commencing. The fines to be paid at first are, for every particular member, the same with the difference between the value of the expectation to him at his present age, and what would have been its value to him had the scheme begun at the time he married. Or, they are, for the whole body of members, the difference between the value of the common expectation, to persons at the mean age of all married persons taken together as they exist in the world, and to persons at that age which is to be deemed their mean age when they marry. VI. Suppose we wish to know the present value of an annuity to be enjoyed by one life, for what may happen to remain of it beyond another life, after a given term; that is, provided both lives continue from the present time to the end of a given term of years; the method of calculating is this:—Find the value of the annuity for two lives, greater by the given term of years than the given lives; discount this value for the given term; and then multiply by the probability that the two given lives shall both continue the given term; and the product will be the answer. Thus, let the two lives be each thirty, the term seven years, the annuity £10 interest for four per cent. The given lives, increased by seven years, become each thirty-seven. The value of two joint lives, each thirty-seven, is (by Table II.) 10·25. The value of a single life at thirty-seven is 13·67. The former subtracted from the latter is 3·42, or the value of an annuity for the life of a person thirty-seven years of age, after another of the same age, as has been shown above: 3·42 discounted for seven years (that is, multiplied by 0·76 the value of £1 due at the end of seven years) is 2·6. The probability that a single life at thirty shall continue seven years is $\frac{42}{56}$.* The

* The probability that a given life shall continue any number of years, or reach a given age, is (as is well known) the fraction whose numerator is the number of the living in any table of observations opposite to the given age, and denominator the number opposite to the present age of the given life.

probability, therefore, that two such lives shall continue seven years, is $\frac{2301}{3135}$, or in decimals 0·765; and, 2·6 multiplied by 0·765 is 1·989, the number of years' purchase which ought to be given for an annuity to be enjoyed by a life now thirty years of age, after a life of the same age, provided both continue seven years. The annuity then being £10, its present value is £19·89. Suppose the value is required of an annuity to be enjoyed for what may happen to remain of one life after another, provided the life in expectation continues a given time. 1. Find the present value of the annuity for the remainder of the life in expectation after the given time, which is done in this manner:—Multiply the present value of the life at the given time by the present value of £1 to be received at that time, and multiply the product again by the probability that the life in expectation will continue so long. Let the given time which the life in expectation is to continue be fifteen years, and let the person then be arrived at fifty years of age. A life at fifty according to M. de Moivre's valuation of lives, and reckoning interest at four per cent., is worth 11·34 years' purchase. The present value of £1, to be received at the end of fifteen years, is 0·5553, and the probability that a life at thirty-five will continue fifteen years is $\frac{146}{409}$. These three values multiplied into one another give £4·44 for the present value of the life in expectation. 2. Find the value of the reversion, provided both lives continue the given time, by the rule given above. 3. Add these values together, and the sum will be the answer in a single present payment. We shall now illustrate this rule by an example. An annuity of £10, for the life of a person now thirty, is to commence at the end of eleven years, if another person now forty should be then dead; or, if this should not happen at the end of any year beyond eleven years in which the former shall happen to survive the latter: What is the present value of such an annuity, reckoning interest at four per cent., and taking the probabilities of life as they are in Dr. Halley's table given in the article MORTALITY? The value of £10 per annum, for the remainder of the life of a person now thirty, after eleven years is £69·43. The probability that a person forty years of age shall live eleven years, is, by Dr. Halley's table, $\frac{335}{445}$. The probability, therefore, that he will die in eleven years, is $\frac{3}{445}$ subtracted from unity *, or $\frac{110}{445}$; which multiplied by £69·43, gives £17·16.—The value of the reversion, provided both live eleven years, is £17, and this value added to the former makes £34·16, the value required in a single present payment; which payment divided by £11·43, the value of two joint lives, aged thirty and forty, with unity added gives £3; or the value required in annual payments during the joint lives, the first payment to be made immediately.

The values of joint lives in these tables have been computed for only one rate of interest; and of single lives in Table III. for only two rates of interest. The following rules will show that it would be a needless labor to compute these values (in strict conformity to the observations) for any other rates of interest. Account of a method of deducing, from the correct values (according to any observation) of any single or joint lives at one rate of interest, the same values at other rates of interest.

PRELIMINARY PROBLEMS.

PROB. I.—The expectation given of a single life by any table of observations, to find its value, supposing the decrements of life equal, at any given rate of interest. *Solution.*—Find the value of an annuity certain for a number of years equal to twice the expectation. Multiply this value by the perpetuity increased by unity, and divide the product by twice the expectation: the quotient subtracted from the perpetuity will be the value required. *Example.*—The expectation of a male life aged ten, by the Sweden observations, is 43·94. Twice this expectation is 87·88. The value of an annuity certain for 87·88 years is (reckoning interest at four per cent.) 24·200. The product of 24·200 into 26 (the perpetuity increased by unity) is 629·2 which divided by 87·88 gives 7·159. And this quotient subtracted from 25 (the perpetuity) gives 17·84 years' purchase, the value of a life aged ten, deduced from the expectation of life at that age according to the Sweden observations. (See the tables in Dr. Price on Reversions, v. iii.)

PROB. II.—Having the expectations given of any two lives, by any table of observations, to decide thence the value of the joint lives at any rate of interest, supposing an equal decrement of life. *Solution.*—Find the difference between twice the expectation of the youngest life and twice the expectation of the oldest life, increased by unity and twice the perpetuity. Multiply this difference by the value of an annuity certain for a time equal to twice the expectation of the oldest life; and by twice the same expectation divide the product, reserving the quotient. From twice the perpetuity subtract the reserved quotient, and multiply the remainder by the perpetuity increased by unity. This last product, divided by twice the expectation of the youngest life, and then subtracted from the perpetuity, will be the required value. When twice the expectation of the youngest life is greater than twice the expectation of the oldest life increased by unity, and twice the perpetuity, the reserved quotient, instead of being subtracted from twice the perpetuity, must be added to it, and the sum, not the difference, multiplied by the perpetuity increased by unity. *Example.*—Let the joint lives proposed be a female life aged ten, and a male life aged fifteen; and let the table of observations be the Sweden table for lives in general, and the rate of interest four per cent. Twice the expectations of the two lives are 90·14 and 83·28. Twice the expectation of the oldest life, increased by unity, and twice the perpetuity, is 134·28, which lessens by 90·14 (twice the expectation of the youngest life), leaves 44·14 for the reserved remainder. This remainder, multiplied by 24·045 (the value of an annuity certain for 83·28 years), and the

* For the difference between unity and the fraction expressing the probability that an event will happen, gives the probability that it will not happen.

product divided by 83·28 (twice the expectation of the oldest life), gives 12·744, the quotient to be reserved; which, subtracted from double the perpetuity, and the remainder (or 37·255) multiplied by the perpetuity increased by unity (or by 26) gives 968·630, which, divided by 90·14 (twice the expectation of the youngest life), and the quotient subtracted from the perpetuity, we have 14·254 for the required value. The value of an annuity certain, when the number of years is a whole number with a fraction added (as will be commonly the case) may be best computed in the following manner:—In this example the number of years is 83·28. The value of an annuity certain for eighty-three years is 24·035. The same value for eighty-four years is 24·072. The difference between these two values is 0·37; which difference, multiplied by ·28 (the fractional part of the number of years), and the product (·0103) added to the least of the two values, will give 24·045 the value for 83·28 years. *General Rule.*—Call the correct value (supposed to be computed for any rate of interest) the first value. Call the value deduced (by the preceding problems) from the expectations at the same rate of interest the second value. Call the value deduced from the expectations for any other rate of interest the third value. Then the difference between the first and second values added to or subtracted from the third value, just as the first is greater or less than the second, will be the value at the rate of interest for which the third value has been deduced from the expectations. The following examples will make this perfectly plain. *Example* I.—In the two last tables the correct values are given of two joint lives among mankind at large, without distinguishing between males and females, according to the Sweden observations, reckoning the interest at four per cent. Let it be required to find from these values the values at three per cent. and let the ages of the joint lives be supposed 10 and 10. The correct value, table IV. (reckoning interest at four per cent.), is 16·141. The expectation of a life aged ten is 45·07. The value deduced from this expectation at four per cent. by prob. II. is 14·539. The value deduced by the same problem from the same expectation at three per cent. is 16·808. The difference between the first and second values is 1·602, which, added to the third value (the first being greater than the second), makes 18·410, the value required. *Example* II.—Let the value be required of a single male life aged ten, at three per cent. interest, from the correct value at four per cent. according to the Sweden observations. First, or correct value, at four per cent. (by table III.) is 18·674. The expectation of a male life aged ten is 43·94. The second value (or the value deduced from this expectation by prob. I.) is 17·838. The third value (or the value deduced from the same expectation at three per cent.,) is 21·277. The difference between the first and second is ·836; which (since the first is greater than the second) must be added to the third; and the sum (that is, 22·113) will be the value required. The third value at five per cent. is 15·286; and the difference added to 15·286 makes 16·122 the value of a male life aged ten at five per cent. according to the Sweden observations. The exact value at five per cent. is (by table III.) 16·014. Again: the difference between 16·014 (the correct value at five per cent.) and 15·286 (the value at the same interest deduced from the expectation), is ·728; which, added (because the first value is greater than the second) to 13·335 (the value deduced at six per cent. from the expectation) gives 14·063, the value of the same life, reckoning interest at six per cent. These deductions, in the case of single lives particularly, are so easy, and give the true values so nearly, that it will be scarcely ever necessary to calculate the exact values (according to any given observations) for more than one rate of interest. If, for instance, the correct values are computed at four per cent. according to the observations, the values at 3, 3½, 4½, 5, 6, 7, or 8 per cent. may be deduced from them by the preceding rules as occasion may require, without much labor or any danger of considerable errors. The values thus deduced will seldom differ from the true values so much as a tenth of a year's purchase. They will not generally differ more than a twentieth or thirtieth of a year's purchase. In joint lives they will differ less than in single lives, and they will come equally near to one another whatever the rates of interest are. The following tables furnish the means of determining the exact differences between the values of annuities, as they are made to depend on the survivorship of any male or female lives; which hitherto has been a desideratum of considerable consequence in the doctrine of life annuities. What has made this of consequence is chiefly the multitude of societies lately established in this and foreign countries for providing annuities for widows. The general rule for calculating from these tables the value of such annuities is the following:—*Rule:* 'Find in table III. the value of a female life at the age of the wife. From this value subtract the value in table IV. of the joint continuance of two lives at the ages of the husband and wife. The remainder will be the value in a single present payment of an annuity for the life of the wife should she be left a widow. And this last value divided by the value of the joint lives increased by unity, will be the value of the same annuity in annual payments during the joint lives, and to commence immediately.' *Example.* Let the age of the wife be twenty-four, and of the husband thirty. The value in table III. (reckoning interest at four per cent.) of a female life aged twenty-four, is 17·252. The value in table IV. of two joint lives, aged twenty-four and thirty, is 13·455; which, subtracted from 17·252, leaves 3·797, the value in a single present payment of an annuity of £1 for the life of the wife after the husband; that is, for the life of the widow. The annuity therefore being supposed £20, its value in a single payment is 20 multiplied by 3·797, that is, £75·94. And this last value, divided by 14·455 (that is, by the value of the joint lives increased by unity), gives 5·25, the value in annual payments beginning immediately, and to be continued during the joint lives of an annuity of £20 to a wife aged twenty four for her life, after her husband aged thirty.

TABLE I.—Showing the Present Value of an Annuity of £1 on a single life, according to M. de Moivre's Hypothesis.

Age.	3 per Ct.	3½ per Ct.	4 per Ct.	4½ per Ct.	5 per Ct.	6 per Ct.
8	19·736	18·160	16·791	15·595	14·544	12·790
9	·868	·269	·882	·672	·607	·839
10	·868	·269	882	·672	·607	·839
11	19·736	18·160	16·791	15·595	14·544	12·790
12	·604	·049	·698	·517	·480	·741
13	·469	17·937	·604	·437	·412	·691
14	·331	·823	·508	·356	·342	·639
15	·192	·707	·410	·273	·271	·586
16	·050	·588	·311	·189	·197	·532
17	18·905	·467	·209	·102	·123	·476
18	·759	·344	·105	·015	·047	·419
19	·610	·220	15·999	14·923	13·970	·361
20	·458	·093	·891	·831	·891	·301
21	18·305	16·963	15·781	14·737	13·810	12·239
22	·148	·830	·669	·641	727	·177
23	17·990	·696	·554	·543	·642	·112
24	·827	·559	·437	·442	·555	·045
25	·664	·419	·318	.340	·466	11·978
26	·497	·279	·197	·235	·375	·908
27	·327	·133	·073	·128	·282	·837
28	·154	15·985	14·946	·018	·186	·763
29	16·979	·835	·816	13·905	·088	·688
30	·800	·682	·684	·791	12·988	·610
31	16·620	15·526	14·549	13·673	12·855	11·530
32	·436	·367	·411	·553	·780	·449
33	·248	·204	·270	·430	·673	·365
34	·057	·039	·126	·304	·562	·278
35	15·864	14·871	13·979	·175	·449	·189
36	·666	·699	·829	·044	·333	·098
37	·465	·524	·676	12·909	·214	·003
38	·260	·345	·519	·771	·091	10·907
39	·053	·163	·359	·630	11·966	·807
40	14·842	13·978	·196	·485	·837	·704
41	14·626	13·789	13·028	12·337	11·705	10·599
42	·407	·596	12·858	·185	·570	·490
43	·185	·399	·683	·029	·431	·378
44	13·958	·199	·504	11·870	·288	·263
45	·728	12·993	·322	·707	·142	·144
46	·493	·784	·135	·540	10·992	·021
47	·254	·571	11·944	·368	·837	9·895
48	·012	·354	·748	·192	·679	·765
49	12·764	·131	·548	·012	·515	·630
50	·511	11·904	·344	10·827	·348	·492
51	12·255	11·673	11·135	10·638	10·176	9·349
52	11·994	·437	10·921	·443	9·999	·201
53	·729	·195	·702	·243	·817	·049
54	·457	10·950	·478	·039	·630	8·891
55	·183	·698	·248	9·829	·437	·729
56	10·902	·443	·014	·614	·239	·561
57	·616	·181	9·773	·393	·036	·387
58	·325	9·913	·527	·166	8·826	·203
59	·029	·640	·275	8·933	·611	·023
60	9·727	·361	·017	·694	·389	7·831
61	9·419	9·076	8·753	8·449	8·161	7·633
62	·107	8·786	·482	·197	7·926	·428
63	8·787	·488	·205	7·938	·684	·216
64	·462	·185	7·921	·672	·435	6·997
65	·132	7·875	·631	·399	·179	·770
66	7·794	·558	·333	·119	6·915	·535
67	·450	·234	·027	6·831	·643	·292
68	·099	6·902	6·714	·534	·362	·040
69	6·743	·565	·394	·230	·073	5·779
70	·378	·219	·065	5·918	5·775	·508
71	6·008	5·865	5·728	5·596	5·468	5·228
72	5·631	·505	·383	·265	·152	4·937
73	·246	·136	·029	4·926	4·826	·636
74	4·854	4·759	4.666	·576	·489	·324
75	·453	·373	·293	·217	·143	·000
76	·046	3·978	3·912	3·847	3·784	3·664
77	3·632	·575	·520	·467	·415	·315
78	·207	·163	·111	·076	·034	2·953
79	2·776	2·741	2·707	2·673	2·641	·578
80	·334	·309	·284	·259	·235	·188
81	1·886	1·867	1·850	1·832	1·816	1·782
82	·429	·411	·406	·394	·384	·362
83	0·961	0.955	0·950	0·943	0·937	0·925
84	0·484	0·483	0·481	0·479	0·476	0·472
85	0·000	0·000	0·000	0.000	0·000	0·000

TABLE II.—Showing the Value of an Annuity on the Joint Continuance of two Lives according to M. de Moivre's Hypothesis.

Age of Ygst.	Age of Eldest.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.
10	10	15·206	13·342	11·855
	15	14·878	·093	·661
	20	·503	12·808	·430
	25	·074	·480	·182
	30	13·585	·102	10·884
	35	·025	11·665	·537
	40	12·381	·156	·128
	45	11·644	10·564	9·646
	50	10·796	9·871	·074
	55	9·822	·059	8·391
	60	8·704	8·105	7·572
	65	7·417	6·980	6·585
	70	5·936	5·652	5·391
15	15	14·574	12·860	11·478
	20	·225	·593	·266
	25	13·822	·281	·022
	30	·359	11·921	10·736
	35	12·824	·501	·402
	40	·207	·013	·008
	45	11·496	10·440	9·541
	50	10·675	9·767	8·985
	55	9·727	8·975	·318
	60	8·632	·041	7·515
	65	7·377	6·934	6·544
	70	5·932	5·623	5·364

TABLE II.—Continued.

Age of Youngest.	Age of Eldest.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.
20	20	13·904	12·341	11·067
	25	·531	·051	10·840
	30	·098	11·711	·565
	35	12·594	·314	·278
	40	·008	10·847	9·870
	45	11·325	·297	·420
	50	10·536	9·648	8·880
	55	9·617	8·879	·233
	60	8·549	7·967	7·448
	65	7·308	6·882	6·495
	70	5·868	5·590	5·333
25	25	13·192	11·786	10·621
	30	12·794	·468	·367
	35	·333	·093	·067
	40	11·770	10·655	9·708
	45	·130	·131	·278
	50	10·374	9·509	8·761
	55	9·488	8·766	·134
	60	8·452	7·880	7·371
	65	7·241	6·826	6·440
	70	5·826	5·551	5·294
30	30	12·434	11·182	10·133
	35	·010	10·838	9·854
	40	11·502	·428	·514
	45	10·898	9·936	·112
	50	·183	·345	8·620
	55	9·338	8·634	·018
	60	8·338	7·779	7·280
	65	7·161	6·748	6·373
	70	5·777	5·505	5·254
35	35	11·632	10·530	9·600
	40	·175	·157	·291
	45	10·622	9·702	8·915
	50	9·955	·149	·450
	55	·156	8·476	7·879
	60	8·202	7·658	·172
	65	7·066	6·662	6·294
	70	5·718	5·450	5 203
40	40	10·770	9·826	9·014
	45	·283	·418	8·671
	50	9·677	8·911	·244
	55	8·936	·283	7·710
	60	·038	7·570	·039
	65	6·951	6·556	6·198
	70	5·646	5·383	5·141
45	45	9·863	9·063	8·370
	50	·331	8·619	7·987
	55	8·662	·044	·500
	60	7·831	7·332	6·875
	65	6·807	6·435	·080
	70	5·556	5·300	5·063
50	50	8·892	8·235	7·660
	55	·312	7·738	·230
	60	7·568	·091	6·664
	65	6·623	6·258	5·926
	70	5·442	5·193	4·964
55	55	7·849	7·332	6·873
	60	·220	6·781	·386
	65	6·379	·036	5·724
	70	5·201	5·053	4·833
60	60	6·737	6·351	6·001
	65	·043	5·730	5·444
	70	5·081	4·858	4·653
65	65	5·547	5·277	5·031
	70	4·773	4·571	4·385
70	70	4·270	4·104	3·952

TABLE III.—Showing the Values of Annuities on Single Lives among Males and Females, according to the Probabilities of the Duration of Life in the Kingdom of Sweden.

Ages.	Males.		Females.		Lives in general	
	4 p. Ct.	5 p. Ct.	4 p. Ct.	5 p. Ct.	4 p. Ct.	5 p. Ct.
1	16·503	14·051	16·820	14·271	16·661	14·161
2	17·355	·778	17·719	15·034	17·537	·906
3	·935	15·279	18·344	·571	18·139	15·425
4	18·328	·624	·780	·951	·554	·787
5	·503	·786	·927	16·088	·715	·937
6	·622	·901	19·045	·203	·833	16·052
7	·693	·977	·131	·291	·912	·134
8	·725	16·021	·162	·335	·943	·178
9	·715	·030	·151	·343	·933	·186
10	·674	·014	·109	·325	·891	·169
11	·600	15·970	·041	·286	·820	·128
12	·491	·896	18·952	·229	·721	·062
13	·378	·819	·840	·153	·609	15·986
14	·246	·724	·707	·059	·476	·891
15	·105	·624	·568	15·960	·336	·792
16	17·958	·517	·424	·856	·191	·686
17	·803	·404	·290	·761	·046	·582
18	·643	·285	·151	·662	17·897	·473
19	·492	·175	·013	·563	·752	·369
20	·335	·059	17·872	·462	·603	·260
21	·192	14·955	·725	·356	·458	·155
22	·042	·846	·573	·245	·307	·045
23	16·887	·732	·414	·129	·150	14·930
24	·742	·627	·252	·009	16·997	·818
25	·592	·517	·087	14·886	·839	·701
26	·436	·402	16·915	·757	·675	·579
27	·274	·282	·751	·636	·512	·459
28	·105	·156	·588	·515	·346	·335
29	15·930	·024	·427	·396	·178	·210
30	·751	13·889	·261	·272	·006	·080
31	·575	·756	·104	·136	15·839	13·956
32	·395	·619	15·941	·035	·668	·827
33	·208	·477	·787	13·923	·497	·700
34	·014	·327	·629	·806	·321	·566
35	14·812	·170	·465	·684	·138	·427
36	·601	·006	·278	·542	14·939	·274
37	·382	12·833	·070	·382	·726	·107
38	·154	·652	14·854	·213	·504	12·932
39	13·916	·462	·629	·036	·272	·749
40	·668	·261	·401	12·856	·034	·558

TABLE III.—Continued.

Ages	Males.		Females.		Lives in gen.		Ages	Males.		Females.		Lives in gen.	
	4 p. Ct.	5 p. Ct.	4 p. Ct.	5 p. Ct.	4 p. Ct.	5 p. Ct.		4 p. Ct.	5 p. Ct.	4 p. Ct.	5 p. Ct.	4 p. Ct.	5 p. Ct.
41	·426	·065	1·85	·687	13·805	·376	69	5·933	·628	·253	5.926	·093	5·777
42	·196	11·880	13·994	·538	·595	·209	70	·670	·389	5·897	·599	5·783	·494
43	12·984	·710	·798	·387	·391	·048	71	·418	·158	·564	·293	·491	·225
44	·763	·532	·596	·229	·179	11·880	72	·180	4·940	·261	·013	·220	4·976
45	·535	·347	·383	·061	12·959	·704	73	4·940	·719	4·998	4·770	4·969	·744
46	·297	·153	·151	11·876	·724	·514	74	·724	·521	·792	·581	·758	·552
47	·051	10·591	12·894	·668	·472	·309	75	·487	·302	·582	·388	·534	·345
48	11·795	·738	·620	·443	·217	·090	76	·253	·084	·367	·189	·310	·131
49	·528	·516	·333	·205	11·930	10·860	77	·024	3·871	·145	3·983	·084	3·927
50	·267	·298	·049	10·970	·658	·634	78	3·768	·631	3·913	·767	3·840	·699
51	·030	10·100	11·769	·737	·399	·418	79	·512	·390	·668	·536	·590	·463
52	10·785	9·895	·492	·507	·138	·201	80	·260	·152	·402	·285	·331	·218
53	·531	·682	·220	·280	10·875	9·981	81	·017	2·921	·145	·041	·081	2·981
54	·269	·460	10·937	·042	·603	·751	82	2·792	·706	2·905	2·812	2·848	·759
55	9·998	·229	·642	9·792	·320	·510	83	·600	·523	·699	·615	·649	·569
56	·717	8·988	·334	·529	·025	·258	84	·473	·403	·559	·480	·516	·441
57	·425	·736	·012	·253	9·718	8·994	85	·371	·306	·552	·476	·461	·394
58	·140	·489	9·692	8·976	·416	·732	86	·281	·222	·518	·446	·399	·334
59	8·845	·232	·358	·687	·101	·458	87	·154	·103	·431	·365	·292	·338
60	·540	7·963	·039	·406	8·789	·184	88	1·955	1·912	·294	·236	·124	·074
61	·241	·700	8·739	·144	·490	7·922	89	·698	·664	·108	·059	1·903	1·861
62	7·950	·442	·453	7·895	·201	·668	90	·417	·392	1·873	1·833	·645	·612
63	·669	·193	·166	·643	7·917	·418	91	·154	·136	·628	·596	·391	·366
64	·382	·938	7·870	·382	·626	·160	92	0·835	0·824	·349	·325	·092	·075
65	·090	·676	·566	·111	·328	6·893	93	0·477	0·471	·071	·054	0·774	0·762
66	6·792	·408	·252	6·831	·022	·619	94	0·240	0·238	0·799	0·788	0·519	0·513
67	·489	·134	6·930	·541	6·709	·337	95	0·000	0·000	0·544	0·537		
68	·201	5·872	·596	·239	·398	·055	96	0·000	0·000	0·320	0·317		

TABLE IV.—Showing the Value of Annuities on two joint Lives, according to the probabilities of the duration of human life among Males and Females collectively, reckoning Interest at 4 per cent.—Difference of 0, 6, 12, and 18 years.

Ages.	Values.	Ages.	Values.	Ages.	Values.	Ages.	Values.
1— 1	12·225	1— 7	13·989	1—13	13·894	1—19	13·389
2— 2	13·583	2— 8	14·780	2—14	14·557	2—20	14·008
3— 3	14·558	3— 9	15·323	3—15	14·988	3—21	14·417
4— 4	15·267	4—10	15·685	4—16	15·259	4—22	14·671
5— 5	15·577	5—11	15·817	5—17	15·326	5—23	14·725
6— 6	15·820	6—12	15·887	6—18	15·354	6—24	14·740
7— 7	16·003	7—13	15·914	7—19	15·351	7—25	14·727
8— 8	16·109	8—14	15·888	8—20	15·310	8—26	14·673
9— 9	16·152	9—15	15·824	9—21	15·244	9—27	14·590
10—10	16·141	10—16	15·729	10—22	15·149	10—28	14·484
11—11	16·087	11—17	15·617	11—23	15·033	11—29	14·357
12—12	15·982	12—18	15·477	12—24	14·889	12—30	14·202
13—13	15·855	13—19	15·327	13—25	14·736	13—31	14·015
14—14	15·701	14—20	15·164	14—26	14·566	14—32	13·874
15—15	15·535	15—21	15·001	15—27	14·392	15—33	13·700
16—16	15 361	16—22	14·832	16—28	14·216	16—34	13·520
17—17	15·196	17—23	14·665	17—29	14·042	17—35	13·340
18—18	15·023	18—24	14·491	18—30	13·860	18—36	13·141
19—19	14·854	19—25	14·320	19—31	13·687	19—37	12·934
20—20	14·682	20—26	14·144	20—32	13·512	20—38	12·720
21—21	14·525	21—27	13·976	21—33	13·345	21—39	12·505
22—22	14·360	22—28	13·807	22—34	13·173	22—40	12·286
23—23	14·194	23—29	13·635	23—35	12·997	23—41	12·073
24—24	14·020	24—30	13·455	24—36	12·801	24—42	11·873
25—25	13·849	25—31	13·284	25—37	12·599	25—43	11·683
26—26	13·671	26—32	13·108	26—38	12·387	26—44	11·485
27—27	13·495	27—33	12·935	27—39	12·170	27—45	11·284
28—28	13·323	28—34	12·763	28—40	11·953	28—46	11·072
29—29	13·148	29—35	12·586	29—41	11·742	29—47	10·847
30—30	12·965	30—36	12·390	30—42	11·543	30—48	10·606
31—31	12·795	31—37	12·192	31—43	11·359	31—49	10·365

TABLE IV.—Continued.

Ages.	Values.	Ages.	Values.	Ages.	Values.	Ages.	Values.
32—32	12·624	32—38	11·988	32—44	11·170	32—50	10·128
33—33	12·456	33—39	11·779	33—45	10·978	33—51	9·905
34—34	12·286	34—40	11·568	34—46	10·775	34—52	9·679
35—35	12·109	35—41	11·361	35—47	10·557	35—53	9·452
36—36	11·904	36—42	11·156	36—48	10·314	36—54	9·207
37—37	11·683	37—43	10·953	37—49	10·059	37—55	8·951
38—38	11·452	38—44	10·741	38—50	9·805	38—56	8·683
39—39	11·209	39—45	10·519	39—51	9·558	39—57	8·404
40—40	10·964	40—46	10·286	40—52	9·308	40—58	8·124
41—41	10·732	41—47	10·049	41—53	9·066	41—59	7·839
42—42	10·531	42—48	9·813	42—54	8·830	42—60	7·569
43—43	10·346	43—49	9·581	43—55	8·597	43—61	7·318
44—44	10·154	44—50	9·351	44—56	8·354	44—62	7·075
45—45	9·954	45—51	9·129	45—57	8·101	45—63	6·836
46—46	9·736	46—52	8·897	46—58	7·841	46—64	6·586
47—47	9·497	47—53	8·658	47—59	7·563	47—65	6·323
48—48	9·236	48—54	8·402	48—60	7·281	48—66	6·048
49—49	8·966	49—55	8·139	49—61	7·008	49—67	5·764
50—50	8·707	50—56	7·874	50—62	6·749	50—68	5·487
51—51	8·469	51—57	7·613	51—63	6·505	51—69	5·221
52—52	8·230	52—58	7·351	52—64	6·256	52—70	4·953
53—53	7·994	53—59	7·083	53—65	6·004	53—71	4·694
54—54	7·748	54—60	6·814	54—66	5·743	54—72	4·455
55—55	7·495	55—61	6·555	55—67	5·474	55—73	4·231
56—56	7·229	56—62	6·299	56—68	5·204	56—74	4·043
57—57	6·924	57—63	6·045	57—69	4·936	57—75	3·844
58—58	6·678	58—64	5·788	58—70	4·664	58—76	3·637
59—59	6·388	59—65	5·519	59—71	4·395	59—77	3·430
60—60	6·104	60—66	5·249	60—72	4·149	60—78	3·210
61—61	5·844	61—67	4·984	61—73	3·927	61—79	2·974
62—62	5·600	62—68	4·729	62—74	3·747	62—80	2·744
63—63	5·367	63—69	4·482	63—75	3·563	63—81	2·557
64—64	5·128	64—70	4·231	64—76	3·370	64—82	2·396
65—65	4·881	65—71	3·982	65—77	3·180	65—83	2·252
66—66	4·626	66—72	3·750	66—78	2·974	66—84	2·123
67—67	4·362	67—73	3·527	67—79	2·743	67—85	2·010
68—68	4·103	68—74	3·340	68—80	2·514	68—86	1·910
69—69	3·851	69—75	3·147	69—81	2·324	69—87	1·798
70—70	3·593	70—76	2·946	70—82	2·155	70—88	1·661
71—71	3·345	71—77	2·752	71—83	2·004	71—89	1·464
72—72	3·128	72—78	2·558	72—84	1·875	72—90	1·189
73—73	2·935	73—79	2·355	73—85	1·768	73—91	0·937
74—74	2·797	74—80	2·172	74—86	1·692	74—92	0·708
75—75	2·648	75—81	2·017	75—87	1·605	75—93	0·575
76—76	2·490	76—82	1·877	76—88	1·497	76—94	0·481
77—77	2·340	77—83	1·756	77—89	1·339	77—95	0·421
78—78	2·170	78—84	1·639	78—90	1·097		
79—79	1·967	79—85	1·524	79—91	0·863		
80—80	1·758	80—86	1·416	80—92	0·638		
81—81	1·600	81—87	1·320	81—93	0·511		
82—82	1·472	82—88	1·225	82—94	0·427		
83—83	1·364	83—89	1·094	83—95	0·379		
84—84	1·276	84—90	0·902				
85—85	1·212	85—91	0·725				
86—86	1·172	86—92	0·556				
87—87	1·127	87—93	0·459				
88—88	1·071	88—94	0·396				
89—89	0·949	89—95	0·364				
90—90	0·718						
91—91	0·516						
92—92	0·326						
93—93	0·236						
94—94	0·190						
95—95	0·024						

TABLE V.—Showing the values of two joint lives, according to the probabilities of the duration of human life among males and females collectively.
Interest four per cent. Difference of age 24, 30, 36, and 42 years.

1—25	12·832	1—31	12·196	1—37	11·465	1—43	10·546
2—26	13·409	2—32	12·730	2—38	11·913	2—44	10·946
3—27	13·778	3—33	13·066	3—39	12·164	3—45	11·168
4—28	14·003	4—34	13·264	4—40	12·284	4—46	11·260
5—29	14·037	5—35	13·277	5—41	12·242	5—47	11·183
6—30	14·033	6—36	13·242	6—42	12·185	6—48	11·064
7—31	14·006	7—37	13·170	7—43	12·112	7—49	10·915
8—32	13·944	8—38	13·059	8—44	12·004	8—50	10·743
9—33	13·855	9—39	12·913	9—45	11·865	9—51	10·560
10—34	13·741	10—40	12·743	10—46	11·694	10—52	10·357
11—35	13·604	11—41	12·563	11—47	11·493	11—53	10·140
12—36	13·428	12—42	12·379	12—48	11·259	12—54	9·898
13—37	13·234	13—43	12·190	13—49	11·011	13—55	9·644
14—38	13·023	14—44	11·997	14—50	10·759	14—56	9·371
15—39	12·798	15—45	11·787	15—51	10·514	15—57	9·087
16—40	12·570	16—46	11·562	16—52	10·264	16—58	8·799
17—41	12·351	17—47	11·328	17—53	10·018	17—59	8·503
18—42	12·146	18—48	11·076	18—54	9·761	18—60	8·208
19—43	11·951	19—49	10·319	19—55	9·500	19—61	7·928
20—44	11·751	20—50	10·567	20—56	9·228	20—62	7·658
21—45	11·550	21—51	10·332	21—57	8·953	21—63	7·396
22—46	11·335	22—52	10·092	22—58	8·675	22—64	7·127
23—47	11·107	23—53	9·352	23—59	8·385	23—65	6·851
24—48	10·862	24—54	9·602	24—60	8·097	24—66	6·5[illegible]
25—49	10·612	25—55	9·347	25—61	7·823	25—67	6·275
26—50	10·364	26—56	9·080	26—62	7·557	26—68	5·986
27—51	10·130	27—57	8·807	27—63	7·297	27—69	5·702
28—52	9·894	28—58	8·534	28—64	7·032	28—70	5·415
29—53	9·659	29—59	8·250	29—65	6·761	29—71	5·136
30—54	9·413	30—60	7·967	30—66	6·481	30—72	4·831
31—55	9·167	31—61	7·702	31—67	6·197	31—73	4·646
32—56	8·912	32—62	7·446	32—68	5·917	32—74	4·453
33—57	8·651	33—63	7·196	33—69	5·642	33—75	4·251
34—58	8·389	34—64	6·942	34—70	5·364	34—76	4·040
35—59	8·114	35—65	6·679	35—71	5·093	35—77	3·833
36—60	7·833	36—66	6·402	36—72	4·840	36—78	3·605
37—61	7·561	37—67	6·115	37—73	4·603	37—79	3·352
38—62	7·296	38—68	5·828	38—74	4·405	38—80	3·098
39—63	7·033	39—69	5·543	39—75	4·195	39—81	2·889
40—64	6·763	40—70	5·254	40—76	3·975	40—82	2·719
41—65	6·492	41—71	4·977	41—77	3·762	41—83	2·553
42—66	6·225	42—72	4·730	42—78	3·539	42—84	2·418
43—67	5·957	43—73	4·507	43—79	3·295	43—85	2·305
44—68	5·689	44—74	4·322	44—80	3·052	44—86	2·203
45—69	5·426	45—75	4·128	45—81	2·854	45—87	2·083
46—70	5·153	46—76	3·921	46—82	2·684	46—88	1·933
47—71	4·884	47—77	3·715	47—83	2·533	47—89	1·708
48—72	4·633	48—78	3·489	48—84	2·396	48—90	1·385
49—73	4·398	49—79	3·238	49—85	2·277	49—91	1·090
50—74	4·205	50—80	2·990	50—86	2·171	50—92	0·818
51—75	4·008	51—81	2·792	51—87	2·050	51—93	0·662
52—76	3·803	52—82	2·623	52—88	1·901	52—94	0·551
53—77	3·605	53—83	2·475	53—89	1·681	53—95	0·468
54—78	3·389	54—84	2·344	54—90	1·366		
55—79	3·150	55—85	2·232	55—91	1·073		
56—80	2·909	56—86	2·130	56—92	0·810		
57—81	2·710	57—87	2·010	57—93	0·655		
58—82	2·539	58—88	1·864	58—94	0·546		
59—83	2·385	59—89	1·644	59—95	0·464		
60—84	2·248	60—90	1·333				
61—85	2·135	61—91	1·050				
62—86	2·037	62—92	0·789				
63—87	1·916	63—93	0·639				
64—88	1·790	64—94	0·533				
65—89	1·585	65—95	0·456				
66—90	1·290						
67—91	1·017						
68—92	0·764						
69—93	0·617						
70—94	0·514						
71—95	0·411						

Upon this subject we have been waiting (see the article LIFE ANNUITIES) for the long promised new tables of Mr. Babbage: they have not yet appeared. We can therefore at present only furnish the reader with the former data, above given. It is probable that these important contributions to science may be forthcoming in time, to be added to a few Supplementary Articles of which we have memoranda.

SURYA, in the Hindoo mythology, is the common name of the sun, or of a personification of that luminary. This luminary, as in all idolatrous nations, appears to have been invoked by the lower classes superstitiously; but by brahmins and the initiated it is asserted typically of that 'divine and incomparably greater light which illumines all, delights all, from which all proceed, to which all must return, and which alone can irradiate (not our visual organs merely, but our souls and) our intellects.' These, as we are told by Sir W. Jones, may be considered as the words of the most sacred text in Indian scripture.

For we must not be surprised, as remarked by the same author, at finding that, on a close examination, the characters of all the pagan deities, male and female, melt into each other, and at last into one or two. It seems a well-founded opinion that the whole crowd of gods and goddesses, in ancient Rome and modern Benares, mean only the powers of nature, and principally those of the sun, expressed in a variety of ways, and by a multitude of fanciful names. A plausible opinion has been entertained by learned men, that the principal source of idolatry among the ancients was their enthusiastic admiration of the sun; and that when the primitive religion of mankind was lost amid the distractions of establishing regal governments, or neglected amid the allurements of vice, they ascribed to the great visible luminary, or to the wonderful fluid of which it is the general reservoir, those powers of pervading all space, and animating all nature, which their wise ancestors had attributed to one Eternal Mind, by whom the substance of fire had been created as an inanimate and secondary cause of natural phenomena. The mythology of the east confirms this opinion. Still the noble truth, so well expressed in the concluding stanza of an ode addressed to Surya by Sir William, is fully recognized by intelligent Hindoos.

'Though the Sanscrit song
Be strown with fancy's wreathes
And emblems rich, beyond low thoughts refin'd,
Yet heav'nly truth it breathes
With attestation strong,
That, loftier than thy sphere, th' Eternal Mind,
Unmov'd, unrival'd, undefiled,
Reigns with providence benign.——
—Since thou, great orb, with all-enlightening ray,
Rulest the golden day,
How far more glorious He, who said serene,
Be—and thou wast—Himself unform'd, unchang'd,
unseen"

We find the Hindoos ascribing to Surya the properties or attributes of the three persons or powers that coalesce mythologically and form their Trimurti, or Trinity, as it has been usual to call it, or that, physically contemplated, are the secondary causes of natural phenomena. One of the names of the sun is Treyitenu, or in shortness Tritnu, meaning three-bodied, as embracing the creative power of Brahma in his capacity of producing forms by his genial heat; the preservative power of Vishnu in the property of light; and the destructive energy of Siva in the concentrated force of his igneous matter. And these are in fact the attributes of the one God, the Eternal Mind, of Hindoo theologians, who is called Brahm. The sun, or Surya, is therefore declared to be Brahma, Vishnu, and Siva. At night and in the west he is Vishnu; he is Brahma in the east and in the morning; from noon to evening he is Siva.

In pictures Surya is usually represented four-handed, seated in a golden car drawn by seven green horses, a nimbus encircling his head, and sometimes blazing round the whole. Sometimes his car is drawn by one horse with seven heads. A legless charioteer, with a red face, named Aruna, guides the chariot with reins of variegated hue.

Surya's seven horses, as well as Aruna's variegated reins, are supposed to have reference to the tints of his preceding ray; but we have yet to learn if the Hindoos have attained a knowledge of optics, warranting a supposition of their being acquainted with a prismatic divisibility of a ray of light. The regents of the sun and of fire, intimately connected as their primary properties are, we may expect to find agreeing in their emblems or attributes. Thus Surya's 'mystic orb triform,' and Agnis 'triplicate of legs,' are deducible from the three descriptions of sacred fires venerated by the Hindoos, and proceeding from, and re-absorbed in, the sun, as the three great powers of nature proceed from, and return to, the Eternal Mind. We may thus discern an additional reason for a people of idolatrous propensities identifying the sun with Brahm, or that being who said BE! and the sun *was*. Surya's seven horses, and Agnis seven legs, are again referrible to the idea of the common properties of light and heat.

The theory of the learned author of the Analysis of Ancient Mythology would have derived a considerable accession of strength in his mind, had he been possessed of the speculation of the Hindoos on the universality of the sun. Sir W. Jones, not altogether agreeing with Newton, that ancient mythology is nothing but historical truth in a poetical dress; nor with Bacon, that it consisted in moral and metaphysical allegories; nor with Bryant, that all the heathen deities are only different attributes and representations of the sun, or of deceased progenitors; reasonably conceived that the whole system of religious fables rose, like the Nile, from several distinct sources; and inclined to the opinion, that one great spring and source of idolatry, in the four quarters of the globe, was the veneration paid by men to the sun; and another, the immoderate respect shown to the memory of deceased ancestors, especially the founders of kingdoms, legislators and warriors,

of whom the sun and moon were wildly supposed to be the parents.

But although the sun is found in the Hindoo system to include the three great powers, Surya externally more resembles Vishnu than either of the others. His forehead is marked with the sectarial hieroglyphic of the Vaishnavas, that is, with perpendicular lines; the Saivas, or sectarists of Siva, marking their and their gods' foreheads with horizontal lines. Surya is also frequently seen with Vishnu's commonest attributes, the shank or shell, and lotos. Vishnu is farther considered as more immediately the sun than either Brahma or Siva; and his most glorious incarnation in the person of Krishna is of direct solar reference. Among the names of Surya will be found both Vishnu and Krishna; and it may be here remarked, on the authority of general Vallencey, that Krishna is the sun in Irish as well as in Sanscrit; and Arun is the precursor of the sun (that is, the dawn, Aurora) both in Irish and Hindoo mythology. The various names of the sun, among the Hindoos, amount it is said to nearly fifty. It may lead to some curious speculation to consider that the primary name of the sun means the attractor. See Sir William Jones's admirable Essay on the Philosophy of the Asiatics, in the fourth volume of the Asiatic Researches, and in his works edited by lord Teignmouth.

Surya has wives assigned him, termed Sakti. The consort that we oftenest read of is Prabha, which means brightness or effulgence. The Hindoos, like some other distant people, consider the moon as a male deity; and, as conjunctions of the sun and moon are a common language with all astrologers and mythologists, we find sexual fables invented for bringing them together, and into separations, or oppositions. The sun and moon are therefore both male and female with the Hindoos, and are duly married, separated, &c. The Greeks had similar tales. See Potter's Arch. Græc. c. xix.

We are told, by Mr. Turner, that among the Anglo-Saxons the moon was a male and the sun a female deity; and the same peculiarity of gender, the author says, obtained in the ancient northern language. It is curious, he further remarks, that in a passage of an Arabian author (in Not. ad Carmen Tograi, p. 13.) we meet with a female sun and masculine moon. The distich is,—

Nec nomen fœmininum Soli dedecus,
Nec masculinum Lunæ gloria.

There is also a solar race in Hindoo fable, like the Heliades of Greece, and the similar families of the Peruvians. Suryavansa, or offspring of Surya, is the Sanscrit designation of these illustrious descendants. The river Yamuna, called Jumna by European geographers, is styled in Hindoo poetics 'the blue-eyed daughter of the sun.'

Representations of Surya are very common throughout India, in pictures, sculptures, and casts; both separately and associated with other deities. Several engravings of him in both situations are given in the Hindoo pantheon, from the three several originals. He is seen seated in his car, surrounded by a blaze of glory, drawn by seven foaming steeds, or by one seven-headed, drawn by the imperfect dawn, Aruna. And he is described as followed by thousands of genii, worshipping him and modulating his praises. The following is a translation of the first verse of a hymn addressed, with oblations, to the regents of the nine planetary spheres, extracted from Colebrook's Essay on the Religious Ceremonies of the Hindoos, in the seventh volume of the Asiatic Researches:—'The divine sun approaches with his golden car, returning alternately with the shades of night; rousing mortal and immortal beings, and surveying worlds. May this oblation to Surya be efficacious!' In some zodiacal representations, Surya is mounted on a lion, and placed in the centre, indicating an early knowledge of the true solar system. His car is sometimes followed by a black ill-favored figure, a personification, probably, of the darkness that the god of day is dispelling.

SUS, the hog, in zoology, a genus of quadrupeds, belonging to the class of mammalia and order of belluæ. There are four cutting teeth in the upper jaw, whose points converge; and, for the most part, six in the lower jaw, which stand forwards. There are two tusks in each jaw, those in the upper jaw being short, while those of the under jaw are long, and extend out of the mouth. The snout is prominent, moveable, and has the appearance of having been cut off or truncated. The feet are armed with divided or cloven hoofs. There are six species:—

1. S. Æthiopicus, the engallo, or Ethiopian hog, has no fore teeth, but small tusks in the lower jaw, very large ones in the upper, in old boars bending towards the forehead in form of a semi-circle: nose broad, depressed, and almost of a horny hardness: head very large and broad; beneath each eye a hollow, formed of loose skin, very soft and wrinkled; under these a great lobe or wattle, lying almost horizontal, broad, flat, and rounded at the end, placed so as to intercept the view of any thing below from the animal. Between these and the mouth, on each side, there is a hard callous protuberance The mouth is small; skin dusky; bristles disposed in fasciculi, of about five each; longest between the ears and on the beginning of the back thinly dispersed on the rest of the back. Ears large and sharp pointed, inside lined with long whitish hairs; tail slender and flat, not reaching lower than the thighs, and is covered with hairs disposed in fasciculi. Body longer, and legs shorter than in the common swine; its whole length four feet nine inches; height before two feet two inches; but in a wild state it grows to an enormous size. These animals inhabit the hottest parts of Africa, from Senegal to Congo, also the island of Madagascar. They are very fierce, active, and swift; they will not breed with the domestic sow. They burrow under ground, into which they dig with surprising expedition. Buffon confounds this with the African.

2. S. Africanus, the African hog, has only two fore teeth in the upper jaw, and six in the lower; on each side six grinders. The body is covered

with very long and fine bristles; the tail reaches to the first joint of the hind leg; is very slender, and ends in a large tuft; the head is long; nose slender; the upper jaw extending far beyond the lower; the ears narrow, erect, and pointed, with very long bristles at the end. They inhabit Africa, from Cape Verd to the Cape of Good Hope.

3. S. babyrussa, the Indian hog, has four cutting teeth in the upper, six in the lower jaw; ten grinders to each jaw; in the lower jaw two tusks pointing towards the eyes, and standing nearly eight inches out of their sockets; from two sockets on the outside of the upper jaw two other teeth, twelve inches long, bending like horns, their ends almost touching the forehead; ears small, erect, sharp-pointed; along the back are some weak bristles; on the rest of the body only a sort of wool, such as is on lambs; the tail long, ends in a tuft, and is often twisted: the body plump and square. It inhabits Buero, a small isle near Amboyna; it is also found in Celebes, but neither on the continent of Asia nor Africa. They are sometimes kept tame in the Indian isles; live in herds; have a very quick scent; feed on herbs and leaves of trees; never ravage gardens like other swine; their flesh well tasted. When pursued, and driven to extremities, they rush into the sea, swim very well, and even dive, and pass thus from isle to isle. In the forests they often rest their heads, by hooking their upper tusks on some boughs. The tusks, from their form, are useless in fight.

4. S. porcus, the Guinea hog, has no bristles; the hinder part of the back is covered with long hairs; the tail is long and naked, and hangs down to the ground; the ears are longish and much pointed; the body is covered with short and shining red hairs. This species inhabits Guinea. There is a variety called the Siamese hog. Both are smaller than the common hog.

5. S. scrofa, the common hog, having the body covered with bristles; two large teeth above and below. There are four varieties:—

i. S. scrofa domesticus, the domestic hog, has the ears long, sharp-pointed, and slouching; the color generally white, sometimes mixed with other colors. In a tame state it is universal, except in the frigid zones, and in Kamschatka, where the cold is very severe. Since its introduction into America by the Europeans, it abounds to excess in the hot and temperate parts. Of all quadrupeds the hog is the most rude and brutal. All his habits are gross; all his appetites are impure; all his sensations are confined to a furious lust and a brutal gluttony. He devours indiscriminately every thing that comes in his way, even his own progeny the moment after their birth. This voraciousness seems to proceed from the perpetual cravings of his stomach, which is of an immoderate size; and the grossness of his appetites, it is probable, arises from the bluntness of his senses of taste and of feeling. The rudeness of the hair, the hardness of the skin, and the thickness of the fat, render these animals less sensible to blows. Mice have been known to lodge upon a hog's back, and to eat his skin and fat, without his showing any marks of feeling. The other senses of the hog are very good. It is well known to the hunters that the wild boar hears and smells at a great distance; for, to surprise him, they are obliged to watch him in silence during the night, and to place themselves opposite to the wind, that he may not perceive the smell, which never fails to make him turn back. The parts of this animal are finely adapted to its way of life. As its method of feeding is by turning up the earth with its nose for roots of different kinds, so it has a more prone form than other animals; a strong brawny neck; eyes small, and placed high in the head; a long snout, nose callous and tough, and a quick sense of smelling to trace out its food. Its intestines have a strong resemblance to those of the human species. Notwithstanding its powers of motion, it is by nature stupid, inactive, and drowsy; much inclined to increase in fat, which is disposed in a different manner from that of other animals, and forms a regular coat over the whole body. It is restless at a change of weather, and in high winds is so agitated as to run violently, screaming horribly at the same time; it is fond of wallowing in the dirt, either to cool its surfeited body, or to destroy the lice, ticks, and other insects with which it is infested. Its diseases generally arise from foul feeding and intemperance; such as meazles, imposthumes, and scrophula. These are best prevented by keeping the animals, as the ancients strongly recommended, very clean in their sties; allowing them air, exercise, and a sufficiency of water. Linnæus observes that its flesh is wholesome food for athletic constitutions, or those that use much exercise; but bad for such as lead a sedentary life; it is, however, of most universal use, and furnishes numberless materials for epicurism. The boar, or male, is chosen with great care, when intended for propagation; and is thus employed from the age of two to five years, and then either sold or fatted. The males not allotted to this use are castrated, sometimes at the age of six weeks, sometimes six months; and then fed to a great size either for sale or for use. Sows are kept for breed generally from one year old to seven, and are then fatted. They have commonly more grease on their intestines than hogs, these being fattest on their backs. Aristotle says, that hogs in general live twenty years; and adds that both males and females are fertile till they arrive at fifteen. They can engender at nine or twelve months; but it is better to restrain them till they be eighteen months or two years. The first litter of the sow is not numerous; and, when only one year old, her pigs are weak, and even imperfect. She may be said to be in season at all times. Though impregnated, she solicits the approach of the male, which is an excess among animals; for almost every other species refuse the male after conception. The ardor of the sow, though almost perpetual, is however marked by paroxysms and immoderate movements, which always terminate by her wallowing in the mire. She, at the same time, emits a thick whitish fluid. She goes four months with young; brings forth in the beginning of the fifth; and soon after solicits the male, is impregnated a second time, and thus brings forth twice a-year. Only eight

or nine of the litter are kept; the rest are sold. In fifteen days pigs are excellent food. The flesh of all the different species of swine, and at all ages, is a very substantial and agreeable aliment; and, in their proper seasons, the different sorts of provisions thus supplied are all of them very saleable. The flesh was much more in favor with our ancestors than with us; though brawn has still many admirers, is made in the greatest perfection, and considered as a rarity peculiar to this country. Pork, though it might be wisely prohibited in some warm countries, is found equally nutritive and salutary here. As such it furnishes a very large proportion of that food which is vended in our markets. It takes salt better, and keeps longer, than the flesh of any other animal; and the consumption of it is prodigious when pickled or salted, more especially in our foreign garrisons and in the sea service. Our bacon is differently cured, so as to render it acceptable to all palates; and our hams are not at all inferior to those of other countries. Fresh pork sells nearly as dear as beef; the lard brings double or triple the price; the blood, the intestines, the feet, and the tongue, are all prepared as food. The fat of the intestines and web, which differs from common lard, is employed for greasing axles of wheels, and for many other purposes. Sieves are made of the skin; and brushes, pencils, &c., of the bristles. The dung is reputed next in value to that of sheep. Mr. Worlidge proposes that swine should be turned into a close well-paled, and planted with greens, pulse, and roots, on which they may feed, and by their trampling and their dung raise a great quantity of excellent soil. Mr. Mortimer assures us that some on poor light shallow land in Staffordshire sow a small white pea, which they never reap, but turn in so many hogs to eat them as they think they will fat; and there they lie day and night, and their dung will so enrich the land that it will bring a good sward upon it, and will graze many years afterwards. Our old husbandmen had an ill opinion of this dung, as supposing it bred weeds. In some places they wash with hogs' dung for want of soap; which answers tolerably well, if the linen hangs long enough in the air to become thoroughly sweet. The snout of an old boar is the only part that is esteemed; but every part of the castrated and young boar, not exceeding one year fed, makes delicate eating. The pork of the domestic boar is worse than that of the wild boar; and it can only be rendered fit for eating by castration and fattening.

ii. S. scrofa dom. monungulus, the single-hoofed hog, has undivided hoofs on all the feet, and resembles the common kind in every thing else. They inhabit Upsal in Sweden, and other places; and are mentioned by the ancients.

iii. S. scrofa dom. Sinensis, the Chinese hog, has the back almost naked, and the belly hanging down to the ground; the legs are short, and the tail short and pendulous. They are common in China, the islands in the Indian Ocean and South Sea, and in New Guinea. They are cultivated in Europe, and are much more cleanly than the common hog.

iv. S. scrofa ferus, the wild hog, is of a dark brinded color, and beneath the bristles is a soft short hair; the ears short and a little rounded. It is found wild in most parts of Europe. In the forests of South America there are vast droves, which derive their origin from the European kind relapsed into a state of nature; and are what Mr. Bancroft, in his history of Guiana, describes as a particular species by the name of warree. They cannot bear excessive cold; inhabit wooded countries; and are very swift. In America they are useful by clearing the country of rattlesnakes, which they devour without danger. The external form of its body is very unwieldy; yet, by the strength of its tendons, the wild boar is enabled to fly from the hunters with amazing agility: the back toe on the feet of this animal prevents its slipping while it descends declivities, and must be of singular use when pursued. As to the age of these animals, it is said the life of the wild boar may be extended to twenty-five or thirty years. The flesh of the wild boar was esteemed a great delicacy by the ancient Romans. The wild sow, which every way resembles the domestic kind, produces only once a year. This difference in fertility is probably owing to want of nourishment, and the necessity of suckling her pigs much longer than the domestic sow, which is never allowed to nurse her young above fifteen days or three weeks. The wild boar was formerly a native of England, as appears from the laws of Hoel Dha, who permitted his grand huntsman to chase that animal from the middle of November to the beginning of December. William I. punished with the loss of their eyes any that were convicted of killing the wild boar, the stag, or the roebuck; and Fitz Stephen tells us that the vast forest that in his time grew on the north side of London was the retreat of stags, fallow-deer, wild boars, and bulls. Charles I turned out wild boars in the New Forest Hampshire, but they were destroyed in the civil wars. On the continent the wild boar is hunted with dogs, or killed by surprise during the night, when the moon shines. As he runs slowly, leaves a strong odor behind him, and defends himself against the dogs, and often wounds them dangerously, fine hunting dogs are unnecessary, and would have their nose spoiled, and acquire a habit of moving slowly, by hunting him. Mastiffs, with very little training, are sufficient. The oldest, which are known by the track of their feet, should only be attacked: a young boar of three years old is difficult to hunt down, because he runs very far without stopping. But the older boars do not run far, allow the dogs to run near, and often stop to repel them. During the day, he commonly remains in his soil, which is in the most sequestrated part of the woods. He comes out in the night in quest of food. In summer, when the grain is ripe, it is easy to surprise him among the cultivated fields, which he frequents every night. As soon as he is slain, the hunters cut off his testicles, the odor of which is so strong that in a few hours it would infect the whole flesh. The ancients castrated the young boars which they could carry off from their mothers, and returned them to the woods, where they grew fat, and their pork was much better than that of domestic hogs.

6. S. tajassus, the tajassu, pecary, or Mexican hog, with four cutting teeth above, and six below; two tusks in each jaw; those in the upper jaw pointing down, and little apparent when the mouth is shut; the others hid: length from nose to the end of the rump about three feet: head not so taper as in common swine: ears short and erect: body covered with bristles, stronger than those of the European kind, and more like those of a hedge-hog; they are dusky, surrounded with rings of white; those on the top of the neck and back are nearly five inches long; shorter on the sides; the belly almost naked; from the shoulders to the breast is a band of white: no tail: on the lower part of the back is a gland, open at the top, discharging a fœtid ichorous liquor; this has been by mistake called a navel. Inhabits the hottest parts of South America, and some of the Antilles: lives in the forests on the mountains: is not fond of mire or marshy places: less fat than the common hog. These animals go in great droves. They are very fierce, and will fight stoutly with the beasts of prey: the jaguar, or American leopard, is their mortal enemy; often the body of that animal is found, with several of these hogs, slain in combat. Dogs will scarcely attack this animal: if wounded, it will turn on the hunters. They feed on fruits and roots; also on toads and all manner of serpents, which they hold with their fore-feet, and skin with great dexterity. The flesh is reckoned very good food; but all writers agree that the dorsal gland must be cut out as soon as the animal is killed, or the flesh will become so infected as not to be eatable. The Indian name of this species is paquiras, whence is derived that of pecary.

SUSA, or SHUSHAN, the ancient royal residence of the kings of Persia, built by Darius Hystaspis, according to Pliny; though he probably only restored it, being a very ancient city, founded by Tithonus, the father of Memnon. It was in compass 120 stadia, of an oblong quadrangular form, with a citadel called memnoneum. In Scripture it is called Shushan, the royal citadel, from the great number of lilies growing in that district (Athenæus); situate on the river Ulai or Eulæus (Daniel): Susa was the winter as Ecbatana was the summer residence of the kings of Persia (Xenophon, Strabo, Plutarch). Here the kings kept their treasure; and Alexander found immense riches in it (Herodotus). It is now called Suster.

SUSA, a province of Piedmont, with a superficial extent of 700 square miles, and 65,000 inhabitants. It consists of a broad valley at the foot of the Cottian Alps, interspersed with steep rocks and eminences. Its products are wine, chestnuts, fruit, silk, and corn. Grazing is also extensively followed. It has mines of iron and marble, and manufactures linen and leather.

SUSA, a fruitful province of Morocco, at its south extremity. There is not, perhaps, a finer climate in the world; its fruits are exquisite, particularly olives, the plantations of which are so extensive that a man may travel uninterruptedly through them for many days. The sugar cane is said to grow spontaneously. Cotton, indigo, and gums, are abundant. Stick-liquorice abounds to such a degree as to be called the root of Suse. Almonds and olive oil are also produced for exportation.

SUSCEP'TIBLE, *adj.* SUSCEPTIBIL'ITY, *n. s.* SUSCEP'TION, SUSCEP'TIVE, *adj.* } Fr. *susceptible;* Lat. *susceptus.* Prior has accented this improperly on the first syllable. Capable of admitting; disposed to admit: susceptibility, the quality of admitting: susception, the act of taking: susceptive, capable to admit.

He moulded him platonically to his own idea, delighting first in the choice of the materials, because he found him *susceptible* of good form. *Wotton.*

The *susceptibility* of those influences, and the effects thereof, is the general providential law whereby other physical beings are governed. *Hale.*

In their tender years they are more *susceptible* of virtuous impressions than afterwards, when solicited by vulgar inclinations. *L'Estrange.*

Children's minds are narrow, and usually *susceptible* but of one thought at once. *Locke on Education.*

Blow with empty words the *susceptible* flame. *Prior.*

A canon, promoted to holy orders before he is of a lawful age for the *susception* of orders, shall have a voice in the chapter. *Ayliffe's Parergon.*

Since our nature is so *susceptive* of errours on all sides, it is fit we should have notices given us how far other persons may become the causes of false judgments. *Watts's Logick.*

SUS'CITATE, *v. n.* Fr. *susciter;* Lat. *suscito.* To rouse; to excite.

It concurreth but unto predisposed effects, and only *suscitates* those forms whose determinations are seminal, and proceed from the idea of themselves. *Browne's Vulgar Errours.*

SUSPECT', *v. a., v. n.,* & *n. s.* Lat. *suspicio, suspectum.* To imagine with a degree of fear and jealousy; imagine guilt; hold uncertain; doubt: as a participial adjective, doubtful: as a noun substantive, an obsolete synonyme of suspicion.

No fancy mine, no other wrong *suspect,*
Make me, O virtuous shame, thy laws neglect. *Sidney.*

The sale of offices and towns in France,
If they were known, as the *suspect* is great,
Would make thee quickly hop without a head. *Shakspeare.*

If I *suspect* without cause, let me be your jest. *Id.*

There be so many false prints of praise, that a man may justly hold a *suspect.* *Bacon.*

Nothing makes a man *suspect* much, more than to know little; and therefore men should remedy suspicion by procuring to know more. *Id.*

Nothing more jealous than a favorite towards the waining time and *suspect* of satiety. *Wotton.*

If the king ends the differences, and takes away the *suspect,* the case will be no worse than when two duellists enter the field. *Suckling*

They might hold sure intelligence
Among themselves, without *suspect* t' offend. *Daniel.*

Let us not then *suspect* our happy state,
As not secure. *Milton.*

Sordid interests or affectation of strange relations are not like to render your reports *suspect* or partial. *Glanville.*

SUSPENSIO

Fig 1

MENAI BRIDG

Approach
of Fig. 3.

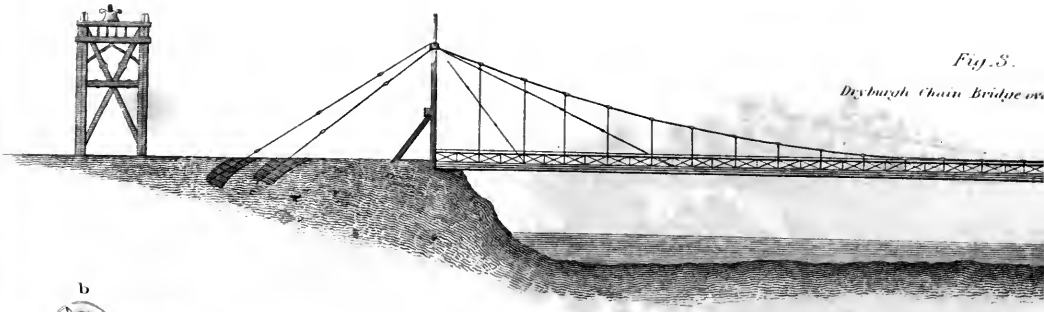
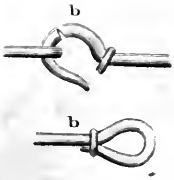


Fig. 3.

Dryburgh Chain Bridge ove



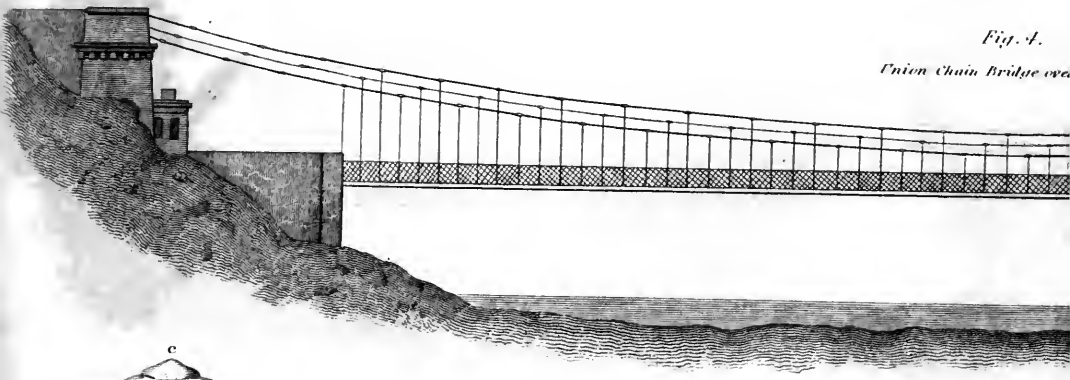
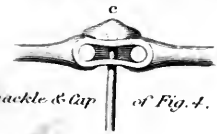


Fig. 4.

Union Chain Bridge ove



Shackle & Cap of Fig. 4.

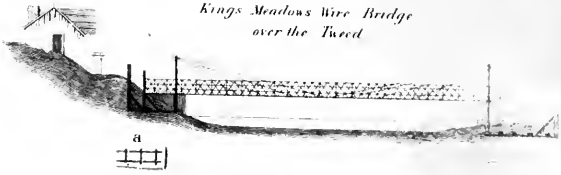
10 0 10 20 30 40

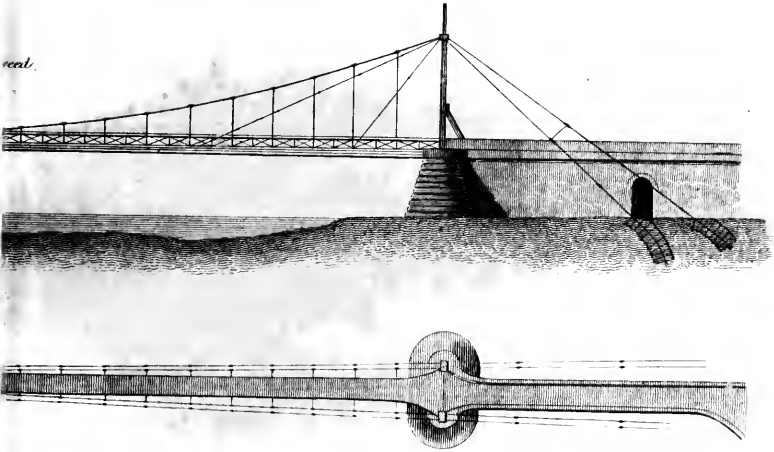
Scale o

London Published by Thomas

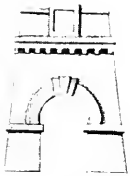
Fig 2

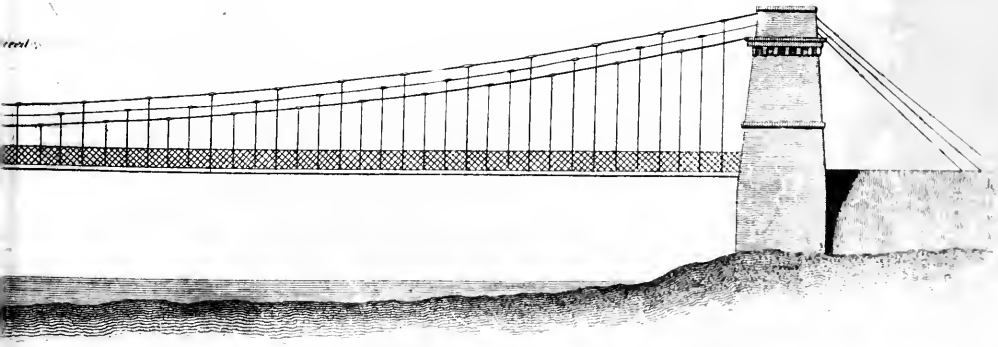
Kings Meadows Wire Bridge over the Tweed

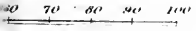




Approach of Fig 1







Cheapside

SUSPEND', *v. a*
SUSPENSE', *n. s.* & *adj.*
SUSPEN'SION, *n. s.*
SUSPEN'SORY, *adj.*
} Fr. *suspendre;* Lat. *suspendo.* To hang; to make to hang by any thing; make to depend upon: hence to interrupt; delay; keep undetermined. Suspense is uncertainty; delay; as an adjective, held in doubt: suspension, the act of hanging up; temporary cessation: suspensory, hanging by; that by which any thing is suspended.

The self-same orders allowed, but yet established in more wary and *suspense* manner, as being to stand in force till God should give the opportunity of some general conference what might be best for every of them afterwards to do. *Hooker.*

Suspend your indignation against my brother, till you can derive from him better testimony of his intent. *Shakspeare.*

To themselves I left them;
For I *suspend* their doom. *Milton.*

SUSPENSION, or SUSPENSE, in music, is produced by supposition, and is nearly the same. It consists in retaining as many as possible of the sounds in a preceding chord that they may be heard in that which succeeds.

SUSPENSION BRIDGES, in civil engineering, are now substituted, in a variety of cases, for the massive and costly structures of stone, some of which we have already described in our article BRIDGES. These bridges recommend themselves as wel. by the economy and durability of their construction as by the simplicity and elegance of their appearance.

The first chain bridge in this country is believed to have been that of *Winch Bridge*, over the river Tees, which forms a communication between the counties of Durham and York. This bridge, of which we have given a view in fig. 1 plate II. SUSPENSION BRIDGES, is described by Hutchinson, in his Antiquities of Durham, 'as a bridge suspended upon iron chains stretched from rock to rock over a chasm nearly sixty feet deep, for the passage of travellers. It is seventy feet in length, and little more than two feet broad; with a hand-rail on one side, and planked in such a manner that the traveller experiences all the tremulous motion of the chain.'

The *King's Meadow Wire Bridge* (fig. 2), on the estate of Sir John Hay, bart., is thrown across the Tweed, a little below Peebles. This is likewise a foot-bridge. It is 110 feet in length, and four feet in breadth; and is ornamented with a handsome lodge, as is represented in the figure. This bridge was contracted for, and executed by Messrs. Redpath and Brown of Edinburgh, in the summer of 1817, and cost about £160. The lower ends of the hollow tubes, forming the piers on the opposite sides of the river, are secured by a brander or grating of timber laid under ground and shown in the connecting diagram marked *a* fig. 2.

The *Dryburgh Chain Bridge*, represented in fig. 3, is intended for foot passengers and led horses, and was built in 1817, in little more than four months, by Messrs. John and William Smith, architects near Melrose, at the expense of the earl of Buchan; and has altogether cost his lordship about £720. This bridge is 260 feet in extent between the points of suspension, and four feet in breadth. On the 15th of January, 1818, this bridge, after it had been finished about six months, was completely destroyed by a violent gale of wind. The eyes formed on one end of the rods or links of the chains supporting the bridge were welded, but the other end was simply turned round and fixed with a collar as shown in the diagram marked *b* fig. 3. It deserves notice that, after the bridge fell, not more than one or two instances appeared of the iron having failed at the welded end; but it had uniformly broken at the open eye of the link as shown in the diagram *b*, above alluded to. The utility of Dryburgh Bridge, as contrasted with a troublesome ferry, having been on so short a trial sufficiently proved, his lordship ordered it to be rebuilt; and in less than three months it was again opened to the public. To this new bridge are added guys, or mooring chains, consisting of rods of iron fixed to stakes in the opposite banks of the river. These guys are attached to the beams of the roadway, as shown in the plan connected with fig. 3. They are said to have some effect in lessening the motion of the bridge in high winds. The post of piers, over which the catenarian chains pass, are formed of logs of memel timber fourteen inches square, erected in pairs as shown in the left hand diagram of fig. 3 marked 'approach of fig 3.'

The work to which the reader's attention is next drawn is the *Union Chain Bridge*, across the river Tweed, at Norham Ford, about five miles from Berwick, as shown in fig. 4. This bridge was begun in August 1819, and opened on the 26th July, 1820; having required only a period of about twelve months for its erection, while a stone bridge must have been the work of abou three years. It was designed and executed b captain Samuel Brown of the royal navy. It is eighteen feet in width, and no less than 361 feet in length. The roadway is suspended from the catenarian, or main chains, by circular rods one inch in diameter. These perpendicular rods are wedged into caps or pieces of cast iron called saddles, which are placed at the distance of five feet apart, and are made to rest upon the shackles or joints of the catenarian chains, as shown in the connecting diagram marked c fig. 4; 'the approach at fig. 4' represents an end view on the Scotch side of the river.

The gigantic structure crossing the *Menai Strait* is represented in plate II. SUSPENSION BRIDGES. It was commenced in 1821, and the first chain was thrown over in the month of April 1825. The extreme length of the chains, from the fastenings in the rocks at either extremity, is about 1600 feet; and the road consists of two carriageways of twelve feet each, with a footpath of four feet in width in the centre. In the first examination of Mr. Rennie before the house of commons, in 1802, it was proposed to have a solid iron bridge with stone abutments; but Mr. Telford, the architect of the present structure, proved that the cost would have been incalculably greater by adopting Mr. Rennie's plan, while the power of resistance would have been less.

The suspension bridge at *Hammersmith* now remains to be described. The design is by Mr.

Tierney Clark, the engineer, and the whole has been executed under his direction. The following are the dimensions:—

	Feet.	In.
The extent of water-way between the suspension towers rising from the bed of the river	400	3
The distance between these and the piers on shore are as follow:—		
On the Middlesex side	142	11
On the Surrey side	145	6
Leaving a clear water-way of . . .	688	8

The suspension towers are forty-eight feet above the level of the road-way, where they are twenty-two feet thick. The road-way is slightly curved upwards, and is sixteen feet above high water; and the extreme length from the back of the piers on shore is 822 feet eight inches, supporting 688 feet of road-way; being 135 feet more than the Menai bridge. There are eight chains composed of wrought iron bars five inches deep, and one inch thick, each. Four of these chains have six bars in each chain, and four have only three bars in each chain, making in the total thirty-six bars which make a dip or curvature in the centre of about twenty-nine feet. From these, vertical rods are suspended, which support the roadway, formed of strong timbers covered with broken granite. The width of the carriage-way is twenty feet, with foot ways five feet wide. The chains pass over the suspension towers, and are secured to the piers on each shore. The suspension towers are built of stone, and designed as archways of the Tuscan order. The bridge has cost £80,000.

SUSPI'CION, *n. s.* SUSPI'CIOUS, *adj.* SUSPI'CIOUSLY, *adv.* SUSPI'CIOUSNESS, *n. s.* } Fr. *suspicion;* Lat. *suspicio.* The act of suspecting; imagination of ill: the adjective, adverb, and noun substantive corresponding.

They, because the light of his candle too much drowned theirs, were glad to lay hold on so colourable matter, and exceeding forward to traduce him as an author of *suspicious* innovations. *Hooker.*

Suspicion all our lives shall be stuck full of eyes,
For treason is but trusted like a fox,
Who, ne'er so tame, so cherished and locked up,
Will have a wild trick of his ancestors. *Shakspeare.*

SUSPIRE', *v. n.* SUSPIRA'TION, *n. s.* } Lat. *suspiro.* To sigh; to fetch the breath deep: it seems in Shakspeare to mean only to begin to breathe: the noun substantive corresponding.

Since the birth of Cain, the first male child,
To him that did but yesterday *suspire,*
There was not such a gracious creature born.
Shakspeare.

Not customary suits of solemn black,
Nor windy *suspiration* of forced breath,
That can denote me truly. *Id.*

In deep *suspirations* we take more large gulphs of air to cool our heart, overcharged with love or sorrow *More.*

SUSQUEHANNA, the largest river of Pennsylvania, North America, which is formed by the east and west branches. The east rises in Otsego Lake, New York, and the west in Huntingdon county Pennsylvania. They unite at Northumberland. The river then runs south-east into the head of the Chesapeake, in Maryland. It is one mile and a quarter wide at its mouth, but it is navigable only five miles. The Susquehanna was surveyed in 1817 by commissioners appointed by Pennsylvania, who reported that below Columbia no ascending navigation was practicable, but that, at the expense of about 20,000 dollars, every obstacle might be removed to the head of the two branches. It is contemplated to unite the waters of this river with those of the Schuylkill.

SUSQUEHANNA, a county on the north side of Pennsylvania, bounded north by New York, east by Wayne county, south by Lucerne county, and west by Ontario county. Chief town Montrose.

SUSSEX, one of the southern counties of England, bounded on the west by Hampshire, on the north by Surrey, on the east and north-east by Kent, and on the south by the British Channel. It is seventy-six miles in length, and nearly twenty in average breadth. Towards Kent it is contracted to an obtuse point.

Sussex, like Surrey, is varied by the inequalities of the downs, with intervening valleys, through which the many little streams of the county pursue their respective courses; and the wooded scenery and pasture land give to the county in general a rural and a rich diversity of appearance. The tracts which come under the description of mere wastes, however, are very considerable. They occupy the northern side of the county, where, in a district containing by computation 500,000 acres, these almost desert tracts form not less than 110,000. Upon the downs the climate fronting is bleak, being exposed to violent winds, impregnated with saline particles. In the western part of the maritime district the climate is warm and highly favorable to the purposes of vegetation; in that called the Weald the climate is cold and damp.

In the easternmost parts of the Weald is found every sort of limestone; and the Sussex marble, when cut into slabs and polished, is equal to most kinds for beauty and quality. It is an excellent stone for square building and paving, and affords a very valuable manure. It is found from ten to twenty feet under ground, where it lies in strata nine or ten inches thick. The limestone has been found superior to both that of Maidstone and Plymouth; and for cement it is thought to surpass all other. Iron-stone abounds in this county; and to the ferruginous mixture with which its soil is in many places so highly impregnated, is to be ascribed the sterility of so large a portion of the surface. Chalk is still more plentiful, a vast range of hills which occupy a considerable part of the county contiguous to the coast being composed of it. On the south side of these hills marl is dug. Fuller's earth is found at Tillington and consumed in the neighbouring mills; and red ochre at Graffham, Chidham, and other places on the coast.

The rivers of Sussex are insignificant when compared with those of some other parts of the kingdom; but they are exclusively its own, as their origin and courses are confined within the limits of the county All of them fall into the British Channel.

Sussex has, from the remotest antiquity, been celebrated for its oak. Before the Norman conquest it was one continued forest; and the quantity of woodland which it at present contains cannot be estimated at less than 170,000 acres. The reigning feature of the Weald is timber, which overspreads it in every direction. The quality of the timber may be collected from this circumstance, that the navy contractors are said to stipulate for Sussex oak in preference to every other. The roads of this county are in general good, being largely composed of whinstone and Kentish rag. There are no considerable canals in Sussex, but the Arun has been made navigable from the sea to its junction with the New Cut, a distance upwards of seventeen miles; and thence a company of merchants have extended it to Newbridge. A similar process has also been taken with the Rother, a branch of the former river, which constitutes part of a grand plan for connecting London with Sussex, by means of the junction of the Arun with the Wey at Guildford. A plan has also been proposed for cutting another canal from Newbridge on the Rother to Horsham, and thence to the iron railway at Merstham near Reigate in Surrey.

The proportion between pasture and arable land varies in different parts of this county. In the Weald a third is pasture, a third arable, and a third wood and waste. On the south side of the downs the arable exceeds the pasture in the proportion of thirty to one. The rotation of crops entirely depends upon the district. Some instances have occurred on very rich land where wheat has been repeated four or five years in succession, and the product amounted to four or five quarters per acre. The crops commonly raised in Sussex are wheat, oats, clover, turnips, peas, barley, and tares. The crops not commonly cultivated are beans, potatoes, buck-wheat, lettuces, hops, carrots, rhubarb, opium, sainfoin, lucerne, and chicory. The management of the meadow and pasture lands varies but little from the practices common in other counties; though here indeed there is but too much reason to complain of negligence with respect to the improvement of grazing land. Irrigation is but locally known; and it is only in the western parts of the county that any signs of it are to be observed. Very great improvements, however, have of late years been effected in the marshes situated along the coast, or in the neighbourhood of the rivers. In the western part of Sussex are some considerable orchards; and where the soil is adapted to the fruit, the plantations are thickly interspersed. The neighbourhood of Petworth yields the best cyder of any in the county. The manures used in Sussex, besides common dung, are chalk, lime, marl, sleech, soap-ashes, wood-ashes, peat-ashes, coal-ashes, rags, sheep-clippings, pilchards, paring-dust, and gypsum. The first three are applied in great abundance; the rest, from their nature, but partially.

Sussex is celebrated for its breed of sheep, which are fed on the south downs, and require but a very slight quantity of food for their subsistence. Their wool is little, if at all, inferior to that of the Hereford sheep, and their hardiness is demonstrated by their healthiness and freedom from losses. The total amount of the sheep kept in the county is about 450,000. The largest estate in Sussex does not greatly exceed £7500 per annum, and most of the proprietors hold their land in their own occupation.

The principal manufacture in this county was the making of iron into bars; but this has decayed on account of the great establishments in Scotland and Wales, where, by the use of pit-coal, the article is supplied at a much cheaper rate. The county contains many Roman and some British antiquities. The Ermine Street, one of the eight British roads, led from this coast to the south-east part of Scotland. Here also was the Stane Street of the Romans, which passed from east to west of the county, with a vicinal, or branching road, towards Porchester. There are also many remains of Roman encampments situated in the vicinity of the downs, and overlooking the Weald. Mr. Dallaway, in his History of Western Sussex, recounts eleven of these relics of early encampment. Over the downs, and other parts of Sussex, are scattered various tumuli, or barrows, which, when opened, have been found to contain either bones, urns, or entire skeletons. Sussex, and the adjoining counties of Hants and Surrey, were by the Romans denominated Belgæ, from the circumstance of their being inhabited by a people so called. These were afterwards joined by the Regni, who settled in the same district antecedent to the invasion of England by Julius Cæsar. After that event, during the Roman dominion of Britain, there were four large stations or towns in Sussex, which included the minor tribes of the Bibroci and the Rhemi. Under the Britons Sussex formed a part of the Suth-Seaxna-rice, as already mentioned in Surrey; and by a similar modulation has been reduced to its present sound. Like the other counties of England Sussex was, at the Norman invasion, divided into lordships and assigned to some of the followers of king William. At that period the title of the earl of Sussex was given to one of these, and the title continued till 1801. It was then constituted a dukedom, and given to Augustus Frederick, sixth son of his late majesty.

The general division of Sussex is into rapes, a division peculiar to this county. These rapes, each of which is said to have had its particular castle, river, and forest, are Chichester, Arundel, and Bramber, forming the western; and Lewes, Pevensey, and Hastings, the eastern portion. The rapes are subdivided into sixty-five hundreds, and comprehend 313 parishes. Chichester is the chief town. Sussex sends eighteen members to parliament, four for the county, two each for Chichester, Brighton, Hastings, Lewes, New Shoreham, and one each for Arundel, Horsham, Midhurst, and Rye.

Sussex, a county of the United States in New Jersey, bounded N. N. E. by New York, south-east by Bergen, Morris, and Hunterdon counties, and west and north-west by the Delaware, which separates it from Pennsylvania. Chief town, Newton.

Sussex, a county of Delaware, United States, bounded north by Kent county, east by Dela-

ware Bay and the Atlantic, south and west by Maryland. Chief towns Georgetown and Lewistown.

SUSSEX, a county of Virginia, bounded north-east by Surrey county, S. S. E. by Southampton county, south-west by Greensville county, and north-west by Dinwiddie and Prince George counties.

SUSTAIN', *v. a.* SUSTAIN'ER, *n. s.* SUS'TENANCE, SUSTENTA'TION. Fr. *soustenir;* Lat. *sustineo.* To bear; prop; hold up; maintain; endure; suffer: a sustainer is one who endures: sustenance and sustentation, both mean support; maintenance; necessaries of life; support of life.

There are unto one end sundry means: as for the *sustenance* of our bodies many kinds of food, many sorts of raiment to clothe our nakedness. *Hooker.*

If you omit
The offer of this time, I cannot promise
But that you shall *sustain* more new disgraces,
With these you bear already.
Shakspeare. Henry VIII.

They charged, on pain of perpetual displeasure, neither to entreat for him, or any way *sustain* him. *Shakspeare.*

When there be great shoals of people, which go on to populate, without foreseeing means of life and *sustentation;* it is of necessity that once in an age they discharge a portion of their people upon other nations. *Bacon.*

But it on her, not she on it depends;
For she the body doth *sustain* and cherish. *Davies.*

Thyself hast a *sustainer* been
Of much affliction in my cause. *Chapman's Iliad.*

My labour will *sustain* me. *Milton.*

Were it I thought death menaced would ensue
This my attempt, I would *sustain* alone
The worst, and not persuade thee. *Id.*

A very abstemious animal, by reason of its frigidity and latitancy in the winter, will long subsist without a visible *sustentation.*
Browne's Vulgar Errours.

Scarcely allowing himself fit *sustenance* of life, rather than he would spend those goods for whose sake only he seemed to joy in life. *Sidney.*

Sacharissa's beauty's wine
Which to madness doth incline;
Such a liquor as no brain
That is mortal can *sustain.* *Waller.*

These streams, once raised above the earth, have their ascent and *sustentation* aloft promoted by the air. *Boyle.*

If he have no comfortable expectations of another life to *sustain* him under the evils in this world, he is of all creatures the most miserable. *Tillotson.*

The admirable curiosity and singular excellency of this design will *sustain* the patience, and animate the industry, of him who shall undertake it. *Holder.*

The ancients were inventers of all arts necessary to life and *sustenance,* as plowing and sowing. *Temple.*

Vain is the force of man,
To crush the pillars that the pile *sustain.*
Dryden's Æneid.

His sons, who seek the tyrant to *sustain,*
And long for arbitrary laws again,
He dooms to death, asserting public right. *Id.*

Can Ceyx then *sustain* to leave his wife,
And unconcerned forsake the sweets of life?
Dryden.

The experiment cost him his life for want of *sustenance.* *L'Estrange.*

Is then the honour of your daughter of greater moment to her than to my daughter her's whose *sustenance* it was? *Addison.*

The mind stands collected within herself, and *sustains* the shock with all the force which is natural to her; but a heart in love has its foundations sapped. *Id.*

The largeness and lightness of her wings and tail *sustain* her without lassitude. *More.*

SUTE, *n. s.* For Suite. Sort. Perhaps only misprinted.

Touching matters belonging to the church of Christ, this we conceive, that they are not of one *sute.* *Hooker.*

SUTHERLAND-SHIRE, one of the most northerly counties of Scotland, extending the whole breadth of the island; about eighty miles in length, from north-west to south-east, and forty miles in breadth, containing 1800 square miles, or 1,122,560 acres; of which forty-seven square acres are water. It is bounded on the north-east by Caithness, on the east and south-east by the German Ocean and the Frith of Dornoch, on the south and south-west by Ross-shire, on the west by the Atlantic Ocean, and on the north by the North Sea.

This county comprehends the districts of Strathnaver, Assint, and Sutherland. The face of the country is mountainous and rocky; partly covered with forests, and part being bleak and barren heaths. The valleys are occupied by numerous lakes and rivers, the chief of which are Loch-Shin, Loch-Naver, Loch-Lyol; and the rivers Oikel, Helmdale, Shin, Naver, Strathy, Brora, &c. The coasts, for the most part, on the north and west, are bold and rocky, indented by numerous bays of great extent. The principal arms of the sea are, Lochs Eribole, Durness, Laxford, Inchaid, and Lowie; and the chief promontories are, Cape Wrath, Far-out-head, Whiten-head, and Strathy-head. Many small islands are scattered along the coast, but few of which are inhabited. It possesses several commodious harbours and fishing-stations, chiefly at the mouth of the rivers. The principal crops raised in Sutherland are oats, and bear alternately, with a few potatoes. The climate is temperate, especially on the east coast; towards Assint and the north-west it is rather cold and damp, from its vicinity to the sea, and is subject to frequent storms. Here are three great deer forests. The people of Sutherland are hardy, and make excellent soldiers; and, for the most part, speak the language of the Lowlanders. Sutherland-shire contains only one town; viz. Dornoch, which is the county town; and several small fishing villages. It is divided into thirteen parochial districts, which contain 23,840 inhabitants. This county has abundance of free-stone, lime-stone, and slate; the lime-stone, in the parish of Assint, is of the nature of marble. Rock crystals and pebbles are found in many parts; and beautiful garnets are found on the coast, in the parish of Tongue. In no part of Scotland have greater changes and improvements taken place, within the last few years, than in this county; and this change has been accomplished by the forming of new roads, building new bridges, and removing the hardy natives from their moun

tainous glens to the sea-coasts, and other situations better suited to advance their own interests, and to increase the prosperity of the country. So strongly, however, were the inhabitants attached to their ancient customs, and modes of living, that the change was not effected but by the adoption of the most decisive measures, on the part of the land proprietors, and even their masters were opposed with a spirit, on the part of the mountaineers, which gave the fullest evidence of their reluctance to relinquish the habitations and pursuits of their ancestors. In 1820 the opposition to their removal totally subsided, and the hardy inhabitants are now establishing fisheries, and devoting themselves to agricultural improvements, in those situations which are best calculated to reconcile them to their new occupations, and to excite them, by their advantages, to habits of industry and perseverance. The county gives the title of earl to the Sutherland family. It sends one member to parliament.

SUTLER, *n. s.* Belg. *soeteler ;* Germ. *sudler.* A man that sells provisions and liquor in a camp.

I shall *sutler* be
Unto the camp, and profits will accrue.
Shakspeare. Henry V.

Send to the *sutler's*, there you 're sure to find
The bully matched with rascals of his kind.
Dryden.

SUTTON (Thomas), esq., founder of the Charter-house, was born at Knaith in Lincolnshire, in 1532, of an ancient and genteel family. He was educated at Eton, and Cambridge, and studied the law in Lincoln's-Inn ; but preferred travelling, and during his absence his father died, and left him a large fortune. On his return he became secretary to the earl of Warwick, and his brother the earl of Leicester. By the former, in 1569, he was appointed master of the ordnance at Berwick ; and, distinguishing himself greatly on the rebellion which broke out in the north, he obtained a patent for that office for life. He was one of the chiefs of those 1500 men who marched into Scotland, by order of queen Elizabeth, to assist the regent, Morton, in 1573. He purchased the manors of Gateshead and Wickham; which, producing coal mines, became to him a source of extraordinary wealth. Soon after this he married a rich widow, who brought him a considerable estate ; and, commencing merchant, riches flowed in to him. He was likewise a commissioner for prizes, and took a Spanish ship worth £20,000. His whole fortune, at his death, was, in land, £5000 a year; in money above £60,000 ; the greatest estate then in the possession of any private gentleman. He lived with great munificence and hospitality ; but, losing his lady in 1602, he retired from the world, and, having no issue, he purchased of the earl of Suffolk Howard House, or the Charter-house, near Smithfield, for £13,000, where he founded the present hospital, in 1611, for the relief of poor men and children. He died December 11th, 1611, at Hackney, aged seventy-nine. His body was conveyed to Christ-church, and there deposited, till 1614, when it was removed to the charter-house, and interred in the chapel under a magnificent tomb.

SUTTON (Samuel), was born at Alfretton in Derbyshire, and going into the army served under the duke of Marlborough in queen Anne's wars with great credit. He afterwards came to London, commenced brewer, and kept a coffee-house in Aldersgate Street, which was well frequented by the learned men of that time, by whom Mr. Sutton was much respected as a man of strong natural parts and cultivated genius. About 1740 he schemed a very simple and natural method for extracting the foul air from the wells of ships, by pipes communicating with the fire-places of the coppers; which operated as long as any fire was kept burning for the ship's use. He took out a patent in 1744, to secure the profits of his invention ; and died in 1752.

SUTTON-COLEFIELD, a market-town in Hemlingford hundred, Warwick. One mile from Warwick, and 110 from London. The parish is very extensive, but the town is situate in a very bleak and barren tract of land. It has a good church, with a square tower, containing six bells. Here is a free grammar-school, which, with other very considerable advantages to the town and the poor, was founded by Vesey, bishop of Exeter, in the reign of Henry VIII. The Birmingham trade has been introduced here. The town is governed by a warden and ten aldermen. Its chase (the remains of a forest) is an extensive tract. Market on Monday. Fairs, Trinity-Monday, and November 8th.

SUTTULEGE, SETLEGE, or SUDLEGE, a celebrated river of Hindostan, the easternmost of the five which are called the Punjab. It rises in the Himalaya mountains, and, running to the south-west, is joined by the Beyah or Hyphasis, in the lat. of 30° N. The united streams fall into the Indus, near 29°. It is estimated to be about 600 miles in length, and to be navigable by large boats for 200 miles above its junction with the Indus.

SUTURE, *n. s.* Lat. *sutura.* A manner of sewing or stitching wounds. See below.

Wounds, if held in close contact for some time, reunite by inosculation : to maintain this situation, several sorts of *sutures* have been invented : those now chiefly described are the interrupted, the glovers, the quilled, the twisted, and the dry *sutures* ; but the interrupted and twisted are almost the only useful ones. *Sharp's Surgery.*

Many of our vessels degenerate into ligaments, and the *sutures* of the skull are abolished in old age. *Arbuthnot.*

SUTURE, in anatomy. See ANATOMY.

SUTURE, in surgery. See SURGERY.

SUVARROF, SUWARROW, or SUWOROW (Alexander, count Rymnikski), a late eminent general in the Russian service. His family was ancient and respectable; but being far from affluent, and their property lying at the extremity of the empire, the subject of this memoir was the first of the family that ever was at court. He was born in 1730. His father had destined him for the law, but his inclination led him to the profession of a soldier; and in 1742 he was enrolled as a fusilier in the guards of Seimonow. He was afterwards a corporal, then a serjeant, and in 1754 he quitted the guards with the brevet of lieutenant in the army. He made his first campaign in the seven years war against the

Prussians, in 1759, entering upon actual service under prince Wolgonski. In 1761 he was ordered on service in the light troops under general Berg; and with the rank of a lieutenant colonel he performed prodigies of valor. At the peace of 1762 he received from the empress a colonel's commission, written with her own hand; and being advanced, in 1768, to the rank of brigadier, he was, in November, ordered to repair to the frontiers of Poland. The object of the empress, at this time, was to subdue the Polish confederates, and to possess herself of certain provinces of that ill-fated kingdom. How completely she and her two allies, the emperor of Germany and the king of Prussia, succeeded in their enterprise, has been related under POLAND. Here we need only observe that the successes of the Russians were chiefly owing to the military skill of Suworow. In 1770 he had been promoted to the rank of major-general; and, for his exploits in the Polish war, the empress conferred upon him, at different times, the orders of St. Anne, St. George, and Alexander Newsky. After performing some important services on the frontiers of Sweden, Suworow was ordered, in 1773, to join the army in Moldavia, under field-marshal Romanzow; and there he began that successful career which soon made his name a terror to the Turks. His first exploit was the taking of Turtukey. During the remainder of the war, which was short, Suworow was constantly engaged, and constantly successful. Early in 1774, he was promoted to the rank of lieutenant-general, and on the 11th of June he defeated the Turks in a great battle. Soon after this victory, peace was concluded, and Suworow was called to Moscow to quell the rebellion of the Cossac Pugatscheff. For several years after Suworow was employed in the Crimea, on the Kuban, and against the Nogay Tartars, in a service, which, though it was of the utmost importance to the empress, and required all his address, furnished no opportunities for that wonderful promptitude and resource which had characterised his more active campaigns. In the end of 1786, Suworow was promoted to the rank of general-in-chief; and, at the breaking out of the war with the Turks in 1787, he made a most masterly defence of Kinburn; a place of little strength, but great importance, as it is situated at the mouth of the Dnieper, opposite to Oczakow. For his zeal and abilities, on this occasion, the empress honored him with the order of St. Andrew. At the siege of Oczakow, Suworow, who commanded the left wing of the army under prince Potemkin, received a dangerous wound in the neck, which was followed by so smart a fever, that, for some time his life was despaired of; but, preferring regimen to medicine, his health was gradually re-established. In 1789 he was appointed to command the army which was to cooperate with the prince of Saxe-Coburg in Walachia; and, by marches of inconceivable rapidity, he twice, in two months, preserved the army of that prince from destruction. Putting himself at the head of 8000 Russians, and literally running to the aid of his ally, he came up with the Turks in time to change the fate of the day at the battle of Forhani, which was fought on the 21st of July; and again at Rymnik, which with 7000 men he had reached with equal celerity, he gained, on the 22d of September, in conjunction with the prince, one of the greatest victories that have ever been achieved. No quarter was given to the Turks; and on this account the Russian general has been charged with savage ferocity. The taking of Bender and Belgrade were the immediate consequences of the victory of Rymnik; and so sensible was the emperor Joseph II. how much the military skill of Suworow had contributed to that victory, that he created him a count of the Roman empire, and accompanied the diploma with a very flattering letter. Similar honors were conferred upon him by Catherine II., who sent him the diploma of count of the empire of Russia, with the title of Rymnikski, and the order of St. Andrew. In autumn 1790 he took Ismailow, after being defended by the Turks at an expense of 33,000 men killed or dangerously wounded; 10,000 taken prisoners; besides 6000 women and children, and 2000 Christians of Moldavia, who fell in one general massacre. Peace being concluded with the Turks, in December 1791, no events occurred from that period to call forth the talents of Suworow till 1794; when mutinies having broken out among the Polish troops in the service of Russia, and the empress with her two allies having resolved on the second partition of Poland, Suworow received orders, in May, to proceed into Red Russia, with a corps of 15,000 men, and to disarm all the Polish troops in that province. This service he soon performed, disarming in less than a fortnight 8000 men, dispersed over a country of 130 miles in circuit. Soon afterwards he was ordered to march into Poland; the king of Prussia having raised the siege of Warsaw, and the empress perceiving that more vigorous measures were necessary to accomplish her design. Under the article POLAND we have given a detailed account of his route to Warsaw. Suffice it to add that he in the course of a very few months overturned the kingdom and republic of Poland. For this service Catherine promoted him to the rank of field-marshal general, loading him with jewels and presenting him with an estate of 7000 peasants in the district of Kubin, which had been the scene of his first battle in the campaign. From the subjugation of Poland we hear little more of Suworow till he entered upon his great career in Italy. For his services in this part of Europe Paul rewarded him by creating him a prince by the title of prince Suworow Italiski; but he gave him a very different reception when he returned into the Russian dominions at the head of his veteran bands. He would not see him, and positively forbad his appearance at court. To the messenger who brought the order, he gave a purse of money, turned his carriage another way, and drove to a wooden house at a distance from the court, and from his former friends, where the conqueror of the Turks, the Poles, and the French republicans, died, almost unattended, on the 18th of May, 1800. The sovereign, who thus disgraced him at the end of his life, gave him a magnificent funeral! In his person Suworow was tall, considerably exceed-

ing six feet, and full chested. His countenance was stern; but among his friends his manners were pleasant, and his dispositions were kind. His temper was naturally violent; but that violence he labored much to moderate, though he was never able completely to extinguish it. He was a scholar, a man of science, and a poet. In 1774 he married a daughter of the general prince John Prosotowski, by whom he had two children, now living; Natalia, married to general count Nicolas Zubow; and Arcadius count Suworow, a youth of promising abilities, who accompanied his father in his march from Italy into Switzerland.

SUZE (Henriette de Coligni), countess of, daughter of the celebrated marshal De Coligni, a French lady, eminent for her poetical abilities. She married first Thomas Hamilton, a Scottish nobleman, and after his death the count La Suze, who was also of an illustrious family. But this second marriage proved unhappy, and ended in a separation. She wrote a great number of Poems, which were much admired; and were collected and printed with those of Pellisson and madam Scudery, at Trevous, in 1725, 12mo. She died in 1673.

SWAB, *v. a.* } Sax. ꝥebban. Belg. *swab-*
SWAB'BER, *n. s.* } *ber.* To clean with a mop: a sweeper of the deck. Used chiefly at sea.

The master, the *swabber*, the boatswain and I,
Loved Moll, Meg, and Marian, and Margery.
Shakspeare.

Was any thing wanting to the extravagance of this degenerate age, but the making a tarpawlin and a *swabber* the hero of a tragedy? *Dennis.*

He made him *swab* the deck. *Shelvock's Voyage.*

SWABIA. See SUABIA.

SWAD'DLE, *v. a.* & *n. s.*, } Saxon ꝥe-
SWAD'DLINGBANDS, *n. s.* } ɒan. To swathe;
SWAD'DLINGCLOTH, } bind in clothes,
SWAD'DLINGCLOUT. } generally used of binding new-born children: the noun substantives the band or cloth used.

Invested by a veil of clouds,
And *swaddled* as new-born in sable shrouds;
For these a receptacle I designed. *Sandys.*

From thence a fairy thee unweeting reft,
There as thou slep'st in tender *swaddlingband*,
And her base elfin brood there for thee left;
Such men do changlings call, so changed by fairies theft. *Spenser.*

That great baby you see there is not yet out of his *swaddling-clouts*. *Shakspeare. Hamlet.*

How soon doth man decay!
When cloths are taken from a chest of sweets,
To *swaddle* infants, whose young breath
Scarce knows the way;
Those clouts are little winding sheets,
Which do consign and send unto death. *Herbert.*

Great on the bench, great in the saddle,
That could as well bind o'er as *swaddle*. *Hudibras.*

The *swaddlingbands* were purple, wrought with gold. *Dryden.*

I begged them to uncase me; no, no, say they; and upon that carried me to one of their houses, and put me to bed in all my *swaddles*. *Addison.*

They *swaddled* me up in my night-gown with long pieces of linen, till they had wrapt me in about a hundred yards of swathe. *Id.*

SWAFFHAM, a market-town in South-Greenhoe hundred, Norfolk, fifteen miles south-east of Lynn, and ninety-three N. N. E. from London. The church is a handsome building, in the form of a cathedral. The vaults and aisles are supported by light pillars, forming fourteen handsome arches, seven on a side, over which there are twenty-eight neat, light windows. Here is a quakers' meeting-house. On a heath near the town, horse-races are held. On the market-hill a handsome cross has been erected by the earl of Orford, and on the west side of the hill a subscription assembly-room has been built. Its noted butter-market was originally held at Dereham. Market on Saturday. Fairs, May 13th, July 21st, and November 3rd. It is a vicarage, value £14 8*s.* 10*d.* Patron, the bishop of Norwich.

SWAG, *v. n.* } Sax. ꝥigan; Isl. *swelgia*. To
SWAGG'Y, *adj.* } sink down by its weight; hang heavy: the adjective corresponding.

They are more apt, in *swagging* down, to pierce with their points, than in the jacent posture, and crevice the wall. *Wotton.*

The beaver is called animal ventricosum, from his *swaggy* and prominent belly.
Browne's Vulgar Errours.

Being a tall fish, and with his sides much compressed, he hath a long fin upon his back, and another answering to it on his belly; by which he is the better kept upright, or from *swagging* on his sides. *Grew.*

SWAGE, *v. a.* From asswage. To ease; to soften; to mitigate.

Nor wanting power to mitigate and *swage*,
With solemn touches, troubled thoughts, and chase
Anguish, and doubt, and fear from mortal minds.
Milton.

I'd find some intervals when my poor heart
Should *swage* itself, and be let loose to thine.
Otway.

SWAG'GER, *v. n.* } Sax. ꝥegan; Belgic
SWAG'GERER, *n. s.* } *swadderen*. To bluster; bully; be turbulently proud and insolent: the noun substantive corresponding.

Drunk? squabble? *swagger*? and discourse sustain with one's own shadow? Oh thou invincible spirit of wine! *Shakspeare.*

He's no *swaggerer*, hostess; a tame cheater: you may stroke him as gently as a puppy greyhound.
Id. Henry IV.

The lesser size of mortals love to *swagger* for opinions, and to boast infallibility of knowledge.
Glanville's Scepsis.

Confidence, how weakly soever founded, hath some effect upon the ignorant, who think there is something more than ordinary in a *swaggering* man, that talks of nothing but demonstration. *Tillotson.*

He chucked,
And scarcely deigned to set a foot to ground,
But *swaggered* like a lord. *Dryden.*

Many such asses in the world huff, look big, stare, dress, cock, and *swagger* at the same noisy rate.
L'Estrange.

To be great is not to be starched, and formal, and supercilious; to *swagger* at our footmen and browbeat our inferiours. *Collier on Pride.*

What a pleasure is it to be victorious in a cause: to *swagger* at the bar! for a lawyer I was born, and a lawyer I will be.
Arbuthnot's History of John Bull.

SWAIN, *n. s.* Sax. and Runick ꝥein; Goth. *sweina*. A young man; country servant or youth; a lover.

That good knight would not so nigh repair,
Himself estranging from their joyance vain,
Whose fellowship seemed far unfit for warlike *swain*.
Spenser.

It were a happy life
To be no better than a homely *swain*.
Shakspeare. Henry VI.

Blest *swains!* whose nymphs in every grace excel;
Blest nymphs! whose *swains* those graces sing so well. *Pope.*

Leave the mere country to mere country *swains*,
And dwell where life in all life's glory reigns.
Harte.

SWAL'LOW, *v. a.* & *n. s.* Sax. ꝑpelgan; Belg. *swelgen;* Goth. and Swed. *swelgia.* To take down the throat: hence to absorb; receive without examination; seize; engross; waste: as a noun substantive, a throat; voracity.

If the earth open her mouth and *swallow* them up, ye shall understand that these men have provoked the Lord. *Numbers* xvi.

Far be it from me that I should *swallow* up or destroy. 2 *Samuel.*

Death is *swallowed* up in victory. 1 *Cor.* xv. 54.

The priest and the prophet are *swallowed* up of wine. *Isaiah.*

If little faults
Shall not be winked at, how shall we stretch our eye,
Whose capital crimes chewed, *swallowed*, and digested,
Appear before us? *Shakspeare. Henry V.*

Though you unite the winds, and let them fight,
Against the churches, though the yesty waves
Confound and *swallow* navigation up. *Shakspeare.*

I may be plucked into the *swallowing* womb
Of this deep pit, poor Bassianus' grave.
Id. Titus Andronicus.

He hid many things from us, not that they would *swallow* up our understanding, but divert our attention from what is more important. *Decay of Piety.*

In bogs *swallowed* up and lost. *Milton.*

Nature would abhor
To be forced back again upon herself,
And, like a whirlpool, *swallow* her own streams.
Dryden.

Men are, at a venture, of the religion of the country; and must therefore *swallow* down opinions, as silly people do emperick pills, and have nothing to do but believe that they will do the cure. *Locke.*

Consider and judge of it as a matter of reason, and not *swallow* it without examination as a matter of faith. *Id.*

The necessary provision for life *swallows* the greatest part of their time. *Id.*

Had this man of merit and mortification been called to account for his ungodly *swallow*, in gorging down the estates of helpless widows and orphans, he would have told them that it was all for charitable uses. *South.*

Should not the sad occasion *swallow* up
My other cares, and draw them all into it?
Addison.

Homer excels all the inventors of other arts in this, that he has *swallowed* up the honour of those who succeeded him. *Pope.*

Corruption *swallowed* what the liberal hand
Of bounty scattered. *Thomson's Autumn.*

SWAL'LOW, *n. s.* Sax. ꝑpalepe. A small bird of passage. See below.

The *swallow* follows not summer more willingly than we your lordship. *Shakspeare. Timon.*

The *swallows* make use of celendine, and the linnet of euphragia. *More.*

When *swallows* fleet soar high and sport in air,
He told us that the welkin would be clear. *Gay.*

SWALLOW, in ornithology. See HIRUNDO. Concerning these birds, a question has oft been discussed, What becomes of them in winter? Upon this subject there are three opinions. Some say that they migrate to a warmer climate; some that they retire to hollow trees and caverns, where they lie in a torpid state; and others affirm that they lie in the same state in the bottom of lakes and under the ice. The first opinion is supported by Marsigli, Ray, Willoughby, Catesby, Reaumur, Adanson, Buffon, &c. The first and second opinions are both adopted by Pennant and White. The third is sanctioned by Schæffer, Hevelius, Derham, Klein, Ellis, Linné, Kalm: and the second and third have been strongly defended by the honorable Daines Barrington. Those who assert that swallows migrate to a warmer country in winter, argue, That many birds migrate is a fact fully proved by the observations of natural historians. See MIGRATION. Is it not more probable, therefore, that swallows, which disappear regularly every season, retire to some other country, than that they lie in a state of torpor in caverns or lakes? But this opinion is founded on facts. We often see them collected in great flocks on churches, rocks, and trees, about the time when they annually disappear. The direction of their flight has been observed to be to the southward. Mr. White, the ingenious historian of Selborne, travelling near the coast of the British Channel one morning early, saw a flock of swallows take their departure, with an easy and placid flight towards the sea. Mr. Laskey of Exeter observed the direction which a flock of swallows took in autumn 1793. On the 22d of September, about 7 A. M., the wind being easterly, accompanied with a cold drizzling rain, Mr. Laskey's house was entirely covered with house swallows. At intervals large flocks arrived and joined the main body, and at their arrival an unusual chirping commenced. The appearance of the whole company was so lethargic that he found it an easy matter to catch a considerable number of them, which he kept in a room all that day. By heating the room they all revived; he opened four of them, and found their stomachs quite full. The main body occupied the house top all day, except for two hours. About half an hour after 9 A. M. the 23d, there was a great commotion, with very loud chirping, and, within a few minutes after, the whole multitude took their flight, in a southeast direction, having ascended to a great height in the atmosphere. He let go the birds which he had caught, at certain intervals till four o'clock, and they all fled toward the same quarter. They have also been found on their passage at a great distance from land. Mr. Adanson informs us, that about fifty leagues from the coast of Senegal four swallows settled upon the ship on the 6th of October; that these birds were taken; and that he knew them to be European swallows, which, he conjectures, were returning to the coast of Africa. Sir Charles Wager, says, 'Returning home, in spring, as I came into soundings in our channel, a great flock of swallows came and settled on all my rigging; every rope

was covered; they hung on one another like a swarm of bees; the decks and carving were filled with them. They seemed almost famished and spent, and were only feathers and bones; but, being recruited with a night's rest, took their flight in the morning.' This vast fatigue proves that their journey must have been very great, considering their amazing swiftness; in all probability they had crossed the Atlantic Ocean, and were returning from the shores of Senegal, or other parts of Africa; so that this account, from that most able and honest seaman, confirms the latter information of Mr. Adanson. Mr. Bruce also mentions, in his travels, that in Abyssinia there is a great variety of swallows; but 'those that are common in Europe appear in passage at the very season when they take their flight thence. We saw the greatest part of them in the island of Masuah, where they lighted and tarried two days, and then proceeded with moonlight, to the south-west.' Mr. Kalm acknowledges that in crossing the Atlantic, from Europe, a swallow lighted on the ship on the 2d of September, when it had passed only two-thirds of the ocean. Since, therefore, swallows have been seen assembled in great flocks in autumn, flying off in company towards southern climes, since they have been found both in their passage from Europe and returning again, can there be any doubt of their annual migration? The second notion (says Mr. Pennant) has great antiquity on its side. Aristotle and Pliny say that swallows do not remove very far from their summer habitation, but winter in the hollows of rocks, and during that time lose their feathers. Of late several proofs have been brought of some species having been discovered in a torpid state. Mr. Collinson mentions three gentlemen, eye-witnesses to numbers of sand martins being drawn out of a cliff on the Rhine, in March 1762. And the honourable Daines Barrington communicated the following fact, on the authority of the late Lord Belhaven:—That numbers of swallows have been found in old dry walls and in sand hills near his lordship's seat in East Lothian, from year to year; and that when they were exposed to the warmth of a fire they revived. We have heard of the same annual discoveries near Morpeth, in Northumberland. Others prove the residence of those birds in a torpid state during winter. 1. In the chalky cliffs of Sussex; as was seen on the fall of a great fragment some years ago. 2. In a decayed hollow tree that was cut down, near Dolgelli, in Merionethshire. 3. In a cliff, near Whitby, Yorkshire; where, on digging out a fox, whole bushels of swallows were found in a torpid condition. 4. The Rev. Mr. Conway of Sychton, Flintshire, a few years ago, on looking down an old lead mine in that county, observed numbers of swallows clinging to the timbers of the shaft, seemingly asleep; and on flinging some gravel on them they just moved, but never attempted to fly: this was between All Saints and Christmas. From all these facts, we must conclude that one part of the swallow tribe migrate, and that others have their winter quarters near home. The third opinion is that of Mr. Kalm, who pleads for their immersion in water; and mentions the following facts:—'Dr. Wallerius, the celebrated Swedish chemist, informs us that he has seen, more than once, swallows assembling on a reed till they were all immersed and went to the bottom; this being preceded by a dirge of a quarter of an hour's length. He had seen a swallow caught during winter out of a lake with a net, drawn, as is common in northern countries, under the ice; this bird was brought into a warm room, revived, fluttered about, and soon after died. Mr. Klein applied to many farmers general of the king of Prussia's domains, who had great lakes in their districts, the fishery in them being a part of the revenue. All the people that were questioned made affidavits upon oath before the magistrates. 1. The mother of the countess of Lehndorf said that she had seen a bundle of swallows brought from the Frishe-Hoff (a lake communicating with the Baltic at Pislau), which, when brought into a moderately warm room, revived and fluttered about. 2. Count Schileben gave an instrument on stamped paper, importing that by fishing on the lake belonging to his estate of Gerdauen in winter, he saw several swallows caught in the net, one of which he took up in his hand, brought it into a warm room, where it lay about an hour, when it began to stir, and half an hour after it flew about in the room.' Mr. Kalm mentions similar affidavits made by four farmers; and at last adds, '7thly, I can reckon myself,' says our author, 'among the eye-witnesses of this paradox of natural history. In 1735, being a boy, I saw several swallows brought in winter by the fishermen from the Vistula to my father's house; where two of them were brought into a warm room, revived and flew about. I saw them several times settling on the warm stove, and I recollect well that the same forenoon they died, and I had them, when dead, in my hand. In January 1754, being covered with ice, I ordered the fishermen to fish therein, and in my presence several swallows were taken, which the fishermen threw in again; but one I took up myself, brought it home, five miles from thence, and it revived, but died about an hour after.' These are facts attested by people of the highest quality. It is therefore incontestably true, that swallows retire in the northern countries, during winter, into the water, and stay there in a torpid state till the return of warmth revives them again in spring. The swallows in Spain, Italy, France, and perhaps some from England, remove to warmer climates; some English ones, and some in Germany and other mild countries, retire into clefts and holes in rocks, and remain there in a torpid state. In the colder northern counties the swallows immerse in the sea, in lakes, and rivers; and remain in a torpid state, under ice, during winter. It is objected, Why do not rapacious fish, and aquatic quadrupeds and birds, devour these swallows? The answer is obvious: swallows choose only such places in the water for their winter retreat as are near reeds and rushes; so that sinking down there between them and their roots they are secured against their enemies. As to the argument taken from their being so long under water without corruption, there is a real difference between animals suffocated in water and animals

being torpid therein. Natural history ought to be studied as a collection of facts. There are five species of swallows which visit Britain during summer; the common swallow, the martin, sand martin, swift, and goat-sucker. 1. The common swallow frequents almost every part of the old continent; being known, says Dr. Latham, from Norway to the Cape of Good Hope on the one side, and from Kamtschatka to India and Japan on the other. It is also found in all parts of North America, and in several West Indian islands. In Europe it disappears during winter. It appears generally a little after the vernal equinox; but rather earlier in the southern, and later in the northern latitudes. It adheres to the usual seasons with much regularity. In the warm spring of 1774 they appeared no earlier than usual. They remain in some warm countries the whole year. Kolben assures us that this is the case at the Cape of Good Hope. Some birds of this species live, during winter, even in Europe; e. g. on the coast of Genoa. 2. The martins are widely diffused through the old continent. 3. The sand martins are found in every part of Europe, and often spend the winter in Malta. 4. The swift visits the whole continent of Europe; has also been observed at the Cape of Good Hope, and in Carolina in North America. 5. The goat suckers are not very common, yet are found in every country between Sweden and Africa: also in India. Mr. Markwick of Catsfield, near Battle in Sussex, has drawn up an accurate table, expressing the day of the month on which the migratory birds appeared in spring, and disappeared in autumn, for sixteen years, from 1766 to 1783 at Catsfield. Were tables of the same kind made in every different country, particularly within the torrid zone, it would be easy to determine the question which we have been considering. To many, perhaps, it may not appear of so much importance as to be worth the labor. But the enquiry must be highly gratifying to every mind that admires the wisdom of the Great Architect of nature. The instinct of the swallow is indeed wonderful: it appears among us just at the time when insects become numerous: and it continues with us during the hot weather, to prevent them from multiplying too much. It disappears when these insects are no longer troublesome. It is never found in solitude; it is the friend of man, and always takes up its residence with us, to protect us from being annoyed with swarms of insects.

Swallow Harbour, a convenient harbour on the shore of Terra del Fuego. There are two channels into it, which are both narrow, but not dangerous, as the rocks are easily discovered by their weeds. It is surrounded by steep mountains, covered with snow, which have a most horrid appearance, and seem to be altogether deserted. Long. 74° 30′ W., lat. 53° 40′ S.

Swallow Island, one of the Queen Charlotte's Islands, of the South Pacific, about six leagues in length. Long. 165° 58′ E., lat. 10° 8′ S.

SWAL'LOWTAIL, *n. s.* Swallow and tail. A species of willow.

The shining willow they call *swallowtail*, because of the pleasure of the leaf.

Bacon's Natural History.

SWAMMERDAM (John), a celebrated natural philosopher, was the son of John James Swammerdam, an apothecary and famous naturalist of Amsterdam, and born in 1637. His father intended him for the church, and with this view had him instructed in Latin and Greek; but he preferred physic. Being kept at home till he should engage in that study, he was often employed in cleaning his father's curiosities, and putting every thing in order. This inspired him with an early taste for natural history; so that he soon began to make a collection of his own. When grown up, he attended to his anatomical and medical studies; but spent part of the day and the night in discovering, catching, and examining the flying insects of Holland, Guelderland, and Utrecht. Thus initiated in natural history, he went to the university of Leyden in 1651; and in 1663 was admitted a candidate of physic. While studying anatomy he considered how the parts of the body, prepared by dissection, could be preserved for anatomical demonstration; and he succeeded, as he had done before in his nice contrivances for dissecting the minutest insects. He then went to France, where he spent some time at Saumer, and became acquainted with several learned men. In 1667 he returned to Leyden, and took his degree of M. D. In 1668 the grand duke of Tuscany, being in Holland, came to view the museum of our author and his father; and Swammerdam made some anatomical dissections of insects in his presence. He was struck with admiration at his great skill in managing them; and proving that the future butterfly lay with all its parts neatly folded up in a caterpillar, by removing the integuments, and exhibiting all its parts, however minute, with incredible ingenuity by instruments of inconceivable fineness. The duke offered him 12,000 florins for his collection, on condition of his removing them into Tuscany, and residing at the court of Florence; but Swammerdam declined. In 1663 he published a General History of Insects. About this time his father, offended at his neglecting the practice of physic, would neither supply him with money nor clothes. This reduced him to some difficulties. In 1675 he published his History of the Ephemeras; and his father dying, in 1676, left him a fortune; but he died in 1682, aged only forty-five. Gabius translated all his works from the Dutch into Latin, from which they were translated into English, in folio, in 1748. See Entomology. Boerhaave wrote his life.

SWAMP, *n. s.* } Swam'py, *adj.* } Sax. ȝpamp; Goth. and Swed. *swamp;* Isl. *suamm;* Dan. *suomp.* A marsh; bog; fen: boggy; fenny.

Swampy fens breathe destructive myriads.

Thomson.

SWAN, *n. s.* Sax. ȝpan; Dan. *suan;* Swed. *swan;* Belg. *swaen.* A large water-fowl. See the extract from Calmet.

With untainted eye
Compare her face with some that I shall show,
And I will make thee think thy *swan* a crow.

Shakspeare.

Let musick sound while he doth make his choice;
Then, if he lose, he makes a *swan*-like end. *Id.*

The fearful matrons raise a screaming cry,
Old feeble men with fainter groans reply;
A jarring sound results, and mingles in the sky,
Like that of *swans* remurmuring to the floods.
Dryden.

SWAN. See ANAS. It is now ascertained, beyond the possibility of doubt, that there are black swans, of equal size and the same habitudes with the common white swans of this island. These fowls have been seen chiefly in New Holland; and captain Vancouver, when there, saw several of them in very stately attitudes, swimming on the water, and, when flying, discovering the under part of their wings and breast to be white. Black swans were likewise seen in New Holland by governor Philips, captain White, and by a Dutch navigator, so long ago as in 1697. Governor Phillips describes the black swan as a very noble bird, larger than the common swan, and equally beautiful in form. Mr. White, indeed, says that its size is not quite equal to that of the European swan; but both agree with captain Vancouver, in mentioning some white feathers in its wings.

SWAN, SWEYN, SUENO, or SWENO, I., II., and III., three kings of Denmark. See DENMARK and SWENO.

SWAN RIVER; a British colony, on the western coast of New Holland, established in 1829. It is situated on Swan river, so called from the great number of black swans seen upon it, which empties into the ocean in lat. 32° 16′ S., lon. 115° 40′ E. Several settlements have been formed, and the soil is represented as fertile. Swan river was explored for nearly sixty miles from its mouth, by M. Bailly, mineralogist to the expedition of Baudin, who found it to flow over calcareous rocks, through a country covered with thick forests of gum trees. At the point where his examination ceased, the river was a third of a mile in width, with a slow current. A group of islands opposite the mouth of the river offer some roadsteads, with safe anchorage for large vessels. Chief town, Perth.

SWAN RIVER, a river of North America, which takes its rise in lake Etowwemahmeh, whence it passes through Swan Lake into the Little Winnipic. This latter is connected, by a considerable river, with the lake of Manitoba, which, by the river Dauphin, finally discharges its waters into lake Winnipic, the common reservoir for the waters of a great number of the adjacent rivers and lakes. All the country in the neighbourhood of this, and of Red Deer River, to the south branch of the Saskatchiwine, abounds in beaver, moose deer, fallow deer, elks, bears, buffaloes, &c. The soil is good, and, wherever attempts have been made to raise the esculent plants, it has been found productive. On this river a fort is erected for the convenience of the fur trade.

SWAN RIVER, a river of North America, which falls into the Mississippi about forty miles from its source.

SWANPAN, or Chinese Abacus, an instrument for performing arithmetical operations, described by Du Halde, in his history of China. It is composed of a small board, crossed with ten or twelve parallel rods or wires, each strung with ivory balls, which are so divided, by a partition in the middle, that two are on one side of it, and five on the other. The two on the upper part stand each for five units, and each of the five in the lower part for one. 'In joining and separating these balls, they reckon much as we do with counters; but, according to our author, more expeditiously than Europeans do even with figures.' This is hardly credible; but, if all the Chinese weights and measures be decimally divided, it is easy to conceive how computation may be made, by this instrument, very expeditiously.

SWANSEA, or SWANSEY, is a borough town within the liberty of Gower, Glamorganshire, South Wales, governed by a portreeve, recorder, twelve aldermen, two common attornies or chamberlains, two serjeants at mace, and an unlimited number of burgesses, and, together with four other contributory boroughs, viz., Kenfig, Aberavon, Neath, and Loughor, by the provisions of the Reform Bill, returns a member to parliament. The town lies at the confluence of the river Tawe with the Bristol Channel, whence the Welsh name Abertawe. It stands near the centre of a beautiful bay, denominated after the town, and has a capacious harbour, enclosed from the sea by two piers on the eastern and western side of the entrance. In the neighbourhood are very numerous and extensive collieries of bituminous coal, which is consumed at the copper works and other manufactories, and shipped off in large quantities to Ireland, Cornwall, and Devon. A canal extends from the town for nearly eighteen miles up the vale of Tawe to Hen-noyadd in Breconshire, for the conveyance of stone coal, culm, iron ore, &c., which is in a very flourishing state, and has been productive of great benefit to the town. There are two extensive potteries within the borough, and eight large copper smelting works, all within three miles distance, from which about 8000 tons of copper are annually exported to London, Liverpool, &c. In 1768, 694 vessels sailed from this port, tonnage 30,621; in 1792 the number of vessels was 2,590, tonnage 134,264; and in 1819 the number of ships sailing out of the port was 2750, tonnage 175,629, exclusive of 140,280 crates of earthenware shipped foreign, and 3521 crates coast-wise. It has two markets, abundantly supplied, on Wednesday and Saturday, and is famed for ship-building. The castle, which was formerly very extensive, was erected by Henry Beaumont, earl of Warwick, in the reign of Henry I.; it is now part of the possession of the duke of Beaufort. The town also contains two churches, and twelve meeting-houses, belonging to Dissenters of various denominations. During the summer season the town is much frequented for sea-bathing. It is forty-two miles W. N. W. of Cardiff, and 206 west of London.

SWARD, *n. s.* Swed. *sward*. The skin of bacon; the surface of the ground.

Water, kept too long, loosens and softens the *sward*, makes it subject to rushes and course grass.
Note on Tusser.

To plant a vineyard in July, when the earth is very dry and combustible, plow up the *swarth* and burn it. *Mortimer.*

The noon of night was past, and then the foe
Came dreadless o'er the level *swart*, that lies
Between the wood and the swift streaming Ouse.
A. Philips.

SWARM, *n. s.* & *v. n.* Sax. ȝpeaȝm; Belg. *swerm*; Swed. *swærm*. A great body or number of small animals, particularly those bees that migrate from the hive: to gather or rise in a body; be crowded or thronged.

These garrisons you have now planted throughout all Ireland, and every place *swarms* with soldiers. *Spenser.*

From this *swarm* of fair advantages,
You griped the general sway into your hand.
Shakspeare.

The merciless Macdonel,
The multiplying villanies of nature
Do *swarm* upon. *Id. Macbeth.*

Her lower region *swarms* with all sort of fowl, her rivers with fish, and her seas with whole shoals. *Howel.*

What a multitude of thoughts at once
Awakened in me *swarm*, while I consider
What from within I feel myself, and hear
What from without comes often to my ears!
Milton.

Not so thick *swarmed* once the soil
Bedropped with blood of Gorgon.
Id. Paradise Lost.

Those days *swarmed* with fables, and from such grounds took hints for fictions, poisoning the world ever after. *Browne.*

A *swarm* of bees that cut the liquid sky,
Upon the topmost branch in clouds alight.
Dryden's Æneid.

Then mounts the throne, high placed before the shrine;
In crowds around the *swarming* people join. *Id.*

Swarmed on a rotten stick the bees I spied. *Gay.*

When bees hang in *swarming* time, they will presently rise, if the weather hold. *Mortimer's Husbandry.*

If we could number up those prodigious *swarms* that had settled themselves in every part of it, they would amount to more than can be found. *Addison on Italy.*

This *swarm* of themes that settles on my pen,
Which I, like summer-flies, shake off again,
Let others sing *Young.*

Life *swarms* with ills, the boldest are afraid,
Where then is safety for a tender maid? *Id.*

SWART, *adj.* & *v. a.* } Sax. ȝpeaȝt; Goth.
SWARTH, *adj.* or } *swarts*. Black; darkly
SWARTHY. } brown; tawny; dark of complexion: to blacken.

A nation strange, with visage *swart*,
And courage fierce, that all men did affray,
Through the world then swarmed in every part. *Spenser.*

A man
Of *swarth* complexion, and of crabbed hue,
That him full of melancholy did shew. *Id.*

Whereas I was black and *swart* before;
With those clear rays which she infused on me,
That beauty am I blest with, which you see.
Shakspeare. Henry VI.

Though in the torrid climates the common color is black or *swarthy*, yet the natural colour of the temperate climates is more transparent and beautiful. *Hale's Origin of Mankind.*

No goblin, or *swart* fairy of the mine,
Hath hurtful power o'er true virginity. *Milton.*

The heat of the sun may *swart* a living part, or even black a dead or dissolving flesh. *Browne's Vulgar Errours*

Set me where, on some pathless plain,
The *swarthy* Africans complain. *Roscommon*

Did they know Cato, our remotest kings
Would pour embattled multitudes about him;
Their *swarthy* hosts would darken all our plains,
Doubling the native horrour of the war,
And making death more grim. *Addison.*

SWASH, *v. n.* } To make a great clatter or
SWASH'ER, *n. s.* } noise: whence swashbuckler: a swasher is, a swaggerer; a bully. Not in use.

We'll have a *swashing* and a martial outside,
As many other mannish cowards have,
That do outface it with their semblances. *Shakspeare.*

Draw, if you be men: Gregory, remember thy *swashing* blow. *Id. Romeo and Juliet.*

I have observed these three *swashers*; three such anticks do not amount to a man. *Id. Henry V.*

SWATCH, *n. s.* Corrupted from swath. A swathe. Not in use.

One spreadeth those bands so in order to lie,
As barlie in *swatches* may fill it thereby. *Tusser.*

SWATH, or SWATHE, *n. s.* & *v. a.* Belgic *swade*. A line of grass cut down by the mower; a band or fillet; to bind.

With tossing and raking, and setting on cox,
Grasse, lately in *swathes*, is meat for an ox. *Tusser.*

The strawy Greeks, ripe for his edge,
Fall down before him, like the mower's *swath*. *Shakspeare.*

He had two sons; the eldest of them at three years old,
I' th' *swathing* cloaths the other, from their nursery
Were stolen. *Id. Cymbeline.*

Their children are never *swathed*, or bound about with any thing, when they are first born; but are put naked into the bed with their parents to lie. *Abbot's Description of the World.*

Swathed in her lap the bold nurse bore him out,
With olive branches covered round about. *Dryden.*

As soon as your grass is mown, if it lie thick in the *swath*, neither air nor sun can pass freely through it. *Mortimer.*

An Indian comb, a stick whereof is cut into three sharp and round teeth four inches long: the other part is left for the handle, adorned with fine straws laid along the sides, and lapped round about it in several distinct *swaths*. *Grew.*

Long pieces of linen they folded about me, till they had wrapped me in above an hundred yards of *swathe*. *Guardian.*

Master's feet are *swathed* no longer,
If in the night too oft he kicks,
Or shews his loco-motive tricks. *Prior.*

SWAY, *v. a.*, *v. n.*, & *n. s.* Teut. *schweben*; Goth. *sweiga*. To poise; weigh; wield; govern; direct: to hang heavy; be drawn by weight; have weight; bear rule: as a noun substantive, the sweep or swing of a weapon; weight; preponderation; power; rule.

An evil mind in authority doth not only follow the *sway* of the desires already within it, but frames to itself new desires not before thought of. *Sidney.*

Glancing fire out of the iron played,
As sparkles from the anvil rise,
When heavy hammers on the wedge are *swayed*.
Spenser.

The example of sundry churches, for approbation of one thing, doth *sway* much; but yet still as having the force of an example only, and not of a law.
Hooker.

This sort had some fear that the filling up the seats in the consistory with so great number of laymen, was but to please the minds of the people, to the end they might think their own *sway* somewhat.
Id.

Heaven forgive them, that so much have *swayed*
Your majesty's good thoughts away from me.
Shakspeare.

The lady's mad: yet if 'twere so,
She could not *sway* her house, command her followers,
With such a smooth, discreet, and stable bearing.
Id.

The mind I *sway* by, and the heart I bear,
Shall never sagg with doubt, nor shake with fear.
Id.

Aged tyranny *sways* not as it hath power, but as it is suffered. *Id. King Lear.*

Only retain
The name and all the' addition to a king;
The *sway*, revenue, execution of the host,
Beloved sons, be yours. *Id.*

In these personal respects, the balance *sways* on our part. *Bacon.*

On Europe thence, and where Rome was to *sway*
The world. *Milton's Paradise Lost.*

A gentle nymph, not far from hence,
That with moist curb *sways* the smooth Severn stream,
Sabrina is her name. *Milton.*

Here thou shalt monarch reign;
There didst not: there let him still victor *sway*.
Id.

To strike with huge two-handed *sway*. *Id.*

The only way t' improve our own,
By dealing faithfully with none;
As bowls run true by being made
On purpose false, and to be *swayed*. *Hudibras.*

Thy judgment is *swayed* by passion, and stored with ludicrous opinions, instead of clearly conceived truths. *Glanville.*

When examining these matters, let not temporal and little advantages *sway* you against a more durable interest. *Tillotson.*

With these I went,
Nor idle stood with unassisting hands,
When savage beasts, and men's more savage bands,
Their virtuous toils subduing; yet those I *swayed*
With powerful speech: I spoke, and they obeyed.
Dryden.

Too truly Tamerlane's successors they;
Each thinks a world too little for his *sway*.
Id. Aurengzebe.

They rush along, the rattling woods give way,
The branches bend before their sweepy *sway*.
Dryden.

They will do their best to persuade the world that no man acts upon principle, that all is *swayed* by particular malice. *Davenant.*

When vice prevails, and impious men bear *sway*,
The post of honour is a private station.
Addison's Cato.

SWEAR, *v.n.* & *v.a.* } *Pret.* swore or
SWEAR'ER, *n.s.* } sware; *part. pass.* sworn. Sax. ȝpeȝian; Gothic *swaran*; Belgic *sweeren*. To obtest some superior power; utter an oath: declare or engage, or give evidence on oath; to put to oath; declare upon oath: the noun substantive corresponding.

Jacob said, *Swear* to me; and he *swear* unto him.
Genesis.

Moses took the bones of Joseph; for he had strailty *sworn* the children of Israel. *Exod.* xiii. 19.

If a man vow a vow unto the Lord, or *swear* an oath to bind his soul with a bond, he shall not break his word. *Numbers.*

Because of *swearing* the land mourneth.
Jer. xxiii. 10.

We shall have old *swearing*
That they did give the rings away to men:
But we'll outface them, and outswear them too.
Shakspeare.

I would have kept my word;
But, when I *swear*, it is irrevocable.
Id. Henry VI.

At what ease
Might corrupt minds procure knaves as corrupt
To *swear* against you! *Id. Henry VIII.*

Obey thy parents, keep thy word justly;
Swear not. *Id. King Lear.*

Swom ashore, man, like a duck; I can swim like a duck, I'll be *sworn*. *Id. Tempest.*

Now, by Apollo, king, thou *swear'st* thy gods in vain.
—O vassal! miscreant! *Shakspeare.*

And must they all be hanged that *swear* and lie?
—Every one.
—Who must hang them?
—Why, the honest men.
—Then the liars and *swearers* are fools; for there are liars and *swearers* enow to beat the honest men, and hang them up. *Id.*

Bacchus taken at Rhodes by Demetrius Poliorcetes, which he so esteemed, that, as Plutarch reports, he *sware* he had rather lose all his father's images than that table. *Peacham.*

Take not his name, who made thy mouth, in vain
It gets thee nothing, and hath no excuse:
Lust and wine plead a pleasure, avarice a gain;
But the cheap *swearer*, through his open sluice
Lets his soul run for naught. *Herbert.*

Of all men a philosopher should be no *swearer*; for an oath, which is the end of controversies in law, cannot determine any here, where reason only must induce. *Browne.*

None so nearly disposed to scoffing at religion as those who have accustomed themselves to *swear* on trifling occasions. *Tillotson.*

Let me *swear* you all to secrecy;
And, to conceal my shame, conceal my life.
Dryden.

Thee, thee an hundred languages shall claim,
And savage Indians *swear* by Anna's name. *Tickell.*

It is the opinion of our most refined *swearers* that the same oath or curse cannot, consistently with true politeness, be repeated above nine times in the same company by the same person.
Swift's Polite Conversation.

Hark! the shrill notes transpierce the yielding air,
And teach the neighbouring echoes how to *swear*.
Young.

SWEAT, *n.s.*, *v.n.*, & *v.a.* Sax. ȝpeat; Belg. *sweet*. The matter evacuated at the pores: of the skin; hence labor; toil; drudgery: to exude, or be moist with such matter; to toil; drudge; emit as sweat: the adjective corresponding.

This painful labour of abridging was not easy, but a matter of *sweat* and watching. 2 *Mac.* ii. 26.

Let them be free, marry them to your heirs,
Why *sweat* they under burthens?
Shakspeare. Merchant of Venice.

Mistress Page at the door, *sweating* and blowing, and looking wildly, would needs speak with you.
Shakspeare.

Grease that 's *sweaten*
From the murtherer's gibbet, throw
Into the flame. *Id. Macbeth.*

The rabblement hooted and clapped their chopped hands, and threw up their *sweaty* night caps.
Shakspeare. Julius Cæsar.

Sweat is salt in taste; for that part of the nourishment which is fresh and sweet turneth into blood and flesh; and the *sweat* is that part which is excerned. *Bacon.*

About this time in autumn there reigned in the city, and other parts of the kingdom, a disease then new; which, of the accidents and manner thereof they called the *sweating* sickness.
Id. Henry VII.

Wainscots will *sweat* so that they run with water.
Bacon.

A young tall squire
Did from the camp at first before him go;
At first he did, but scarce could follow strait,
Sweating beneath a shield's unruly weight. *Cowley.*

What from Jonson's oil and *sweat* did flow,
Or what more easy nature did bestow
On Shakspeare's gentler muse, in thee full grown
Their graces both appear. *Denham.*

The field
To labour calls us, now with *sweat* imposed.
Milton.

How the drudging goblin *swet*
To earn his cream bowl duly set;
When in one night, ere glimpse of morn,
His shadowy flail hath threshed the corn. *Id.*

A *sweaty* reaper from his tillage brought
First-fruits, the green ear, and the yellow sheaf. *Id.*

Our author, not content to see
That others write as carelessly as he;
Though he pretends not to make things complete,
Yet, to please you, he'd have the poet's *sweat.*
Waller.

Some insensible effluvium, exhaling out of the stone, comes to be checked and condensed by the air on the superficies of it, as it happens to *sweat* on the skins of animals. *Boyle.*

When Lucilius brandishes his pen,
And flashes in the face of guilty men,
A cold *sweat* stands in drops on ev'ry part,
And rage succeeds to tears, revenge to smart.
Dryden.

For him the rich Arabia *sweats* her gum. *Id.*

Beans give in the mow; and therefore those that are to be kept are not to be threshed till March, that they have had a thorough *sweat* in the mow.
Mortimer's Husbandry.

In cold evenings there will be a moisture or *sweating* upon the stool. *Mortimer.*

Those who labour
The *sweaty* forge, who edge the crooked scythe,
Bend stubborn steel, and harden gleening armour,
Acknowledge Vulcan's aid. *Prior.*

Sweat is produced by changing the balance between the fluids and solids, in which health consists, so as that projectile motion of the fluids overcome the resistance of the solids. *Arbuthnot.*

And then, so nice, and so genteel,
Such cleanliness from head to heel,
No humours gross, or frowsy steams,
No noisome whiffs, or *sweaty* streams. *Swift.*

SWEAT. See ANATOMY and PERSPIRATION. The excess of sweat dries and weakens the body, deprives the humors of their watery parts, and induces the blood to an inflammatory and atrabiliary disposition. A sudden suppression of it will hurt as well as a suppression of perspiration. In cases of excessive sweating, from hard labor, many people ruin their health for life, and sometimes even bring on sudden death, by too suddenly exposing themselves to cold air, taking cold drinks, &c. In all cases of excessive perspiration, the most speedy and effectual antidote against all dangerous consequences is a glass of spirits, and keeping moderately warm till the perspiration wear gradually off. All persons exposed by their daily labor to excessive sweating should wear flannel next their skin.

When the temperature of the body is much increased, either by being exposed to a hot atmosphere or by violent exercise, the perspired vapor not only increases in quantity, but even appears in a liquid form. This is known by the name of sweat.

Beside water, it cannot be doubted that carbon is also emitted from the skin; but in what state, the experiments hitherto made do not enable us to decide. Mr. Cruickshanks found that the air of the glass vessel in which his hand and foot had been confined for an hour contained carbonic acid gas; for a candle burned dimly in it, and it rendered lime-water turbid. And Mr. Jurine found that air which had remained for some time in contact with the skin, consisted almost entirely of carbonic acid gas. The same conclusion may be drawn from the experiments of Ingenhousz and Milly. Trousset has lately observed that air was separated copiously from a patient of his while bathing. Beside water and carbon, or carbonic acid gas, the skin emits also a particular odorous substance. That every animal has a peculiar smell is well known: the dog can discover his master, and even trace him to a distance by the scent. A dog, chained up several hours after his master had set out on a journey of some hundred miles, followed his footsteps by the smell. But it is needless to multiply instances of this fact; they are too well known to every one. Now this smell must be owing to some peculiar matter, which is constantly emitted; and this matter must differ somewhat, either in quantity or some other property, as we see that the dog easily distinguishes the individual by means of it. Mr. Cruickshanks has made it probable that this matter is an oily substance; or at least that there is an oily substance emitted by the skin. He wore repeatedly, night and day for a month, the same under waistcoat of fleecy hosiery, during the hottest part of the summer. At the end of this time he always found an oily substance accumulated in considerable masses on the nap of the inner surface of the waistcoat, in the form of black tears. When rubbed on paper it rendered it transparent, and hardened on it like grease. It burned with a white flame, and left behind it a charry residuum.

Berthollet has observed the perspiration acid; and he has concluded that the acid which is present is the phosphoric; but this has not been proved. Fourcroy and Vauquelin have ascertained that the scurf which collects upon the skins of horses consists chiefly of phosphate of lime, and urea is even sometimes mixed with it

According to Thenard, however, who has lately endeavoured more particularly to ascertain this point, the acid contained in sweat is the acetous; which, he likewise observes, is the only free acid contained in urine and in milk, this acid existing in both of them when quite fresh. His account of his examination of it is as follows:—The sweat is more or less copious in different individuals; and its quantity is perceptibly in the inverse ratio of that of the urine. All other circumstances being similar, much more is produced during digestion than during repose. The maximum of its production appears to be twenty-six grains and two-thirds in a minute; the minimum nine grains troy weight. It is much inferior, however, to the pulmonary transpiration; and there is likewise a great difference between their nature and manner of formation. The one is a product of a particular secretion, similar in some sort to that of the urine; the other, composed of a great deal of water and carbonic acid, is the product of a combustion gradually effected by the atmospheric air.

The sweat, in a healthy state, very sensibly reddens litmus paper or infusion. In certain diseases, and particularly in putrid fevers, it is alkaline; yet its taste is always rather saline, and more similar to that of salt than acid. Though colorless it stains linen. Its smell is peculiar and insupportable when it is concentrated, which is the case in particular during distillation. But before he speaks of the trials to which he subjected it, and of which he had occasion for a great quantity, he describes the method he adopted for procuring it, which was similar to that of Mr. Cruickshanks. Human sweat, according to M. Thenard, is formed of a great deal of water; free acetous acid; muriate of soda; an atom of phosphate of lime, and oxide of iron; and an inappreciable quantity of animal matter, which approaches much nearer to gelatin than to any other substance.

Sweating. See Sweat.

Sweating Sickness, a disorder which appeared in England about 1481, and was by foreigners called the English sweat. It returned again in 1485; then in 1506; afterwards in 1517. It appeared again in 1528 or 1529, at which time alone it spread itself to the Netherlands and Germany; a circumstance which shows the impropriety of calling it the English sweat, in Latin sudor Anglicanus: besides Sennertus takes notice that it spread as far as Denmark, Norway, and France. It raged again in 1548. And the last return of it in London was in 1551, when it was so violent as in one day to take off 120 of the inhabitants of Westminster. Some were seized abroad, and cut off in the road, others at home; some when awake, others when fast asleep. Some died in a moment, and others in one, two, three, four, or more hours after they began to sweat.

SWEDEN.

SWEDEN, a considerable kingdom of Northern Europe, extends, including Swedish Lapland, from lat. 55° 20′ to 69° N., or about 1000 miles in extreme length; while its breadth varies from between 200 to 300 miles. It contains altogether an area of about 172,000 square miles, of which Swedish Lapland constitutes one-third. Its long. is from about 11° 20′ to 23° 20′ E. This country lost in 1809 the valuable province of Finland; for which it was professedly compensated, in 1814, by the accession of Norway in exchange for the small province of Swedish Pomerania. The native geographers divide the kingdom into the North, Middle, and Southern Provinces. These are again sub-divided into districts, denominated læns or stadtholderships; but, among the greater part of the inhabitants, the ancient distinction of provinces is still preserved.

The geographical enumeration of the læns is thus given:—

Læns.	Extent in Sq. Miles.	Population.	Capitals.
Middle Sweden.			
Stockholm city, Drottingsholm, Stockholm district .	2,624	172,029	Stockholm
Upsal . .	2,261	84,128	Upsal
Westeras .	2,793	84,808	Westeras
Middle Sweden.			
Nykoping .	2,880	98,761	Nykoping
Orebro . .	3,670	100,428	Orebro
Carlstadt .	6,550	140,100	Carlstadt
South Sweden.			
Gottenburg	1,835	119,514	Gottenburg
Elfsborg .	3,008	156,271	Menersborg
Staraborg .	3,207	138,410	Mariestad
Linkoping .	4,305	162,859	Linkoping
Calmar . .	4,181	136,296	Calmar
Joenkoping	4,267	117,381	Joenkoping
Cronoberg .	3,495	89,631	Merloe
Carlskrona .	1,088	63,824	Carlskron
Gothland .	1,045	32,988	Wisby
Halmstad .	1,963	73,594	Halmstad
Christianstad	2,174	120,547	Christianstad
Malmoe .	1,750	149,892	Malmoe
North Sweden.			
Falun or Storakopparberg . .	12,587	124,816	Falun
Gefleborg .	7,765	79,000	Gefleborg
Jaemtland .	18,261	32,000	Oestersund
Norrland .	10,496	62,000	Hernoesand
Maester, and Nordbottens . .	54,597	76,000	[illegible]

The chief places, or those containing more than 3000 inhabitants, are as follows:—Stockholm 65,474; Gottenburg 17,760; Carlscrona 10,553; Norrkopping 9428; Gefleborg 5930; Malmoe 4932; Upsal 4897; Falun 4709; Uddewalla 3971; Wisby 3819; Landskrona 3776; Carlsham 3387; Orebro 3242; Lund 3224; Christianstad 3106; Calmar 3058. Of the towns eighty-eight are denominated cities, and four market towns. They are mostly small, except the few above enumerated. The inhabitants of these cities and towns, according to the tables of 1815, were 248,029, or one-tenth of the whole population; the other nine-tenths were living in 2214 parishes, containing 65,284 farms.

A curious table, exhibiting a complete view of the population and professions of Sweden, before the separation of Finland, was drawn up by Mr. Nicander, and published in the Transactions of the Swedish Academy of Sciences for 1809, of which the following is an abstract:—

	Number.	
	Males.	Females.
Clergy and teachers of various kinds	13,884	
Exercising civil offices and professions	11,097	
In the war department	57,788	
Various kinds of merchants	6,291	
Seamen, including pilots and light-house keepers	11,313	
Peasants	799,322	
Officers of gentlemen	35,226	
Artists and handicraftsmen	15,705	
Persons free from service and proprietors of lands, &c.	34,309	
Employed in trades and manufactures	30,765	
Artists and tradesmen in towns	26,184	
Children	531,678	
Beggars and prisoners (females 53,993)	24,394	
Laplanders (females 2,968)	2,476	
Married women, widows, and female children		1,279,024
Unmarried women		442,136
Total	1,599,487	1,721,160
Grand total	3,320,647	

The lakes of Sweden are said to occupy an area of 9200 square miles, or one-eighteenth of the whole surface of the country. Wenner, the largest of all, situated in the south-west of the kingdom, communicates with Gottenburg by the canal of Trolhætta, and is likely ere long to communicate with Stockholm by the extension of that canal to the Malar Lake. Other great lakes are the Wetter and the Hjelmar, both to the southward of the capital, and at some distance from it. Of the rivers the Ljusna, the Dal, and the Clara, rise in the mountains bordering on Norway, and flow, the first two into the gulf of Bothnia, the last into the lake of Wenner. From that lake issues the Gotha, which flows southward in a full stream, but not a long course, until reaching the Cattegat; while the waters of the Wetter Lake are conveyed to the Baltic by the Mottala. The other rivers of Sweden are of secondary size; but on approaching Lapland we meet with streams of some magnitude, flowing into the gulf of Bothnia, viz. the Angerman, the Umea, the Skeleftea, the Pitea, the Lulea, the Torneo. In winter, these flowing from frost-bound mountains, are comparatively inconsiderable; but in summer the melting of the snow often swells them prodigiously, and they overflow large tracts of country.

Not more than a twentieth part of Sweden is capable of cultivation, and of that only about one-half is cultivated. The soil, according to Akrel, yields not more than five times the seed that is sown in good years: in ten years the same writer states that one of them fails, two are scanty, five are moderate, and two are abundant. The deficiency of corn for the support of the inhabitants compels them to mix the rind of the pinus silvestris, and the roots of some bog-plants, with their flour; but the late extensive cultivation of potatoes has been found to afford most valuable aid to the subsistence of the lower classes. Hemp, flax, and tobacco, are grown for domestic use; and hops are cultivated and exported. Altogether the vegetable productions of Sweden are very similar to those of Great Britain, with the exception of several, such as broom, furze, and the walnut-tree, which have not strength to withstand a Swedish winter: but throughout all the temperate part of Sweden the oak, elm, and alder, thrive as in England, while some trees, such as the spruce and Scotch fir, succeed better. Apple, pear, and cherry trees grow but languidly; while berries of many different kinds are produced spontaneously and luxuriantly. Corn and wheat succeed best of course in the southern provinces; oats are raised more generally and in larger quanties; rye and barley are the grain most frequently met with. With respect to the appearance of the oak, Von Buch remarks, 'The course of the boundary of oaks in the northern regions is singular. It distinctly demonstrates the manner in which the climate deteriorates with the distance from the great ocean. In Norway the oaks grow vigorously in the interior of the sea-bays, at Christiansund, and at Molde almost as high as 63°, and even at Drontheim they are not altogether extinct. Harness, on the other hand, does not lie higher than 60° 40′. On the other side of the Bothnian Gulf oaks scarcely go beyond Abo; in the Fin-


SWEDEN & NORWAY.
English Miles.
LOFODEN ISLES
North Cape
Christiania
Bergen
Trondhjem
Ostersund
Umea
Stora
Tornea
Carlsgammen
Varanger Fiord
Kandalaksha G.
Kitka
Kajana
Trask
Kola
Kiruna
Gellivare
Pello
Kemi
Uleaborg
Tornea R.
Luta Joki
Ivalojoki
Kuopio
Tavastehus
Helsingfors
Abo
Wiborg
Nystad
Reval
Hwal Isle
Hammerfest
Tromsoe
Lappajarvi
Tiefisjarva
Muonioniska
Sodermanland
Upland
Gothland
Ostergotland
Westergotland
Wermland
Dalecarlia
Jemtland
Lapland
Finland
Norway
Sweden

Drawn by J. Assheton

Engraved on Steel by J. Shury.

nish bays they only cover the coasts to Helsingfors, and on the south side they cannot penetrate beyond Norva in Ingria, so that they do not even reach 60°. Georgi relates that the czar Peter I. ordered oaks to be planted at Petersburgh. They grew indeed to the thickness of a man, but irregularly, and with a decayed appearance quite unsuitable to their age and nature. On the road to Moscow they first appear on the banks of the river Masta; and, although the country does not rise in any considerable degree, their boundaries in an eastern direction towards Siberia are to be found in the neighbourhood of Ossa, between Cassan and Catherinenburg, in lat. 57° 30′.

The breeding of cattle is productive, though the races are generally small. In the north the rein-deer is a valuable domestic animal, and some proprietors have herds of more than 1000; goats and pigs are also thinly scattered over the whole country. The fisheries yield employment and numerous articles of export; but the herrings are considerably diminished of late years.

The chief production of the soil is timber; and the far greater part of the dwellings are composed wholly of wood; the demand for wood as fuel is also great; and yet the export of planks, masts, pitch, tar, potashes, and charcoal, forms the chief foreign trade.

The mines of Sweden have long been worked, and long stationary as to product. They average about sixty-four ounces of gold; 12,900 ounces of silver; 24,800 quintals of copper; 431 quintals of lead; 100,000 tons of iron; 22,000 quintals of alum; 35,000 tons of coal; and 65,000 quintals of saltpetre. The manufactures are confined to the few articles required for the home supply, cloths, cottons, silks, and linens, and many smaller articles, being furnished from the different parts of the kingdom, to an annual amount of about £280,000 sterling.

The foreign commerce of Sweden, favored for a time by her neutrality, became after 1807 from her participating in hostilities exposed to great losses; since 1814 it has had its full share also of the fluctuations so general throughout Europe. To these unavoidable evils have been added impediments originating in arbitrary restrictions and prohibitions on the imports. The result is that these imports take place illegally, depriving government of the benefit that would arise from a small duty, disseminating the habit of smuggling, and finally obliging the consumer to pay higher. The export of timber, for instance, was very cramped by the law obliging foreign vessels to pay five per cent. more of duty on it than is paid by the Swedish. The mercantile navy of Sweden consists of about 11,000 vessels, aggregating about 180,000 tons, and navigated by nearly 10,000 seamen. Sweden has suffered greatly from paper currency. In 1657 the bank of Stockholm was conducted with regularity; but since the latter part of the eighteenth century, advances to government have produced an over issue, and consequently a great depreciation of its credit. The exclusive privileges granted to the East India Company, and some smaller associations, are also sources of disadvantage.

The chief exports are iron, copper, timber, and tar. Herrings may be said to have ceased to form an article of export, the coast being at present deserted. The imports are corn from Poland and Russia, wine from France and the south of Europe; cotton from America and the West Indies; tea from China; sugar, coffee, and other tropical products, from the West Indies.

The *revenue* is derived from the rent of royal domains, a portion of the great tythes, duties on imports and exports, a tax on spirituous liquors, and one of more questionable policy on mines, forges, and chimneys, along with a poll tax and a few monopolies. The amount is about £1,000,000 sterling, and as it never was greater, the military force of Sweden has at no time been so permanent or so large as might have been imagined from its achievements. The troops which crossed the Baltic, along with Gustavus Adolphus, did not exceed 10,000 men; and, though they subsequently received reinforcements, the chief part of his army were Germans. A progressive increase took place towards the close of the eleventh century; but, even in the exploits of Charles XII., a large proportion of his followers were foreigners, supported by foreign resources. In the reign of Gustavus III. the Swedish army was larger; and in 1808, the aid of a British subsidy, £1,200,000 a year, carried it to 50,000 regulars, and a reserve of 30,000. At present it is on a peace establishment, but on a scale abundantly large for the means of the country. There is a national force, or militia, for the levy and support of which, the whole country is divided into petty districts, called hemmans, each of which is bound to furnish a soldier, and a spot of land for his maintenance. This land the soldier in time of peace cultivates, being pledged to attend at exercise only a specified number of days in each year: when permanently absent, the inhabitants of the district are bound to cultivate it for him. The officers are supported in the same manner; the colonel by a property placed in the centre of his regiment; the captain by a less extensive lot in the centre of his company, and so on down to the corporal. When in the field, these troops receive the same pay as the rest of the army, but at other times the government supplies only their clothing.

The Swedes were early ranked among the vigorous supporters of the Reformation, having adopted it with great unanimity in the reign of Gustavus Vasa, and having subsequently made the most signal exertions for its maintenance in Germany. The established creed is Lutheranism; and though particular sects, such as the Swedenborgians, have arisen, the dissenters are, on the whole, not numerous. To the Catholics there prevails a general antipathy, nor would it have been prudent, before the latter part of the eighteenth century, for a Catholic priest to have shown himself openly. The ecclesiastical establishment consists of one archbishop, eleven bishops, seventy archdeacons, and 3230 other clergymen.

The university of Upsal, founded in 1477, has in general maintained a high character for physical science. The number of professors is

twenty-two: the students necessarily vary; their greatest number (in 1774) was 1500. During the late war they decreased greatly. The university of Lund, in Schonen in the south, is of more recent date, and on a smaller scale: the number of its students at present is about 600. The gymnesia, or high schools, of which the number in the kingdom is eleven, are also well attended of late, having, along with the minor classical establishments, nearly 2000 pupils. Of elementary schools, the number in Sweden is great: the primary or fundamental part of education being, as in Scotland, generally diffused. Government disburses, for the universities and schools of every description, in the shape of salaries, allowances to the poorer students, purchase of books, &c., about £60,000 annually.

The Swedish language bears a great resemblance to the Danish, and not a little to the English, being evidently sprung from the same source as the Saxon or German; but, being little known out of the country, the Swedish men of letters have frequently adopted Latin as the medium of their publications. The necessity of seeking for information in other languages has made the literati in general familiar with German, French, English, and Italian. In natural history, poetry, and general history, the Swedes have several late writers of great merit.

The scientific and literary societies of Stockholm are numerous. An antiquarian society was founded so far back as 1668; a medical society in 1688; and the royal academy of sciences in 1739. In 1753 an academy was founded by the queen for the investigation of subjects connected with the language, the history, and the poetry of Sweden; and, being a numerous association, it was subsequently divided into two sections. The society of sciences at Upsal dates from 1728. Of printing presses in Sweden, the number is only between forty and fifty, of which one-third are in Stockholm; of annual publications, averaging between 300 and 400, one-fourth, or rather more, are translations. On the whole, Sweden is receiving considerable improvements, such as the new modelling of its civil code, and the establishment at Stockholm of a great central school.

In general the Swedes are of fair complexion, resembling the inhabitants of the north of Germany. In the towns this simplicity is less remarkable; but the population of Sweden is, in a great degree, agricultural, which joined to the effect of the reformed faith, and the general diffusion of education, has produced a great degree of honesty among the lower orders. In other respects they have the virtues and defects of a people little advanced in civilisation; highly hospitable on the one hand, they are not, on the other, exempt from the charge of excess in the indulgence of personal appetites. The population being thinly scattered, and the communication far less frequent than in the most retired counties of Wales, ancient usages are kept up, and very slowly modified. Dalecarlia, in particular, remote from the capital, is said to be a province where hereditary customs are handed down from age to age.

The government of Sweden is a limited monarchy, now hereditary in the male line of Bernadotte: in case of the failure of males in that family, a successor is to be nominated by the king, and approved by the legislature. The appointed civil list is 320,000 rix dollars banco, or about £50,000 sterling for the king; that of the crown prince one-third. The states are composed of 1100 nobles, fifty to eighty clergy, from 100 to 200 burgesses, and 100 peasants, who vote by classes, not by the head. They must assemble every fifth year, and more frequently if convened by the king. They make laws, grant taxes, regulate the coinage and the press, and superintend the administration of justice. The laws are contained in a volume of 480 pages, which is looked up to with much veneration from its antiquity, having been adopted as early as the year 1442. All new cases of differences that occur are referred to the principles of this fundamental code. There are courts of revision and of appeal, however, and lawyers find or make a trade here.

The public expenses may be said to be rigidly watched, and have recently been considerably reduced; at present they stand thus:—

Establishment of the royal households	£210,000
For the senators and the government	180,000
For the judicial and police branches	50,000
For the military branch	370,000
For the marine branch	180,000
For extraordinary expenses, including interest on the public debt	150,000
	£1,140,000

The public income is nearly commensurate with the expenditure. The public debt, 16th of April 1819, amounted to 6,371,862 Reichsthalern banco, or about £1,387,500 sterling; having been reduced £250,000 since the year 1813. It is wholly owing to residents in Sweden; and, on the plan of a sinking fund now in progress, will be extinguished in fourteen years. The chief financial evil under which the kingdom suffers is from the vast quantity of paper money which still circulates, but measures are in train by which this paper is gradually to be withdrawn.

The early *history* of Sweden is no less involved in fables than that of most other nations. Alstedius gives a chronological list of 149 monarchs of Sweden, from Magog, the son of Japhet, and grandson of Noah, who, he says, began to reign in Sweden and Gothland, A. M. 1745, eighty-eight years after the flood, to queen Christina, in 1633. Others affirm that ancient Scandinavia was first governed by judges elected for a certain time by the voice of the people. Among these temporary princes the country was divided, until A. M. 2054, when Eric I. was raised to the supreme power, with the prerogatives of all the temporary magistrates united in his person for life. From this very early period, till 1366 of the Christian era, the histories of Sweden, present us with nothing but what is common to all nations in their early periods, viz. the endless combats and massacres of barbarians, tending to no other purpose than the effusion of blood, and the temporary acquisition of a little ter-

ritory. At this time, however, Albert of Mecklenburg, having concluded a peace between Sweden and Denmark, which had been at violent war for some time before, was proclaimed king of Sweden.

Sweden until the appearance of Gustavus Vasa.—The peace above mentioned was of short duration, being broken in 1368; on which Albert entered into an offensive and defensive league with the earl of Holstein, the Jutland nobility, the dukes of Sleswick, Mecklenburg, and the Hanse Towns, against the kings of Denmark and Norway. Albert proved very successful against Waldemar king of Denmark at that time, driving him entirely out of his dominions; but he himself was defeated by the king of Norway, who laid siege to his capital. Soon after this a new treaty of peace was concluded, by which Albert was allowed to enjoy the crown of Sweden in peace. However, having formed a design of rendering himself absolute, he fell under the displeasure of his subjects, and Margaret of Norway was proclaimed queen of Sweden by the malcontents. A war immediately ensued, in which Albert was defeated and taken prisoner; but as the princes of Mecklenburg, the earls of Holstein, and the Hanse Towns, entered into a league in his favor, the war was so far from being extinguished by this event, that it raged with more fury than ever. At length, in 1394, the contending parties came to an accommodation. Albert was set at liberty, on condition that he should in three years surrender to Margaret all pretensions to the city of Stockholm; and the Hanse Towns engaged to pay 60,000 marks of silver in case of Albert's breach of faith. Not long after this, Eric the son of Albert died; and he, having no other child, did not think it worth his while to contend for the kingdom of Sweden: he therefore acquiesced in the pretensions of Margaret, and passed the remainder of his days at Mecklenburg. Margaret died in 1412 or 1415. See DENMARK.

Margaret was succeeded by Eric XIII. of Pomerania. This prince's reign was cruel and oppressive to the last degree. The people were ruined by taxes; and the Danes, being every where preferred to the offices of power, committed the greatest cruelties. The consequence of this was a revolt; and Charles Canutson, grand mareschal of Sweden and governor of Finland, having joined the malcontents, was declared commander in chief of their army. Eric was now formally deposed, and commenced pirate: Canutson was chosen regent: but beginning to oppress the people, and aspiring openly at the crown, the Swedes and Danes revolted; in consequence of which a revolution took place, and Christopher duke of Bavaria, nephew to Eric, was chosen king of Denmark, Sweden, and Norway, in 1442. On the accession of the new prince, complaints against Canutson were brought from all quarters; but, through the interest of his friends, he escaped punishment; and in 1448, Christopher having died after a tyrannical reign of five years, he was raised to the throne by the name of Charles VIII. However, the kingdoms of Denmark and Norway refused to own allegiance to him; upon which a war immediately commenced. In 1454 peace was concluded, and Denmark for the present freed from the Swedish yoke. Neither did Charles VIII. long enjoy the crown of Sweden. Having quarrelled with the archbishop of Upsal, the latter formed such a strong party that the king could not resist him. Christian I. king of Denmark was called to the throne of Sweden; and, in 1459, once more united the three kingdoms. But, having begun to oppress his subjects in an arbitrary manner, he was soon after obliged to retire to Denmark in 1463. Katil bishop of Linkioping, who had driven out the king, took upon himself the office of regent. Next year Christian returned with a powerful army, but was defeated. The people then recalled Charles; but he, on his accession, having offended bishop Katil, was by him defeated, and obliged to renounce his right to the crown. After this the kingdom was rent into factions, between whom the most cruel civil wars took place, until 1467, when Charles was again recalled, and enjoyed the kingdom, though not without opposition, till his death, in 1470.

The confusion in which the Swedish affairs had been so long involved did not cease on the death of Charles. Christian again invaded Sweden; but was defeated by Steno Sture, nephew of the late king. After this the kingdom remained in peace till 1487, when the Russians invaded Carelia, committing every where the greatest ravages. These were soon driven out: but in 1497, a rupture happening between Sture and the senate, an offer was made of the Swedish crown to John king of Denmark, who readily accepted the offer, and was crowned accordingly: but no sooner was he seated on the throne than he became odious to the Swedes, from his partiality to the Danes. In a short time he set out for Denmark, leaving his queen with a strong garrison in the citadel of Stockholm. He was no sooner gone than the capital was invested; and, though the queen made a noble defence, she was obliged to capitulate, on condition of being allowed to pass into Denmark. All the garrison were made prisoners of war, and the queen was confined in a monastery till 1498. The Swedish affairs continued to be involved in the same dreadful confusion until 1520, when a great revolution was effected by Gustavus Vasa, the son of Eric Vasa, a nobleman of the first rank, who restored the kingdom to its liberty, and laid the foundation of its future grandeur. The occasion of this great revolution was as follows:—In 1518 Christian II. king of Denmark invaded Sweden, with a design to subdue the whole country; but being defeated with great loss by young Steno Sture, then regent, he set sail for Denmark. But, meeting with contrary winds, he made several descents on the Swedish coast, which he ravaged with all the fury of an incensed barbarian. The inhabitants, however, bravely defended themselves, and Christian was reduced to the utmost distress: one-half of his forces having perished with hunger, and the other being in the most imminent danger by the approach of a rigorous winter. He then thought of a stratagem, which almost proved fatal to the regent; for having invited him to a conference, at which he designed

either to assassinate or take him prisoner, Sture was about to comply, had not the senate, who suspected the plot, interposed and prevented him. Christian then offered to go in person to Stockholm to confer with Sture, upon condition that six hostages should be sent in his room. This was accordingly done; but, the wind happening then to prove favorable, he set sail for Denmark with the hostages. Next year he returned; and, having drawn Sture into an ambush, the regent received a wound of which he died soon after. The kingdom being thus left without a head, matters soon came to the most desperate crisis. The army disbanded itself; and the senate, instead of taking proper measures to oppose the enemy, spent their time in idle debates. Christian, in the mean time, advanced into the heart of the kingdom, destroying every thing with fire and sword; but, on his arrival at Stragnez, he granted a suspension of arms, to give the people time to deliberate on their situation, and to reflect that they might easily get rid of their troubles by electing him king. This they accordingly did; and Christian proved one of the most bloody tyrants that ever sat on the throne of any kingdom. Immediately after his coronation, he gave grand entertainments for three days; during which time he projected the diabolical design of extirpating at once all the Swedish nobility, and actually executed above sixty people of the first rank. Innumerable other cruelties were committed. At last he departed for Denmark, ordering gibbets to be erected, and causing the peasants to be hanged on them for the slightest offences, as he passed along; and at Jencoping he caused two boys to be whipped to death.

Sweden under, and to the death of, Gustavus I.—This monstrous cruelty, instead of securing him on the throne, exasperated the whole nation against him. Gustavus Vasa was among the hostages whom Christian had perfidiously carried to Denmark in 1519. Large promises had been made to reconcile him to Christian, and threats had been used for the same purpose, but all in vain. Banner, a Danish nobleman, prevailed on the king to put him into his hands, to try whether he could prevail upon him to change his sentiments. The king, however, told Banner, that he must pay 6000 crowns in case the prisoner should make his escape. Banner generously assented; and, having brought the noble prisoner to his fortress of Calo in Jutland, soon allowed him all the liberty he could desire, and otherwise heaped favors upon him. All this, however, could not extinguish his remembrance of the cruelties of Christian, and the desire he had of being serviceable to his country. He therefore determined to make his escape. With much difficulty, and under various disguises, he effected his escape, which Banner was no sooner acquainted with than he set out after him, and found him at Lubec. He reproached him as ungrateful and treacherous; but he was soon appeased by the arguments urged by Gustavus, and by the promise he made of indemnifying him for the loss of his ransom. Upon this Banner returned, giving out that he could not find his prisoner. Christian, enraged at his escape, ordered Otho his general to do his utmost to arrest him. Gustavus applied to the regency for a ship to convey him to Sweden, but the captain steered a different course, and put him on shore near Calmar; a city hitherto garrisoned by the troops of Christina, widow of the regent. When Gustavus arrived, he made himself known to the governor and the principal officers of the garrison, who were mostly Germans, and his fellow soldiers in the late administrator's army. He flattered himself that his birth, his merit, and his connexions, would immediately procure him the command. But they, seeing him without troops and without attendants, threatened to kill or betray him if he did not instantly quit the city. Thus disappointed, Gustavus departed with great expedition; and, his arrival being known, he was again forced to have recourse to disguise to conceal himself from the Danish emissaries who were in search of him. In a waggon, loaded with hay, he passed through every quarter of the Danish army, and at last repaired to an old family castle in Sudermania. Hence he wrote to his friends, notifying his return to Sweden, and beseeching them to assemble all their forces to break through the enemy's army into Stockholm, at that time besieged; but they, too, refused to embark in so hazardous and desperate an attempt. He next applied to the peasants; but they also refused to engage. At length, after several vain attempts to throw himself into Stockholm, and disappointed in all his hopes, he determined to apply to the Dalecarlians. Attended by a peasant, to whom he was known, he travelled in disguise through Sudermania, Nericia, and Westermania, and, after a laborious and painful journey, arrived in the mountains of Dalecarlia. Scarcely had he finished his journey, when he found himself deserted by his companion and guide, who carried off with him all the money he had provided for his subsistence. Thus forlorn, destitute, half starved, he entered among the miners, and wrought like a slave under ground; here he continued until he was discovered accidentally by a gentleman, his acquaintance, in the neighbourhood, who offered him an asylum in his house. This he joyfully accepted; but, finding it impossible to make him take arms in his behalf, he fled to the house of one Peterson with whom he had formerly served. This last proved a traitor to his friend, and Gustavus would have been delivered to the Danes had he not received timely warning from the wife of his host. By her advice he took refuge with a clergyman, who shut him up in an apartment adjoining to the church, and counselled him to apply at once to the peasants at an approaching annual festival. They listened to him with enthusiasm, and he instantly led them against the governor's castle; which he took by assault, and put the garrison to the sword. This inconsiderable enterprise was attended with the most happy consequences. Great numbers of the peasants flocked to his standard; some of the gentry openly espoused his cause, and others supplied him with money. Christian was soon acquainted with what had passed; but, despising such an inconsiderable enemy, he sent only a slender detachment, under the command of one Soren Norby, to assist his

adherents in Dalecarlia. Gustavus advanced with about 5000 men, and defeated a body of Danes commanded by one Meleen; but he was strenuously opposed by the archbishop of Upsal, who raised numerous forces for king Christian. The fortune of Gustavus, however, still prevailed, and the archbishop was defeated with great loss.

Gustavus then laid siege to Stockholm; but, his force being too inconsiderable for such an undertaking, he was forced to abandon it with loss. This check did not prove in any considerable degree detrimental to the affairs of Gustavus; the peasants from all parts of the kingdom flocked to his camp, and he was joined by a reinforcement from Lubec. Christian, unable to suppress the revolt, wreaked his vengeance on the mother and sisters of Gustavus, whom he put to death with the most excruciating torments. Several other Swedish ladies he caused to be thrown into the sea, after having imposed on them the inhuman task of making the sacks in which they were to be enclosed. His barbarities served only to make his enemies more resolute. Gustavus, having assembled the states at Wadstena, was unanimously chosen regent, the diet taking an oath of fidelity to him, and promising to assist him to the utmost. Having thus obtained the sanction of legal authority, he pursued his advantages against the Danes. A body of troops appointed to throw succors into Stockholm were totally cut in pieces; and the regent, sending some troops into Finland, struck the Danes there with such terror that the archbishop of Upsal, together with Slaborg and Baldenacker the Danish governors, fled to Denmark. He then sent express orders to all his governors and officers in Finland and Sweden to massacre the Swedish gentry without distinction. The Swedes made reprisals by massacring all the Danes they could find; so that the whole country was filled with bloodshed and slaughter. In the mean time Gustavus had laid siege to the towns of Calmar, Abo, and Stockholm; but Norby obliged him to raise all of them with loss. Gustavus, in revenge, laid siege to the capital a third time, and petitioned the regency of Lubec for a squadron of ships, and other succors, for carrying on the siege. This was complied with, but on very hard conditions, viz. that Gustavus should oblige himself, in the name of the states, to pay 60,000 merks of silver as the expense of the armament; that, until the kingdom should be in a condition to pay that sum, the Lubec merchants trading to Sweden should be exempted from all duties on imports or exports; that all other nations should be prohibited from trading with Sweden, and that such traffic should be deemed illicit; that Gustavus should neither conclude a peace, nor even agree to a truce with Denmark, without the concurrence of the regency of Lubec; and that, in case the republic should be attacked by Christian, he should enter Denmark at the head of 20,000 men. Upon these hard terms did Gustavus obtain assistance from the regency of Lubec; nor did his dear bought allies prove very faithful. They did not indeed go over to the enemy; but in a sea-fight, where the Danes were entirely in the power of their enemies, they suffered them to escape, when their whole force might have been entirely destroyed. This treachery had well nigh ruined the affairs of Gustavus; for Norby was now making preparations effectually to relieve Stockholm; in which he probably would have succeeded: but, at this critical period, news arrived that the Danes had unanimously revolted, and driven Christian from the throne; and that the king had retired into Germany, in hopes of being restored by the arms of his brother-in-law, the emperor. On hearing this news, Norby retired with his whole fleet to the island of Gothland, leaving but a slender garrison in Calmar. Gustavus did not fail to improve this opportunity to his own advantage, and quickly made himself master of Calmar. Meantime Stockholm continued closely invested; but Gustavus protracted the siege until he should get himself elected king. Having for this purpose called a general diet, the first step was to fill up the vacancy in the senate occasioned by the massacres of Christian. Gustavus had the address to get such nominated as were in his interest; and of consequence the assembly was no sooner met than a speech was made containing the highest encomiums on Gustavus, setting forth in the strongest light the many eminent services he had done for his country, and concluding that the states would show themselves equally ungrateful and blind to their own interest if they did not immediately elect him king. This proposal was acceded to by such tumultuous acclamations that it was impossible to collect the votes; so that Gustavus himself acknowledged that their affection exceeded his merit, and was more agreeable to him than the effects of their gratitude.

Gustavus on his election was urged to have the ceremony of his coronation immediately performed; but the king, having some designs on the clergy, did not think proper to comply with their request, as he would have been obliged to take an oath to preserve them in their rights and privileges. Indeed he had not been long seated on the throne before he incurred the displeasure of that body; for, having large arrears due to the army, with other incumbrances, Gustavus found it necessary to raise large contributions on the clergy. On this he was accused of avarice and heresy before the pope's nuncio. Gustavus defended himself against these accusations; and soon after showed a great partiality for the doctrines of Luther, which by this time had been preached and received by many people in Sweden. This embroiled him more than ever with the clergy; and it soon appeared that either Gustavus must resign his throne, or the clergy some part of the power they had assumed. Matters were driven to extremities by the king's allowing the Scriptures to be translated into the Swedish language. In 1526 the king, finding them entering into a combination against the reformists, went to Upsal, and publicly declared his resolution of reducing the number of oppressive and idle monks and priests, who, under the pretence of religion, fattened on the spoils of the industrious people. At last, taking advantage of the war between the pope and Charles V. of Spain, he declared himself to be of the reformed religion.

and established it throughout his dominions; and at the same time, to humble the arrogance of the ecclesiastics, he gave the senators the precedency of them, and in many other respects degraded them from the dignities they formerly enjoyed. For some time the states hesitated at supporting the king in his work of reformation; insomuch that at last he threatened to resign the kingdom, which he said was doomed to perpetual slavery either to its temporal or spiritual tyrants. On this the states came into his measures, and retrenched the privileges of the ecclesiastics in the manner he proposed. Several disturbances however ensued. An impostor, who pretended to be of the family of Sture, the former regent, having claimed the throne, the Dalecarlians revolted in his favor; but, on the approach of a powerful army sent by Gustavus, they submitted. Soon after Lutheran professors were established in every diocese; upon which a new rebellion ensued. At the head of this was Thure Johanson, who had married the king's sister. Several of the nobility joined him; and the king of Denmark acceded to their cause, thinking, by means of these disturbances, to reunite the three kingdoms of Sweden, Denmark, and Norway, as formerly. But Gustavus prevailed, and the rebels were obliged to take refuge in Denmark. A fresh accident, however, had like to have embroiled matters worse than before. The subsidy granted to the regency of Lubec was still due; and for the payment of it the states granted to the king all the useless bells of the churches and monasteries. The people were shocked at the sacrilege; and the Dalecarlians again betook themselves to arms. Intimidated, however, by the courage and vigorous conduct of the king, they again submitted, and were taken into favor. But tranquillity was not yet restored. Christian, having established a powerful interest in Norway, once more made an attempt to recover his kingdoms, and was joined by the Dalecarlians; but, being defeated by the Swedish forces, he was forced to return to Norway, where, being obliged to capitulate with the Danish generals, he was kept prisoner all his life. In 1542 Gustavus, having happily extricated himself out of all his troubles, prevailed on the states to make the crown hereditary in his family; after which he applied himself to the encouragement of learning and commerce. A treaty was set on foot for a marriage between his eldest son Eric and Elizabeth queen of England. The prince's brother, duke John, went over to England, and resided for some time at the court of London with great splendor. He returned full of expectations of success; but, bringing with him no sort of proofs in writing, his father soon perceived that he had been the dupe of Elizabeth's superior policy. However, at last he allowed prince Eric to go in person to England; but, before he could embark, the death of Gustavus, in 1569, made him lay aside all thoughts of the voyage and marriage.

Sweden, until the death of Gustavus Adolphus.—Gustavus Vasa was succeeded by his son Eric XIV. The new king was a man possessed of all the exterior ornaments which give an air of dignity to the person; but he had neither the prudence nor the penetration of his father. He created the first nobility that were ever known in Sweden; which he had no sooner done than he quarrelled with them, by passing some acts which they thought derogatory to their honor and dignity. The whole course of his reign was disturbed by wars with Denmark, and disputes with his own subjects. In the former he was unfortunate, and towards the latter he behaved with the greatest cruelty. At last, by the torments of his own conscience, it is said, he ran mad. He afterwards recovered his senses, but was dethroned by his brothers; of whom duke John, who had been hitherto kept prisoner by Eric, succeeded him in the kingdom.

This revolution took place in 1568, but with no great advantage to Sweden. Disputes about religion between the king and his brother, and wars with Muscovy, threw matters into the utmost confusion. At last prince Sigismund, the king's son, was chosen king of Poland, which proved the source of much trouble to the kingdom. See Poland. In 1590 king John died; and, as Sigismund was at a distance, every thing fell into the utmost confusion; the treasury was plundered, and the wardrobe quite spoiled, before even duke Charles could come to Stockholm to take the administration into his hands, until king Sigismund should return. This, however, was far from being the greatest disaster which befel the nation at this time. It was known that the king had embraced the popish religion, and it was with good reason suspected that he would attempt to restore it upon his arrival in Sweden. Sigismund also was obliged, on leaving Poland, to promise that he would stay no longer in Sweden than was necessary to regulate his affairs. These circumstances served to alienate the minds of the Swedes from their sovereign, even before they saw him; and the universal dissatisfaction was increased, by seeing him attended, on his arrival in Sweden in 1593, by Malaspina the pope's nuncio, to whom he made a present of 30,000 ducats to defray the expenses of his journey to Sweden. What the people had foreseen was too well verified; the king refused to confirm the Protestants in their religious privileges, and showed such partiality on all occasions to the Papists that a party was formed against him; at the head of which was duke Charles his uncle. Remonstrances, accompanied with threats, took place on both sides; and, at an interview between the king and Charles, the dispute would have ended in blows, had they not been parted by some of the nobility. This, however, made such an impression upon Sigismund that he was apparently reconciled to his brother, and promised to comply with the inclinations of the people in every respect, though without any inclination to perform what he promised. The agreement indeed was scarcely made, before Sigismund conceived the horrid design of murdering his uncle at the Italian comedy, acted the night after his coronation. The duke, however, having notice of the plot, avoided it. This enraged the king so much that he resolved to accomplish his design by force; and therefore commanded a Polish army to march towards the frontiers of Sweden, where

they committed all the ravages that could be expected from an enraged and cruel enemy. Complaints were made by the Protestant clergy to the senate; but no other reply was made them than that they should abstain from these bitter invectives and reproaches, which had provoked the Catholics, until the king's departure; at which time they would be more at liberty. In 1595 Sigismund set sail for Dantzic, leaving the administration in the hands of duke Charles. The consequence of this was that, the dissensions which had already taken place being continually increased by the obstinacy of the king, duke Charles assumed the sovereign power; and in 1604 Sigismund was formally deposed, and his uncle Charles IX. raised to the throne. He proved a wise and brave prince, restoring the tranquillity of the kingdom, and carrying on a war with vigor against Poland and Denmark. He died in 1611, leaving the kingdom to his son, the celebrated Gustavus Adolphus.

Though Charles IX. by his wise and vigorous conduct had in a great measure retrieved the affairs of Sweden, they were still in a very disagreeable situation. The finances of the kingdom were entirely drained by a series of wars and revolutions; powerful armies were preparing in Denmark, Poland, and Russia; while the Swedish troops were not only inferior in number to their enemies, but the government was destitute of resources for their payment. Though the Swedish law required that the prince should have attained his eighteenth year before he was of age, yet such striking marks of the great qualities of Gustavus appeared, that he was allowed by the states to take upon him the administration even before this early period. His first act was to resume all the crown grants, that he might be the better able to carry on the wars in which he was unavoidably engaged; and to fill all places, both civil and military, with persons of merit. At the head of domestic and foreign affairs was placed chancellor Oxenstiern, a person every way equal to the important trust, and the choosing of whom impressed mankind with the highest opinion of the young monarch's penetration and capacity. Soon after his accession, Gustavus received an embassy from James I. of Britain, exhorting him to make peace with his neighbours. This was seconded by another from Holland. But, as the king perceived that the Danish monarch intended to take every opportunity of crushing him, he resolved to act with such vigor as might convince him that he was not easily to be overcome. Accordingly he broke into Denmark with three different armies at once; and though the enemy's superiority at sea gave them great advantages, and the number of the king's enemies distracted his attention, he carried on the war with such spirit that in 1613 a peace was concluded upon good terms. This war being finished, the king applied himself to civil polity, and made some reformations in the laws of Sweden. In 1615 hostilities were commenced against Russia, on account of the refusal of that court to restore some money which had been formerly lent them. The king entered Ingria, took Kexholm by storm, and was laying siege to Plescow, when, by the mediation of James I., peace was concluded, on condition of the Russians repaying the money, and yielding to Sweden some part of their territory. In this and the former war, notwithstanding the shortness of their duration, Gustavus learned the rudiments of the military art for which he soon became so famous. In one campaign he not only learned, but improved, all the military maxims of La Gardie, a celebrated general, brought the Swedish army in general to a more steady and regular discipline than formerly had been exercised, and formed and seasoned an invincible body of Finlanders, who had afterwards a very considerable share in the victories of the Swedes. Peace was no sooner concluded with Russia than Gustavus was crowned with great solemnity at Upsal. Soon after this, Gustavus ordered his general La Gardie to acquaint the Polish commander, Codekowitz, that as the truce between the two kingdoms, which had been concluded for two years, was now expired, he desired to be certainly informed whether he was to expect peace or war from his master. In the mean time, having borrowed money of the Dutch for the redemption of a town from Denmark, he had an interview on the frontiers with Christian IV. At this interview the two monarchs conceived the utmost esteem and friendship for each other; and Gustavus obtained a promise that Christian would not assist Sigismund in any designs he might have against Sweden. In the mean time, receiving no satisfactory answer from Poland, Gustavus began to prepare for war. Sigismund entered into a negociation, and made some pretended concessions, with a view to seize Gustavus by treachery; but, the latter having intimation of his design, the whole negociation was changed into reproaches and threats on the part of Gustavus. Immediately after this Gustavus made a tour in disguise through Germany, and married Eleonora, the daughter of the elector of Brandenburgh. He then resolved to enter heartily into a war with Poland, and with this view set sail for Riga, with a great fleet, which carried 20,000 men. The place was well fortified, and defended by a body of veterans enthusiastically attached to Sigismund; but it was carried after a siege of six weeks, acompanied by much desperate fighting.

After the reduction of Riga, the Swedish monarch entered Courland, where he reduced Mittau; but ceded it again on the conclusion of a truce for one year. Sigismund, however, no sooner had time to recover himself than he began to form new enterprises against the Swedes in Prussia; but Gustavus setting sail with his whole fleet for Dantzic, where the king of Poland then resided, so broke his measures that he was obliged to prolong the truce for another year. Sigismund, however, was not yet apprised of the danger he was in, and refused to listen to any terms of accommodation; upon which Gustavus, entering Livonia, defeated the Polish general, and took Dorpt, Hockenhausen, and several other places of less importance; after which, entering Lithuania, he took the city of Birsen. Notwithstanding this success, Gustavus proposed peace on the same equitable terms

as before; but Sigismund was still infatuated with the hopes that, by means of the emperor of Germany, he should be able to conquer Sweden. Gustavus, finding him inflexible, resolved to push his good fortune. His generals, Horn and Thurn, defeated the Poles in Semigallia. Gustavus himself with 150 ships set sail for Prussia, where he landed at Pulaw. This place was immediately delivered up to him; as were also Brannsberg, Frauenberg, Elbing, Marienburg, Mew, Dirschau, Stum. Christburg, &c. Sigismund, alarmed at the great successes of Gustavus, sent a body of forces to oppose him, and to prevent Dantzic from falling into his hands. In this he was attended with as bad success as before. His troops were defeated before Marienburg, Mew, and Dirschau; and in May, 1627, Gustavus arrived with fresh forces before Dantzic, which he would probably have carried had he not been wounded in the belly by a cannon shot. The Poles in the mean time recovered Mew; and the States of Holland sent ambassadors to mediate a peace between the two crowns. Sigismund, however, depending upon the assistance of the emperor of Germany and king of Spain, determined to hearken to no terms, and resolved to make a winter campaign; but Gustavus was so well intrenched, and all his forts were so strongly garrisoned, that the utmost efforts of the Poles were to no purpose. Dantzic in the mean time made such a desperate resistance as greatly irritated Gustavus. In a sea engagement the Swedish fleet defeated that of the enemy; after which Gustavus, having blocked up the harbour with his fleet, pushed his advances on the land side with incredible vigor. He made a surprising march over a morass fifteen miles broad, assisted by bridges of a peculiar construction, over which he carried a species of light cannon invented by himself. By this unexpected manœuvre he got the command of the city in such a manner that the garrison were on the point of surrendering, when, by a sudden swell of the Vistula, the Swedish works were ruined, and the king was obliged to raise the siege. In other respects, however, the affairs of Gustavus went on with their usual good fortune. His general, Wrangel, defeated the Poles before Brodnitz; and at Stum the king gained another and more considerable victory in person. In addition to these misfortunes of the Poles, a famine and plague raged in their camp, so that they were at last obliged to consent to a truce for six years, to June 1635. Gustavus restored some places, but kept the port and citadel of Memel, the harbour of Pillau, the town of Elbing, Bransbergh, and all that he had conquered in Livonia.

Gustavus having thus brought the war with Poland to an honorable conclusion, began to think of resenting the conduct of the emperor in assisting his enemies and oppressing the Protestant states. Before embarking in such an important undertaking it was necessary that he should consult the diet. In this the propriety of engaging in a war with Germany was warmly debated; but, after much altercation, Gustavus, in a very noble speech, determined the matter; and set forth in such strong terms the virtuous motives by which he was actuated that the whole assembly wept, and every thing was granted which he could require. It was not difficult for Gustavus to begin his expedition. His troops amounted to 60,000 men, hardened by a succession of severe campaigns in Russia, Finland, Livonia, and Prussia. His fleet exceeded seventy sail, carrying from twenty to forty guns, and manned with 6000 mariners. Embarking his troops, he landed at Usedom on the 24th of June 1730, the Imperialists having evacuated all the fortresses they possessed there; and the isle of Rugen had been before reduced by general Lesly, in order to secure a retreat if fortune should prove unfavorable. Passing the frith Gustavus stormed Wolgast and another strong fortress in the neighbourhood, leaving general Bannier with a garrison for the defence of these conquests. He then proceeded to Stettin; which was no sooner invested than it consented to receive a Swedish garrison, and the king persuaded the duke of Pomerania to enter into an alliance with him. In consequence of this the Swedish troops were received into several towns of Pomerania; and the most bitter enmity took place between the Imperialists and Pomeranians, each refusing the other quarter. These successes of Gustavus struck the empire with consternation; for, being already overwhelmed with civil dissensions, they were in no condition to resist so impetuous an enemy. At this time also the Imperialists were without a general; but at last count Tilly was fixed upon, and invested with the dignity of Field Marischal. In the mean time the king, being reinforced by a considerable body of troops in Finland and Livonia under Gustavus Horn, defeated the Imperialists before Griffenhagen, taking the place soon after by assault. By this and some other conquests he opened a passage into Lusatia and Silesia; but, in the mean time, count Tilly cut off 2000 Swedes at New Brandenburg, owing to the obstinacy of their commander Kniphausen, who had orders to evacuate the place and join the main army. This advantage, however, was soon overbalanced by the conquest of Frankfort on the Oder, which Gustavus took by assault, making the whole garrison prisoners. Thus he commanded the rivers Elbe and Oder on both sides, and had a fair passage not only to these countries, but also to Saxony and the dominions of the house of Austria. Soon after this Gustavus laid siege to Landsberg, which he took by assault; though the number of soldiers he had with him was so inconsiderable that he had thoughts of sending to the main army for a reinforcement before the prisoners should march out, being apprehensive that they might give him battle in the open field, though they could not defend themselves behind walls. About this time the Protestant princes held a diet at Leipsic; to which Gustavus sent deputies, and conducted his negociations with such address as tended greatly to promote his interests. Immediately after this he reduced Gripswald, and with it all Pomerania. Then, marching to Custrow, he restored the dukes of Mecklenburg to their dominions. Here the Imperialists had tyrannised in such a manner that Gustavus was received as the deliverer of the people, and the ceremony of the duke's inau-

guration was performed with great solemnity. All this time count Tilly was employed in the siege of Magdeburg; but now, being alarmed at the repeated successes of the Swedes, he left Pappenheim with part of the army before that city, while he marched with the rest into Thuringia, to attack the landgrave of Hesse-Cassel and the elector of Saxony. After a most obstinate defence Magdeburg fell into the hands of Pappenheim, where he committed all imaginable cruelties. Gustavus formed a plan of recovering the city; but, relinquishing it, he ordered Bannier to attack Havelsburg; which was done with such resolution that the place was forced in a few hours, and all the garrison made prisoners. Werben was next obliged to submit after an obstinate conflict, in which many fell on both sides. These successes obliged count Tilly to attempt in person to check the progress of the Swedes. He detached the vanguard of his army, composed of the flower of the imperial cavalry, within a few miles of the Swedish camp. An action ensued, in which Bernstein the imperial general was defeated and killed, with 1500 of his men. Gustavus, after this advantage, placed himself in a situation so much superior to his enemies that count Tilly was fired with indignation, and marched up to the Swedish lines to give him battle. Gustavus kept within his works, and Tilly attacked his camp, though almost impregnably fortified, keeping up a most terrible fire from a battery of thirty-two pieces of cannon; which, however, produced no other effect than obliging the Swedish monarch to draw up his army behind the walls of Werben. Tilly had placed his chief hopes in being able to nail up the enemy's cannon, or set fire to their camp in divers quarters; after which he proposed making his grand attack. With this view he bribed some prisoners; but they betrayed him and told his design to Gustavus. The king ordered fires to be lighted in different parts of his camp, and his soldiers to imitate the noise of a tumultuous disorderly rabble. This had the desired effect. The count led his army to the breach made by the cannon; where he was received with such a volley of grape-shot as cut off the first line, and put the whole body in disorder, so that they could never be brought back to the charge. In this confusion the imperial army was attacked by Bauditzen, and, after an obstinate conflict, obliged to quit the field.

Soon after this action the queen arrived at the camp with a reinforcement of 8000 men; at the same time a treaty was concluded with Charles I. of England, by which that monarch allowed the marquis of Hamilton to raise 6000 men for the service of Gustavus. These auxiliaries were to be conducted to the main army by a body of 4000 Swedes; and were in every thing to obey the king while he was personally present, but in his absence were to be subject to the orders of the marquis. With these troops the king had resolved to make a diversion in Bremen: but the marquis, finding it impossible for him to effect a junction with the Swedish army, resolved, without debarking his troops, to steer his course for the Oder, and land at Usedom. Gustavus was very much displeased at finding his project thus disconcerted; however, making the best of the existing circumstances, he commanded the British troops to act on the Oder instead of the Weser. The number of this little army was magnified exceedingly by report, insomuch that count Tilly had some thoughts of marching against them with his whole force; but, on the departure of the marquis for Silesia, he reinforced the army in that country with a large detachment, which was thought to contribute not a little to the defeat he soon after received. Ever since the late action, Gustavus had kept within his entrenchments, where his army was well provided with every thing. Tilly made several attempts to surprise or draw him to an engagement; but, finding all his endeavours fruitless, he marched into Saxony and laid siege to Leipsic. This precipitate measure proved highly advantageous to the Swedish monarch; as thus the elector, who had been wavering in his resolutions, was now obliged to have recourse to the Swedes, to preserve himself from utter destruction. A treaty offensive and defensive was immediately concluded with Gustavus: and the elector willingly promised every thing that was required of him; and, among the rest, that not only the prince his son, but he himself should reside in the Swedish camp and engage his life and fortune in the common cause. Tilly, in the mean time, carried fire and sword into the unhappy electorate. At the head of an army of 44,000 veterans, he summoned Leipsic to surrender; denouncing the same vengeance against it as had been executed on Magdeburg, in case of a refusal. By this the governor was so much intimidated that he instantly submitted; and also surrendered the castle of Passenberg, which was in a condition to have stood out till the arrival of the Swedish army. The elector, enraged at the loss of these valuable places, ordered his army to join the Swedes with all expedition, and pressed the king so warmly to engage that at last he yielded to his desire. On the 7th of September, 1631, Gustavus gained the celebrated battle of Leipsic, in which 7000 Imperialists lay dead on the field of battle; 4000 were taken prisoners; a fine train of artillery was lost, and upwards of 100 standards, ensigns, and other military trophies. On this occasion the Scottish regiment in the Swedish service first practised the method of firing in platoons; to which some ascribe the astonishment and confusion that appeared in the Imperial army.

Gustavus next penetrated into Franconia, where he reduced the fort of Workburg and other places. Tilly having collected his scattered troops, which formed an army still superior to that of Gustavus, marched to the relief of this place; but came too late. He then directed his march towards Rottenberg, where four regiments were cut in pieces by a Swedish detachment. After this the king reduced Hanau, Frankfort on the Maine, and Mentz; destroying a body of Spaniards, who had thrown themselves in the way to obstruct his passage. The court of Vienna was now thrown into the utmost confusion; and sent every where begging assistance, and soliciting the Catholic princes to arm in defence of their religion. The emperor was most embarrassed in

finding out a general capable of opposing Gustavus in the field; for the late misfortunes of count Tilly had entirely sunk his reputation. Wallestein, an old experienced officer, was made choice of; but, as he had formerly been disgraced, it was apprehended that he would not accept of the command; yet he not only accepted, but, at his own expense, augmented the army to 40,000 men. During the whole winter the Swedish army kept the field; and before the approach of summer had reduced Crantznach, Bobenhausen, Kirchberg, Magdeburg, Gozlar, Northeim, Gottingen, and Dunderstadt; while the landgrave William made great progress in Westphalia. Gustavus Horn was repulsed before Bamberg; but soon had his revenge, by entirely destroying two regiments of Imperialists. The king now resolved to give battle to Tilly, who was marching into Bavaria to prevent the Swedes from gaining a footing in that electorate. He pursued the imperial general through a vast tract of country, defeated his rear-guard, and, having reduced many towns and fortresses on the Danube, penetrated as far as Ulm. Advancing to the river Leck, count Tilly posted himself in a wood on the opposite side, to dispute his passage. Gustavus endeavoured to dislodge him by a regular fire from seventy pieces of cannon. The slaughter was dreadful; and Tilly himself, being wounded by a cannon-ball in the knee, died a few days before he was to have been superseded by Wallestein. The following night the imperial army evacuated the post; part retiring to Ingoldstadt and others to Newburg. Gustavus immediately crossed the river, and seized the towns of Rain and Newburg, which the enemy had abandoned. Augsburg next submitted; and from the inhabitants of this place Gustavus exacted an oath of fidelity, not only to himself but to the crown of Sweden. This measure gave the greatest offence to many of the Germanic body, and made them imagine that the king of Sweden had other views than the defence of the Protestant cause. From Augsburg the Swedes advanced towards Ratisbon: but were disappointed in their design of getting possession of that city, by the Bavarians having thrown a very numerous garrison into the place. In the mean time ambassadors arrived from Denmark, offering the mediation of that crown for obtaining a lasting peace. Gustavus, however, replied that no such peace could take place till the Catholic princes thought proper to grant the Protestants full and ample security for their enjoyment of future tranquillity. But the ambassadors had no instructions to propose any thing farther. Gustavus now, resolving to retort upon the Bavarians the cruelties they had inflicted on the Protestants, laid the towns of Morzbourg, Frielengen, and Landshut, in ashes. The inhabitants of Munich saved themselves by submission; but, as the peasants in that neighbourhood had collected themselves into bodies to murder the stragglers from the Swedish army, Gustavus burnt their houses, and defeated the forces of the elector, who had been joined by a body of militia. While Gustavus was thus employed Wallestein had assembled a vast army. He was solicited by the elector of Bavaria to come to his assistance; but, in revenge of the elector's having formerly obtained the command for count Tilly in preference to himself, he drew off towards Bohemia to encounter the Saxons. Arnheim, who commanded the Saxon forces in that place, was the enemy of Gustavus, who had formerly rallied him for his cowardice. He therefore permitted Wallestein to gain an easy victory, in hopes that his master the elector of Saxony, a prince entirely devoted to his pleasure, might be induced to relinquish the friendship of such a restless and warlike ally as Gustavus; and, indeed, he used all the eloquence of which he was master to detach him from the Swedish cause. Several advantages, in the mean time, were gained by the imperialists. Pappenheim defeated the archbishop of Bremen's cavalry at Warden; and three Swedish regiments were cut off near Kadingen. Pappenheim, however, was forced to withdraw his forces from Stade; of which the Swedes took possession. Wallestein and the elector of Bavaria, who had now joined their forces, threatened Gustavus with greatly superior numbers. At last, however, the king, being reinforced with 15,000 men, no longer declined the engagement; but Wallestein was too wise to trust the fate of the empire to a single engagement against such an enemy as the king of Sweden. Gustavus attacked his camp, but was repulsed with the loss of 2000 men; which caused a general murmuring against his rashness. Several other misfortunes happened to the Swedes; and, at last, after various manœuvres, Wallestein bent his course towards Misnia, to oblige the elector of Saxony to declare against the Swedes, and to draw them out of Bavaria. Gustavus, notwithstanding the inconstancy of Augustus, immediately set out to assist him. With incredible speed he marched to Misnia, where the imperialists were assembling their whole strength. Hearing that the enemy were encamped at Wesenfells, and that Pappenheim had been detached with a strong corps, Gustavus resolved to engage them before they could effect a junction. With this view he marched to Lutzen, where he attacked Wallestein with incredible fury. The Swedish infantry broke the imperialists in spite of their utmost efforts, and took all their artillery. The cavalry not being able to pass the river so expeditiously as the king thought it necessary, he led the way, attended only by the regiment of Smaland and the duke of Saxe-Lauwenburg. Here, after charging impetuously, he was killed, as Puffendorff alleges, by the treachery of the duke; who, being corrupted by the emperor, shot him in the back during the heat of the action. The news of his death was in an instant spread over both armies. The courage of the imperialists revived, and they now made themselves sure of victory. But the Swedes, eager to revenge the death of their beloved monarch, charged with such fury that nothing could resist them. The imperialists were defeated a second time, just as Pappenheim, with his fresh corps, came up to their assistance. On this the battle was renewed, but the Swedes were still irresistible. Pappenheim was mortally wounded, and his army finally routed, with the loss of 9000 killed in the field and in the pursuit.

To the treaty of Westphalia.—The victory of Lutzen proved more unfortunate to Sweden than the greatest defeat. The crown devolved upon Christina, an infant of six years old; the nation was involved in an expensive foreign war, without any person equal to the arduous task of commanding the armies or regulating domestic affairs as Gustavus had done. However, Christina, the daughter of Gustavus, was immediately proclaimed queen. The regency devolved on the grand bailiff, the marischal, the high-admiral, the chancellor, and the treasurer of the crown. Oxenstiern was invested with the chief management of affairs, and conducted himself with the greatest prudence. He was greatly embarrassed indeed by the divisions among the Protestant princes, which became more violent after the death of Gustavus; but, in spite of all difficulties, he went on pursuing the interest of his country, and planning the means of retaining the Swedish conquests. Matters went on pretty successfully till 1634, when, through the rashness of the Swedish soldiers, they were defeated at Nordlingen, with the loss of 6000 men killed, a number of prisoners, and 130 standards taken by the enemy. Oxenstiern's constancy was shaken by this dreadful blow; but he applied himself diligently to repair the loss by recruiting the army and rendering the allies faithful. The latter proved the most difficult task. The death of Gustavus, and the defeat of Nordlingen, had thrown them into despair; and every one was desirous of making the best terms he could with the emperor. The Saxons not only renounced their alliance with Sweden, but openly commenced war against it; and though the regency would gladly have consented to an honorable peace, the enemy were now too much flushed with success to grant it. Oxenstiern had no other resource than an alliance with France and the bravery of his generals. In 1635 he went in person to the court of Louis XIII. and concluded a treaty, which, however, was never observed. The enemy, in the mean time, pushed their good fortune. They surprised Philipsburg, where the French had laid up vast magazines; and reduced Spires, Augsburg, Treves, Wurtsburg, Cobourg, and some other places. To complete the misfortunes of Sweden it was expected that the Poles would immediately invade Prussia. To prevent this La Gardie was despatched thither with a powerful army; but, as it was impossible to resist so many enemies at once, the chancellor purchased the friendship of Poland for twenty-six years by ceding that duchy to the republic. Thus he got rid of a powerful enemy; and the Swedish affairs began to revive by a victory which general Bannier gained over the Saxons, in consequence of which they were driven beyond the Elbe. Early in spring 1636 the Saxons made some motions as if they intended to cut off Bannier's communication with Pomerania. This he prevented by a stratagem, defeated a body of the enemy, and obliged the Saxons to retire. Soon after this he drove them out of their winter quarters with considerable loss; at which time also a considerable body of imperialists who came to their assistance were dispersed. In Westphalia general Kniphausen beat the imperialists with the loss of 1500 men, but he himself was killed in the pursuit, and his army obliged to repass the Weser. Some advantages were also gained in the neighbourhood of Minden by general Lesly, who had assembled a considerable army. In Alsace, Bernard, duke of Saxe-Weymar, defeated count Gallas the imperial general and dispersed his army. But when every thing seemed thus successful for the Swedes, the city of Magdeburg, contrary to the expectation of every body, surrendered for want of powder, which the garrison had wantonly consumed. The Saxons also made some conquests on the Elbe, which obliged Bannier to recal general Lesly from Westphalia to march against them. The Saxons fixed on a most convenient situation, where they hoped to destroy the Swedish army without coming to a battle. But Bannier, resolving to hazard every thing rather than suffer his army to be wasted by famine, advanced towards Berleberg, a place closely blocked up by the enemy. Here he drove from an advantageous post four regiments of Saxon curassiers, having killed or taken prisoners 400 men; after which he soon forced them to a general engagement. The numbers were very unequal, Bannier's army amounting to 9000 horse and 7000 foot, and the Saxons to 15,000 horse and thirteen battalions of foot. The battle began with great fury; the right wing of the Swedes was almost oppressed by numbers before the left could come to their assistance. They were ten times driven back, and as often returned to the charge. At last they made such a desperate effort that the enemy were entirely defeated; 5000 killed on the spot, 3000 wounded, and as many taken prisoners, with 150 standards, and several pieces of cannon.

Thus ended the campaign of 1636, in a manner highly honorable to the Swedes. Some fruitless negociations were set on foot during the winter; but these coming to nothing Bannier quitted his winter quarters very early in the season; and falling upon eight regiments of Saxons cantoned at Eulenburg pursued them to Torgau, where he obliged them to surrender at discretion. Another party of Saxons was defeated near Leipsic; which he proposed investing, but was disappointed by the imperialists penetrating into Thuringia. He then called in all his detachments; defeated 2000 imperialists near Pegau, and destroyed several detachments that attempted to obstruct his march. Yet he still found his situation every day more straitened from the continual increase of the enemy's forces; which obliged him at last to retreat into Pomerania, out of which he soon drove count Gallas. The affairs of the Swedes were now once more on the brink of ruin through the misconduct of general Wrangel, who had also an army in Pomerania, but who, imagining himself perfectly secure, cantoned his troops, and extended his quarters, to accommodate his army. But Gallas suddenly returned, ravaged all Upper Pomerania, and reduced the towns of Usedom, Dermin, and Wollin; after which, leaving garrisons in the forts, he returned to his winter quarters in Saxony. This unfortunate campaign counterbalanced all the advantages of the former. Wrangel was so struck with the suddenness of the

blow that he could take no measure for opposition. Some of the Swedish allies again fell off, and took up arms against them. In 1638 the Swedish affairs again began to revive in this quarter, through the excellent conduct of Bannier, who defeated count Gallas with the loss of 3000 men killed and taken prisoners. Pursuing his good fortune, he so harassed the count that he obliged him to repass the Elbe and take shelter in Austria.

Great as Bannier's exploits had been, however, they were eclipsed by those of Bernard duke of Saxe-Weimar. That general had so increased his army in the Protestant cantons of Switzerland, and in Franche Comte, that he was in a condition to act without the assistance of the French, who indeed were but treacherous allies. Advancing to the Rhine he seized on Seckingen and Lassuburg, and laid siege to Rheinfield. The imperialists, in conjunction with the troops of Bavaria, advanced to the relief of the place. An engagement ensued in which the victory was disputed; the enemy threw succors into the city, and the duke withdrew his army. Within a month he gave them battle a second time; and so completely defeated them that only one imperial officer above the rank of a captain escaped being killed or taken prisoner. He then renewed the siege of Rheinfield, which he reduced, as well as several other important places. Advancing to Brisac he blocked it up to force the garrison to surrender. General Gotz, with 12,000 men, attempted to throw in 1000 waggons of provisions; but he was defeated with the loss of all his men except 2500. Duke Charles of Lorrain, with 4000 men, joined the remains of Gotz's army, but being surprised by Bernard his whole army was cut in pieces. A third attempt was made by Gotz, but it proved as unsuccessful as the former; and the place being reduced to great straits was obliged to capitulate. In January, 1639, the two victorious generals Bernard and Bannier prepared to attack the enemy on their own ground. Bannier made an irruption into Anhalt and Halberstadt. Leaving his infantry he pushed on with his cavalry, and surprised Salis, grandmaster of the imperial artillery. After a bloody conflict the Swedes gained a complete victory, seven regiments of the enemy being cut to pieces. Next entering Saxony he defeated four regiments of the enemy, obliging a much larger body to take shelter under the cannon of Dresden. Hearing that the Saxons were encamped near Chemnitz, where they waited to be joined by the imperialists, he attacked them before this junction could be effected, and the Saxons were almost all killed or taken. Bannier next entering into Bohemia laid the country under contribution; after which, returning across the Elbe, he fell on general Hofskirk, who was encamped near Brandeiz with ten regiments of horse and several battalions of foot. Him he defeated with the loss of 2000 men. The remains of the imperial forces were pursued to the walls of Prague, and the generals Hofskirk and Montecuculi were taken prisoners. Yet notwithstanding these successes the enemies of Bannier multiplied daily. The Protestant princes, overawed by the enemy, did not send him assistance. Undismayed, however, by difficulties, Bannier performed wonders. He defeated a body of imperialists at Glatz; drove the Saxons thrice from their camp at Firn, and yet was forced to evacuate the place because he could not spare a garrison. His army being destitute of recruits was much diminished in number; yet with it he reduced many towns, and obtained various other important advantages, when on a sudden all his hopes were blasted by the death of the duke of Saxe-Weymar; poisoned, as was supposed, by the French, who wished to get Brisac into their hands, from which the duke prevented them.

The difficulties to which Bannier was now reduced proved extreme. Louis XIII. took upon him to dispose of the army and conquests of Bernard as he thought proper. Brisac, and other places of importance, he kept to himself; after which the French endeavored to ruin the army. In the mean time the imperial army under Piccolomini, in the Netherlands, was prodigiously augmented; and the archduke Leopold William, as generalissimo, was assembling his whole strength to crush the Swedes at once. But Bannier did not despair. George duke of Lunenburg, being disgusted at the emperor, Bannier hoped to gain him over; he therefore approached nearer to his country, and also drew towards the armies of Weymar and Hesse. In his way he cut in pieces a body of 3000 Croats. General Konigsmark routed the imperialists at Gera; a second time at Scholen; and a third time entirely defeated them near Leipsic. Bannier was very pressing on the allies to join him; and at last, in 1640, he was joined by the Weymar army under the dukes of Longueville and Gubrien, a body of Russians led by general Melander, and the troops of Lunenburg commanded by general Klitzing. The army now amounted to twenty-two battalions of infantry and 22,000 horse; so that they were much more than a match for their enemies, had they been under the sole direction of Bannier. But unanimity was wanting; every one would be supreme, and Bannier, the best general, had the least influence. Instead of those masterly strokes by which the Swedes had hitherto distinguished themselves, the armies continued looking at one another, each suffering the rigors of famine. At last Bannier, resolving to expose his troops no longer, set out for Thuringia, through Franconia, to seize an advantageous post on the Maine; but, as he advanced to the Sala, he found the imperialists entrenched on the other side. Finding it impossible to force a passage, he took the road through Hesse, where his troops suffered greatly by famine. Here he proposed to fight the enemy; but the Landgrave and duke of Lunenburg refused their consent. Upon this he threatened to leave them to the mercy of the confederates, and thus obliged them to be somewhat more pliant. None of those brilliant successes, however, now attended the operations of the Protestant allies; the campaigns of 1640 and 1641 were spent in useless marches and countermarches; serving only to bring the army into the greatest dangers, from which they were as constantly relieved by the active and intrepid Bannier. At last this brave general, worn out with per-

petual fatigues, died of a fever in 1641, leaving the Swedish army in a worse situation than ever.

The imperialists were too well acquainted with the abilities of Bannier not to take advantage of the opportunity offered by his death. A Swedish detachment was cut in pieces at Quedlinburg. The Swedish army, accustomed only to be obedient to Bannier, became mutinous, and Piccolomini resolved to fall upon them with his whole force. But the four generals, Wrangel, Konigsmark, Wittemberg, and Pful, having convinced the soldiers of the necessity of defending themselves, made such excellent dispositions that the imperialists durst not attack them. Piccolomini then detached part of his army to attack the Hessians in their quarters; but Wrangel and Konigsmark threw themselves in their way, and defeated them with the loss of 2000 men. This victory, however, did not retrieve the Swedish affairs. Dissensions and mutiny began again to take place in the army to such a degree as threatened its dissolution. In 1642 general Torstenson was sent from Sweden with money, and a strong reinforcement, to take upon him the supreme command. This general was inferior to none of his predecessors, and designed to come to an immediate engagement; but the Weymar army separating from him obliged him to remain for a considerable time inactive. He was also confined to his chamber by the gout; and thus, a report of his death being spread, the imperialists were encouraged to begin a long march through roads scarcely passable, in hopes of surprising the Swedish army without a general. But Torstenson seized an advantageous post, which could not be forced, and thus obliged the enemy to retreat, after having suffered as much by their fatiguing march as if they had fought a bloody battle. Then joining general Stalhanch, who had been driven by the imperialists out of Silesia, he reduced Great Glogau, with a number of other important places; after which he laid siege to Schweidnitz. The duke of Saxe Lauenburg, with his cavalry, endeavoured to throw in succors; but was defeated with the loss of 3000 men, taken prisoner, and died of chagrin a few days after. In consequence of this defeat Schweidnitz surrendered at discretion; and Torstenson, having sent a detachment to invest the city of Neisse, proceeded with the rest to drive the enemy entirely out of Silesia. This he effectually performed, obliging them to retire over barren mountains, almost famished for want of provisions, and harassed by his light troops; so that this lately formidable army was almost entirely ruined. With his victorious troops the Swedish general then poured into Moravia; where in five days he reduced the strong town of Olmutz.

Litta and Neustadt shared the fate of Olmutz; after which the Swedes, returning suddenly to Silesia, took Oppelen and Brieg, and laid siege to Breslau. Here the garrisons made such an obstinate defence that the imperialists had time to assemble under the conduct of the archduke Leopold, and come to their relief. As Torstenson was greatly inferior in number, he raised the siege; but appeared so formidable in his retreat that the enemy durst neither attack him, nor attempt to prevent his encamping in a very advantageous situation. The imperialists then laid siege to Glogau; but, after having lost a great number of men, they were forced to abandon the enterprize on the junction of Wrangel with Torstenson; by which means the Swedes were once more in a condition to face their enemies in the field. Torstenson now projected an irruption into Bohemia, but in this he was prevented by the vigilance of the enemy: however, he reduced the city of Zittau, where for the first time a cartel for prisoners was established; by which means the Swedish army was considerably augmented. Torstenson then directed his course to Leipsic, but the imperial generals assembled their whole force, and set out to relieve it. The two armies soon came in sight of each other; and the Swedes, after an obstinate conflict, obtained a complete victory, 5000 of the enemy being killed on the spot, 3000 wounded, and as many taken prisoners. This victory was followed by the immediate surrender of Leipsic.

In all probability the Swedes would have finally triumphed over all their enemies, had not a rupture with Denmark ensued. Torstenson and Horn behaved with their usual valor in Holstein and Schonen, while general Konigsmark distinguished himself in Germany; but the ruin of the Weymar army, which was totally defeated with the loss of one half its number at Dettingen by the Bavarians, proved a dreadful blow, from which the Swedes could scarcely recover themselves. Indeed, notwithstanding the valor and success of the Swedes, their affairs in Germany must have gone to wreck in the campaigns of 1643 and 1644, had not the French under Condé and Turenne made a most powerful diversion, and performed such exploits as immortalised their names. In 1645 the war against Denmark was pushed with such vigor that a peace, very advantageous for Sweden, was concluded. Torstenson now took measures for carrying the war into the Austrian dominions. Hatfield assembled a considerable army to oppose the Swedes; and the emperor came to Prague to animate his troops. The two armies came in sight at Jancowitz, and prepared for an engagement. The valor of the Swedes once more prevailed, and they totally defeated their enemies: 4000 of the imperialists were killed on the spot, among whom were general Hatfield and many officers; and nearly 5000 were taken prisoners. Yet no great advantages were derived from this victory. Some towns indeed were reduced: but at last Torstenson was obliged to retire into Moravia, where he put his army into winter quarters; and, in the beginning of 1646, resigned the command to Wrangel. Wrangel conducted the Swedish affairs with great ability and success; till at last the imperialists, unable to drive the Swedes out of Germany, concluded a peace in 1648. This was the memorable treaty of Westphalia, by which the Germanic constitution was settled, and those disputes which had so long torn the empire were ended: the duchies of Bremen and Verden, all the Upper and part of Lower Pomerania, the city of Wismar and the isle of Rugen, were assigned to Sweden, and 5,000,000 of crowns were given to the army.

Sweden to the death of Charles X.—Sweden

now enjoyed some years of repose. Charles Gustavus, count palatine, having gained the favor of Christina, was appointed generalissimo of the forces, and heir apparent to the crown. A marriage was proposed between them; but the queen would never listen to this or any other proposal of the kind. In 1650 the ceremony of the queen's coronation was performed; but in 1654 she resigned the crown in favor of Gustavus. See CHRISTINA.

Charles Gustavus, who now took the name of Charles X., found himself involved in considerable difficulties on his accession. The treasury was quite exhausted; great part of the revenue was appointed for the support of Christina's household; the people were oppressed with taxes; the nation, having been disarmed for several years, began to lose its reputation. To remedy these evils, Charles proposed to resume all the crown lands which had been alienated to favorites during the late reign; to repeal the duty upon salt; to put the kingdom in a posture of defence; and to enter upon a war with some neighbouring state. Under pretence that Casimir king of Poland had questioned his title to the throne, he prepared to invade that kingdom. Several embassies were sent from Poland to Stockholm; but they returned without their errand. General Wittemburg made an irruption into Poland from Pomerania. The Poles opposed him with an army of 15,000 men, but in a short time they entirely dispersed themselves. Charles, with a powerful army, pursued his march, all the cities throwing open their gates to him. As he advanced to Cracow, Casimir made one effort to save his capital. But his army amounted only to 10,000 men; and these, after a feeble resistance, fled with precipitation, having lost 1000 men in killed and prisoners. A few days after this, Charles defeated the Poles a second time about twenty-four miles from Cracow; upon which Casimir fled with his family to Oppelen, in Silesia. The capital was then invested; and, though defended with the utmost valor by Stephen Czarneski, was soon obliged to capitulate. Thus, in less than three months, Charles apparently became master of Poland; but the Poles had no intention of abandoning their former sovereign.

In 1656 a war took place with the elector of Brandenburg. While Charles was employed in the conquest of Poland, that prince had invaded the Royal and Ducal Prussia, and reduced the most considerable towns. The king of Sweden marched against him, defeated his forces in several slight encounters, and obliged him to own that he was a vassal of Sweden. These rapid conquests alarmed all Europe; and the different powers sought for means of driving the Swedes out of Poland, which they had so unjustly seized. The Poles, assured that they should be assisted, every where revolted and massacred the Swedes. Casimir returned from Silesia; and those troops and generals who had submitted to Charles now ranged themselves under his antagonist. Charles immediately marched for Prussia, and totally defeated 12,000 Poles under Czarneski. This did not hinder all the Poles incorporated with his troops to desert; which reduced his army: and, the campaign being performed in the depth of winter, he was obliged to retreat to Prussia. In his march he was harassed by the Poles; and a body of 4000 Swedes was defeated by them at Warka. But this loss was soon after compensated by a complete victory gained by Adolphus the king's brother, and general Wrangel, over Czarneski. In the mean time Charles took measures for laying siege to Dantzic; but the Dutch threatened to oppose him, unless a proper regard was paid to their interest. Charles accordingly granted them advantageous terms; and afterwards gained over the elector of Brandenburg, by ceding to him the sovereignty of Prussia, that he might be at liberty to turn his whole strength against Poland. By the treaty with the elector, the latter was to assist Charles in his war with Poland; but the elector had so procrastinated matters, that the Poles, having obtained assistance from the Tartars, had reduced the city of Warsaw. The two princes however now marched in concert against their enemies, who were encamped in a strong situation near Warsaw, their camp being fronted by the Vistula. The Poles were driven from their entrenchments with prodigious slaughter, and a vast number taken prisoners. The Poles and Tartars then labored to break the alliance; entered Ducal Prussia, and defeated the electoral army, taking prince Radzivil and other great persons prisoners. The Swedes soon had their revenge. General Steinbock attacked the Polish army at Philippowa, and overthrew it with such slaughter as obliged the Poles to quit the field. A more formidable enemy than the Poles now began to appear. The Russians invaded the provinces of Carelia, Ingermania, and Livonia, while the elector of Brandenburg began to waver in his fidelity. To preserve this only ally at such a critical juncture, Charles was obliged to give him more advantageous terms; while the Russians were repulsed in Carelia and Ingermania. But in Livonia they had better success, two important fortresses falling into their hands; after which they laid siege to Riga. For seven months they battered the walls of this city, without once venturing to pass the ditch or storm the practicable breaches. The besieged, under Magnus de la Gardie and Simon Helmfield, defended themselves with the greatest intrepidity, cutting off many thousands of the enemy in the sallies they made. At last they attacked the Russian camp, drove them out of it with great slaughter, and obliged them to raise the siege with precipitation.

Charles, notwithstanding the number of his enemies, was now become so formidable by the valor of his troops that whole armies often fled on the very news of his approach. At last, in 1657, the Poles, finding they could not resist him in the field, harassed the Swedes on their march, and cut off the foragers and convoys. This proved much more destructive to the Swedes than their former method; so that Charles was obliged to enter into an alliance with Ragotski prince of Transylvania, by assigning him certain provinces in his neighbourhood, to furnish himself with irregular troops, who might fight the Poles in their own way. But the confederates, after spending a whole campaign in Lithuania, were obliged to return without accomplishing

more than the reduction of a single fortress; upon which Charles returned with the Swedish army to Prussia. Leopold, the young king of Hungary, having beheld for a long time the Swedes with a jealous eye, resolved to declare for Poland. To curb the ambition of the Swedish monarch he solicited the king of Denmark to break with him. This was complied with, and the Danes invaded Bremen. Charles hastened to oppose this new enemy; which gave such offence to Ragotski that he neglected to take proper measures for his own defence in the absence of the Swedes, and suffered his army to be destroyed by the Poles and Tartars. At the same time the Turks invaded Transylvania, under pretence that Ragotski, being a vassal of the grand seignior, had no right to invade Poland without his leave. Rogotski opposed them in the field; where he was defeated and killed, leaving Charles destitute of the only ally on whom he could have depended. But, not dismayed by this misfortune, he traversed Pomerania and Mecklenburg; after which he fell upon Holstein, while general Wrangel with another corps entered Bremen. In fifteen days Wrangel retook all the towns which the enemy had reduced; defeated and drove the Danish army out of the country, killing 3000 of their best soldiers. In Holstein the king reduced several fortresses, laid Itzehoe in ashes, defeated a body of Danes, and laid siege to Frederic Udda, into which the Danes had thrown a strong garrison. The conduct of this siege he left to Wrangel, he himself retiring to Wismar to observe the situation of Poland; but no sooner was he gone than Wrangel attacked the place with such fury that he became master of it in two hours. In Holland the Swedes were defeated; but the enemy derived no advantage from their victory: at sea the fleets met and maintained a hot engagement for two days, without any considerable advantage on either side. In Poland matters went on much worse. The house of Austria had now declared for Casimir; a German army entered Poland and reduced Cracow, though not without great loss. Czarneski entered Pomerania, where he butchered the unhappy peasants; but on the approach of Charles he fled as usual, having gained nothing by his expedition but the character of a cruel barbarian. The king of Sweden was now surrounded by enemies. The elector of Brandenburg had declared against him; and he had besides to engage the armies of Austria, Poland, Russia, and Denmark in the field. In this dangerous situation he resolved to attack Denmark in such a manner as should oblige that power to come to a speedy accommodation. His designs were forwarded by a very early frost which enabled him to transport his troops without shipping. Having passed over on the ice to the island of Funen, he cut in pieces a body of 4000 Danish soldiers and 500 peasants. The whole island was reduced in a few days; after which he passed to Langland, then to Laaland, after that to Falstre, and lastly to Zealand. The Danes were terrified at this unexpected invasion, and were giving themselves up to despair, when Charles offered peace upon equitable terms. The king of Denmark very gladly consented. By this treaty, called the treaty of Roschild, concluded 12th March 1658, the provinces of Schonen, Halland, and Bleking, Lyster, and Huwen, the isle of Borkholm, the bailliages of Bahus and Drontheim in Norway, were yielded to Sweden, and a free passage through the sound was granted to the Swedish ships.

No sooner was Charles retired than the king of Denmark began to act against him in an underhand manner; on which, resolving to anticipate him in his design, he appeared unexpectedly with a fleet before Copenhagen. Had he given the assault immediately, before the inhabitants had time to recover from their surprise, it would probably have surrendered at once; but, by landing at the distance of seventeen miles, he gave them time to prepare for their defence: the siege proved extremely tedious, and at last the place was relieved by a Dutch fleet. On this Charles converted the siege into a blockade, which continued till the end of the war. Wrangel reduced the strong fortress of Gronenburg; and the Swedish forces were so judiciously posted that all Denmark was in a manner blocked up; when in 1660 king Charles X. died of an epidemical fever: and thus an end was put for that time to all the ambitious designs of Sweden.

To the imprisonment of Charles XII. in Turkey.—The new king Charles XI. was a minor at his father's death; and, as the kingdom was involved in a dangerous war with so many enemies, the regency determined to conclude a peace, if it could be obtained on reasonable terms. A treaty was accordingly concluded at Oliva: by which Casimir renounced his pretensions to the crown of Poland, and that republic gave up all pretensions to Livonia. Bornholm and Drontheim were ceded to Denmark; and an equivalent in Schonen remained with Sweden. During the minority of the king nothing remarkable occurred. In 1672 he entered into alliance with Louis XIV.; which, in 1674, involved him in a war with the elector of Brandenburg. At first the Swedes carried all before them; and, general Wrangel having fallen sick, they continued their conquests under Mardenfeldt. Almost all the towns in Brandenburg were reduced when the elector arrived with an army. He retook several towns, defeated Mardenfeldt in a general engagement, and soon after forced them to abandon all their conquests. In conjunction with the Danes, he then invaded the Swedish dominions: many places of importance were reduced; and in 1676 Sweden received a most destructive blow by the defeat of her fleet in an engagement with the combined fleets of Denmark and Holland. Soon after this the king took the government into his own hands, and in some degree restored the fortune of Sweden; but, though matters went on in a prosperous way where the king commanded in person, the same disgrace attended the Swedish arms in every other quarter. In Pomerania count Konigsmark lost every part of importance excepting Stralsund, Stetin, and Gripswald. In 1678 the Swedish fleet was defeated in two engagements. At Landscroon a most obstinate battle was fought from 10 A. M. till 6 P. M., when both parties were obliged by fatigue to retire to their camps. At Oldeval, in Norway, the

Swedes were defeated; and the Danes laid desolate the islands of Oeland, Smaland, Unno, and Kuno; while the electoral troops and Imperialists reduced count Konigsmark to the utmost distress near Stralsund. But in this deplorable situation count Konigsmark attacked his enemies to such advantage that he obtained a complete victory; after which he ravaged the duchy of Mecklenburg. Yet he could not prevent the elector from reducing Stralsund; after which he was obliged to evacuate Pomerania; and, to complete his distress, the fleet which transported the Swedish army from Pomerania was wrecked on the coast of Bornholm; by which accident 2000 persons were drowned, and the remainder plundered and taken prisoners by the Danes, though they had been furnished with passports from king Frederic. In this unprosperous situation of affairs a peace was concluded at St. Germain's with France, by which the Swedes and Danes were left to decide their quarrel by themselves. Denmark being no match for Sweden, even in her distressed situation, a treaty was soon concluded on terms very favorable to Sweden; and confirmed by a marriage between Charles and Ulrica Eleonora, daughter to the king of Denmark. From this time the Swedish monarch applied himself to the reformation of the state; and, by artfully managing the disputes between the nobility and peasants, he obtained a decree of the states empowering him to alter the constitution as he pleased. Being thus invested with absolute power, he proceeded to take some very extraordinary measures. In 1685 it was projected to liquidate the public debts by raising the nominal value of money, without adding any thing to its intrinsic value. This was put into execution in 1686, by which the creditors of the government lost upwards of 9,000,000 of crowns. This, with some other arbitrary steps, disgusted all the nobility, merchants, and crown creditors. In Livonia they were highly resented; and remonstrances were repeatedly sent by the hands of deputies, who had orders to insist upon their privileges, confirmed by many acts of the king's predecessors. The deputies could obtain nothing, so that the diet was assembled. On their report the nobility resolved to draw up a stronger remonstrance than any of the former, to be presented to the king by captain Patkul, one of the deputies, who had already distinguished himself by his boldness and attachment to liberty. His public spirit, however, produced no other effect than to procure his own destruction. See PATKUL. On the 15th April, 1697, died Charles XI., leaving his crown to his son, the celebrated Charles XII., then a minor.

Charles XII., on his accession, was only fifteen. He was scarcely seated on the throne when a powerful combination was formed against him. Augustus, king of Poland, formed designs on Livonia; Christian V. of Denmark revived the disputes with the duke of Holstein, as a prelude to a war with Sweden; and Peter the Great of Muscovy began to form designs upon Ingria, formerly a province of Russia. In 1699 Christian marched an army into Holstein; Charles sent troops to the duke's assistance; but before their arrival the Danes had ravaged the country, taken the castle of Gottorp, and laid siege to Tonningen. Here Christian commanded in person; and was assisted by the troops of Saxony, Brandenburg, Wolfenbuttle, and Hesse-Cassel. England and Holland as guarantees of the last treaty with Denmark, in concert with Sweden, joined Charles against this confederacy, and sent fleets to the Baltic. They proposed a termination of the war upon equitable terms; but these were haughtily refused by the Danish monarch, who despised the youth of Charles, and relied upon his alliance with Saxony, Brandenburg, Poland, and Russia. The town of Tonningen, however, resisted all his efforts; and, when he ordered the place to be stormed, his troops were driven headlong from the walls by a few Swedes under general Bannier. In 1700 Charles, having entrusted the affairs of the nation with a council chosen out of the senate, set out on the 8th of May from his capital, to which he never afterwards returned. He embarked at Carlscroon, and defeated the fleet of the allies. Having made a descent on Zealand, he defeated a body of cavalry, and proceeded to invest Copenhagen by sea and land. Frederick IV., the new king of Denmark, saw the danger of having his capital destroyed, and concluded a treaty in eleven days, upon the same terms as the former. Charles, being thus at liberty to turn his arms against the other princes, resolved to lead his army against Augustus king of Poland; but, hearing that the czar had laid siege to Narva with 100,000 men, he immediately embarked at Carlscroon, though it was then mid winter, and the Baltic scarcely navigable; and soon landed at Pernaw in Livonia with part of his forces. His army did not exceed 20,000 men; but they were the best soldiers in Europe, while the Russians were only an undisciplined rabble. The consequence was, the Swedes were victorious, entirely routing this vast army, and taking all the cannon, 20,000 prisoners, and entirely destroying the remainder.

Peter was advancing with 40,000 men to surround the Swedes, when he received intelligence of the dreadful defeat at Narva. He was greatly chagrined; but returned to his own dominions to raise another army. He evacuated all the provinces which he had invaded, and for a time abandoned all his great projects, thus leaving Charles at liberty to prosecute the war against Poland. As Augustus had expected an attack, he endeavoured to draw the czar into a closer alliance with him. The two monarchs had an interview at Birsen, where it was agreed that Augustus should lend the czar 50,000 German soldiers, to be paid by the czar, who should send an equal number of his troops to be trained up to war in Poland; and that he should pay the king 3,000,000 of rixdollars in two years. Of this treaty Charles had notice, and, by means of his minister, count Piper, entirely frustrated the scheme. In 1701 Charles, having received a reinforcement from Sweden, took the field, and appeared suddenly on the banks of the Duna, along which the Saxon army was posted to receive him; he gained a signal victory.

This victory was followed by the surrender of all the towns and fortresses in the duchy of Cour-

land. The king then passed into Lithuania, where every town opened its gates to him. At Birsen an army of 20,000 Russians retired with precipitation on his approach, when Charles, perceiving that Poland was greatly disaffected to Augustus, began to project the scheme of dethroning him by means of his own subjects. While count Piper was intriguing with the Poles for this purpose, Augustus determined to trust his fortune to the Saxon army and the nobility of Cracow, who offered to support him to the utmost. The Saxon army was now advanced to the frontiers, and Augustus put himself at the head of it. Being joined by the nobility of Cracow, his forces amounted to 30,000 men, all brave and well disciplined. With these he marched in quest of his enemy; who did not decline the combat, though he had with him only 12,000 men. Though the Saxons were strongly posted, they were entirely defeated, with the loss of 4000 killed, 2000 prisoners, and all their baggage and cannon. This victory was followed by the loss of Cracow; after which Charles set out in pursuit of the flying army, with a design of preventing them from reassembling; but his horse falling under him, he had the misfortune to break his thigh bone, by which he was confined six weeks; and thus Augustus obtained some respite.

Augustus made the best of this interval. Having convoked a diet first at Marienburg, and then at Lublin, from them he obtained the following resolutions: that an army of 50,000 men should be raised by the republic for the service of the prince; that six weeks should be allowed the Swedes to determine whether they were for war or peace; and that the same time should be granted to the turbulent and discontented nobles of Poland to make their concessions. To counteract the effects of these resolutions, Charles assembled another diet at Warsaw; and, while the two assemblies disputed concerning their rights and privileges, he recovered of his wound, received a strong reinforcement from Pomerania, and utterly defeated and dispersed the remains of the Saxon army. The ill-fortune of Augustus continued. In 1704 he was formally deposed by the diet, and the crown conferred by Charles on Stanislaus Lecsinsky palatine of Posnania. Augustus, however, did not yet tamely give up his kingdom. His adherents daily skirmished with the Swedes, and Augustus himself, being reinforced by 9000 Russians, retook Warsaw, and was very near surprising the new king, who lived in perfect security in the city, while Charles fought in his cause. Count Horn, with 1500 Swedes, vigorously defended the citadel; but, finding it no longer tenable, he surrendered at discretion. The reduction of Warsaw was amongst the last advantages gained by Augustus in this war. His troops were now composed of Saxon recruits and undisciplined Poles, who had no attachment to his person. Charles and Stanislaus advanced with the victorious army; the Saxons fled, and the towns for several miles round sent their submissions. The Poles and Saxons were under Schullemberg, a most experienced general, who used every expedient to check the progress of the Swedes. But, with all his conduct and caution, he found himself outwitted, and Charles near his camp, ready to fall upon him, while he thought him at fifty leagues distance. The king attacked him with a superior army, but entirely composed of horse. This was almost the first time that infantry had been regularly opposed to cavalry, and the superiority of the former was evident. After the engagement had continued about three hours, the Saxons retreated in good order; which no enemy had ever done before in any engagement with Charles. The Swedes pursued them towards the Oder, but Schullemberg effected a retreat which Charles always spoke of with admiration, and said he had been conquered by Schullemberg. No material advantage, however, resulted from this to Augustus; who was again obliged to leave Poland, and fortify the capital of Saxony which he expected every moment to see invested. In the mean time, the Russians, having recovered their spirits, fell upon the Swedes in Livonia with the utmost fury. Narva, Dorpt, and several other towns were taken, and the inhabitants and garrisons treated with great barbarity. Soon after an army of 100,000 Russians entered Poland: 60,000 Cossacks, under Mazeppa, entered the country at the same time, and ravaged every thing with the fury of barbarians. Schullemberg, too, advanced with 14,000 Saxons and 7000 Russians, disciplined in Germany, and reputed excellent soldiers. But Charles seemed to triumph over his enemies with more ease, the more numerous they were. The Russians were defeated so fast that they were all dispersed before one party had notice of the misfortunes of another. The Swedish general Renschild engaged and defeated Schullemberg in half an hour. Whole regiments of Saxons threw down their arms, and begged their lives: 6000 were slain in the field, and 7000 taken prisoners; thirty-six pieces of cannon, 11,000 muskets, forty pairs of colors and standards, with all the Saxon baggage, fell into the hands of the Swedes: and the consequences were still more important; for now a passage was opened into Saxony, and Augustus seemed to be in as great danger of losing his hereditary dominions as he had been of losing Poland. This extraordinary victory, which was gained February 12th, 1706, was looked upon with admiration, and thought to make the renown of Renschild equal to that of his sovereign. Charles himself became jealous of his fame. But the cruelty of Renschild sullied his reputation; for six hours after the engagement, he caused 1000 Russians to be massacred in cold blood, to revenge, as he said, the cruelties they had committed in Poland.

Soon after this victory, Charles entered Saxony at the head of 24,000 men. The diet at Ratisbon declared him an enemy to the empire if he crossed the Oder. But to this declaration he paid no regard, but pursued his march; while Augustus was reduced to the condition of a vagrant in Poland, where he possessed not a single town besides Cracow. Into this city he threw himself with a few Saxon, Polish, and Russian regiments, and began to erect some for-

tifications for its defence; but the approach of the Swedish general Meyerfeldt, and the news of the invasion of Saxony, disconcerted all his measures, and threw him into despair. The Russians indeed were his faithful allies; but he dreaded them almost as much as the Swedes: so that he was under the necessity of writing to Charles with his own hand, begging for peace on any terms. But, as he was then at the mercy of the Russians, this transaction was concealed with the greatest care. His emissaries were introduced to Charles in the night time; and received the following answer:—That Augustus should for ever renounce the crown of Poland, acknowledge Stanislaus, and promise never to reascend the throne, should an opportunity offer; that he should release the princes Sobieski, and all the Swedish prisoners made in the course of the war; surrender Patkul, then resident at his court as ambassador for the czar of Muscovy; and stop proceedings against all who had passed from his into the Swedish service. Augustus all this time was obliged to continue a show of war, though he had neither ability nor inclination to carry it on. He was joined by prince Menzikoff with 30,000 Russians; which obliged him, contrary to his inclination, to engage with Meyerfeldt, who commanded 10,000 men, one half of whom were Swedes. As at this time no disparity of numbers was reckoned an equivalent to the valor of the Swedes, Meyerfeldt did not decline the combat, though the army of the enemy was four times as numerous as his own. With his countrymen he defeated the enemy's first line, and was on the point of defeating the second when Stanislaus, with the Poles and Lithuanians, gave way. Meyerfeldt then perceived that the battle was lost; but he fought desperately, to avoid the disgrace of a defeat. At last, however, he was oppressed by numbers, and forced to surrender: suffering the Swedes, for the first time, to be conquered by their enemies. The whole army were taken prisoners excepting major-general Krassau; who, having repeatedly rallied a body of horse formed into a brigade, at last broke through the enemy, and escaped to Posnania.

Augustus had scarcely sung Te Deum for this victory, when his plenipotentiary returned from Saxony with the articles of the treaty abovementioned. The king hesitated and scrupled, but at last signed them; after which he set out for Saxony, glad at any rate to be freed from such an enemy as the king of Sweden, and from such allies as the Russians. The czar Peter was no sooner informed of this extraordinary treaty, and the cruel execution of his plenipotentiary Patkul (see PATKUL), than he sent letters to every court in Christendom, complaining of this gross violation of the law of nations, but without effect. In 1707 he entered Poland at the head of 60,000 men. Advancing to Leopold, he made himself master of that city, where he assembled a diet and solemnly deposed Stanislaus, with the same ceremonies which had been used with regard to Augustus. The country was now reduced to the most miserable situation; one party through fear adhered to the Swedes; another was gained over, or forced by Peter to take part with him: a violent civil war took place between the two, and great numbers of people were butchered, while cities, towns, and villages, were laid in ashes by the frantic multitude. The appearance of a Swedish army under king Stanislaus and general Lewenhaupt put a stop to these disorders, Peter himself not caring to stand before such enemies. He retired, therefore, into Lithuania, giving as the cause of his retreat, that the country could not supply him with provisions and forage necessary for so great an army. In the mean time Charles had taken up his residence in Saxony, where he gave law to the court of Vienna, and intimidated all Europe. He declared himself the protector of the Protestant interest in Germany, particularly of the emperor's Protestant subjects in Silesia. He desired, or rather commanded, the emperor to renew and confirm to them all the liberties granted by the treaties of Westphalia, but since that time reclaimed or eluded at the treaty of Ryswick. The emperor durst not refuse; and upwards of 100 churches were given to the Protestants. At last, Charles began to evacuate Saxony, in pursuit of his great plan, the dethroning czar Peter, and conquering the vast empire of Russia. While the army was on full march, in the neighbourhood of Dresden, he surprised king Augustus with a visit with only five attendants.

The armies of Sweden, in Saxony, Poland, and Finland, now exceeded 70,000 men; a force more than sufficient to have conquered all the power of Russia had they met them on equal terms. Peter, who had his army dispersed in small parties, instantly assembled it on receiving notice of the king of Sweden's march; was making all possible preparations for a vigorous resistance, and was on the point of attacking Stanislaus, when the approach of Charles struck his whole army with terror. In January 1708 he passed the Niemen, and entered the south gate of Grodno, just as Peter was quitting the place by the north gate. Charles at this time had advanced to some distance before the army at the head of 600 horse. The czar, having intelligence of his situation, sent back a detachment of 2000 men to attack him: but they were utterly defeated; and this disappointment was followed by the total evacuation of Lithuania. The king pursued his flying enemies in the midst of snow and ice, over mountains, rivers, morasses, and through almost every obstacle that could be surmounted by human power; and, coming up with them at the Boristhenes, completely defeated them.

The czar, finding himself closely pursued by the enemy with whom he was not able to cope, proposed peace; but Charles returned no other answer than that he would treat at Moscow; which being reported to Peter, he coolly replied, 'My brother Charles affects to play Alexander, but he will not find in me a Darius.' However he did not venture an engagement, but continued his retreat; and Charles pursued so closely that he was daily skirmishing with the rear of the enemy. In these actions the Swedes had generally the advantage, though in the main these victories proved detrimental, by weakening the army in a country where it was impossible to re-

cruit. Near Smolensko, the king, with only six regiments, defeated a body of 10,000 horse and 6000 Calmucks. In this engagement he was exposed to the utmost danger, the enemy having separated him from his troops.

By the 3d of October 1708 Charles was within 109 leagues of Moscow; but Peter had made the roads impassable, either by laying them under water, digging deep ditches, or covering them with the wood of whole forests. He had also destroyed the villages on every side, and taken away every possibility of subsisting an army. The season was also far advanced; the intense severe weather was approaching; so that the Swedes were threatened with all the miseries of cold and famine, at the same time that they were exposed to the attacks of an enemy greatly superior in number. For these reasons the king resolved to pass through the Ukrain, where Mazeppa, a Polish gentleman, was general and chief of the nation. Mazeppa, having been affronted by the czar, readily entered into a treaty with Charles, whom he promised to assist with 30,000 men, great quantities of provisions and ammunition, and with all his treasures, which were immense. The Swedish army advanced towards the Disna, where they had to encounter the greatest difficulties; a forest above forty leagues in extent filled with rocks, mountains, and marshes. To complete their misfortunes, they were led ninety miles out of the right way; all the artillery was sunk in bogs and marshes; the provision of the soldiers, which consisted of biscuit, was exhausted; and the whole army spent and emaciated when they arrived at the Disna. Here they expected to have met Mazeppa with his reinforcement; but, instead of that, they perceived the opposite banks of the river covered with a hostile army, and the passage itself almost impracticable. Charles, however, was still undaunted; he let his soldiers by ropes down the steep banks; they crossed the river, either by swimming or on rafters hastily put together; drove the Russians from their post, and continued their march. Mazeppa soon after appeared, having with him about 6000 broken remains of the army he had promised. The Russians had got intelligence of his designs, defeated and dispersed his adherents, laid his towns in ashes, and taken all the provisions collected for the Swedish army. However, he still hoped to be useful by his intelligence in an unknown country; and the Cossacks, out of revenge, crowded daily to the camp with provisions. Greater misfortunes still awaited the Swedes. When Charles entered the Ukrain, he had sent orders to general Lewenhaupt to meet him with 15,000 men, 6000 of whom were Swedes, and a large convoy of provisions. Against this detachment Peter now bent his whole force, and marched against him with an army of 65,000 men, Lewenhaupt defeated him in a number of engagements, and at last arrived at the camp of Charles with 4000 men, after having killed upwards of 30,000 of the enemy on their march.

This was the last effort of Swedish valor. The difficulties they had now to undergo exceed what human nature could bear; yet still they hoped by constancy and courage to overcome every obstacle. In the severest winter known for a long time, even in Russia, they made long marches, clothed like savages in the skins of wild beasts; all the draught horses perished; thousands of soldiers dropped dead with cold and hunger: so that by February, 1707, the whole army was reduced to 18,000. Amidst numberless difficulties these penetrated at last to Pultowa, a town on the eastern frontier of the Ukrain, where the czar had laid up magazines; and of these Charles resolved to get possession. The place made an obstinate defence, the Swedes were repulsed in every assault, and 8000 of them were defeated and almost entirely cut off, in an engagement with a party of Russians. To complete his misfortunes, Charles received a shot from a carabine in his heel, which shattered the bone. For some days the czar, with an army of 70,000 men, had lain at a small distance, harassing the Swedish camp, and cutting off the convoys of provision; but now intelligence was received, that he was advancing, as if with a design of attacking the lines. In this situation, Charles determined to be the assaulter, and on the 8th of July, 1709, he lost the memorable battle of Pultowa, which decided the fate of the Swedes. Our limits forbid a detail of the particulars, but the issue of the day was, that Charles escaped with a mere handful of followers; the rest of his army being slain or taken prisoners.

Charles fled in a mean calash, attended by a little troop inviolably attached to his person, some on foot, and some on horseback. They were obliged to cross a sandy desert, where neither herb nor tree was to be seen, and where the burning heat and want of water were more intolerable than the extremities of cold they had formerly suffered. They reached Oczakow, the bashaw of which supplied the king with every necessary. But it was some time before boats could be got ready for transporting the whole of the king's attendants; by which accident 500 Swedes and Cossacks fell into the hands of the enemy. This loss affected him more than all his other misfortunes. The king remained but a few days at Oczakow, when the serasquier of Bender sent an aga to compliment him on his arrival in the Turkish dominions, and to invite him to that city. Here he was treated with the utmost hospitality. In the Turkish divan it was proposed to escort Charles with a numerous army to the frontiers of Poland: but the revolution which took place there quickly put an end to all such projects. Augustus thought himself no longer bound to observe the treaty which he had made, than Charles was at hand to force him to it. After the battle of Pultowa, therefore, he entered Poland, and took every measure, in concert with the czar, for the recovery of his kingdom. Stanislaus was obliged to leave his dominions and fly to Bender, in the disguise of a Swedish officer, to share the fortune of Charles. It was not in Poland alone that the Swedish affairs began to suffer in consequence of the defeat at Pultowa. The Danes invaded the province of Schonen with an army of 13,000 foot and 2500 horse. Only 13,000 Swedish forces remained to defend all the territories possessed by

Charles in Germany; and of these only a small part were allotted for the defence of Schonen. The regency of Sweden, however, exerted themselves to the utmost to repel this ungenerous invasion; and, having collected an army of 12,000 militia and 8000 regulars, despatched them under general Steenboek into Schonen. Some Saxon troops were incorporated in this army; and among these a prodigious desertion took place, which the general found it impossible to prevent; and thus the Danes gained several advantages, and at last took Christianstadt. Their insolence on this success was so great that the Swedes demanded to be instantly led against them. Here the good fortune of Sweden seemed once more to revive. The Danes were driven from a very strong situation, with the loss of 8000 killed and taken prisoners, besides a vast number wounded.

In the mean time Charles, by his agents, count Poniatowski and Sieur Neugebar, used his utmost efforts to procure a rupture between the Porte and Russia. For a long time the money bestowed by Peter on the viziers and janisaries prevailed; but at last, in 1711, the grand seignior, influenced by his mother, who was strongly in the interest of Charles, and who had been wont to call him her lion, determined to avenge his quarrel with Peter. He therefore gave orders to the vizier to fall upon the Russians with an army of 200,000 men. The vizier promised obedience; but professed his ignorance in the art of war. The khan of Crim Tartary, who had been gained over by the reputation and presents of the king of Sweden, had orders to take the field with 40,000 of his men, and had the liberty of assembling his army at Bender, that Charles might see that the war was undertaken upon his account. The czar, on these news, left the siege of Riga, where he had continued for some months; and with 24,000 men entered Moldavia, where he was joined by Cantemir, a vassal of the Porte. The vizier marched against him with a prodigious army; and, through the negligence of the czar, cooped him up in such a manner that he could neither advance nor retreat. In this desperate situation he perceived that he was now in as bad a situation as Charles at Pultowa; and gave orders for breaking through the enemy with fixed bayonets. The desponding spiritless soldiers, however, were little disposed to execute these orders; when Catharine, wife to the czar, without his knowledge, set on foot a treaty with the vizier; and, having soon obtained his consent, had the peace signed in six hours; by which means the whole Russian army was saved. The new treaty was most violently opposed by count Poniatowski and the khan of Tartary. The former had made the king acquainted with the situation of both armies; on which he instantly set out from Bender, filled with the hopes of fighting the Russians, and taking ample revenge. Having ridden fifty leagues post, he arrived at the camp just as the czar was drawing off his half-famished troops. He alighted at Poniatowski's tent; and, being informed of particulars, instantly flew in a rage to the vizier, whom he loaded with reproaches, and accused of treachery. Recollecting himself, however, he proposed a method by which the fault might be remedied; but, finding his proposal rejected, he posted back to Bender, after having by the grossest insults showed his contempt of the vizier. This violent behaviour of Charles did not promote his interest. The vizier perceived that his stay in Turkey might prove fatal to himself, and therefore determined to get him out of the country as soon as possible, either by fair means or foul. Succeeding viziers adopted the same plan; and at last the grand seignior himself wrote a letter to the king, in which he desired him to depart by next winter, promising to supply him with a sufficient guard, with money, and every thing else necessary for his journey. Charles gave an evasive answer, and determined to procrastinate his journey, as well to gratify his own stubborn temper as because he discovered a correspondence between Augustus and the khan of Tartary, the object of which he had reason to believe was to betray him to the Saxons. When he was therefore again pressed to fix the day of his departure, he replied that he could not think of going before his debts were paid. Being asked how much was necessary for this purpose, he replied, 1000 purses (of thirty sequins each). 1200 purses were instantly sent to the serasquier at Bender, with orders to deliver them to the king of Sweden, but not before he should have begun his journey. By fair promises, however, Charles persuaded him to part with the money; after which, instead of setting out, he squandered away his treasure in presents and gratifications, and then demanded 1000 purses more before he would set out. The serasquier was astonished at this behaviour. He shed tears; and, turning to the king, told him, that his head would be the forfeit of having obliged him with the money. The grand seignior, on being acquainted with this shameful behaviour of Charles, flew into a rage, and called an extraordinary divan, where he himself spoke, a thing very unusual for the Turkish monarchs. It was unanimously agreed that such a troublesome guest ought to be removed by force should other means fail. Orders were therefore positively sent to Charles to depart; and, in case of refusal, to attack him in his quarters. Nothing could equal his obstinacy on this occasion: in spite of the menaces of his enemies, in spite of the intreaties of his friends, he persisted in his resolution; and at last determined to resist, with 300 Swedes, being all the attendants he had, an army of 20,000 janisaries well armed and furnished with cannon. At length he was attacked in earnest; though, even in this extremity, the Turks showed their regard to him, and were tender of his life. Most of the Swedes surrendered, as thinking it the only method of saving the king's life. But Charles became the more obstinate the more desperate his affairs seemed to be. With forty menial servants only, and the generals Hord and Dardorff, he determined to defend himself to the last extremity, and, after the house was on fire, he was forcing his way to an adjoining building, which had a stone roof, when his foot slipped, and his fall saved his life by making him a prisoner. This happened on the 12th of February

1713. He was now kept prisoner, with all his retinue: and in this situation he was visited in disguise by the unfortunate Stanislaus, whom he desired 'never to make peace with Augustus;' adding, 'we shall soon have a change in our affairs.'

Sweden, from the return of Charles XII. unto his death.—Such were the considerations that still occurred to the mind of Charles; however, at last he seemed inclined to submit to his fate, and began seriously to think of returning to his kingdom, now reduced to the most deplorable situation. His habitation was now fixed at Demotica, a small town about six leagues from Adrianople. Here he was allowed provisions for his own table and those of his retinue; but only twenty-five crowns a day in money, instead of 500 which he had received at Bender. During his residence here he received a deputation from Hesse-Cassel, soliciting his consent to the marriage of Frederick the landgrave with Ulrica Eleonora, princess royal of Sweden; to which he readily agreed. A deputation was also sent him by the regency of Sweden, requesting that he would prepare for returning to his own dominions which were ready to sink under a ruinous war in his absence. What determined him, however, more than any thing to hasten his return, was the following accident:—The new grand vizier Ibrahim Molla, having for private reasons determined to come to a rupture with the czar, invited Charles to a conference, in the style and with the familiarity of an equal. Charles was so much chagrined at this indignity, that he sent his chancellor Mullern to meet the vizier with a pretence that he was sick. To avoid giving offence to this minister, Charles was obliged to keep his bed during his residence at Demotica, which was for ten months after. At last this vizier being strangled, and the Swedish interest at the Porte thereby entirely ruined, he determined to quit Turkey at all events. His departure was to be negociated by his favorite Grothusen, whom he vested with the character of ambassador extraordinary; sending him to Adrianople with a train of fourteen persons richly dressed. To equip this retinue the king was reduced to the most mortifying shifts, and to the necessity of borrowing money from usurers at fifty per cent. The great object was, to obtain from the vizier money and a passport. Grothusen was received with all the respect due to his rank; but the vizier started difficulties. With regard to the passport, he said, it could be of no use until the consent of the court of Vienna was first obtained; and, as to money, he said, 'his master knew how to give when he thought proper, but it was beneath his dignity to lend; that the king should have every necessary provided for his journey, and possibly the Porte might make some pecuniary present, but he would not have it expected.' The imperial minister, however, removed every difficulty with regard to the passport, by granting it in the most full and ample manner, in the name of the emperor, the princes and states, of Germany. He sent also a present to the king, consisting of a tent of scarlet richly embroidered with gold; a sabre, the handle of which was studded with jewels; and eight fine horses richly caparisoned. Money, the article most wanted, was entirely forgotten; however, the day was fixed for Charles's departure, and the vizier appointed sixty carriages loaded with all kinds of provisions, and several companies of janisaries and other troops to attend him to the frontiers of Transylvania. On the 14th of October, 1714, Charles quitted his bed at Demotica, and set out for Sweden. All the princes through whose territories he was to pass had given orders for his entertainment in the most magnificent manner; but the king, perceiving that these compliments only rendered his imprisonment and other misfortunes more conspicuous, suddenly dismissed his Turkish attendants, and, assembling his own people, bid them take no care about him, but make the best of their way to Stralsund. After this he set out post, in the habit of a German officer, attended only by colonel During. Keeping the bye-roads through Hungary, Moravia, Austria, Bavaria, Wirtemburg, the Palatinate, Westphalia, and Mecklenburg, he arrived on the 21st of November at midnight before the gates of Stralsund. Being unknown, he was admitted with difficulty; but, being soon recognised by the governor, the greatest tokens of joy were shown all over the town. In the midst of the tumult Charles went to bed. He had been booted for sixteen days, and now his legs were swelled to such a degree that it was necessary to cut his boots off. Having slept for some hours, he arose, reviewed his troops, and gave orders for renewing the war with redoubled vigor.

Sweden was now in the greatest distress. On the defeat at Pultowa, the Danes had invaded Schonen, but were defeated by general Steenboek. This victory, however, did not put an end to the war, for the kings of Denmark and Poland, with the czar of Muscovy, entered into stricter bonds of amity than ever. They dreaded the return of Charles to his own dominions, and apprehended that numberless victories would soon efface the remembrance of Pultowa. They determined therefore to make the best use of their time; and Charles never took a more imprudent resolution than obstinately to remain so long in the Turkish dominions. The kings of Denmark and Poland invaded Pomerania; but after laying siege in vain to Stralsund, Wismar, and other places, they were obliged to retire with disgrace. In 1712 the king of Denmark invaded and reduced Bremen and Verden; but the same year met with a terrible defeat from Steenboek, with the loss of a vast number killed and wounded, and almost all their artillery taken. The following year, however, this general being pursued, and surrounded by the united forces of the Russians, Danes, and Saxons, was obliged to throw himself into the neutral town of Tonningen; where he was besieged, and obliged to surrender at discretion, with his whole army. The consequence was an invasion of Finland by the czar; which he totally reduced, after defeating the Swedes in several battles. Indeed the Swedish forces were now unable to cope with almost any enemy. The return of Charles, however, seemed to give new life to the nation.

Though the number of inhabitants was visibly diminished, the levies he had ordered were completed in a few weeks; but the hands left to cultivate the earth consisted of the infirm, aged, and decrepid; so that a famine was threatened in consequence of the military rage which had seized all the youth of the kingdom. The presence of Charles did not now produce those consequences which the allies had feared. The kingdom was too much reduced to be able to furnish the necessary supplies of men and money; and, though the king's courage and military skill were not in the least diminished, the efforts he made, instead of restoring Sweden to its splendor, served entirely to ruin it. In 1715 Prussia declared against him, on account of his demanding back the town of Stettin, which that monarch had seized. To complete his embarrassment, George I. of Britain also became his enemy. The forces of Denmark, Prussia, Saxony, and Hanover, joined to invest Wismar, while a body of 36,000 men formed the siege of Stralsund; at the same time that the czar, with a fleet of twenty large ships of war, and 150 transports, carrying 30,000 men, threw every part of the Swedish coast into the greatest consternation. The heroism of Charles could not prevail against so many enemies; yet he was still so dreadful that the prince of Anhalt, with 12,000 brave troops, did not think himself a match for this furious enemy, when at the head of only 2000, till he had entrenched his army behind a ditch, defended by chevaux de frize. This precaution was not unnecessary; for in the night Charles with his men clambered up the ditch, and attacked the enemy furiously. Numbers, however, at last prevailed, and Charles was obliged to retire, after having seen his favorite Grothusen, general Dardorff, and During, the companions of his exile, killed by his side, he himself being wounded in the breast. This rash attempt was made to save Rugen, whence the town of Stralsund was supplied with provisions. The place was well fortified and garrisoned with 9000 men, with Charles himself at their head; but nothing could resist the efforts of the enemy. The houses were laid in ashes by the bombs; the walls miserably shattered, and large breaches made in them by the cannon; so that by the 17th of December it was proposed to give the assault. The attack on the horn work was desperate; the enemy was twice repulsed; but at last, by dint of numbers, effected a lodgment. The next day Charles headed a sally, in which he dealt terrible destruction among the besiegers, but was at length overpowered and obliged to retreat into the town. At last his officers, apprehending that he must either fall into the hands of the enemy, or be buried in the ruins of the place, intreated him to retire. A retreat, however, was now almost as dangerous as to remain in the town, on account of the fleets of the enemy with which the sea was covered; and this very circumstance induced the king to consent to it. Setting out, therefore, in a small boat with sails and oars, he passed all the enemy's ships and batteries, and arrived safe at Ystedt in Schonen.

To revenge himself for these losses, Charles invaded Norway with an army of 25,000 men The Danes were every where defeated and pursued with that vigor for which Charles was so remarkable; but strong reinforcements arriving from Denmark, and provisions failing, he was at last obliged to retire. Soon after this the Swedes lost Wismar; but, when every thing seemed to go to wreck, baron Goertz, the chief minister and favorite of Charles, set on foot a treaty with the czar, by which the most formidable of all Charles's enemies was taken off. The minister prevailed upon the inflexible temper of Charles, by representing to him that the cession of certain provinces to Peter would induce him to assist him in his projects of again dethroning Augustus, and of replacing James on the throne of Britain; which last scheme he had projected out of revenge for the elector of Hanover having seized on the duchies of Bremen and Verden. In consequence of the conferences between the czar and Goertz, the former engaged to send into Poland an army of 80,000 men to dethrone that prince whom he had so long defended. He engaged also to furnish ships for transporting 30,000 Swedes to Germany, and 10,000 into Denmark. This treaty, however, was not fully ratified; and the king's death put a final stop to all the great prospects of Sweden. Charles had resolved on the conquest of Norway, and he marched his army into that cold and barren country in October, when the ground was covered with frost and snow. With 18,000 men he formed the siege of Frederickshall, though the severity of the frost rendered it almost impossible to break the ground. Charles, however, resolved to form trenches: and his soldiers cheerfully obeyed, digging into the ground with the same labor as if they had been piercing a rock. On the 11th of December 1718 the king visited the trenches in the midst of a terrible fire from the enemy, to animate his men by his presence. He took his post in a most dangerous station, standing upon a gabion and leaning over the parapet, while the enemy were firing chain shot at the very spot where he stood. He was intreated to change his station; but he remained obstinate, as if he had been proof against cannon bullets. At last he was seen to fall on the parapet with a deep groan. A small cannon ball had struck him on the temple, beat in the left eye, and forced the right eye quite out of its socket; his right hand in the mean time grasped the hilt of his sword, as if he had meant to revenge the blow. See Charles XII.

From the death of Charles XII. until the revolution in 1772.—Charles XII. was succeeded by his sister, princess Ulrica Eleonora, wife to Frederick, hereditary prince of Hesse. On this occasion the states took care to make a previous stipulation for the recovery of their liberties, and obliged the princess to sign a paper to this purpose before entering on the government. Their first care was to make a peace with Great Britain, which the late king intended to have invaded. The Swedes then, to prevent their farther losses by the progress of the Russian, the Danish, the Saxon, and other arms, made many great sacrifices to obtain peace from those powers. In 1720 queen Ulrica Eleonora resigned the

crown in favor of her husband Frederick, who was elected by the States, and crowned May 3d, 1721. The French, about 1738, formed a dangerous party in the kingdom, under the name of the Hats; which not only broke the internal quiet of the kingdom, but led it into a ruinous war with Russia, by which the province of Finland was lost. Their Swedish majesties having no children, it was necessary to settle the succession; especially as the duke of Holstein was descended from the queen's eldest sister, and was, at the same time, the presumptive heir to the empire of Russia. Four competitors appeared: the duke of Holstein Gottorp, prince Frederick of Hesse-Cassel, nephew to the king, the prince of Denmark, and the duke of Deux-Ponts. The duke of Holstein had undoubtedly the best right. His name was Peter Ulric, the son of Charles Frederick, prince of Holstein-Gottorp, and grandson of duke Frederick IV. by Hedwiga Sophia, eldest sister to Charles XII., but he had embraced the Greek religion, that he might succeed to the throne of Russia; which he did, on the death of Elizabeth, and became the unfortunate Peter III. The czarina interposed, and offered to restore all the conquests she had made from Sweden, excepting a small district in Finland, if the Swedes would receive the duke of Holstein's uncle, Adolphus Frederick, bishop of Lubec, as their hereditary prince and successor to their crown. This was agreed to; and a peace was concluded at Abo, under the mediation of his Britannic majesty. This peace was so firmly adhered to by the czarina, that the king of Denmark dropt all resentment for the indignity done his son. Queen Ulrica Eleonora died in 1741, and king Frederick, her husband, in 1751.

King Adolphus Frederick was elected successor to the throne July 4th, 1743; and on July 17th, 1744, had married princess Louisa Ulrica, third sister to the king of Prussia. In 1751 he entered into the possession of his new dignity, which proved to him a crown of thorns. Through a strange medley of affairs and views of interest, the French had acquired vast influence in all the deliberations of the Swedish senate. The intrigues of the senators forced Adolphus to take part in the late war against Prussia; but as that war was disagreeable not only to the people, but also to the king of Sweden, the nation never made so mean an appearance; and, upon Russia's making peace with the king of Prussia, the Swedes likewise made their peace, upon the terms of leaving things as they stood at the beginning of the war. Adolphus died dispirited in 1771, after a turbulent reign of twenty years; and was succeeded by his son Gustavus III.

The most remarkable transaction of the reign of Gustavus III. is the revolution which took place in the government in 1772, by which the king, from being the most limited, became one of the most despotic monarchs in Europe. Ever since the death of Charles XII. the whole power of the kingdom had been lodged in the states; and this power they had on all occasions most grievously abused. Gustavus therefore determined either to seize on that power of which they made such a bad use, or perish in the attempt. By the power of his eloquence, he obtained the acquiescence of all the military in one day: and on the following morning the terrified senate subscribed with acclamations to fifty-seven new articles of government which he presented to them, lodging their power in his own hand. The power, however, thus obtained, the king employed for the good of his subjects. He took care that the law should be administered with impartiality to the richest noble and the poorest peasant, making a severe example of such judges as were proved to have made justice venal. He gave particular attention and encouragement to commerce, was a liberal and enlightened patron of learning and science, and labored strenuously to introduce into his kingdom the most valuable improvements in agriculture that had been made in foreign countries.

Sweden, history of, until the present time.—Gustavus, while thus active in promoting the arts of peace, was not inattentive to those of war. The fleet and the army he placed on a more respectable footing than they had ever before attained. Of this the war with Russia afforded numerous proofs. It is needless for us to enter into a detail of the particulars of that war, which, as well as the astonishing activity and military skill displayed by the Swedish monarch, are fresh in the memory of all our readers. Suffice it to say, that neither Gustavus Adolphus nor Charles XII. gave greater proofs of undaunted courage and military conduct in their long and bloody wars, than were given by Gustavus III. from the end of 1787 to 1790, when peace was restored between the courts of St. Petersburg and Stockholm. In 1792 he entered into the alliance that was formed against the revolutionary government of France; and to raise an army to co-operate with the emperor and the king of Prussia, he was obliged to negociate large loans, and to impose upon his subjects heavy taxes. The nobles took advantage of that circumstance to prejudice the minds of the people against the sovereign, who had labored so long for their real good. On the 16th of March, 1792, he received an anonymous letter, warning him of his immediate danger from a plot that was laid to take away his life, requesting him to remain at home, and avoid balls for a year. Gustavus, like Cæsar, read the note with contempt, and at a late hour went to a ball that very night. He mingled, without apprehension, among the crowd; and just as he was preparing to retire, in company with the Prussian ambassador, he was surrounded by several persons in masks, one of whom fired a pistol at the back of the king, and lodged the contents in his body. The king languished from the 17th to the 29th of March, when he died with that unshaken courage he had manifested during his life. A few hours before his decease he appointed his brother, the duke of Sudermania, sole regent, till his son, who was then about fourteen, should have attained the age of eighteen. His last words were a declaration of pardon to the conspirators against his life. But his orders in this instance were disobeyed. The assassin Ankarstrom, who had been detected by the pistols and cutlass he dropped, was severely whipped three successive days; on the

last of which his right hand and head were cut off, and his body impaled. Four of his accomplices were beheaded, and others were imprisoned, and some pardoned. Immediately on the death of the king, his son was proclaimed king by the title of Gustavus IV.

Gustavus IV., during his short and unfortunate reign, certainly displayed much of the genius of his illustrious ancestors; but madness was mixed with his genius, and the utmost extravagance of mind with the greatest generosity of intention. His conduct in the unfortunate war which first removed Prussia from the list of European powers, and the singular and unexpected revolution by which his aged uncle, the worthless tool of France, deprived him of his crown, are the most remarkable circumstances of his reign. The unfortunate monarch, with all the fine qualities with which he was adorned, seems to have had in his own country neither friend nor party. He lived for a little while in England, which he quitted suddenly. He then retired to Switzerland, and took the simple name of Gottorp; acquiescing, it would appear, in his own exclusion, and in that of his family. He after this repudiated his wife, became a Moravian in religion, and proposed to marry a young lady of that sect; all evident signs of mental derangement, belying, in a very melancholy manner, the promise of his early years. The election of Bernadotte to be crown prince of Sweden followed; and the war with Russia (2d September 1812). A treaty of peace had been signed between Great Britain, Russia, and Sweden; and lord viscount Cathcart went out as British ambassador to Russia, and Mr. Thornton to Sweden. An expedition was then prepared, in concert with Great Britain and Russia, under the crown prince (Bernadotte), in Sweden, with the view of attacking Buonaparte in his rear.

It seems that the election of Bernadotte as crown prince or successor to the throne was without any intrigues on his own part, but certainly without any on the part of the French emperor (who was jealous of this success of his protegée), chiefly on account of the reputation he had acquired through the north of Europe, by his wise and humane conduct in the government of Hanover. On the demise of Charles XIV., after his co-operation with the allies in the deliverance of Europe, Bernadotte mounted the throne, and succeeded in uniting Sweden and Norway under his government, and in establishing in his family the succession to the crown

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SWEDENBORG (Emanuel), was born at Stockholm, in Sweden, January 29th, 1688. His father, Jesper Swedberg, was bishop of Skara, in West Gothland, a member of the society for the propagation of the gospel, formed on the plan of that in England, and president of the Swedish churches in England and America. The subject of this memoir, Emanuel, was ennobled by queen Ulrica Eleonora in 1719 and named Swedenborg. His youth was remarkable for uncommon assiduity and application in the usual exercises of that age. A son of the bishop of Skara could not fail to have a good and careful education, suitable to the manner of the times in which he lived. He was placed in the road to useful and extensive knowledge; and he advanced with a speed and success rarely witnessed. In 1709, when little more than twenty years of age, he published at Upsal a small collection of maxims, from Seneca and others, with the following title: L. Annæi Senecæ et Pub. Syri Mimi, forsan et aliorum, Selectæ Sententiæ, &c., which was applauded as a remarkable production for a young man. In 1710 he published at Skara a superior collection of pieces on different subjects, in Latin verse, under the title of Ludus Heliconius, sive Carmina Miscellanea, quæ variis in locis cecinit Emanuel Swedberg. The same year he began his travels, first into England, afterwards into Holland, France, and Germany. On his return, in 1714, from his first voyage, he applied himself chiefly to mathematics and physics, in which he soon became so distinguished a proficient that he was made the associate of the celebrated Polhammar, in the superintendance of the construction of public works; and two years afterwards was appointed assessor extraordinary to the Royal College of Mines by Charles XII., who honored him with frequent conversations, and bestowed upon him a large share of his favor. In 1716, at the age of twenty-eight years, he published essays and observations on the mathematical and physical sciences, under the title of Dædalus Hyperboreus. In 1718 he executed a work of the greatest importance at the time of the siege of Frederickshall, where he gave evident proof of his extraordinary abilities. Charles could not send his heavy artillery to Fredericks-hall, on account of the badness of the roads, which were then deeply covered with snow. In this extremity Swedenborg brought the sciences to the aid of valor. By help of proper instruments he cut through the mountains, raised the valleys which separated Sweden from Norway, and then sent to his master two galleys, five large boats, and a sloop, loaded with pieces of artillery, to be employed in the siege. The length of this canal was about two miles and a half, Swedish measure, or upwards of sixteen miles English. Mechanism, however, was not his only study; for he gave the Continuation of his Dædalus Hyperboreus in 1717 and 1718; and in the latter year an introduction to algebra, under the title of The Art of the Rules. He is said to have been the first person in Sweden who wrote on the subject of the integral and differential calculus.

Having lost his patron Charles XII. at the siege of Frederickshall, he was taken under the protection of queen Ulrica Eleonora, the sister and successor of that hero; and, in 1719, he was ennobled by her and named Swedenborg, as before observed; from which time he took his seat with the nobles of the equestrian order in the Triennial assemblies of the states. But his elevation to this rank did not lessen his ardor for the sciences;

for he published in the same year A Method to fix the Value of Money, and to determine the Swedish Measures in such a Way as to suppress all the Fractions, and to facilitate the Calculations. About the same time he gave the public a treatise On the Position and Motion of the Earth and the other Planets; with another On the Height of the Tides and the Flux and Reflux of the Sea; which, from information gathered in different parts of Sweden, appeared to have been greater formerly than when he wrote. From some experiments, of which he published an account, he concluded, agreeably to a well-established fact, that the earth is flatter at the poles than at the equator. The three last-mentioned works are said to have been printed in the Swedish language.

Assiduous in his attention to the duties of his office, as assessor of the mines, Swedenborg undertook a second journey into foreign countries, to examine their mines and smelting-works, particularly those of Saxony and Harts. He was particularly noticed at this time by the duke of Brunswick, who did much to facilitate his labors. During these travels, which were undertaken for the improvement of the manufactures of his native country, he printed the following tracts, viz. 1. Prodromus Principiorum Naturarium, sive Novorum Tentaminum, Chemiam et Physicam, experimentalem geometricè explicandi. 2. Nova Observata et Inventa circa Ferrum et Ignam præcipua Naturam Ignis Elementorum, una cum nova Camini inventione. 3. Methodus nova inveniendi Longitudines locorum, terra marique, ope Lunæ. 4. Modus construendi Receptacula Navalia, vulgo en Suedois, Dockybygnadder. 5. Nova constructio Aggeris Aquatici. 6. Modus explorandi Virtutes Navigiorum. 7. Miscellanea Observata circa res Naturales, præsertim Mineralia, Ignem, et Montium Strata. The first six of these tracts were printed at Amsterdam in 1721, and the last at Leipsic and Hamburg in 1722. Few literary men have ever performed so much in so short a time. After his return home in 1722 Swedenborg did not remain idle, but so equally divided his time between the duties of his office, as metallic assessor to the Royal College, and his private studies, that in 1733 he finished his grand work, entitled Opera Philosophica et Mineralia, and had it printed under his own direction in 1734, part at Dresden and part at Leipsic; in which year he also went to inspect the mines of Austria and Hungary. This work is divided into three volumes folio: the title of the first is Principia Rerum Naturalium, sive Novorum Tentaminum, Phænomena Mundi Elementaris philosophicè explicandi; the second Regnum Subterraneum sive Minerale de Ferro; and the third Regnum Subterraneum sive Minerale de Cupro et Orichalco; all of them written with great strength of judgment, and ornamented with 155 copper plates, to facilitate the comprehension of the text. The first volume treats of elementary principles; of magnetism, and the variations of the magnetic needle; of the sun and its vortex, the origin of the planetary bodies, and of paradise and the first man. It is remarkable that, in treating on the origin of the planets in our solar system, he makes express mention of seven primary ones besides the moon and the other satellites. This was more than forty years before the discovery of the seventh planet by Dr. Herschel. The second and third volumes treat on mineralogy, and are generally termed Swedenborg's Regnum Minerale. The professor of natural philosophy in the university of Pennsylvania, R. M. Patterson, observes on this work, that 'it is an extraordinary production of one of the most extraordinary men, certainly, that ever lived. Many of the experiments and observations on magnetism, presented in this work, are believed to be of much more modern date, and are unjustly ascribed to much more recent writers.' Indeed it has been frequently remarked, by other learned men, that several important discoveries in science, claimed by different writers, were anticipated, and in some cases minutely described, by Swedenborg.

His name had now been most deservedly enrolled among the academicians at Upsal, Stockholm, and Petersburg; and several distinguished foreigners were anxious to have the honor and advantage of corresponding with him. Wolfius, with many other learned men, valued his correspondence and consulted him on the most difficult subjects. The editors of the Acta Eruditorum, at Leipsic, found in his works a rich harvest to ornament their collection with. The authors, also, of the magnificent Description of Arts and Trades, which are carried on at Paris, found the second part of Swedenborg's work on iron and the preparation of steel, which abounds with valuable information, of so much consequence, that they translated and inserted the whole in their collection of the best things written on these subjects.

After the year 1737 he made eight different voyages into foreign parts, particularly England and Holland. He visited France and Italy; spent some time at Venice and Rome; and on his return published an account of his travels. Besides the works already mentioned Swedenborg was the author of the following. 1. Prodromus Philosophiæ ratiocinantis de Infinito, de Causa Creationis, et de Mechanismo Operationis, Animæ et Corporis; printed at Dresden in 1733. 2. Œconomia Regni Animalis; in two parts, the first printed at Amsterdam in 1740, and the second in 1741. 3. Regnum Animale: in three parts; the first two printed at the Hague in 1744; and the third in London in 1746. 4. De Cultu et Amore Dei; London, 1745.

In the two works entitled Œconomia Regni Animalis and Regnum Animale, the author made many important discoveries in anatomy, and in the circulation of the blood: but, owing to the little pains taken to circulate his philosophical and scientific writings, those discoveries are not generally known to belong to him. The treatise De Cultu et Amora Dei is also an extraordinary work. It is in two parts, the first of which traces the origin of the earth from the sun; then treats of paradise; and of the birth, infancy, and love of the first man, or Adam. The second part treats of the marriage of the first man; of the soul; of the intellectual spirit; of the state of integrity, and of the image of God. The existence of a seventh primary planet in our solar

system is again noticed in this little work, which was published about thirty-five years before the discovery made by Dr. Herschel.

Having thus given an account of the principal works, which Swedenborg published before he undertook to write on theology, it will now be proper to state that about this time, 1743 or 1744, an extraordinary change seems to have taken place in his studies and pursuits. His views were directed to subjects which he conceived to be of infinitely greater importance than those of mere literature and science. By many persons the reputation which baron Swedenborg acquired as a philosopher, and the high consideration in which he was held by the public academies of Europe, and by learned men of all nations, would have been prized almost beyond measure: but by him they were not so regarded, when he came to enter upon that new scene which he now states to have opened before him. 'Whatever of worldly honor and advantage,' says he, 'may appear to be in the things beforementioned, I hold them but as matters of low estimation, when compared to the honor of that holy office to which the Lord himself hath called me, who was graciously pleased to manifest himself to me, his unworthy servant, in a personal appearance, in the year 1743; to open in me a sight of the spiritual world, and to enable me to converse with spirits and angels; and this privilege has continued with me to this day. From that time I began to print and publish various unknown Arcana, that have been either seen by me or revealed to me, concerning Heaven and Hell, the state of man after death, the true worship of God, the spiritual sense of the Scriptures, and many other important truths tending to salvation and true wisdom. And that mankind might receive benefit from these communications, was the only motive which has induced me at different times to leave my home to visit other countries. As to this world's wealth I have what is sufficient; and more I neither seek nor wish for.'

The extraordinary event, or impression of his mind, here related, was followed by a series of theological publications, which have no parallel in the annals of Christianity. We give the titles of them in the order in which they appeared; and as they have obtained in the world no small notice, even among persons of sound judgment and most amiable dispositions, we shall allow them to stand on their own merits, and leave the reader to form his own opinion of the nature of their contents. 1. Arcana Cælestia, or Heavenly Mysteries, contained in the sacred Scriptures, or word of the Lord: being an explanation of the spiritual sense of the books of Genesis and Exodus; interspersed with relations of wonderful things seen in the world of spirits, and the heaven of angels. In 8 vols. 4to. London, 1749 to 1756. 2. De Cœlo et Inferno, ex Auditis et Visis; a treatise concerning heaven and hell, and the wonderful things heard and seen there, London, 1758. 3. De Nova Hierosolyma, et Ejus Doctrina Cœlesti; concerning the New Jerusalem, and its heavenly doctrines; London, 1758. 4. De Ultimo Judicio, et Babylonia Destructa; concerning the last judgment, and the destruction of Babylon; London, 1758 5. De Equo Albo, de quo in Apocalypsi; concerning the white horse mentioned in the Revelation; London, 1758. 6. De Telluribus in Mundo nostro Solari, quæ vocantur Planetæ; et de Telluribus in Cœlo Astrifero; deque illarum Incolis, &c.; concerning the earths in our solar system, and in the starry heaven; with an account of their inhabitants, &c.; London, 1758. 7. Doctrina Novæ Hierosolymæ de Domino; the doctrine of the New Jerusalem, concerning the Lord; Amsterdam, 1763. 8. Doctrina Novæ Hierosolymæ de Scriptura Sacra seu Verbo Domini; the doctrine of the New Jerusalem concerning the sacred scripture or word of the Lord; Amsterdam, 1763. 9. Doctrina Vitæ pro Nova Hierosolymæ, ex Præceptis Decalogi; the doctrine of life for the New Jerusalem, from the precepts of the decalogue; Amsterdam, 1763. 10. Doctrina Novæ Hierosolymæ de Fide; the doctrine of the New Jerusalem concerning faith; Amsterdam, 1763. 11. Continuatis de Ultimo Judicio, et de Mundo Spirituali; continuation concerning the last judgment, and concerning the spiritual world; Amsterdam, 1763. 12. Sapientia Angelica de Divina Amore et Divina Sapientia; angelic wisdom concerning divine love and divine wisdom; Amsterdam, 1763. 13. Sapientia Angelica de Divina Providentia; angelic wisdom concerning divine providence; Amsterdam, 1764. 14. Apocalypsis Revelata; the apocalypse revealed; Amsterdam, 1766. 15. Delitiæ Sapientiæ de Amore Conjugiali, &c.; the delights of wisdom concerning conjugal love; after which follow the pleasures of insanity concerning scortatory love; Amsterdam, 1768. 16. Sumonaria Expositio Doctrinæ Novæ Ecclesiæ; a brief exposition of the doctrine of the new church; Amsterdam, 1769. 17. De Commercio Animæ et Corporis; concerning the intercourse between the soul and body; Amsterdam, 1769. 18. Vera-Christiana Religio, continens Universalem Theologian Novæ Ecclesiæ; Amsterdam, 1771.

These works have all been translated into English, and circulated very extensively both in Great Britain and America. The author left behind him many other works in MS., of which the following have been printed:—1. Coronis seu Appendix ad Veram Christianam Religionem; a coronis or appendix to the true Christian religion; London, 1780. 2. Clavis Hieroglyphica Arcanorum Naturalium et Spiritualium, &c.; an hieroglyphic key to natural and spiritual mysteries, by way of representations and correspondences; London, 1784. 3. Summaria Expositio Sensus Interni Librorum Propheticorum Verbi Veteris Testamenti, necron et Psalmorum Davidis; a summary exposition of the internal sense of the prophetical books of the Old Testament, and of the Psalms of David; London, 1784. 4. Apocalypsis Explicata secundum Sensum Spiritualem; the apocalypse explained according to the spiritual sense; 4. vols. 4to., London, 1785 to 1789.

Sublime things are announced by all these titles; and though the works are many, and embrace a great variety of subjects, they all assume to be connected by one chain of argument and illustration. The application requisite to pro-

duce so many and such important works, not allowing him to continue the necessary functions of his office as assessor, beyond the year 1747, he resigned his situation in the Royal College, and obtained in the same year permission from the king to retire, and to retain his salary as an appointment for life, without any prejudice to his title and rank. He assisted as a member of the house of nobles during several diets; and his behaviour was such as to procure him universal esteem and respect. He was honored with the favor and particular kindness of the kings who reigned during his time; and all who had the happiness of enjoying his company soon became sensible of his superior wisdom, erudition, and virtue. The rules of life which he laid down for his own practice, and which after his death were found placed and repeated in various parts of his MSS., bespeak a temper of mind truly Christian, and are well worthy of being universally observed. These were, 1. 'To read often, and to meditate well on, the word of the Lord. 2. To be always resigned and content under the dispensations of Providence. 3. Always to observe a propriety of behaviour, and to preserve the conscience clear and void of offence. 4. To obey that which is ordained; to be faithful in the discharge of the duties of our employment; and to do every thing in our power to render ourselves as universally useful as possible.'

Of the particular circumstances connected with the appointment of this extraordinary man to the office, which he says he was called by the Lord to perform, we have no account that can be depended upon but that which he has himself given in several of his printed works, particularly in his work entitled True Christian Religion, in the chapter on the consummation of the age, the coming of the Lord, and the new heaven and new church, n. 779, 780; from which we quote the following passage:—'That this second coming of the Lord is effected by the instrumentality of a man (meaning himself), before whom he hath manifested himself in person, and whom he hath filled with his spirit, to teach from him the doctrines of the new church by means of the word.—Since the Lord cannot manifest himself in person (to the world), as was shown above, and yet he foretold that he would come and establish a new church, which is the New Jerusalem, it follows that he will effect this by the instrumentality of a man, who is able not only to receive the doctrines of that church in his understanding, but also to publish them in print. That the Lord hath manifested himself before me his servant, and sent me on this office, and that afterwards he opened the sight of my spirit and thereby let me into the spiritual world, and granted me to see the heavens and the hells, and also to converse with angels and spirits, and this now continually for several years, I testify in truth; and farther, that from the first day of my call to this office, I never received any thing appertaining to the doctrines of that church from any angel, but from the Lord alone, whilst I was reading the word. To the end that the Lord might be constantly present, he revealed to me the spiritual sense of his word, in which sense divine truth is in its light, and in this light he is continually present.' A similar statement is made in n. 851 of the same work, where he asserts, 'that the privilege of conversing with angels and spirits had continued with him for twenty-seven years,' that is, from 1743 to 1770, when he wrote that work two years before his death!

The following are, according to one of his respectable followers, the chief articles of doctrine deducible from the whole of baron Swedenborg's Theological Writings, viz. 1. That Jehovah God, the creator and preserver of heaven and earth, is a Being of infinite love, wisdom, and power, that he is one in essence and in person, in whom nevertheless is a divine trinity, consisting of Father, Son, and Holy Spirit, like soul, body, and operation in man; and that the Lord and Saviour Jesus Christ is that God. 2. That Jehovah God himself came down from heaven as divine truth, which is the word, and took upon him human nature, for the purpose of subduing and removing the powers of darkness, of restoring the spiritual world to order, of preparing the way for a new church upon earth, and thus of accomplishing the great work of redemption: that through the process of sufferings and temptations he also glorified his humanity by uniting it with his essential divinity; and that all who believe in him from the heart, with the understanding, and in the life, will be saved. 3. That the word of the Lord, or sacred Scripture, was written by divine inspiration; that it contains an internal spiritual sense for the use of angels in heaven, and an external natural sense for the use of men upon earth; and that in each sense it is holy and divine. That these two senses, the spiritual and the natural, are united by correspondences, like soul and body; and thus that the word is the medium of communication with heaven, and of conjunction with the Lord. 4. That all evils, whether of affection, of thought, or of life, ought to be shunned as sins against God, because they proceed from the devil, that is, from hell, and destroy in man the capacity of enjoying the happiness of heaven. But that, on the other hand, good affections, good thoughts, and good actions, ought to be cherished and performed, because they are of God, and from God; and that every act of love and charity, of justice and equity, both towards society in general and towards individuals in particular, ought to be done by man as of himself, nevertheless under the acknowledgment and belief that they are really and truly from the Lord, operating in him and by him. 5. That man, during his abode in the world, is kept in a state of spiritual equilibrium between heaven and hell, or good and evil, in consequence of which he enjoys free-will in spiritual as well as natural things, and has the capacity either of turning himself to the Lord, or of separating himself from the Lord; that so far as he does the work of repentance, and lives in charity according to the truths of faith, so far his sins are remitted, that is to say, so far his evils are removed; and in the same proportion also he is regenerated, or created anew by the Lord. 6. That man is not life in himself, but only a recipient of life from the Lord, who alone is life in himself; which life is communicated by influx to all in the spiritual world, whether

belonging to heaven or to hell, and to all in the natural world; but is received differently by each according to the quality of the recipient subject. 7. That adequate means of salvation are, by the divine mercy and providence of the Lord, extended to all of the human race without exception; and consequently that men of every persuasion or denomination upon the face of the earth, whether they be Christians, Jews, Mahometans, or Pagans, may be saved, if they live in mutual love and charity from religious motives, according to the best of their knowledge and understanding. But that nevertheless the new and true Christian religion, inasmuch as it is more immediately derived from our Lord and Saviour Jesus Christ, who is the One only God of heaven and earth, is of all religions the most capable of effecting close and intimate conjunction with him; and on that account is to be esteemed more excellent, more heavenly, and more divine, than any other. 8. That every event or occurrence in human life, whether of prosperity or of adversity, is under the immediate superintendance and direction of the Divine Providence; and that nothing does or can befal man, either in his collective or in his individual capacity, but what even in the most minute, as well as in the more important circumstances attending it, is made to contribute in a way known only to infinite wisdom, to the final benefit and advantage of those who love and obey the Lord. 9. That immediately on the death of the material body, which will never be reassumed, man rises again as to his spiritual or substantial body, wherein he exists in a perfect human form, with every faculty which he before enjoyed; and that his eternal state, as to happiness or misery hereafter, will altogether depend on the quality of his past life, whether it has been good or evil. 10. But that with respect to children dying before they come to the use of reason, and the exercise of their own judgment, all such, whether baptised or unbaptised, whether within the Christian church or without it, and whether they be the offspring of godly or of ungodly parents, are received into heaven by the Lord, and after instruction, or improvement in understanding and wisdom, participate in all the happiness and perfection of angels. 11. That there is not in the universal heaven a single angel that was created such at first, nor a single devil in all hell that had been created an angel of light, and was afterwards cast out of heaven; but that all both in heaven and in hell are of the human race, in heaven such as had lived in the world in heavenly love and faith, and in hell such as had lived altogether according to the principles of self-love and the love of the world. 12. That true conjugal love, which can only exist between one husband and one wife, is a primary characteristic of the new church, being grounded in the marriage or conjunction of good and truth, and corresponding with the marriage of the Lord and his church; and therefore it is more celestial, spiritual, holy, and pure, than any other love in angels or men. 13. That baptism and the holy supper are sacraments of divine institution, and are to be permanently observed; baptism being an external medium of introduction into the church, and a sign representative of man's purification and regeneration; and the holy supper being an external medium, to those who receive it worthily, of introduction, as to spirit, into heaven, and of conjunction with the Lord, of which it is also a sign and seal. 14. That the last judgment, so frequently spoken of in the gospels, and in the Apocalypse, being a separation of the evil from the good in the spiritual world, where heretofore they had been collected and mixed in society together, from the time of the Lord's first advent into the world till the time of his second advent, was actually accomplished in the year 1757; when the former heaven and the former earth, or the old church, passed away according to the Scriptures, and the foundation of a new church was laid, wherein all things are become new. 15. That therefore, as an act of mercy towards the human race, which would otherwise have perished in eternal death, the second advent of the Lord has already taken place and still continues in the present day; being a coming not in person, but in the power and glory of the spiritual sense of his holy word, as demonstrated in the theological writings of his servant Emanuel Swedenborg: and thus that the holy city, New Jerusalem, is now descending from God out of heaven, prepared as a bride adorned for her husband.

'In addition to these articles of doctrine,' says the gentleman to whom we are indebted for the above summary, 'there are many other important subjects contained in the writings of Swedenborg. The doctrine of correspondences is one, according to which, he says, the whole of the Sacred Scriptures is written, and without a knowledge of which its true and genuine sense cannot possibly be understood. This doctrine he represents as having been 'hidden now for some thousands of years, viz. ever since the time of Job; at which time, and in the ages before it, the science of correspondences was esteemed the chief of all sciences, being the fountain of wisdom to man, because it was the fountain of knowledge concerning spiritual things relating to heaven and the church; but, by reason of its being perverted to idolatrous purposes, it was so obliterated and destroyed, by the divine providence of the Lord, that no traces of it were left remaining: that nevertheless it is at this time again revealed by the Lord, in order to effect a conjunction of the members of the church with him, and their association with the angels, which purposes are effected by the word, in which all and every thing are correspondences.'

He further declares 'that there is a sun in the spiritual world distinct from the sun of the natural world; that the former sun is pure love, and the latter sun pure fire; that therefore whatever proceeds from the spiritual sun, by reason of its being pure love, hath something of life in it, and whatever proceeds from the natural sun, by reason of its being pure fire, hath in it nothing of life; that hence ariseth the distinction between what is spiritual, and what is natural,' the one not being a refinement, attenuation, or exaltation of the other, in the way of continuous degrees, from grosser to purer of the

same order, but a discreetly distinct and superior order of things, just as the light of truth in the mental eye is discreetly distinct from the light of the sun or of a candle in the bodily eye; 'which distinction heretofore unknown (or at least not properly attended to) is now revealed, together with the source of that light which enlighteneth the human understanding with wisdom, and the source of that heat which kindleth love in the human will.'

He also affirms 'that the planets in our solar system are inhabited by human beings, nay, that millions of planetary bodies, revolving about other suns in the starry heavens, are in like manner the abodes of men, and that he himself has actually been permitted to visit many of them, not in body, but in spirit. The manner in which he explains this subject is really curious, and well worthy of notice. He states that, in consequence of his intercourse with angels and spirits for many successive years of his life, he discovered that distances in the spiritual world are not like distances here on earth, but are altogether according to the several states of the interiors of the inhabitants. They who are in a similar state are together in one society, and in one place; for all presence is caused by similitude of state, and all distance by dissimilitude of state. Hence to be present with any spirit or angel, whether he be from this earth, or from any other earth in the universe, it is only requisite to be in a similar state with such spirit or angel as to the interiors of the mind, that is, as to the interior affections and thoughts. And in this way, he says, it is as possible for the spirit of a man still living in the body, whose interiors are open to heaven, to be led by the Lord into a similitude of state with the spirits and angels from other earths or planets, and even with the inhabitants themselves, as with the spirits, angels, and distant inhabitants of this earth. Now when the interior faculties of a man are so far opened as to enable him to see and converse with spirits and angels (which however is a rare case in the present day, owing to causes which need not be here stated), then such spirits and angels as are present with him (and every man is surrounded with beings of this description) can see through his eyes the natural objects of this world and hear through his ears the conversation that passes among men; which they cannot otherwise do. So, again, the man whose interiors are open may, by being brought into a similar state with an inhabitant of some distant earth, in like manner see through the eyes of such inhabitant, if his interiors are open, the natural objects of his world, and hear through his ears the natural sounds there produced.

This doctrine of the possibility of man's seeing and conversing with spirits and angels, Swedenborg confirms by a variety of testimonies from the sacred Scriptures, particularly by the cases of Abraham and Sarah, Lot, the inhabitants of Sodom, Joshua, Gideon, Manoah and his wife, Zacharias, Mary, John, and many others, who all saw and conversed with angels as with men. He adds also his own experience, saying, 'Inasmuch as it hath been granted me by the Lord to be at one and the same time in the spiritual world and in the natural world, and thereby to converse with angels as with men, and thus to become acquainted with the states of those who, after death, flock together into that heretofore unknown world (for I have conversed with all my relations and friends, and likewise with kings and princes, and men of learning, after their departure out of this life, and this now for twenty-seven years without interruption), therefore I am able to describe the states of men after death, from lively experience, both in relation to such as have lived good lives, and such as have lived evil.' He then goes on to describe the successive states of those after death who had confirmed themselves in false doctrines, by a misapplication and perversion of the sacred Scriptures. See True Christian Religion, n. 281.

We select another passage from the same work, n. 792, 794, for the information of the reader, which, with the other peculiarities taught by Swedenborg will furnish a just view of the nature of his publications, and the extraordinary character of the writer. 'With respect to the state and nature of a future life, mankind have heretofore remained in the dark: it has been generally believed that man after death is a mere soul, and the common idea concerning such soul has been that it is something like ether, or air, consequently that it is like the breath which goes out of a man's body when he dies, in which nevertheless there resides some vital principle. But then it has been conceived that this vital principle neither has the faculty of seeing, such as belongs to the eye, nor of hearing, such as belongs to the ear, nor of speaking, such as belongs to the organs of speech: when nevertheless man after death is as much a man as he was before, and so little changed that he does not know but he is still living in the former world; for he sees, hears, and speaks, as in the former world; he walks, runs, and sits, as in the former world; he lies down, sleeps, and wakes, as in the former world; he eats and drinks, as in the former world; he enjoys conjugal delight, as in the former world; in a word, he is a man in all and every respect. From which circumstances it is evident that death is not an extinction but a continuation of life, and consequently that it is only a passage from one state to another.—In consequence of what I have seen, and been an eye-witness of for many years together, I can assert the following facts relating to the spiritual world; that there are earths in that world, just as in the natural world, and that there are also plains and valleys, mountains and hills, fountains and rivers; that there are paradises, gardens, groves, and woods; that there are cities, with palaces and houses contained therein; also that there are writings and books, employments and merchandises; and that there are gold, silver, and precious stones; in a word, that there is in the spiritual world all and every thing that is in the natural world, but that in heaven such things are in an infinitely more perfect state. The difference is, that all things which are seen in the spiritual world are created in a moment by the Lord, as houses, paradises, meats, and other things, and that they

are created according to a correspondence with the interiors of angels and spirits, that is, of their affections and thoughts; whereas all things that are seen in the natural world begin to exist and grow from seed.'

The Rev. Thomas Hartley, formerly rector of Winwick, in Northamptonshire, who was personsonally acquainted with Swedenborg, describes his character as follows:—'The extensive learning displayed in his writings evinces him to be the scholar and the philosopher; and his polite behaviour and address bespeak the gentleman. He affects no honor, but declines it; pursues no worldly interest, but spends his substance in travelling and printing, in order to communicate instruction and benefit to mankind; and he is so far from the ambition of heading a sect, that, wherever he resides on his travels, he is a mere solitary, and almost inaccessible, though in his own country of a free and open behaviour. He has nothing of the precisian in his manner, nothing of melancholy in his temper, and nothing in the least bordering upon the enthusiast in his conversation or writings; in the latter of which he delivers facts in the plain style of narrative, speaks of his conversation with spirits and angels with the same coolness that he treats of earthly things, as being alike common to him; he proves all points of doctrine from Scripture testimony; always connects charity and a good life with true faith; and is, upon the whole, the most rational divine I ever read.'—Hartley's Preface to the Intercourse between the Soul and Body. He died at his lodgings in Great Bath Street, Cold Bath Fields, Clerkenwell, London, on the 29th of March 1772, in the eighty-fifth year of his age; and, after lying in state at an undertaker's, his remains were deposited in a vault under the Swedish church in Prince's Square, Ratcliff Highway.

SWEDENBORGIANS, or, as they call themselves, the Members of the New Jerusalem Church, are the followers of Emanuel Swedenborg, a Swedish nobleman, distinguished by his writings as a philosopher and theologian; for an account of whom, and the doctrines taught by him, see the preceding article. During the lifetime of this author, and for some years after his death, it appears that only a few individuals in his own country, and still fewer in England, cordially embraced his doctrines. In 1782, however, a society of gentlemen was formed in Manchester, for the purpose of translating, printing, and publishing the author's works in English; and the next year, 1783, a similar society was formed in London. But it was not till the year 1788 that the followers of Swedenborg instituted public worship separately from the other professors of Christianity: in that year they opened a chapel in Great East Cheap, London, as members of the New Jerusalem Church; and their doctrines soon began to excite very general attention. In a few years societies were formed in different parts of Great Britain, and numerous places of worship have either been erected or engaged by them in some of the principal towns, as well as villages, throughout the kingdom. It is supposed there are many thousands in England, Scotland, and Ireland, who profess baron Swedenborg's doctrines; and it is well known that his writings have obtained a favorable reception among many distinguished and well-informed persons in France, Holland, Germany, Sweden, Denmark, Russia, Poland, North and South America, the West India Islands, the East Indies, and other distant parts of the globe. In England the admirers of his system use a printed liturgy, and have appropriate forms for baptism, the holy supper, and other rites of the church, whereby uniformity of worship is established among them. They also hold annual conferences of the ministers and other members of their church; and, on the whole, they appear to be in a prosperous condition. They have among them writers of eminence, who have distinguished themselves by their successful vindications of the character and writings of Swedenborg against the various attacks that have from time to time been made against them. The Rev. John Clowes, rector of St. John's Church, Manchester, the translator of many of the baron's works, and the able advocate of the New Jerusalem doctrines, completely refuted the calumnies brought against the noble author by the abbé Barruel. Mr. Robert Hindmarsh, also of London, formerly printer extraordinary to his royal highness the prince of Wales, and afterwards George IV., succeeded in answering Dr. Priestley, Mr. Wesley, and some others. And the Rev. Samuel Noble, minister of the New Jerusalem church in Cross Street, Hatton Garden (late the Caledonian Asylum, where Mr. Irving formerly officiated), has been said to be equally successful in silencing the ungenerous and ill-founded attacks which have been more recently directed against the doctrines of the New Jerusalem. Besides these writers, many others might be named, whose varied productions are held in high estimation, and do credit to the cause which they are intended to serve.

SWEEP, *v. a.*, *v. n.*, & *n. s.*
SWEEP'INGS, *n. s.*
SWEEP'NET,
SWEEP'STAKE,
SWEEP'Y, *adj.*
} *Part*, & *part. pass.*, swept. Sax. ȝpapan; Swed. *swepa.* To drive away with a besom; to clean with a brush or besom: hence to carry off; carry with pomp or parade: pass with violence or pomp: the act or instrument of sweeping; violent destruction; direction of any particular motion; compass: the sweepings are that which is swept away: sweepnet, a net that sweeps all: sweepstake, a man that wins all: sweepy is far-reaching; passing with great speed or violence.

The river Kishon *swept* them away. *Jud.* v.

A poor man that oppresseth the poor, is like a *sweeping* rain which leaveth no food.
Prov. xxviii. 3.

What woman, having ten pieces of silver, if she lose one, doth not *sweep* the house, and seek diligently till she find it? *Luke*, xv. 8.

The blustering winds striving for victory *swept* the snow from off the tops of those high mountains, and cast it down into the plains in such abundance that the Turks lay as men buried alive.
Knowles's History.

Let frantic Talbot triumph for a while,
And, like a peacock, *sweep* along his tail.
Shakspeare. Henry VI

Though I could,
With barefaced power, *sweep* him from my sight,
And bid my will avouch it; yet I must not.
Shakspeare.

She *sweeps* it through the court with troops of ladies,
More like an empress than duke Humphrey's wife.
Id.

Is 't writ in your revenge,
That *sweepstake* you will draw both friend and foe,
Winner and loser? *Id.*

She was a *sweepnet* for the Spanish ships, which happily fell into her net. *Camden.*

Cowen in her course
Towards the Sabrinian shores, as *sweeping* from her source,
Takes Towa. *Drayton.*

In countries subject to great epidemical *sweeps*, men may live very long; but, where the proportion of the chronical distemper is great, it is not likely to be so. *Graunt.*

Flying bullets now
To execute his rage appear too slow;
They miss or *sweep* but common souls away;
For such a loss Opdam his life must pay. *Waller.*

My looking is the fire of pestilence,
That *sweeps* at once the people and the prince.
Dryden.

I have already *swept* the stakes, and with the common good fortune of prosperous gamesters can be content to sit. *Id.*

Before tempestuous winds arise,
Stars shooting through the darkness gild the night
With *sweeping* glories, and long trails of light. *Id.*

They rush along, the rattling woods give way,
The branches bend before their *sweepy* sway. *Id.*

A door drags, when, by its ill hanging on its hinges, or by the ill boarding of the room, the bottom edge of the door rides in its *sweep* upon the floor. *Moxon's Mechanical Exercises.*

A torrent swelled
With wintry tempests, that disdains all mounds,
Breaking away impetuous, and involves
Within its *sweep*, trees, houses, men. *Philips.*

To *sweep* fame, power, and wealth away;
The past is all by death possest,
And frugal fate that guards the rest,
By giving, bids them live to-day. *Fenton.*

Having made one incision a little circularly, being a second, bringing it with an apposite *sweep* to meet the other. *Sharp.*

Descend, ye nine; descend, and sing;
The breathing instrument inspire,
Wake into voice each silent string,
And *sweep* the sounding lyre. *Pope.*

A duke holding in a great many hands, drew a huge heap of gold; but never observed a sharper, who under his arm *swept* a great deal of it into his hat. *Swift.*

Should this one broomstick enter the scene, covered with dust, though the *sweepings* of the finest lady's chamber, we should despise its vanity. *Id.*

SWEET, *adj.* & *n. s.*
SWEET'BREAD, *n. s.*
SWEET'BRIAR,
SWEET'EN, *v. a.* & *v. n.*
SWEETEN'ER, *n. s.*
SWEET'HEART,
SWEET'ING,
SWEET'ISH, *adj.*
SWEETLY, *adv.*
SWEET'MEAT, *n. s.*
SWEET'NESS.

Sax. ꝑꝑeꞇe; Belg. *zoet;* Dan. *soed;* Goth. *soet;* Lat. *suavis.* Luscious to the taste or smell; eye or ear; soft; mild; gentle; grateful; something pleasing to a sense, or the senses; a word of endearment; a perfume: sweetbread is the pancreas of a calf: sweet briar, a fragrant shrub: to sweeten is, to make sweet, mild, or kind; to palliate; reconcile; soften: and, as a verb neuter, to grow sweet: sweetener corresponds: sweetheart is a lover or mistress: sweeting, a particularly sweet apple; a term of endearment: sweetish, somewhat sweet: sweetly, in a sweet manner; delicately: sweetmeat, a sweet preserve: sweetness, the quality of being sweet; lusciousness; mildness; agreeableness.

The best wine for my beloved goeth down *sweetly.*
Cant.

The right form, the true figure, the natural colour that is fit and due to the dignity of a man, to the beauty of a woman, to the *sweetness* of a young babe. *Ascham.*

A child will chuse a *sweeting*, because it is presently fair and pleasant, and refuse a runnet, because it is then green, hard, and sour. *Id. Schoolmaster.*

She, the *sweetness* of my heart, even *sweetening* the death which her *sweetness* brought upon me. *Sidney.*

Mopsa as glad as of *sweetmeats* to go of such an errand, quickly returned. *Id.*

Balm his foul head with warm distilled waters,
And burn *sweet* wood, to make the lodging *sweet.*
Shakspeare.

Heaven bless thee;
Thou hast the *sweetest* face I ever looked on. *Id.*

Let me report to him
Your *sweet* dependency, and you shall find
A conqueror that will pray in aid of kindness. *Id.*

Pluck out
The multitudinous tongue, let them not lick
The *sweet* which is their poison. *Id. Coriolanus.*

Sweet! leave me here a while;
My spirits grow dull, and fain I would beguile
The tedious day with sleep. *Shakspeare.*

Give me an ounce of civet to *sweeten* my imagination. *Id. King Lear.*

Mistress, retire yourself
Into some covert; take your *sweethearts,*
And pluck o'er your brows. *Shakspeare.*

Trip no further, pretty *sweeting;*
Journies end in lovers meeting. *Id.*

Where a rainbow hangeth over or toucheth, there breatheth a *sweet* smell; for that this happeneth but in certain matters which have some *sweetness*, which the dew of the rainbow draweth forth. *Bacon.*

Time changeth fruits from more sour to more *sweet;* but contrariwise liquors, even those that are of the juice of fruit, from more *sweet* to more sour. *Id. Natural History.*

For March come violets and peach-tree in blossom, the cornelian-tree in blossom, and *sweetbriar.*
Bacon.

Where a wasp hath bitten in a grape, or any fruit, it will *sweeten* hastily. *Id. Natural History.*

This honey tasted still is ever *sweet.* *Davies.*

Nothing so *sweet* is as our countrie's earth,
And joy of those from whom we claim our birth.
Chapman.

What softer sounds are these salute the ear,
From the large circle of the hemisphere,
As if the center of all *sweets* met here? *Ben Jonson.*

Wherefore frowns my *sweet?*
Have I too long been absent from these lips? *Id.*

I would have my love
Angry sometimes, to *sweeten* off the rest
Of her behaviour. *Id. Catiline.*

If every *sweet*, and every grace,
Must fly from that forsaken face. *Carew.*

Never tie yourself always to eat meats of easy digesture, as veal, pullets, or *sweetbreads*.
Harvey on Consumption.

One thing, *sweetheart*, I will ask,
Take me for a new-fashioned mask. *Cleaveland.*

The dulcimer, all organs of *sweet* stop. *Milton.*

The Pleiades before him danced,
Shedding *sweet* influence. *Id.*

Hail! wedded love,
Perpetual fountain of domestic *sweets!* *Id.*

Shred very small with thyme, *sweet*-margory, and a little winter savoury. *Walton's Angler.*

Serene and clear harmonious Horace flows,
With *sweetness* not to be exprest in prose.
Roscommon.

His *sweetness* of carriage is very particularly remembered by his contemporaries. *Fell.*

Mercy has, could Mercy's self be seen,
No *sweeter* look than this propitious queen. *Waller.*

Powder of crabs' eyes and claws, and burnt egg-shells, are prescribed as *sweeteners* of any sharp humours. *Temple.*

The sails drop with rain,
Sweet waters mingle with the briny main. *Dryden.*

Euryalus,
Than whom the Trojan host
No fairer face or *sweeter* air could boast.
Dryden's Æneid.

Now since the Latian and the Trojan brood
Have tasted vengeance, and the *sweets* of blood,
Speak. *Id.*

As, in perfumes,
'Tis hard to say what scent is uppermost;
Nor this part musk or civet can we call,
Or amber, but a rich result of all:
So she was all a *sweet*. *Dryden.*

Sweetbread and collops were with skewers pricked
About the sides; imbibing what they decked. *Id.*

Corregio has made his memory immortal, by the strength he has given to his figures, and by *sweetening* his lights and shadows, and melting them into each other so happily that they are even imperceptible. *Id. Dufresnoy.*

She interprets all your dreams for these,
Foretells the' estate, when the rich uncle dies,
And sees a *sweetheart* in the sacrifice. *Id. Juvenal.*

There was plenty, but the dishes were ill sorted; whole pyramids of *sweetmeats* for boys and women, but little solid meat for men. *Dryden.*

These lessons may be gilt and *sweetened* as we order pills and potions, so as to take off the disgust of the remedy. *L'Estrange.*

A wench was wringing her hands and crying; she had newly parted with her *sweetheart*. *Id.*

If a child cries for any unwholesome fruit, you purchase his quiet by giving him a less hurtful *sweetmeat:* this may preserve his health, but spoils his mind. *Locke.*

Sweet and stinking commonly serve our turn for these ideas, which, in effect, is little more than to call them pleasing or displeasing; though the smell of a rose and violet, both *sweet*, are certainly very distinct ideas. *Id.*

All kindnesses descend upon such a temper, as rivers of fresh water falling into the main sea; the sea swallows them all, but is not changed or *sweetened* by them. *South.*

Thy mercy *sweetened* every soil,
Made every region please;
The hoary Alpin hills it warmed,
And smoothed the Tyrrhene seas.
Addison's Spectator.

At a lord-mayor's feast, the *sweetmeats* do not make their appearance till people are cloyed with beef and mutton. *Addison.*

This old man's talk, though honey flowed
In every word, would now lose all its *sweetness*. *Id.*

Flowers
Innumerable, by the soft south-west
Opened, and gathered by religious hands,
Rebound their *sweets* from the' odoriferous pavement.
Prior.

When metals are dissolved in acid menstruums, and the acids, in conjunction with the metal, act after a different manner, so that the compound has a different taste much milder than before, and sometimes a *sweet* one; is it not because the acids adhere to the metallic particles, and thereby lose much of their activity? *Newton's Opticks.*

Make your transparent *sweetmeats* truly nice,
With Indian sugar and Arabian spice.
King's Cookery.

The streets with treble voices ring,
To sell the bounteous product of the spring;
Sweet-smelling flowers, and elders early bud. *Gay.*

They esteemed that blood pituitous naturally, which abounded with an exceeding quantity of *sweetish* chyle. *Floyer.*

The balmy zephyrs, silent since her death,
Lament the ceasing of a *sweeter* breath. *Pope.*

Praise the easy vigour of a line,
Where Denham's strength and Waller's *sweetness* join. *Id.*

When you roast a breast of veal, remember your *sweetheart* the butler loves a *sweetbread*. *Swift.*

Be humbly minded, know your post;
Sweeten your tea, and watch your toast. *Id.*

Those softeners, *sweeteners*, and compounders, shake their heads so strongly that we can hear their pockets jingle. *Id.*

No poet ever *sweetly* sung,
Unless he were like Phœbus young;
Nor ever nymph inspired to rhyme,
Unless like Venus in her prime. *Id.*

They are allowed to kiss the child at meeting and parting; but a professor, who always stands by, will not suffer them to bring any presents of toys or *sweetmeats*. *Id.*

A man of good education, excellent understanding, and exact taste; these qualities are adorned with great modesty, and a most amiable *sweetness* of temper. *Id.*

Sweet expresses the pleasant perceptions of almost every sense: sugar is *sweet*, but it hath not the same *sweetness* as musick; nor hath musick the *sweetness* of a rose, and a *sweet* prospect differs from them all: nor yet have any of these the same *sweetness* as discourse, counsel, or meditation hath; yet the royal psalmist saith of a man, we took *sweet* counsel together: and of God, my meditation of him shall be *sweet*. *Watts.*

Devotion softens his heart, enlightens his mind, *sweetens* his temper, and makes every thing that comes from him instructive, amiable, and affecting.
Law.

SWEETWILLIAM. See DIANTHUS.

SWEETWILLIAM OF BARBADOES, a species of ipomoea.

SWEETWILLOW. See MYRICA.

SWELL, *v. n., v. a.*, & *n. s.*] *Part. pass.* swollen. SWEL'LING, *n. s.*] Sax. ȝpellan; Belg. *swellen;* Teut. *schwellen*. To grow bigger; grow turgid; extend; inflate: aggravate; cause to grow big: extension of bulk: a swelling is an effort to grow big, or for vent; a morbid tumor; protuberance.

I will help every one from him that *swelleth* against him, and will set him at rest. *Ps.* xii. 6.

This iniquity shall be as a breach ready to fall, *swelling* out in a high wall. *Isaiah* xxx. 13.

Strangely visited people,
All *swollen* and ulc'rous, pitiful to the eye,
The mere despair of surgery he cures.
Shakspeare. Macbeth.

My pity hath been balm to heal their wounds,
My mildness hath allayed their *swelling* griefs.
Shakspeare.

Here he comes, *swelling* like a turkey-cock. *Id.*

The hearts of princes kiss obedience,
So much they love it; but to stubborn spirits
They *swell* and grow as terrible as storms. *Id.*

O for a muse of fire, that would ascend
The brightest heaven of invention!
A kingdom for a stage, princes to act,
And monarchs to behold the *swelling* scene. *Id.*

The swan's down feather,
That stands upon the *swell* at full of tide,
And neither way inclines. *Id. Antony and Cleopatra.*

All these miseries proceed from the same natural causes, which have usually attended kingdoms *swollen* with long plenty, pride, and excess. *Clarendon.*

Peleus and Telephus, exiled and poor,
Forget their *swelling* and gigantick words.
Roscommon.

Propitious Tyber smoothed his wat'ry way,
He rolled his river back, and poised he stood,
A gentle *swelling*, and a peaceful flood.
Dryden's Æneid.

Swol'n in his breast; his inward pains increase,
All means are used, and all without success.
Dryden.

In all things else above our humble fate,
Your equal mind yet *swells* not into state. *Id.*

The king of men, who, *swol'n* with pride,
Refused his presents, and his prayers denied. *Id.*

My heart was torn in pieces to see the husband suppressing and keeping down the *swellings* of his grief. *Tatler.*

Your youth admires
The throes and *swellings* of a Roman soul,
Cato's bold flights, the extravagance of virtue.
Addison.

The superficies of such plates are not even, but have many cavities and *swellings*, which, how shallow soever, do a little vary the thickness of the place.
Newton's Opticks.

There is not a chronical disease that more frequently introduces the distemper I am discoursing of than strumous or scrophulous *swellings* or ulcers.
Blackmore.

It is low ebb with his accuser, when such peccadillos are put to *swell* the charge. *Atterbury.*

SWELT, *v. n.* To break out in sweat.

Chearful blood in faintness chill did melt,
Which, like a fever fit, through all his body *swelt*.
Spenser's Faerie Queene.

If the sun's excessive heat
Makes our bodies *swelter*,
To an osier hedge we get
For a friendly shelter;
There we may
Think and pray,
Before death
Stops our breath. *Chalkhil.*

Some would always have long nights and short days; others again long days and short nights; one climate would be scorched and *sweltered* with everlasting dog-days, while an eternal December blasted another. *Bentley's Sermons.*

SWELLING. See SURGERY and TUMOR.

SWELLING, WHITE, or Paronychia. See SURGERY, Index.

SWENO I., or SUENO, SWAN, SWEIN, or SWEYN, a king of Denmark, who flourished in the tenth century, twice invaded England, conquered part of it, and became father of Canute the Great, who conquered the whole of it, and reigned many years. See DENMARK and ENGLAND.

SWENO, II. and III. See DENMARK.

SWENO'S STONE, an ancient monument near Forres, erected in memory of the defeat of the Danes under Sweno. On that side of it which fronts the south, and measures the thickness of the obelisk about four feet above the pavement on the top of the steps by which one ascends, is an inscription disposed in two lines, on a scale of fifteen inches in length. The Rev. Dr. Playfair reads it thus: LOHH in resi; and says it composes the initials of the following words: lege obelisci hujus hieroglyphicis in nostro regno extinctionem Suenone invasionis; which the Dr. translates thus, 'understand that the hieroglyphics of this obelisk represent the extinction, in our kingdom, of the invasion under Sweno.' The monument was placed here, because the Danes had attempted to form their settlement in this quarter. Translated literally it signifies 'by the hieroglyphics of this obelisk, read the extinction, in our kingdom, of the invasion under Sweno.'

SWERD, *v. n.* See *To* SWARD. To breed a green turf.

The clays that are long in *swerding*, and little subject to weeds, are the best land for clover.
Mortimer.

SWERTIA, or more properly SUERTIA; for, it is monstrously unclassical to put W even into a modern Latin word. To avoid such barbarism the late Dr. Browne turned his name into Bruno. Marsh Gentian, in botany, a genus of plants belonging to the class of pentandria, and to the order of digynia; and in the natural system ranging under the twentieth order, rotaceæ. The corolla is wheel-shaped. There are nectaliferous pores at the bases of the segments of the corolla. The capsule is unilocular and bivalve. There are six species; viz. 1. S. carinthiaca; 2. corniculata; 3. dichotoma; 4. difformis; 5. perennis; and 6. Rotata. S. perennis is a native of England. It is distinguished by radical oval leaves. It flowers in August.

SWERVE, *v. n.* Saxon and Belg. *swerven*; Swed. *swarfwa*. To wander; rove; bend from a straight course or direction; deviate; wind round.

The ungodly have laid a snare for me; but yet I *swerve* not from thy commandments. *Common Prayer.*

A maid thitherward did run,
To catch her sparrow which from her did *swerve*.
Sidney.

That which angels do clearly behold, and without any *swerving* observe, is a law celestial and heavenly.
Hooker.

Were I the fairest youth
That ever made the eye *swerve*. *Shakspeare.*

Annihilation in the course of nature, defect and *swerving* in the creature, would immediately follow.
Hakewill.

Till then his majesty had not in the least *swerved* from that act of parliament. *Clarendon.*

Firm we subsist, yet possible to *swerve*. *Milton.*

The *swerving* vines on the tall elms prevail,
Unhurt by southern showers or northern hail.
Dryden.

She fled, returning by the way she went,
And *swerved* along her bow with swift ascent. *Id.*

Many who, through the contagion of an example, *swerve* exceedingly from the rules of their holy faith, yet would upon such an extraordinary warning be brought to comply with them. *Atterbury's Sermons.*

SWIETEN. See VAN SWIETEN.

SWIETENIA, or more properly SUIETENIA, mahogany, in botany, a genus of plants belonging to the class of decandria, and to the order of monogynia; and in the natural system arranged under the fifty-fourth order, miscellaneæ. The calyx is quinquefid. There are five petals; the nectarium is cylindrical, supporting the antheræ with its mouth. The capsule is five-celled, woody, and opening at the mouth. The seeds are imbricated and winged. There is only one species;

S. mahagoni, a native of the warmest parts of America, growing also in the island of Cuba, Jamaica, Hispaniola, and the Bahama Islands. It abounded formerly in the low lands of Jamaica, but it is now found only on hills and places difficult of access. It thrives in most soils, but varies in texture and grain according to the nature of the soil. On rocks it is of a smaller size, but very hard and weighty, of a close grain and beautifully shaded; while the produce of the low and richer lands is observed to be more light and porous, of a paler color and open grain; and that of mixed soils to hold a medium between both. The tree grows very tall and straight, and is usually four feet in diameter; the flowers are of a reddish or saffron color, and the fruit of an oval form, and about the size of a turkey's egg. The wood is generally hard, takes a fine polish, and is found to answer better than any other sort in all kinds of cabinet ware. It is said to be used sometimes in ship-building; a purpose for which it is remarkably adapted, if it were not too costly, being very durable, capable of resisting gun-shots, and burying the shots without splintering. The seed vessels are of a curious form, consisting of a large cone splitting into five parts, and disclosing its winged seeds, disposed in the regular manner of those of apocynum. The seeds, being winged, are dispersed on the surface of the ground, where some falling into the chinks of the rocks strike root; then creep out on the surface of it, and seek another chink, into which they creep and swell to such a size and strength, that at length the rock splits and is forced to admit of the root's deeper penetration; and with this little nutriment the tree increases to a stupendous size in a few years. The first use to which mahogany was applied in England was to make a box for holding candles for Dr. Gibbons, an eminent physician in the latter end of the seventeenth and beginning of the eighteenth century, who had a brother, a West India captain, who brought over some planks of this wood as ballast. The superior qualities of it being immediately discovered, it soon came into general use.

SWIFT, *adj.* & *n. s.* } Sax. ꝼpiꝼt. Quick;
SWIFT'LY, *adv.* } moving far in a short
SWIFT'NESS, *n. s.* } time; fleet; speedy; rapid: the current of a stream: the adverb and noun substantive correspond.

Men of war, whose faces were like the faces of lions, and as *swift* as the roes upon the mountains.
1 *Chron.* xii. 8.

Let every man be *swift* to hear, slow to speak.
James i. 19.

Thou art so far before
That *swiftest* wing of recompence is slow
To overtake thee. *Shakspeare.*

We may outrun
By violent *swiftness* that which we run at;
And lose by over-running. *Id. Henry VIII.*

We imitate and practise to make *swifter* motions than any out of other muskets. *Bacon.*

These move *swiftly*, and at great distance; but then they require a medium well disposed, and their transmission is easily stopped. *Id. Natural History*

Exulting, till he finds their nobler sense
Their disproportioned speed does recompense;
Then curses his conspiring feet, whose scent
Betrays that safety which their *swiftness* lent.
Denham.

To him with *swift* ascent he up returned. *Milton.*

Speed to describe whose *swiftness* number fails.
Id.

He can live in the strongest *swifts* of the water.
Walton.

Pleased with the passage, we slide *swiftly* on,
And see the dangers which we cannot shun.
Dryden.

Such is the mighty *swiftness* of your mind,
That, like the earth's, it leaves our sense behind.
Id.

Things that move so *swift* as not to affect the senses distinctly with several distinguishable distances of their motion, and so cause not any train of ideas in the mind, are not perceived to move.
Locke.

Thy stumbling foundered jade can trot as high
As any other Pegasus can fly;
So the dull eel moves nimbler in the mud,
Than all the *swift*-finned racers of the flood.
Dorset.

It preserves the ends of the bones from incalescency, which they, being solid bodies, would contract from any *swift* motion. *Ray.*

Clouded in a deep abyss of light,
While present, too severe for human sight,
Nor staying longer than one *swift*-winged night.
Prior.

In decent order they advance to light;
Yet then too *swiftly* fleet for human sight,
And meditate too soon their everlasting flight. *Id.*

Mantiger made a circle round the chamber, and the *swift*-footed martin pursued him. *Arbuthnot.*

There too my son—ah once my best delight,
Once *swift* of foot, and terrible in fight.
Pope's Odyssey.

SWIFT, *n. s.* From the quickness of their flight; apus. A bird like a swallow; a martin.

Swifts and swallows have remarkably short legs, and their toes grasp any thing very strongly.
Derham.

SWIFT (Dr. Jonathan), a wit and classical writer of the English language, was born in Dublin, November 30th, 1667. His father was an attorney, and of a good family; but, dying poor, the expense of his son's education was defrayed by his friends. At the age of six young Swift

was sent to the school of Kilkenny, whence he removed in his fifteenth year to Trinity College, Dublin. So much did he despise the study of the old logicians, at that time held so indispensably necessary, that he was refused a degree on account of his ignorance of their writings, and obtained it afterwards through the interest of his friends, and 'by special favor,' as inserted in the college registry. He remained in the college nearly three years after this, little known or regarded. By scholars he was reckoned a blockhead; and, as his circumstances would not permit him to keep company with persons of equal rank upon an equal footing, he lived much alone, and his time was employed in pursuing his course of reading in history and poetry. Yet, under this pressure, he conceived the first rude draught of the Tale of a Tub. In 1688, being by the death of Godwin Swift his uncle, who had chiefly supported him, left without subsistence, he went to consult his mother, who then lived in Leicester, about the future course of his life; and, by her direction, solicited the advice and patronage of Sir William Temple, whose father had lived in great friendship with Godwin Swift. Temple received him with great kindness, and was so much pleased with his conversation that he detained him two years in his house, and recommended him to king William, who offered to make him a captain of horse. This not suiting his disposition, and Temple not having it quickly in his power to provide for him otherwise, Swift left his patron (1694) in discontent: having previously taken his master's degrees at Oxford. He now resolved to enter into the church, where his first preferment was only £100 a-year, being the prebend of Kilroot in Connor; which some time afterwards, upon Sir William Temple's earnestly inviting him back to his house at Morpark, he resigned. In 1699 Swift lost his patron Sir W. Temple, who left him a legacy in money, with the property of his MSS.; and, on his death-bed, obtained for him a promise from the king, of the first prebend that should become vacant at Westminster or Canterbury. Swift dedicated to the king the posthumous works with which he was entrusted, and for a while attended the court; but soon found it in vain. He was then invited by the earl of Berkely to accompany him into Ireland, where he obtained the livings of Laracor and Rathbaggin, in the diocese of Meath; and soon afterwards invited over the unfortunate Stella, a young woman of the name of Johnson, whose life he contrived to embitter, and whose days, though he certainly loved her, we may confidently affirm that he shortened by his caprice. This lady is generally believed to have been the daughter of Sir W. Temple's steward, though it has been said that she was Sir William's own natural daughter, and Swift himself his natural son; and that a discovery of this relationship was the cause of Swift's otherwise unaccountable conduct to that excellent woman. This apology, however, seems worthy of no credit. But, be it as it may, it is certain that Sir William left her £1000; and that, accompanied by Mrs. Dingley, whose whole fortune amounted to an annuity of £27 for life, she went, in consequence of Swift's invitation, to Laracor. With these two ladies he passed his hours of relaxation, and to them he opened his bosom; but they never resided in the same house, nor did he see either without a witness. In 1701 Swift published A discourse of the contests and dissensions in Athens and Rome. It was the only work which he ever expressly acknowledged. Early in the following spring king William died; and Swift, on his next visit to London, found queen Anne upon the throne. He was during the earlier part of the queen's reign of no party, but employed himself in discharging the duties of his function, and in publishing from time to time such tracts as he thought might be useful. In 1704 he published The Tale of a Tub; which, considered merely as a work of genius, is unquestionably the greatest which he ever produced; but the levity with which religion was thought to be there treated, raised up enemies to him among all parties, and eventually precluded him from a bishopric. From that period till 1708 he seems to have employed himself in solitary study; but he then gave successively to the public The sentiments of a Church of England man, the ridicule of astrology under the name of Bickerstaff, the Argument against abolishing Christianity, and the defence of the Sacramental Test. Soon after began the busy and important part of Swift's life. He was employed in 1710 by the primate of Ireland to solicit the queen for a remission of the first fruits and twentieth parts to the Irish clergy. This introduced him to Mr. Harley, afterwards earl of Oxford, who, though a whig himself, was at the head of the tory ministry, and in great need of an auxiliary so able as Swift, by whose pen he and the other ministers might be supported in pamphlets, poems, and periodical papers. In 1710 was commenced the Examiner, of which Swift wrote thirty-three papers, beginning his first on the 10th of November, 1711. In 1712 he published The Conduct of the Allies ten days before the parliament assembled; and soon afterwards, Reflections on the barrier Treaty. The purpose of these pamphlets was to persuade the nation to a peace, by showing that 'mines had been exhausted and millions destroyed' to secure the Dutch and aggrandise the emperor, without any advantage whatever to Great Britain. Though these two publications, together with his Remarks on the Bishop of Sarum's Introduction to the third Volume of his History of the Reformation, certainly turned the tide of popular opinion, and effectually promoted the designs of the ministry, the best preferment which his friends could venture to give him was the deanery of St. Patrick's, which he accepted in 1713. In the midst of his power and his politics, he kept a journal of his visits, his walks, his interviews with ministers, and quarrels with his servant, and transmitted it to Mrs. Johnson and Mrs. Dingley, to whom he knew that whatever befel him was interesting; but in 1714 an end was put to his power by the death of the queen, which broke down at once the whole system of tory politics, and nothing remained for him but to withdraw from persecution to his deanery. In the triumph of the whigs, Swift met with every mortification that a spirit like his could possibly be exposed to.

The people of Ireland were irritated against him beyond measure; and every indignity was offered him as he walked the streets of Dublin. Nor was he insulted by the rabble only, but persons of distinguished rank and character forgot the decorum of common civility to give him a personal affront. In this situation he retired from the world to discharge his duties as a clergyman, and attend to the care of his deanery. That no part of his time might lie heavy on his hands, he employed his leisure hours on some historical attempts relating to the change of the ministers and the conduct of the ministry; and completed the History of the four last years of queen Anne's reign, which had been begun in her lifetime, but which he never published. Of the work which bears that title, and is said to be his, Dr. Johnson doubts the genuineness; and it certainly is not such as we should have expected from a man of Swift's sagacity and opportunities of information. In 1716 he was privately married to Mrs. Johnson by Dr. Ashe, bishop of Clogher; but the marriage made no change in their situation, 'and it would be difficult to prove,' says lord Orrery, 'that they were ever afterwards together but in the presence of a third person.' The dean lived in a private manner, known and regarded only by his friends, till about 1720 that he published his first political pamphlet relative to Ireland, entitled A Proposal for the Universal Use of Irish Manufactures; which so roused the indignation of the ministry that they commenced a prosecution against the printer, which drew the attention of the public to the pamphlet, and at once made its author popular. Whilst he was enjoying the laurels which this work had wreathed for him, his felicity, as well as that of his wife, was interrupted by the death of Mrs. Van Homrigh, and the publication of his poem called Cadenus and Vanessa, which brought upon him much merited obloquy. With Mrs. Van Homrigh, he became acquainted in London during his attendance at court; and finding her possessed of genius, and fond of literature, he took delight in directing her studies, till he got, insensibly, possession of her heart. From being proud of his praise, she grew fond of his person; and, despising vulgar restraints, she made him sensible that she was ready to receive him as a husband. She had wit, youth, beauty, and a competent fortune to recommend her, and for a while Swift seems to have been undetermined whether or not he should comply with her wish. She had followed him to Ireland, where she lived in a house about twelve miles from Dublin; and he continued to visit her occasionally, and to direct her studies, as he had done in London; but with these attentions she was not satisfied, and at last sent to him a letter written with great ardor and tenderness, insisting that he should immediately accept or refuse her as a wife. His answer, which probably contained the secret of his marriage, he carried himself; and, having indignantly thrown it on the lady's table, instantly quitted the house, we believe, without speaking to her, and returned to Dublin to reflect on the consequences of his own conduct. These were dreadful. Mrs. Van Homrigh survived her disappointment but a few weeks; during which time she cancelled a will that she had made in his favor, leaving him a large fortune of £8000 a-year; and ordered the poem to be published in which Cadenus had proclaimed her excellence and confessed his love. In 1724 his patriotism again burst forth, to obstruct the currency of Wood's halfpence, and his zeal was crowned with success. Wood had obtained a patent to coin £180,000 in halfpence and farthings for the kingdom of Ireland; and was about to turn his brass into gold, when Swift, finding that the metal was debased to an enormous degree, wrote letters under the name of M. B. Drapier, to show the folly of giving gold and silver for coin not worth a third part of its nominal value. A prosecution was carried on against the printer; and lord Carteret, then lord lieutenant, issued a proclamation, offering £300 reward for discovering the author of the fourth letter. The day after Swift brushed up to the lord lieutenant at a levee at the castle, and upbraided him in loud and petulant terms with persecuting a poor shop-keeper whose crime was an endeavour to save his country from ruin; when lord Carteret, who had listened with great composure to the whole speech, made this fine reply, in a line of Virgil:—

Res duræ, & regni novitas me talia cogunt
Moliri.

From this time Swift was considered by the populace as the champion, patron, and instructor of Ireland. In 1727 he returned to England; where, in conjunction with Pope, he collected three volumes of miscellanies; and the same year he sent into the world his Gulliver's Travels. Whilst he enjoyed the reputation of this work, he was suddenly called to a home of sorrow. Poor Stella was sinking into the grave; and, after a languishing decay of about two months, died in her forty-fourth year, January 28th, 1728. With her vanished all his domestic enjoyments; the severity of his temper increased; he drove his acquaintance from his table, and wondered why he was deserted. The fits of giddiness and deafness to which he had been subjected from his boyish years became more frequent and violent as he grew old. In 1736, while he was writing a satire, called the Legion Club, against the Irish parliament, he was seized with so dreadful a fit of his malady that he left the poem unfinished; and never after attempted a composition that required a course of thinking. From this time his memory gradually declined. In 1741 he became utterly incapable of conversation; and it was found necessary to appoint legal guardians to his person and his fortune. He now lost all sense of distinction. During next year a short interval of reason ensuing gave hopes of his recovery; but in a few days he sunk into lethargic stupidity, motionless, heedless, and speechless. After a year of total silence, however, when his housekeeper told him that the usual illuminations were preparing to celebrate his birth, he answered, 'It is all folly: they had better let it alone.' He at last sunk into a perfect silence, which continued till the 29th of October 1745, when he expired without a struggle, in his seventy-eighth year. By his will, dated May 1740, just before he ceased to

be a reasonable being, he left about £1200 in specific legacies; and the rest of his fortune, which amounted to about £11,000, to erect and endow an hospital for lunatics and idiots. He was buried in the most private manner, according to his will, in the great aisle of St. Patrick's cathedral.

Swift (Dean, esq.), a near relation of the dean, grandson to Godwin Swift, the dean's uncle, was born in Dublin, educated at the university there, and completed his studies at Oxford. He had a fine taste, wrote entertaining verses, and was esteemed a perfect master of the Greek and Roman classics. He published an Essay upon the Life, Writings, and Character of Dr. Jonathan Swift, 1755; 2. The eighth 4to. volume of the dean's works, 1765; and, 3. His Letters, in 2 vols., 1768. He died at Worcester in 1783.

Swift, in ornithology. See Hirundo.

SWILL, *v. a.* & *n. s.* Sax. ȝpilȝan. To drink luxuriously and grossly; wash; drench; inebriate: drink thus lavishly taken or poured down.

The wretched, bloody, and usurping boar,
That spoiled your summer fields and fruitful vines,
Swills your warm blood like wash, and makes his trough
In your embowelled bosoms.
Shakspeare. Richard III.

As fearfully as doth a galled rock,
O'erhang and jutty his confounded base,
Swilled with the wild and wasteful ocean. *Shakspeare.*

I should be loth
To meet the rudeness and *swilled* insolence
Of such late wassailers. *Milton.*

He drinks a *swilling* draught; and, lined within,
Will supple in the bath his outward skin. *Dryden.*

Give swine such *swill* as you have. *Mortimer.*

With that a German oft has *swilled* his throat,
Deluded that imperial Rhine bestowed
The generous rummer. *Philips.*

The most common of these causes are an hereditary disposition, and *swilling* down great quantities of cold liquors. *Arbuthnot.*

Such is the poet, fresh in pay,
The third night's profits of his play;
His morning draughts till noon can *swill*,
Among his brethren of the quill. *Swift.*

Thus as they swim in mutual *swill*, the talk
Reels fast from theme to theme. *Thomson.*

SWIM, *v. n.*, *v. a.*, & Swim'mer, *n. s.* [*n. s.* Swim'mingly, *adv.* } *Pret.* swam, swom, or swum. Sax. ȝpimman; Belg. *swimmen.*
To move or float on the water; be conveyed by water; glide along; be floated; be dizzy; to flow in any thing; hence, have abundance of a thing: to pass by swimming: the bladder of a fish: a swimmer is one who swims: swimmingly is, smoothly: without obstruction.

The soldiers' counsel was to kill the prisoners, lest any of them should *swim* out and escape.
Acts xxvii. 42.

The rest, driven into the lake, were seeking to save their lives by *swimming;* they were slain in coming to land by the Spanish horsemen, or else in their *swimming* shot by the harquebusiers.
Knolles.

I will scarce think you have *swam* in a gondola.
Shakspeare.

Leap in with me into this angry flood,
And *swim* to yonder point. *Id. Julius Cæsar.*

She with pretty and with *swimming* gate
Following, her womb then rich with my young squire,
Would imitate. *Shakspeare.*

We have ships and boats for going under water, and brooking of seas; also *swimming*-girdles and supporters. *Bacon.*

Birds find ease in the depth of the air, as *swimmers* do in a deep water. *Id.*

With tenders of our protection of them from the fury of those who would soon drown them, if they refused to *swim* down the popular stream with them.
King Charles.

They now *swim* in joy,
Ere long to *swim* at large, and laugh; for which
The world a world of tears must weep. *Milton.*

Animals *swim* in the same manner as they go, and need no other way of motion for natation in the water, than for progression upon the land.
Browne's Vulgar Errours.

Latirostrous and flat-billed birds being generally *swimmers,* the organ is wisely contrived for action.
Browne.

The frighted wolf now *swims* among the sheep,
The yellow lion wanders in the deep:
The stag *swims* faster than he ran before. *Dryden.*

I *swoom* with the tide, and the water under me was buoyant. *Id.*

A hovering mist came *swimming* o'er his sight,
And sealed his eyes in everlasting night. *Id.*

I am taken with a grievous *swimming* in my head, and such a mist before my eyes that I can neither hear nor see. *Id.*

Sometimes he thought to *swim* the stormy main,
By stretch of arms the distant shore to gain. *Id.*

My slack hand dropt, and all the idle pomp,
Priests, altars, victims *swam* before my sight!
Smith.

The braces have the nature and use of tendons, in contracting the *swim,* and thereby transfusing the air out of one bladder into another, or discharging it from them both. *Grew.*

When the heavens are filled with clouds, when the earth *swims* in rain, and all nature wears a lowering countenance, I withdraw myself from these uncomfortable scenes into the visionary worlds of art.
Addison's Spectator.

John got on the battlements, and called to Nick,
I hope the cause goes on *swimmingly.* *Arbuthnot.*

The fainting soul stood ready winged for flight,
And o'er his eye-balls *swum* the shades of night.
Pope.

Sudden the ditches swell, the meadows *swim.*
Thomson.

Life is oft preserved
By the bold *swimmer,* in the swift illapse
Of accident disastrous. *Id.*

Swimming, the art of suspending one's self on water, and at the same time making a progressive motion through it. Although swimming is not natural to man, yet there are no nations so barbarous but the art is known among them, even in greater perfection than among civilised people. It is probable, therefore, that the art, though not absolutely natural, will always be acquired by people in a savage state from imitating the brutes, most of whom swim naturally. The theory of swimming depends upon this simple principle: that if a force is applied to any body, it will always move towards that side where there is the least resistance. This is evident in the motion of vessels; and the same thing takes place in swimming, whether the ani-

mal be man, quadruped, bird or fish. When a man swims, he strikes the water with his hands, arms, and feet; in consequence of which the body moves in a direction contrary to the stroke. Upon this principle, and on this only, a man may either ascend, descend, or move obliquely, in any possible direction in the water. It is incredible what expert swimmers will perform in this way; of which Mr. Forster gives a remarkable instance in the inhabitants of Otaheite; whose agility was such, that when a nail was thrown overboard, they would jump after it into the sea, and never fail to catch it before it came to the bottom. As to the practice of swimming, few directions can be given. The great obstacle is the natural dread which people have of being drowned; and this it is impossible to overcome by any thing but practice and habit. With regard to the real danger of being drowned, it is but little, and arises entirely from terror. Dr. Franklin observes, ' 1st. That though the legs, arms, and head, of a human body, being solid parts, are specifically heavier than fresh water, yet the trunk, particularly the upper part, from its hollowness, is so much lighter than water, as that the whole of the body, taken together, is too light to sink wholly under water, but some part will remain above until the lungs become filled with water: which happens from drawing water into them instead of air, when a person in the fright attempts breathing while the mouth and nostrils are under water. 2dly, That the legs and arms are specifically lighter than salt water, and will be supported by it; so that a human body would not sink in salt water though the lungs were filled as above, but from the greater specific gravity of the head. 3dly, That therefore a person throwing himself on his back in salt water, and extending his arms, may easily lie so as to keep his mouth and nostrils free for breathing; and by a small motion of his hands may prevent turning, if he should perceive any tendency to it. 4thly, That in fresh water, if a man throws himself on his back near the surface, he cannot long continue in that situation, but by a proper action of his hands on the water. If he uses no such action, the legs and lower part of the body will gradually sink till he comes to an upright position; in which he will continue suspended, the hollow of the breast keeping the head uppermost. 5thly, But if in this erect position the head is kept upright above the shoulders, as when we stand on the ground, the immersion will, by the weight of the part of the head that is out of the water, reach above the mouth and nostrils, perhaps a little above the eyes; so that a man cannot long remain suspended in water with his head in that position. 6thly, The body continuing suspended as before, and upright, if the head be leaned quite back, so that the face looks upwards, all the back part of the head being then under water, and its weight consequently in a great measure supported by it, the face will remain above water quite free for breathing, will rise an inch higher every inspiration, and sink as much every expiration, but never so low as that the water may come over the mouth. 7thly, If, therefore, a person unacquainted with swimming, and falling accidentally into the water, could have presence of mind to avoid struggling and plunging, and to let the body take this natural position, he might continue long safe from drowning, till, perhaps, help would come; for, as to the clothes, their additional weight, while immersed, is very inconsiderable, the water supporting it; though, when he comes out of the water, he would find them very heavy indeed.' The doctor's method of learning to swim is as follows:—The person must walk into water so deep that it will reach to the breast. He is then to lie down gently on the belly, keeping the head and neck perfectly upright, the breast advancing forward, the thorax inflated, and the back bent; then, withdrawing the legs from the bottom, and stretching them out, strike the arms forward in unison with the legs. Swimming on the back is somewhat similar to that on the belly; but with this difference, that, although the legs are employed to move the body forwards, the arms are generally unemployed, and the progressive motion is derived from the movement of the legs. In *diving*, a person must close his hands together, and, pressing his chin upon his breast, make an exertion to bend with force forwards. While in that position, he must continue to move with rapidity under the surface; and, whenever he wishes to return to his former situation, he has nothing to do but bend back his head, and he will immediately return to the surface. It is very common for novices to use corks or bladders to assist in keeping the body above the water. Dr. Franklin allows that they may be of service for supporting the body while one is learning what is called the stroke, or that manner of drawing in and striking out the hands and feet that is necessary to produce progressive motion. ' But,' says he, ' you will be no swimmer till you can place confidence in the power of the water to support you: I would, therefore, advise the acquiring that confidence in the first place, especially as I have known several who, by a little of the practice necessary for that purpose, have insensibly acquired the stroke, taught as it were by nature. The practice I mean is this:—Choosing a place where the water deepens gradually, walk coolly into it till it is up to your breast: then turn round your face to the shore, and throw an egg into the water between you and the shore; it will sink to the bottom, and be easily seen there, if the water is clear. It must lie on the water so deep as that you cannot reach it to take it up but by diving for it. To encourage yourself to do this, reflect that your progress will be from deeper to shallower water; and that at any time you may, by bringing your legs under you, and standing on the bottom, raise your head far above the water: then plunge under it with your eyes open, throwing yourself towards the egg, and endeavouring, by the action of your hands and feet against the water, to get forward till within reach of it. In this attempt you will find that the water buoys you up against your inclination, and it is not so easy a thing to sink as you imagined; that you cannot but by active force get down to the egg. Thus you feel the power of the water to support you, and learn to confide in that power; while your endeavours to overcome it,

and to reach the egg, teach you the manner of acting on the water with your feet and hands; which action is afterwards used in swimming to support your head higher above water, or to go forward through it.' Many other rules have been laid down for acquiring this; but, if a young man once gets rid of fear, these are sufficient, and by practice he may soon acquire various evolutions; or he may find a full account of these in the Encyclopedie Methodique.

Swimming of Fish. A great proportion of the inhabitants of the waters have an air-bladder, by which they poise themselves. Their movements chiefly depend upon their tail. See Ichthyology and Zootomy.

SWINDON, a market-town and parish in Kingsbridge hundred, Wilts., situate on an eminence, ten miles north from Marlborough, and eighty-three from London; containing 272 houses and 1580 inhabitants. This is a neat town, and the houses are well built of stone. The church is neatly fitted up in its interior. Here is a free-school for boys and girls, and in the vicinity of the town are some excellent stone quarries. Market on Monday. Fairs, Monday before April 5th, second Monday after May 11th, September and October. It is a vicarage, value £17.

SWINE, *n. s.* } Sax. ꝥpin; Belg. *swyn*; Goth.
Swine'herd } and Swed. *swin*. Probably the plural of some old word, but now the same in both numbers. A hog; a pig: a keeper of hogs.

There *swineherd*, that keepeth the hog. *Tusser.*

O monstrous beast! how like a *swine* he lies! *Shakspeare.*

Now I fat his *swine*, for other's cheere. *Chapman.*

Who knows not Circe,
The daughter of the Sun? whose charmed cup
Whoever tasted, lost his upright shape,
And downward fell into a grovelling *swine*. *Milton.*

Had the upper part, to the middle, been of human shape, and all below *swine*, had it been murder to destroy it? *Locke.*

How instinct varies in the grovelling *swine*,
Compared, half-reasoning elephant, with thine! *Pope.*

The whole interview between Ulysses and Eumeus has fallen into ridicule: Eumeus has been judged to be of the same rank and condition with our modern *swineherds*. *Broome.*

Swine, in zoology. See Sus.

Swine, in geography, a branch of the Oder, anciently called Suevus.

Swine-grass, or Swine Cress. See Cochlearia.

Swine's Cress, a species of cochlearia.

Swine-stone, lapis suillus, or fetid stone, so called from its excessively fetid smell, is a species of saline stone. It is found, 1. Solid, with the particles scarcely visible, of a black color; as the marble of Flanders and Jutland. 2. With visible grains of a blackish-brown color, found in Sweden. 3. With coarse scales, found also in Sweden. Many of the limestones found in England belong to this species, and emit a very fetid smell when struck violently; but it goes off in the fire. See Mineralogy.

SWINESHEAD, a market-town and parish in Kirton hundred, parts of Holland, Lincolnshire, six miles south-west of Boston, and 113 north-east of London; containing 345 houses and 1695 inhabitants. Market on Thursday. Fairs, first Thursday in June and second in October.

SWING, *v. n.*, *v. a.*, & *n. s.* Sax. ꝥpingan. To wave to and fro loosely: whirl around in the air; wave loosely: motion of this kind, or the influence or power that moves; course; liberty; unrestrained tendency; sweep.

Where the *swing* goeth, there follow, fawn, flatter, laugh, and lie lustily at other men's liking. *Ascham's Schoolmaster.*

His sword prepared,
He *swang* about his head, and cut the winds. *Shakspeare.*

The ram that batters down the wall,
For the great *swing* and rudeness of his poise,
They place before his hand that made the engine. *Id.*

Take bottles and *swing* them: fill not the bottles full, but leave some air, else the liquor cannot play nor flower. *Bacon.*

In casting of any thing, the arms, to make a greater *swing*, are first cast backward. *Id. Natural History.*

Facts unjust
Commit, even to the full *swing* of his lust. *Chapman.*

Swing thee in the air, then dash thee down,
To the hazard of thy brains, and shattered sides. *Milton.*

Those that are so persuaded, desire to be wise in a way that will gratify their appetites, and so give up themselves to the *swing* of their unbounded propensions. *Glanville.*

Swinging a red hot iron about, or fastening it unto a wheel under that motion, it will sooner grow cold. *Browne.*

In this encyclopædia, and round of knowledge, like the great wheels of heaven, we are to observe two circles, that, while we are daily carried about, and whirled on by the *swing* and rapt of the one, we may maintain a natural and proper course in the sober wheel of the other. *Id.*

The descending of the earth to this orbit is not upon that mechanical account Cartesius pretends, namely, the strong *swing* of the more solid globuli that overflow it. *More.*

I tried if a pendulum would *swing* faster, or continue *swinging* longer in our receiver, in case of exsuction of the air than otherwise. *Boyle.*

If one approach to dare his force,
He *swings* his tail, and swiftly turns him round. *Dryden.*

Take thy *swing*:
For not to take is but the self-same thing. *Id.*

Men use a pendulum, as a more steady and regular motion than that of the earth; yet, if any one should ask how he certainly knows that the two successive *swings* of a pendulum are equal, it would be very hard to satisfy him. *Locke.*

Were it not for these, civil government were not able to stand before the prevailing *swing* of corrupt nature, which would know no honesty but advantage. *South.*

These exuberant productions only excited and fomented his lusts; so that his whole time lay upon his hands, and gave him leisure to contrive, and with full *swing* pursue his follies. *Woodward.*

If the coach *swung* but the least to one side, she used to shriek so loud, that all concluded she was overturned. *Arbuthnot.*

Jack hath hanged himself: let us go see how he *swings*. *Id.*

When the *swinging* signs your ears offend
With creaking noise, then rainy floods impend.
Gay.

Let them all take their *swing*
To pillage the king,
And get a blue ribband instead of a string. *Swift.*

SWINGE, *v. a.* & *n. s.* Sax. ꝥpingan. To
SWINGEBUCK'LER, *n. s.* whip; bastinade;
SWIN'GING, *adj.* punish; flourish
SWIN'GINGLY, *adv.* about: a sweep or away: a swingebuckler is a bully: swinging, sweeping; huge; great; a low word: the adverb corresponding.

You had not four such *swingebucklers* in all the inns of court again. *Shakspeare. Henry IV.*

Sir, I was in love with my bed: I thank you, you *swinged* me for my love, which makes me the bolder to chide you for your's.
Id. Two Gentlemen of Verona.

He, wroth to see his kindom fail,
Swinges the scaly horror of his folded tail. *Milton.*

The shallow water doth her force infringe,
And renders vain her tail's impetuous *swinge*.
Waller.

This very reverend letcher, quite worn out
With rheumatisms, and crippled with his gout,
Forgets what he in youthful times hath done,
And *swinges* his own vices in his son.
Dryden, jun. Juvenal.

The countrymen, seeing the lion disarmed, with a *swinging* cudgel broke off the match. *L'Estrange.*

A good *swinging* sum of John's readiest cash went towards building of Hocus's country-house.
Arbuthnot.

The printer brought along with him a bundle of those papers, which, in the phrase of the whig-coffee-houses, have *swinged* off the Examiner.
Swift.

Henceforward he'll print neither pamphlets nor linen,
And, if swearing can do't, shall be *swingingly* mauled. *Id.*

SWINGING, a kind of exercise strongly recommended to persons in consumption by some physicians, and disapproved of by others. See MEDICINE.

SWING-TREE of a waggon is the bar fastened across the fore-guide to which the traces of the horses are fastened.

SWING-WHEEL, in a royal pendulum, that wheel which drives the pendulum. In a watch or balance clock it is called the crown-wheel.

SWINK, *v. n.*, *v. a.*, & *n. s.* Sax. ꝥpincan. To labor; toil; drudge: to over-labor: such labor; drudging. Obsolete.

Riches, renown, and principality,
For which men *swink* and sweat incessantly.
Spenser.

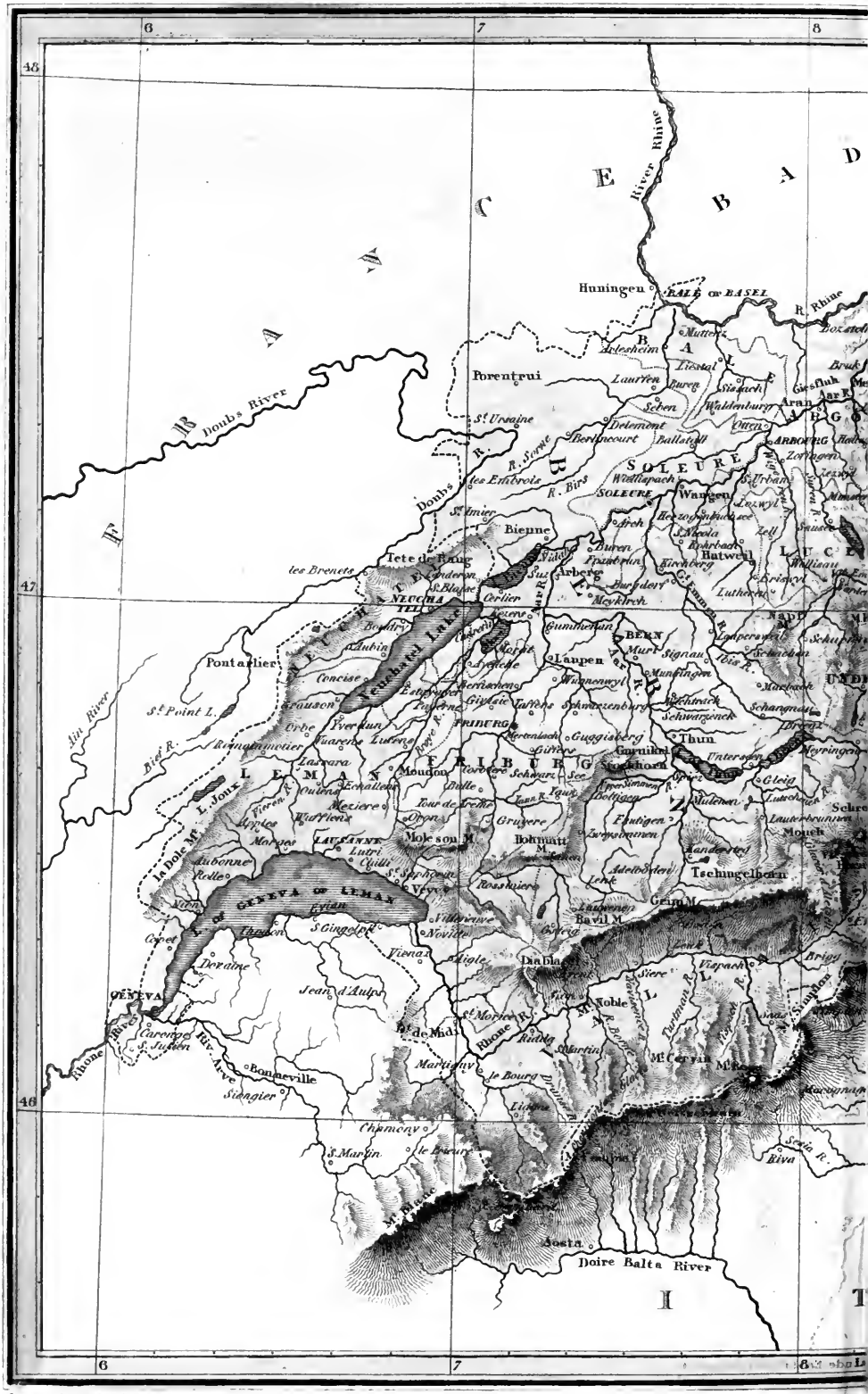
Ah, Piers, been thy teeth on edge, to think
How great sport they gaynen with little *swinke*? *Id.*

Thou 's but a lazy loorde,
And rekes much of thy *swinke*. *Id.*

The laboured ox
In his loose traces from the furrow came,
And the *swinked* hedger at his supper sat. *Milton.*

SWINNA, an island of Scotland, in the Pentland Frith, one mile long and half a mile broad, inhabited by six families, and about twenty-two souls, who live chiefly by piloting vessels through the dangers of the frith, and the whirlpools, called the Wells of Swinna.

SWINTON (John), a very celebrated English antiquary, the son of John Swinton of Bexton, gent, was born in Cheshire in 1703. His parents were not affluent, as he was entered at Oxford as a Servitor at Wadham College in October, 1719. On June 30, 1723, he was elected a scholar on a Cheshire foundation. In December, 1723, he became B. A., and on December 1, 1726, M. A. He was ordained deacon May 30, 1725; priest May 28, 1727; and made rector of St. Peter le Bailey in Oxford in February, 1728. In June 1728 he was elected a fellow of his college; but willing to see the world, he accepted of a chaplainship to the English factory at Leghorn. But as he did not enjoy his health he went to Florence in April 1733, where he attended Mr. Coleman, the English envoy, in his last moments. He returned through Venice and Vienna, and visited Presburg in Hungary. While he was abroad he was admitted into some foreign societies; viz. the Academy degli Apatisti at Florence, and the Etruscan Academy of Cortona. On his return he settled at Oxford, where he became chaplain to the gaol. He married in 1743 and gave up his fellowship. In 1759 he became B. D.; in 1767 he was elected custos Archivorum; and, on April 4th, 1777, he died without issue. His wife died in 1784, and both were buried in the chapel of Wadham College. His publications were numerous and learned. He published, 1. De Linguæ Etruriæ Regalis vernacula Dissert. 4to. 19 p. Oxon, 1738. 2. A Critical Essay on the Words Δαιμων and Δαιμονιον, 8vo. London, 1739. 3. De priscis Romanorum literis, 4to. 20 p. Ox. 1746. 4. De Primogenio Etruscorum Alphabeto, Ox. 1746. 5. Inscriptiones Citicæ; sive in binas Inscriptiones Phœnicias, inter rudera Citii nuper repertas, conjecturæ. Accedit de nummis quibusdam Samaritanis et Phœniciis, vel insolitam præ se literaturam ferentibus, vel in lucem hactenus non editis, dissertatio, 4to. 87 p. Ox. 1750. 6. Inscriptiones Citicæ; sive in binas alias Inscriptiones Phœnicias, inter rudera Citii nuper repertas, conjecturæ, 4to. 19 p. 7. De nummis quibusdam Samaritanis et Phœniciis, vel insolitam præ se literaturam ferentibus, vel in lucem hactenus non editis diss. 2da. 4to. 36 p. 8. Metilia: sive de quinario Gentis Metiliæ, et nummis vetustis cæteroquin minimum notæ, diss. 4to. 22 p. Ox. 1750. 9. Several dissertations in the Philosophical Transactions. As, A Dissertation upon a Parthian Coin; with characters on the reverse resembling those of the Palmyrenes, vol. xlix. p. 593. Remarks on a Parthian Coin, with a Greek and Parthian Legend, vol. l. p. 16. A Dissertation upon the Phœnician Numeral Characters anciently used at Sidon, vol. l. p. 791. In nummum Parthicum hactenus ineditum conjecturæ, vol. ii. p. 683. A Dissertation upon a Samnite Denarius, vol. lii. p. 28. An Account of a Subærated Denarius of the Plætorian Family, with an Etruscan Inscription, vol. lxii. p. 60. Observations upon Five Ancient Persian Coins, struck in Palestine or Phœnicia before the Dissolution of the Persian Empire, vol. lxii. p. 345. 10. A part of the Ancient Universal History, in the sixth and seventh volumes of that work The particulars of this piece of literary history were communicated by Dr. Johnson to Mr. Ni-



Drawn by J. Assheton.

London, Published by Thoma

Engraved on Steel by J. Shury

...13 Cheapside

chols, in a paper printed in the Gentleman's Magazine for December, 1784. The original is deposited in the British museum. It assigns the following divisions of the history to Mr. Swinton:—The history of the Carthaginians, Numidians, Mauritanians, Gætulians, Garamantes, Melano-Gætulians, Nigritiæ, Cyrenaica, Marmorica, the Regio Syrtica, Turks, Tartars, and Moguls, Indians, and Chinese; a Dissertation on the Peopling of America, and one on the Independency of the Arabs.

SWITCH, *n. s.* & *v. a.* Isl. and Swed. *swig.* A small flexible twig: to lash; jerk.

Fetch me a dozen crabtree staves, and strong ones; these are but *switches.* *Shakspeare. Henry VIII.*

Lay thy bridle's weight
Most of thy left side; thy right horse then *switching,*
all thy throat
Spent in encouragements give him; and all the rein
let float. *Chapman's Iliad.*

When a circle 'bout the wrist
Is made by beadle exorcist,
The body feels the spur and *switch.* *Hudibras.*

Mauritaniâ, on the fifth medal, leads a horse with something like a thread; in her other hand she holds a *switch.* *Addison*

SWITZERLAND, a delightful country in the interior of Europe, bounded on the west by France, on the south by Italy, on the north and east by Germany. It extends from east to west nearly 200 miles, and from north to south about 140. Its form is a medium between an oblong and an oval; and, though the limits of its circumference are irregular, it is on the whole compact. Various have been its modern territorial changes and arrangements; but it was recognised by the congress of Vienna, in 1815, as consisting of twenty-two cantons of the following extent and population:—

Cantons.	Extent.	Population.	Chief Towns.	
	Square miles.			Population.
Zurick	960	224,150	Zurick	10,470
Berne	3,690	356,710	Berne	13,000
Lucerne	768	105,560	Lucerne	5,000
Uri	512	13,930	Altorf	3,000
Schwitz	470	96,040	Schwitz	4,640
Unterwalden	260	23,150	Sarnen	3,000
Glarus	453	28,000	Glarus	3,000
Zug	125	14,710	Zug	2,500
Fryburg	490	67,814	Fryburg	6,460
Solothurn	277	54,380	Solothurn	4,100
Basle	266	55,330	Basle	16,200
Schaffhausen	170	28,050	Schaffhausen	5,500
Appenzell	223	57,510	Herisau	7,000
			Appenzell	3,000
St. Gall	853	157,700	St. Gall	9,000
Gray League	2,986	98,090	Chur	3,350
Aargau	768	152,900	Aargau	3,000
Thurgau	357	89,845	Frauenfeld	1,800
Tessino	1,183	103,950	Lugano	3,400
Vaud or Waadt	1,493	178,880	Lausanne	9,960
Vallois or Wallis	1,962	77,570	Sitten or Sion	2,500
Neufchatel	320	56,640	Neufchatel	5,150
Geneva	95	53,560	Geneva	22,000
	18,681, or 11,955,840 acres	2,037,030		

Each of the cantons has its own system of government; out they all form a general community, by means of representatives chosen from each, who meet to regulate the external relations of the union, and to provide the means, in troops and money, for the common defence; assembling yearly in July, or more frequently, on the requisition of any five of them. Treaties of peace, or declarations of war, require the assent of three-fourths of the votes. All other matters are determined by majority. The place of meeting is in rotation, Zurick, Berne, and Lucerne, each for two years, where the supreme court is held, and the chancellor and state-secretary hold their offices. The expenses of the general government are defrayed by contributions from each canton, according to their estimated wealth, which, as well as the military contingent, is adjusted every period of twenty years. The revenues, expenses, and debts of the cantons are generally kept as a kind of state secret; and the taxes are various, but, in general, very light.

Every man capable of bearing arms is occasionally trained and exercised, but a more permanent force is arranged, to which each of the cantons must furnish their proportion, at the rate of two men out of every hundred of the proper age. These form an army of nearly 34,000 men, as follows:—

Artillery	32 companies	2,272 men.
Sappers	2 ditto	142
Pontoniers	1 ditto	71
Train		1,400
Light cavalry	17 troops	1,088
Sharpshooters	10 companies	1,000
Infantry	204 ditto	25,199

Yagars . . .	2 companies	2,000 men.
Staff corps		586

A militia, mustered under the direction of each individual canton, amounts also to 67,516 men, besides the landwehr, or levy en masse, which comprehends the whole of the male population. To cherish the military spirit, the cantons permit great numbers of their young men to enter into the service of foreign states. In 1816 the numbers so engaged were estimated at 30,000; of whom 12,370 were in France; 10,000 in the Netherlands; 430 in Prussia; and the others in Spain and Sardinia.

Lucerne, Uri, Schwitz, Unterwalden, Zug, Fryburg, Solothurn, Tessino, and a part of Appenzell, still adhere to the Roman Catholic religion. Protestantism is established in Zurich, Berne, Basle, Schaffhausen, Vaud, Neufchatel, Geneva, and a part of Appenzell: and both religions in Glarus, Thurgaw, Aargau, St. Gall, and the Gray League, but here the majority of the people are Protestants. The number of the Reformed or Calvinists are estimated to be 1,046,000; of the Catholics 682,000; in the remainder are comprised a few Jews, Lutherans, and Baptists.

Switzerland, the most mountainous country in Europe, is largely occupied by various branches of the Alps. The only extensive tract of vales, with mountains of more moderate height, is to the westward, in the cantons of Bale, Zurich, and part of Berne; but even here the frontier is formed by mountains, the Jura ridge extending in a long line from north to south. The most remarkable valley of Switzerland is that of the Rhone; being at once the widest, and surrounded by the highest mountains. The Alps vary in height from 5000 to 8000, 10,000, and even 15,000 feet. After Mont Blanc, computed at 15,500 feet, comes Monte Rosa, 14,200 feet. Mount St. Gothard, the great St. Bernard, and the Simplon, well known as the route of travellers, are still not equal in height to several mountains of the interior, such as Mont Cervin, 13,800 feet; the Jungfrau-horn, the Tursteraarhorn, the Furca, Schreckhorn, each nearly 14,000 feet; the Wetter-horn and Gallenstock, between 11,000 and 12,000, &c. Toward their base the Alps exhibit every variety of temperature and product; rich corn fields or luxuriant pastures extending along the lower part of many of them. The middle consists of pastures less productive, but containing a great variety of plants; while the summits are composed of rocks, craggy, inaccessible, devoid of vegetation, and covered with enormous masses of ice and snow. In some parts the transition from pasture to sterility takes place very gradually; in others it is more rapid. Every mountain has its rivulets, which dash from rock to rock, and frequently its beautiful cascades. At Staubbach, in the valley of Lauter-bronnen, in the canton of Berne, is a stream which precipitates itself over a rock of nearly 1000 feet. Other parts offer a transition from scenes bleak and savage to landscapes of luxuriant verdure.

Switzerland is less remarkable for its minerals than might be expected. Iron, however, is found in several parts, particularly in the district of Sargans, in the east; and there are mines, or rather quarries, of rock salt in the canton of Berne. Mines of silver, copper, and lead, are also found in different parts; but they do not repay the labor of working. Marble, porphyry, alabaster, crystal, and sulphur, are found occasionally: of mineral waters the most considerable are those of Leuck and Schintznach, and the warm baths of Pfeffers. The glaciers, or lakes of frozen snow, accumulated to a vast height, or rather depth, are found first at about 8000 or 9000 feet above the sea; although, in a winter of unusual rigor, their ramifications extend considerably lower. Their surface, in some cases smooth and unbroken, is in others marked by deep chasms and pinnacles rising in fantastic forms, and presenting to the eye the appearance of a city of crystal. In the long alpine range, extending along the south of Switzerland, from Mont Blanc in the west, to the extremity of Tyrol in the east, are reckoned no less than 400 of these glaciers, differing greatly in magnitude, but frequently extending from sixteen to eighteen miles in length by one or two in breadth. The latter can with difficulty be ascertained, but is supposed to vary from 100 to 600 feet; the total extent of their surface has been calculated at 1000 square miles. Bourrit's description of one of these magnificent scenes is as follows:—'At length,' says he, 'we perceived through the trees a mountain of ice as splendid as the sun, and flashing a similar light on the environs. The first aspect of the glacier of the Rhone inspired us with great expectation. A moment afterwards, this enormous mass of ice having disappeared behind thick pines, it soon after met our sight between two vast blocks of rock, which formed a kind of portico. Surprised at the magnificence of this spectacle, and at its admirable contrasts, we beheld it with rapture. At length we reached this beautiful portico, beyond which we were to discover all the glacier. We arrived; at this sight, one would suppose one's self in another world; so much is the imagination impressed with the nature and immensity of the objects. To form an idea of this superb spectacle, figure in your mind a scaffolding of transparent ice, filling a space of two miles, rising to the clouds, and darting flashes of light like the sun. Nor were the several parts less magnificent and surprising. One might see, as it were, the streets and buildings of a city, erected in the form of an amphitheatre, and embellished with pieces of ice, cascades, and torrents. The effects were as prodigious as the immensity and the height. The most beautiful azure, the most splendid white, the regular appearance of a thousand pyramids of ice, are more easy to be imagined than described. Such is the aspect of the glacier of the Rhone, reared by nature on a plan which she alone can execute: we admire the majestic course of the river without suspecting that what gives it birth and maintains its waters, may be still more majestic and magnificent.'

No country is better provided with water, particularly in summer, when the melting of the snow affords a copious supply. The Rhone, rising in the centre of Switzerland, holds a westerly course through a beautiful valley, and pours into the lake of Geneva a stream which, turbid at

its influx, becomes pure and transparent when reissuing from the lake. The Ticino collects the waters flowing from Mount St. Gothard and the Alps, which look towards Lombardy. The Aar, rising on the northern slope of the central Alps, receives numberless streams flowing towards the western or more level parts of Switzerland; while the Rhine, holding at first a north-east course, encircles a part of the cantons, flows through the lake of Constance and Zell, and receives successively the Thur, the Limmat, the Reuss, and the Aar, which, joined to its own waters, render it, ere quitting the Swiss territory, the second river in Europe. The lakes of Switzerland are also numerous: the principal are those of Geneva, Constance, Neufchatel, Bienne, Zurich, Wallenstadt, Walstadter or Lucerne, Thun, and Brientz; most of them navigable. On this account a number of the towns of Switzerland are situated on their sides; and the mountains, rising from the shore in an amphitheatre form, render the scenery beautifully romantic.

The valleys of Switzerland and the bases of the mountains enjoy the warmth of an Italian sun, where their ascent discovers a scanty vegetation, and the summit is doomed to all the rigors of an Arctic winter. Such a contrast is not, however, exhibited in the northern or level part of the country, where the climate differs little from that of the south of Germany. In winter, however, the degree of cold is greater in the valleys of Switzerland, than in most parts of France or Germany, in consequence, doubtless, of the accumulation of snow and ice on the adjacent mountains; and stormy weather frequently occurs.

In travelling through this country one is constantly surprised at the care bestowed on the most unpromising spots; and at seeing vines, corn, and rich pasturages, where at one time there can have been little else than naked rocks. The products are wheat, barley, oats, maize, flax, hemp, and tobacco: the fruits of frequent occurrence, vines, chestnuts, prunes, peaches, walnuts, cherries; in the colder situations, apples and pears; and in the southern valleys the almond and fig. Wood, both for building and fuel, is found in most parts: but the corn raised is considerably below the consumption; and bread is by no means of universal use. The breeding of cattle, a branch of industry pointed out by the abundance of pasture, and the difficulties attending tillage, forms the grand source of national subsistence: the herds are driven to the mountains in spring, and graze there until the approach of winter forces them to descend; cheese, butter, allow, hides, form the chief articles of export. After cattle, the animals chiefly raised are goats, sheep, and hogs. The summits of the Alps are occupied by the chamois, wild goat, white and red fox, and a kind of hare, which, in summer, resembles the hare of Britain, but in winter becomes white.

Switzerland has on the whole a fair share of trade. The conveyance of goods along the Aar, the Reuss, and the Rhine, facilitates its intercourse with Germany and the Netherlands; and the Rhone, though more difficult of navigation, serves the same purpose in regard to France: the exports are linen, cotton cloth, woollens, and, in a small degree, silks; also cattle, sheep, hides, tallow, butter, and cheese; the chief imports, corn from Germany, salt from Tyrol and Franche Comte; spices, dyewoods, groceries, and other colonial produce from Holland; raw silk from Italy, and manufactured articles (such as hardware and cotton yarn), from England. The manufactures are linen, lace, thread, and woollens, and are of old standing; cottons have been introduced, or at least extended, since the latter part of the eighteenth century; leather gloves, silks, porcelain, pottery, toys, tobacco, and snuff, are made in various places; and clocks and watches have long been staple articles at Geneva and Neufchatel.

The universities of Geneva and Basle have long been distinguished. There are, besides, academies or colleges at Zurich, Berne, and Lausanne, and schools of good repute in various towns, in particular Neufchatel, Schaffhausen, and St. Gall; also at Coire, the small sequestered capital of the Grisons. Among literary associations are to be mentioned the Helvetic society of Bale, the physical of Zurich, and the economical of Berne. In regard to improvements in education, it suffices to mention the names of Pestallozzi and Fellenberg, both inhabitants of Switzerland: nor is there any reluctance here to borrow improvements from other countries, the method of Bell and Lancaster having been introduced in several places.

The Swiss were anciently called Helvetii, and the country Helvetia, whence the modern name of the Helvetic Republic. The ancient Helvetians were a Gaulish or Celtic people, and Helvetia was divided into four cantons or territories. Julius Cæsar was the first who reduced the inhabitants under the dominion of the Romans, and these founded colonies here under the names of Julia Equestris, Augusta Raurocorum, and Aventicum. Their dominion continued till the fifth century, when the country was overrun by the Burgundians and Germans; but soon after the Franks made themselves entire masters of it. On the decease of Louis I., king of the Franks and emperor of the Romans, the south part of Helvetia, or Burgundy, devolved to the emperor Lotharius, and the north, or that of Allemain, to king Louis the German. Lotharius II., son to the former and king of Austrasia, retained the south part of Helvetia, which, together with Burgundy, or Franche Comte, was styled the Lesser Burgundy. After his demise this south part also devolved to Louis the German, who thus became possessed of all Switzerland, and from him it descended to his son Charles the Fat. In 888 Rodolphus, duke of the Lesser Burgundy, took on him the title of king, but the north part of Switzerland continued under the dominion of the emperor Arnolphus. Rodolphus II., son to the former, obtained a grant of the Argau from the emperor Henry I. This prince was succeeded by his son Conrad, as the latter was by his son Rodolphus III., who, in 1032, by a formal will, bequeathed his kingdom of the Lesser Burgundy to the emperor Conrad II., whereby all Switzerland once more became united to the German empire. In the thirteenth century it became a

third time a nominal province of the German empire, which, however, was possessed of little real authority here. A great part of the country was in the hands of the clergy, and the remainder in general of particular nobles. The inhabitants of Uri, Schwitz, Underwald, and the territory of Hasli, were, from time immemorial, possessed of the right of being governed by their own magistrates, with other important privileges; and, in the twelfth century, the first three entered into an alliance which they solemnly renewed every tenth year. They had always declared themselves averse to the authority of the emperor's stadtholder in Switzerland, till, in 1209, Otho IV. compelled them to receive Rodolphus III., count of Habsburg, as his representative, though he was to take an oath that he would govern according to law and equity, and make no encroachments upon their rights and liberties. This nobleman seems to have been little observant of that engagement; for, in 1231, we find them unanimously addressing the emperor, Henry VII., to recal him; which he accordingly did, farther confirming to them all their privileges. In 1249 the like was done by his successor Frederick. In 1257, during the interregnum, in consideration of his great power, they chose for their protector Rodolphus V. count of Habsburg, who, in 1273, became emperor of Germany. At the solicitation of his son Albert, duke of Austria, he intended to have erected a particular dukedom in Switzerland, which design did not transpire till several years after, when it appeared that he had purchased of the abbot of Murbach the town of Lucern, with his revenues, and prerogatives in several villages in the territory of Schwitz. These three districts, on the death of Rodolphus, faithfully adhered to his successor the emperor Adolphus, which gave so much offence to his son, duke Albert, that on his accession to the crown of Germany, on the death of the latter, he displayed his resentment in more than one instance, not only refusing peremptorily to confirm their privileges, without vouchsafing to allege any reason for his refusal, but likewise setting over them two noblemen of the most infamous character for avarice and arrogance, whose administration became quite insupportable. On this, seeing that nothing less was in agitation than the total deprivation of their liberties, and the bringing them under the yoke of Austria, they united in a firm resolution to defend themselves to the last extremity. The tyranny of Grisler, the Austrian governor, hastened this revolution by his barbarously ordering William Tell, the celebrated Swiss patriot, to shoot an apple off his son's head at a considerable distance. Tell, having accomplished this without hurting his son, Grisler observed that he had another arrow concealed under his cloak, and asked him for what purpose that was. To which Tell boldly replied, 'To have shot you through the heart if I had had the misfortune to have killed my son.' On this the enraged governor ordered Tell to be hanged; but his fellow citizens flew to arms, attacked and vanquished Grisler, who was shot to death by William Tell, and instantly formed an association for their independence. This memorable event happened on the 7th of November, 1307. See TELL. Arnold Melchthal of Underwalden was the first who raised the standard of liberty. The citizens chose for commanders three gentlemen of approved courage and abilities; namely, Werner, or Gerhard Stauffach, of Schwitz, Walthur Furst of Uri, and Arnold Melchthal above-mentioned, who secretly agreed together that, on the first day of January, 1308, they should surprise and demolish the castles in which the imperial governors resided. This resolution being effected, these three places joined again in a league for ten years, which gave birth to the Helvetian confederacy. Schwitz being the most powerful of the three confederate places, and the first meeting of the confederates being held at Brunnen in its territories, as also the first league concluded there, and after that the first battle, by the success of which the liberty of the confederates was retrieved, being fought within its jurisdiction, its name was given to the general confederacy. The emperor Albert, thinking that this was the season for totally reducing these three places by force of arms, hastened to Baden to begin the preparations, but being, on his return, murdered by his brother's son, John of Habsburg, the design was dropped; till, not long after, the house of Austria invented another pretence for falling on the United Cantons. For these and other parts of Switzerland adhering to the emperor Louis of Bavaria, his competitor, Frederick of Austria, was so extremely irritated that the Switzers having, during their contests with the abbey of Einsidlen, made some of its monks prisoners, put them under the ban, to which the bishop of Constance added excommunication. The former was taken off again by the emperor Louis, and the latter by the archbishop of Mentz. Leopold, duke of Austria, by virtue also of a commission from his brother Frederick, above-mentioned, in 1315 attacked the confederates with a powerful army, but was defeated by them at Morgarten. Hereupon, on the 8th of December, 1315, they entered into a perpetual alliance, which proved the origin of the late Helvetian confederacy. In 1332 Lucern acceded to it; in 1351 Zurich and Glaurus; and, in 1352, their number was increased by the accession of Zug and Berne.

For the space of 125 years this confederacy was composed only of the above eight territories or cantons, on which account they are called the Old Cantons. In 1481 Friburg and Soleure, and in 1501 Basil and Schaffhausen, were admitted into the confederacy; and in 1513 Appenzell also acceded to it. These thirteen towns and counties, which properly constituted the Helvetic republic, were united by a reciprocal convention, which, though not in all places the same, and the unions of the eight old and five later cantons differing in certain respects, yet in the principal points nearly agreed; the first and chief articles relating to the succors, assistance, and protection, to be given to any one of them in case of any unjust violence, and determining in what manner and by whom the reasons for any military enterprise should be discussed; as also how and where such succor should be given, and stating both the expenses of the war and the distribution of any acquisitions. The second

article regulated their procedure in accommodating any differences which might arise between two or more towns or cantons, &c. In some leagues, and particularly in those of the old towns, it was permitted to enter into any other connexions at pleasure, provided such connexions did not affect the original confederacy; but in the conventions with the later towns and cantons it was expressly stipulated that they should not contract any engagements without the privity, advice, and consent, of the old ones. The federal union, however, extended no farther than to the succors stipulated in the leagues, and other cases set forth in the same; in all other incidental affairs relative to the confederacy, the majority of votes was not obligatory to the whole body; particularly with respect to the making of alliances with foreign powers, wherein every town and canton was at liberty to act as a contracting party or not, and that even though such alliance should have been approved of by all the other towns and cantons. Thus the whole Helvetian body consisted properly of thirteen distinct republics or free states, united by oath for their mutual security and maintenance. It had for some centuries before the French revolution supported itself in an absolute freedom and independency, enjoyed all the privileges of majesty, made wars, concluded treaties, received and sent envoys from and to the several European powers, entered into alliances with them, given what form they thought proper to their constitution, enacted laws and ordinances both in temporal and spiritual affairs, and exercised all the various prerogatives of sovereignty. Accordingly, at the peace of Westphalia in 1648, it was acknowledged to be a free state even by the emperor and empire.

This brave nation continued to enjoy their freedom and independence under their respective various constitutions with little interruption, except what took place in their internal governments by occasional alterations, from 1648 till the commencement of the French revolution in 1789. But soon after that great event, which more or less convulsed all the states of Europe, the rage for innovation, and the hopes of establishing a perfect liberty and equality, reached the Swiss Cantons; and the democratic party not only attempted to overturn the old aristocratic governments, but even to new model those democratic cantons, the governments of which by universal suffrage, and other established privileges, appeared to be as perfectly free as they could be rendered by any change. At last, on the 22nd of March, 1798, they were revolutionised upon the plan of the French republic, under a directory and two councils. See HELVETIC REPUBLIC. After this the whole country was repeatedly overrun, and successive changes made in its government, by the different belligerent powers; while the inhabitants, notwithstanding the natural strength of their situation, were subjected to all the horrors of war.

One benefit however, was derived from these changes. An uniform mode of keeping accounts was adopted, viz. in franken or francs of ten batzen; each batze being divided into ten rappen. The franc is equal to one franc and a half of the money of France. The money now coined consisted of gold pieces of thirty-two and sixteen francs, silver pieces of forty and twenty batzen, or four and two francs, and base silver pieces of ten and five batzen.

The Swiss are a brave, honest, hospitable, hardy, people; very true to their engagements, friendly, and humane. In short there is not a people in Europe whose national character stands higher. In their persons they are generally tall, robust, and well made; but their complexions are none of the best, and those that live in the neighbourhood of the mountains are subject to wens. The women are generally handsome and well-shaped, sensible and modest, yet frank, easy, and agreeable in conversation. Few of the peasants are miserably poor; many of them are rich, especially in the Protestant cantons, and that of Berne in particular.

Before the time of the French Revolution, the form of government was in some monarchical, in others aristocratical, and in others democratical. Their sovereigns were the princes of the empire, such as the bishop of Basil, and the abbot of St. Gall. The aristocratical governments were the cantons of Zurich, Basil, and Schaffhausen, with some incorporate places, as the towns of St. Gall, Muhlhausen, and Biel, the cantons of Berne, Lucerne, Friburg, and Soleure, over which were appointed Schultherszen or justiciaries, and Neufchatel, and Geneva. The democratical form of government prevailed in the six cantons of Uri, Schwitz, Underwalden, Zug, Glaris, and Appenzell, which were under the direction of Landammans; as also, though with some variation, in the Grisons and the Valais, but in all every male of the age of sixteen, whether master or servant, had a vote in the enacting of laws, and electing of magistrates. The general annual diets were held at Baden or Frauenfeldt, extraordinary diets at Altorf. Lucerne took the lead of the Roman Catholic cantons, but Zurich, though less powerful than Berne, took the precedence of the whole. With respect to their military establishments the only regular forces here were those of the garrisons of Zurich, Berne, Basil, Geneva, and Arburg; but every burgher, peasant, and subject, was diligently to exercise himself in the use of arms, to appear on the stated days for shooting at a mark, to furnish himself with proper clothing, accoutrements, powder, and ball, to be always ready for the defence of his country, and punctually to comply with every article of war. Switzerland was, and probably still is, well provided with arsenals, particularly at Berne; but the only fortified places in it are Soleure, Zurich, Berne, Basil, and Arburg. The Switzers engaged in the service of foreign princes and states either merely as guards, or as marching regiments; in the latter case the government permitted the enlisting volunteers, though only in such states as they were in alliance or had made a previous agreement with: and no subject was to be forced into foreign service, nor even to be enlisted without the concurrence of the magistracy. All the advantages arising to the regencies from these levies, were usually only an annual subsidy paid by the state in whose favor the

levies were thus granted; and perhaps a promise of reciprocal aid when necessary. The public benefit, however, attending this custom was that these men, returning home after a long service abroad, were a great improvement to the standing militia of their country. The confederates of the Swiss cantons were the abbot of St. Gall and the Valais; the Grisons, towns of Geneva, St. Gall, Bienne, Muhlhausen, and Neufchatel. The independent states under the protection of the states or the allies were Gerisau Engelberg, and Kapperschweil, Roman Catholics; and Haldenstein, Protestants. The subjects were Baden, Morat, Gransen, Echalen, Orbe, Schwartzenburg, Werdenberg, and Bienne, Protestants; the free bailiwics Utznach Gaster, the Italian bailiwics, Roman Catholics; and the Thurgau, Rheinthal, Surgans, and Tockenburg, mixed. But great changes have taken place in the constitution and government of this country during the late revolutionary war.

At last, in the spring of 1814, the allied armies approached the Swiss frontier, and entered it with an overpowering force, refusing to acknowledge the neutrality, but promising the future independence of Switzerland. They proved faithful to this engagement. The number of cantons, increased by the French to nineteen, was now carried by the addition of the Valais, Geneva, and Neufchatel, to twenty-two, the integrity and independence of which were recognised, as we have seen, by the congress of Vienna. Austria, however, reserved to herself the Valteline, a mountainous district in the south-east, and formerly a dependency of the Grisons.

SWITZERLAND, a county of Indiana, United States, bounded west by Jefferson, south by the Ohio River, north in part by Indian lands, and east by Dearborn county. Its surface is, in some places, broken by the Ohio and Silver Creek hill. It is watered by Venoge and Plum creeks, and several small streams, some running into the Ohio, and others into White River. Vevay is the chief town.

SWOB'BER, *n. s.* See SWABBER. A sweeper of the deck.

Cubbed in a cabbin, on a mattress laid,
On a brown george with lousy *swobbers* fed.
Dryden.

The clergyman used to play at whist and *swobbers*: playing now and then a sober game at whist for pastime, it might be pardoned; but he could not digest those wicked *swobbers*. *Swift.*

SWOLLEN', } The *part. pass.* of SWELL,
SWOLN. } which see.

Unto his aid she hastily did draw
Her dreadful beast, who, *swoln* with blood of late,
Came ramping forth with proud presumptuous gait.
Spenser.

When thus the gathered storms of wretched love
In my *swoln* bosom with long war had strove,
At length they broke their bounds: at length their force
Bore down whatever met its stronger course;
Laid all the civil bonds of manhood waste,
And scattered ruin as the torrent past. *Prior.*

Whereas at first we had only three of these principles, their number is already *swoln* to five.
Baker on Learning.

SWOON, *v. n.* & *n. s.* Saxon ąpunan. To suffer a suspension of thought and sensation; faint: the fit of fainting.

So play the foolish thongs with one that *swoons*;
Come all to help him, and so stop the air
By which he should revive. *Shakspeare.*

We see the great and sudden effect of smells in fetching men again, when they *swoon*. *Bacon.*

The most in years *swooned* first away for pain;
Then, scarce recovered, spoke. *Dryden.*

There appeared such an ecstacy in his action, that he seemed ready to *swoon* away in the surprize of joy. *Tatler.*

The woman finds it all a trick,
That he could *swoon* when she was sick;
And knows that in that grief he reckoned
On black-eyed Susan for his second. *Prior.*

SWOOP, *v. a.* & *n. s.* Saxon ꝥpipan; Goth. *swepa.* To seize by falling at once as a hawk upon his prey: the act of so doing.

All my pretty ones?
Did you say all? What all? O hellkite! all?
What, all my pretty chickens and their dam,
At one fell *swoop?* *Shakspeare. Macbeth.*

The nine-stoned trophy thus whilst she doth entertain,
Proud Tamer *swoops* along with such a lusty train,
As fits so brave a flood. *Drayton.*

A fowl in Madagascar, called a ruck, the feathers of whose wings are twelve paces, can with as much ease *swoop* up an elephant as our kites do a mouse.
Wilkins.

The physician looks with another eye on the medicinal herb, than the grazing ox, which *swoops* it in with the common grass. *Glanville's Scepsis.*

This mouldering piecemeal in your hands did fall,
And now at last you came to *swoop* it all. *Dryden.*

The eagle fell into the fox's quarters, and carried away a whole litter of cubs at a *swoop*. *L'Estrange.*

SWOP, *v. a.* Of uncertain derivation.—Johnson. Mr. Thomson says, ingeniously, of Teut. *zwo*, two, and *happen*, to acquire or gain. To change; to exchange one thing for another. A low word.

When I drove a thrust home, he put it by,
And cried, as in derision, Spare the stripling;
Oh that insulting word! I would have *swopped*
Youth for old age, and all my life behind,
To have been then a momentary man.
Dryden's Cleomenes.

SWORD, *n. s.* } Sax. ꝥpeopd; Belg. *sweerd*;
SWORD'ED *adj.* } Teut. *schwerd*; Goth. *siord.*
SWORD'ER, *n. s.* } A weapon used in cutting
SWORD'FISH, } or thrusting: hence destruc-
SWORD'KNOT, } tion by war; the punishment
SWORD'LAW, } or authority of justice:
SWORD'MAN, } sworded is girt with a sword:
SWORD'PLAYER. } a sworder, a cut-throat; a soldier: swordfish, a fish with a long bone projecting from its head: swordknot, the ribbon tied on the hilt of a sword: swordlaw is violence: swordman is also a soldier; one dextrous with the sword: swordplayer, a fencer; gladiator; a public prizefighter with the sword.

Each man took his *sword*, and slew all the males.
Genesis.

The *sword* without, and terrour within.
Deut. xxxii. 25.

A *swordfish* small him from the rest did sunder,
That in his throat him pricking softly under,
His wide abyss him forced forth to spew. *Spenser.*

Old unhappy traitor, the *sword* is out
That must destroy thee. *Shakspeare. King Lear.*
A Roman *sworder* and banditto slave
Murthered sweet Tully. *Id. Henry VI.*
Worthy fellows, and like to prove most sinewy *swordmen.* *Id. All's Well that ends Well.*
At Lecca's house,
Among your *swordmen*, where so many associates
Both of thy mischief and thy madness met.
Ben Jonson.
These they called *swordplayers*, and this spectacle a *sword*-fight. *Hakewill on Providence.*
Essex was made lieutenant-general of the army, the darling of the *swordmen.* *Clarendon.*
But the *sword*
Of Michael from the armoury of God
Was given him tempered so, that neither keen
Nor solid might resist that edge: it met
The *sword* of Satan with steep force to smite
Descending, and in half cut sheer. *Milton.*
The *sworded* seraphim
Are seen in glittering ranks with wings displayed.
Id.
So violence
Proceeded, and oppression, and *swordlaw*,
Through all the plain, and refuge none was found.
Id.
This I, her *sword*-bearer, do carry,
For civil deed and military. *Hudibras.*
Justice to merit does weak aid afford,
She quits the balance and resigns the *sword.*
Dryden
Our little fleet was now engaged so far,
That like the *swordfish* in the whale they fought;
The combat only seemed a civil war,
Till through their bowels we our passage wrought.
Id.
Malphigi observed the middle of the optick nerve of the *sword-fish* to be a large membrane, folded, according to its length, in many doubles, like a fan.
Derham's Physico-Theology.
Wigs with wigs, *swordknots* with *swordknots* strive,
Beaus banish beaus, and coaches coaches drive.
Pope.

A Sword is an offensive weapon worn at the side, and serving either to cut or stab. Its parts are the handle, guard, and blade; to which may be added the bow, scabbard, pummel, &c.

Sword of State, which is borne before the king, lords, and governors of counties, cities, or boroughs, &c. For or before the king it ought to be carried upright; the hilt as low as the bearer's waist, the blade up between his eyes. For or before a duke the blade must decline from the head, and be carried between the neck and the right shoulder. For or before an earl the blade is to be carried between the point of the shoulder and the elbow; and for or before a baron the blade is to be borne in the bend of the arm. This ceremonial form no less denotes the dignity of a governor than the coronet set on his coat of arms.

Sword Fish. See Xiphias.

SYB, *adj.* Properly sib. Sax. ȝib. Related by blood. Obsolete. But the Scottish dialect retains it.

If what my grandsire to me said be true,
Siker, I am very *syb* to you. *Spenser's Pastorals.*

SYBARIS, an ancient city of Italy, in Lucania, at the mouth of the river on the bay of Tarentum; founded by a colony of Achæans. It became very rich and powerful; and at one period had the command of four adjacent nations, of twenty-five towns, and an army of 300,000 men. The city walls were six miles and a half in circumference, and the suburbs covered seven miles of the banks of Crathis. It was five times destroyed, but always rebuilt. It stood a long and vigorous siege by the Crotonians, but at last was reduced by the Pythagoreans, A. A. C. 508. A town was built on its site called Thurium, A. A. C. 444.

SYBARITÆ, Sybarites, the people of Sybaris, who were long celebrated for bravery and skill in arts; but at last degenerated so much by the increase of luxury that Sybarite became synonymous with effeminate.

SYC'AMINE, *n. s.* } Gr. συκομορος. A tree.
Syc'amore. } See below. The sycamore of Scripture is not the same with ours.

If ye had faith as a grain of mustard-seed, ye might say unto this *sycamine* tree, Be thou plucked up, and it should obey you. *Luke* xvii. 6.
I was no prophet, but an herdman, and a gatherer of *sycamore* fruit. *Amos* vii. 14.
Go to yonder *sycamore* tree, and hide your bottle of drink under its hollow root. *Walton's Angler.*
Sycamores with eglantine were spread;
A hedge about the sides, a covering over head.
Dryden.
Sycamore is our acer majus, one of the kinds of maples: it is a quick grower.
Mortimer's Husbandry.

Sycamore, in botany. See Acer.

Sycamore Tree of Scripture. See Ficus.

SYCHAR, a city of Samaria, anciently called Shechem. See Samaria, and Shechem.

SYC'OPHANT, *n. s.* Gr. συκοφαντης; Lat. *sycophanta.* A talebearer; makebate; a malicious parasite.

Accusing *sycophants*, of all men, did best sort to his nature; but therefore not seeming *sycophants*, because of no evil they said, they could bring any new or doubtful thing unto him, but such as already he had been apt to determine; so as they came but as proofs of his wisdom, fearful and more secure, while the fear he had figured in his mind had any possibility of event. *Sidney.*
Men know themselves void of those qualities which the impudent *sycophant*, at the same time, both ascribes to them, and in his sleeve laughs at them for believing. *South.*
His *sycophanting* arts being detected, that game is not to be played a second time; whereas a man of clear reputation, though his barque be split, has something left towards setting up again.
Government of the Tongue.

Sycophant was an appellation given by the ancient Athenians to those who informed of the exportation of figs contrary to law; and hence it is still used in general for all informers, parasites, flatterers, &c.

SYDENHAM (Floyer), M. A., a learned English writer, born in 1710, and educated at Wadham College, Oxford; where he took his degree in 1734. He translated some parts of Plato's writings, and published them between 1753 and 1767. He was known and esteemed by many gentlemen eminent in literature; but having, from that excess of modesty which too often accompanies great merit and excessive sensibility, concealed his distress, he was put in jail

for a small debt contracted for maintenance, and died without letting his friends know his wants. Of this melancholy event the rev. and ingenious David Williams speaks in the following indignant and affecting terms in his Claims of Literature, p. 93:—'During the summer of 1788 an event took place which tarnished the character of English opulence and humanity, and afflicted the votaries of learning. Floyer Sydenham, the well known translator of Plato, one of the most useful, if not one of the most competent Greek scholars of his age, a man revered for his knowledge, and beloved for the candor of his temper, and the gentleness of his manners, died in consequence of having been arrested and detained for a debt to a victualler, who had for some time furnished his frugal dinner. At the news of that event every friend of literature felt a mixture of sorrow and shame; and one of the members of a club at the Prince of Wales' coffee house proposed, that it should adopt, as its object and purpose, some means to prevent similar afflictions, and to assist deserving authors and their families in distress.' This gave rise to the establishment of that excellent institution, the Literary Fund for the relief of Authors and their Families.

Sydenham (Thomas), M. D., an excellent English physician, was the son of William Sydenham, of Winford Eagle, in Dorsetshire, and was born there about 1624. He studied at Magdalen Hall, Oxford; but left that university when Oxford was garrisoned for king Charles I., and went to London: where, becoming acquainted with Dr. Thomas Cox, an eminent physician, that gentleman persuaded him to study physic; accordingly, after the garrison was delivered up to the parliament, he retired again to Magdalen Hall, entered on the study of medicine, and in 1648 was created M. B. Soon after he was made a fellow of All Souls College, and continued there several years: when, leaving the university, he settled at Westminster; became M. D. at Cambridge; grew famous for his practice; and was the chief physician in London from 1660 to 1670; when he became disabled by the gout. He died in 1689.

Sydenham (William), elder brother of the above, was for some time a gentleman commoner of Trinity College, Oxford. Entering into the army of the parliament, he acquitted himself so well that he rose to the highest offices. In 1649 he was appointed governor of the Isle of Wight, and vice admiral of that isle and of Hampshire. In 1653 he was chosen M. P. for Dorsetshire; in 1654 was appointed commissioner of the treasury, and a member of the privy council; and in 1658 was summoned to parliament by the protector, Richard Cromwell. What became of him after the Restoration we know not.

SYDEROPŒCILUS, in mineralogy, a stone mentioned by the ancients. It was found in Arabia, and obtained this name from its being spotted with a ferruginous color. It might possibly be a granite with spots of this peculiar color.

SYDERVELT, a town of Holland, in the department of the Rhine, and late province of Guelderland; six miles west of Culemburg.

SYDLING, a town of England, in Dorsetshire; called also St. Nicholas; with a fair December 6th.

SYDNEY, a thriving town of New Holland, and the capital of the British settlements in New South Wales. It is about seven miles from the mouth of Port Jackson, in a cove to which it gives name, and stands principally on two hilly necks of land, with a proportion of flat ground intervening. These together form one of the finest natural basins of water that can be imagined, and for safety and convenience rival the finest works of art. It is perfectly secured against any wind, and ships of any dimensions lie there. The western side of the town extends to the water's edge, and occupies, with a small exception round Dawe's battery, the whole of the neck of land which separates Sydney Cove from Lane Cove. On the eastern neck of land, the extension of the town has been stopped by the government-house, and the adjoining domain, which occupies the whole of Bennilong's point.

Until the administration of governor Macquarrie, little or no attention had been paid to the laying out of the streets, and each proprietor was left to build as caprice inclined him. He, however, succeeded in establishing a perfect regularity in most of the streets, and, in all future additions that may be made to it, the proprietors of leases will not be allowed to deviate from the lines marked out by the surveyor-general. Here is a very good market, established by this governor in 1813, and very well supplied with grain, vegetables, poultry, butter, eggs, and fruit. It is held three times a week; viz. on Mondays, Wednesdays, and Fridays, in a large oblong enclosure. The vender pays a small duty to the clerk of the market. Here is also the New South Wales bank.

Two excellent public schools have been founded at Sydney. One is a day school for boys, and of course only intended to impart gratuitous instruction:—the other is designed both for the education and support of poor and helpless female orphans. Besides these two public schools in the town of Sydney, which together contained, by late accounts, 224 children, there are establishments for the gratuitous diffusion of education in every populous district throughout the colony: the masters being allowed stipulated salaries from the orphan fund. Formerly particular duties, those on coals and timber, which still go by the name of 'the orphan dues,' were allotted for the support of these schools; but they were found to be insufficient, and afterwards one-fourth, and more recently one-eighth, of the whole revenue of the colony was appropriated to this purpose. Independent of these laudable institutions, supported at the expense of the government, there are various private ones intended for the dissemination of religious knowledge. One is termed the Auxiliary Bible Society of New South Wales, and its object is to co-operate with the British and Foreign Bible Society, and to distribute the holy Scriptures either at prime cost, or gratis, to deserving applicants. Another is the New South Wales Sunday School Institution. There are also in this town and other parts of the colony, several good private semi-

naries for the board and education of the children of opulent parents.

The harbour of Port Jackson is considered equal to any in the world, and would contain the shipping of all countries. It is navigable for vessels of any burden for about seven miles above the town, i. e. about fifteen from the entrance, and possesses the best anchorage all the way. Value of land in Sydney town is daily increasing; rents are in consequence high; and Mr. Wentworth, in his statistical account of the British settlements in this quarter, mentions, that it is very far from a commodious house that can be had for £100 a year unfurnished. Population 7000. Long. 151° 25′ E., lat. 33° 15′ S.

Sydney, a river in the interior of New Holland, seen by Mr. Oxley in his second expedition. Its course was northward, and the part of it seen crossed 31° S. lat., long. 151° 15′ E.

Sydney Bay, a bay on the south coast of Norfolk Island, in the South Pacific. Long. 168° 2′ E., lat, 29° 5′ N.

SYENE, an ancient city of Egypt, situated, according to Mr. Bruce, in lat. 24° 0′ 45″ N., although Pliny and Strabo both say that it lay directly under the tropic of Cancer. Syene is remarkable for being the place where the first attempt was made to measure the circumference of the earth, by Eratosthenes, whom Ptolomy Eurgetes had invited from Athens to Alexandria. It is now called Assouan. Here is still a small temple, supposed by some to be the ancient observatory. Mr. Hamilton cleared it till he reached the pavement, but he was interrupted before he dug down to the spot where the ancient well might have been expected. There are also the remains of a Roman bridge, and a handsome stone quay. But the principal ruins of Syene are those of the Saracen town, including the city wall, built of unburnt bricks, and flanked with square towers. Many large houses are still in a state of extraordinary preservation, as well as mosques, with lofty minarets, still entire. Although Syene is considered as a military station, yet the Aga is not provided with any force, and the castle is of no strength. In the Nile, opposite to Syene, is Elephantina, which see.

SYLAH, a large fortified town of Gujrat, district of Chalawara, Hindostan. The south of this town marks the boundary of Cottiwar, and here Gujrat Peninsula may be considered as terminating. This place is larger than Wankaneer, but not so well fortified. It belongs to a Rajpoot chieftain, but, like all others in this neighbourhood, pays a tribute to the Guicowar. A very large sheet of water covers the south face of the town. (Macmurdo, &c.)

SYLBURGIUS (Frederick), a learned German, born at Marpurg in Hesse, in 1546. He taught Latin, Greek, and French for some time at Licha; but afterwards applied himself solely to the revising and correcting of ancient authors, particularly the Greek classics, for the presses of Wechel and Commelin. He also greatly assisted the celebrated Henry Stephens in compiling his Thesaurus Græcæ Linguæ. See Stephens. He likewise published a Greek Grammar, which was much esteemed. For these services he had a salary from the university of Marpurg. He died in 1596.

SYLEUM, an ancient town of Pamphylia.

SYLLA (Lucius Cornelius) was descended from the illustrious family of the Cornelii, but from a branch quite distinct from that of the Scipios. His debauched behaviour in his younger years did not correspond with his excellent education. Nicopolis, a rich courtezan, left him heir to her great estate. He learned the art of war under Marius, whom he attended to Numidia as questor; and soon became the most skilful soldier in the army, while by his obliging behaviour he gained the esteem of all. His courage and dexterity contributed to the success of the war; and his eloquence persuaded Bocchus to deliver up Jugurtha. He served afterwards in the social war, and as a reward he was raised to the prætorship, next elected consul, and soon after declared general of the army against Mithridates VII. king of Pontus. Marius was exasperated that the management of this war was not committed to him. The people were persuaded, by his intrigues, to reverse the decree, and substitute him in place of Sylla. Upon this he sent down officers to take the command of the army; but Sylla by this time had gained over the soldiers, who, instead of obeying the decree of the people, slew Marius's officers, and intreated Sylla to lead them instantly to Rome. Accordingly he entered the city sword in hand, slew Sulpicius the consul, obliged Marius to flee, new-modelled the laws, and afterwards marched into the east, and immediately laid siege to Athens; for that city, together with the rest of Greece, had fallen into the power of Mithridates. He wrote to the Amphyctions, who were assembled at Delphi, to send him all the gold in the temple of Apollo, promising to restore it at the end of the war; and when he received it said that he now was sure of victory, since the gods themselves furnished him with money. Athens was at last taken by assault, and Sylla was upon the point of destroying it, when he recollected its ancient glory, and spared, as he said, the living for the sake of the dead. After burning the Piræus he gained two decisive victories over the generals of Mithridates. In the second battle, fought at Orchomenus, he was almost defeated; his troops began to flee, when, leaping from his horse, he snatched up a standard, and crying out, 'I will die here gloriously; and soldiers, when you are asked where you abandoned your general, answer, At Orchomenus.' This reproach recalled the courage of the Romans; they followed him and gained a complete victory. Mithridates then sued for peace. Mean time Cinna had declared against Sylla in Italy; and Marius returning from banishment had taken the most severe vengeance on all his enemies. Sylla was declared a traitor; his laws reversed, his friends were murdered, and the government new modelled. These news induced Sylla to conclude a treaty with Mithridates, and march directly to Rome. His approach terrified the Romans. Marius and Cinna were both dead; but the consuls made vigorous preparations to oppose him. A civil war was begun, but Sylla in the end subdued all his enemies, and entirely ruined the Marian faction. He entered Rome at the head of his victorious army, and assumed the title of Felix

Happy. The remainder of his life was stained with the most abominable cruelties. He ordered 8000 wretches, who had thrown themselves upon his clemency, to be butchered in the Campus Martius. To carry on these cruelties with the appearance of justice, he commanded the people to elect him dictator. He kept this office above two years; and then, to the amazement of all, laid it down, and offered to stand his trial before the people. Soon afterwards he retired into the country, and plunged into every kind of debauchery. He died of the lousy disease, in the sixtieth year of his age. His person was elegant, his air noble, and his manners easy. He was eloquent, liberal, crafty, insinuating; and a profound master of dissimulation, by which he concealed a hideous train of vices. This Nero of the republic did one essential service to science by recovering the works of Aristotle at the taking of Athens.

SYL'LABLE, *n. s.* & *v. a.* Fr. *syllabe;* Gr. *συλλαβη*. As much of a word as is uttered by the help of one vowel, or one articulation: to utter; pronounce.

Abraham, Job, and the rest that lived before any *syllable* of the law of God was written, did they not sin as much as we do in every action not commanded? *Hooker.*

I heard
Each *syllable* that breath made up between them. *Shakspeare.*

To-morrow, and to-morrow, and to-morrow,
Creeps in this petty pace from day to day;
To the last *syllable* of recorded time;
And all our yesterdays have lighted fools
The way to dusty death. *Id. Macbeth.*

Airy tongues that *syllable* men's names
On sands, and shores, and desart wildernesses. *Milton.*

There is that property in all letters of aptness to be conjoined in *syllables* and words, through the voluble motions of the organs from one stop or figure to another, that they modify and discriminate the voice without appearing to discontinue it. *Holder's Elements of Speech.*

He hath told so many melancholy stories, without one *syllable* of truth, that he hath blunted the edge of my fears. *Swift.*

SYL'LABUB, *n. s.* Rightly SILLABUB, which see. Milk and acids.

No *syllabubs* made at the milking pail,
But what are composed of a pot of good ale. *Beaumont.*

Two lines would express all they say in two pages: 'tis nothing but whipt *syllabub* and froth, without solidity. *Felton.*

A SYLLABUB is a kind of compound drink, most usual in summer; ordinarily made of white wine and sugar, into which is squirted new milk with a syringe or wooden cow. Sometimes it is made of canary, in which case the sugar is spared, and a little lemon and nutmeg are added in lieu of it. To prepare it the best way, the wine and other ingredients, except the milk, are to be mixed over night, and the milk or cream added in the morning. The proportion is, a pint of wine to three of milk.

SYLLABUB WHIPT. To half a pint of white wine or rhenish is put a pint of cream, with the whites of three eggs. This they season with sugar and beat with birchen rods, or work with a syringe. The froth is taken off as it rises, and put into a pot; where, after standing to settle two or three hours, it is fit to eat.

SYLLABUS, in literature, denotes a table of contents, or an index to the chief heads of a book.

SYLLEPSIS (*συλλεψις*, Gr.), in grammar, a figure in which two nominative cases of the singular number are joined to a plural verb.

SYL'LOGISM, *n. s.* SYLLOGIS'TIC, or SYLLOGIS'TICAL, *adj.* SYLLOGIS'TICALLY, *adv.* SYL'LOGIZE, *v. n.* } Fr. *syllogisme*; Gr. *συλλογισμὸς*. An argument composed of three propositions: as, 'every man thinks; Peter is a man; therefore Peter thinks:' the derivatives all strictly corresponding.

Though we suppose subject and predicate, and copula, and propositions and *syllogistical* connexions in their reasoning, there is no such matter; but the entire business is at the same moment present with them, without deducing one thing from another. *Hale's Origin of Mankind.*

A piece of rhetorick is a sufficient argument of logick, an apologue of Æsop beyond a *syllogism* in Barbara. *Browne.*

A man knows first, and then he is able to prove *syllogistically;* so that *syllogism* comes after knowledge, when a man has no need of it. *Locke.*

What a miraculous thing should we count it, if the flint and the steel, instead of a few sparks, should chance to knock out definitions and *syllogisms!* *Bentley.*

Though the terms of propositions may be complex, yet, where the composition of the whole argument is thus plain, simple, and regular, it is properly called a simple *syllogism,* since the complexion does not belong to the *syllogistick* form of it. *Watts's Logick.*

Men have endeavoured to transform logick into a kind of mechanism, and to teach boys to *syllogize,* or frame arguments and refute them, without real knowledge. *Watts.*

Logick is, in effect, an art of *syllogizing.* *Baker.*

A SYLLOGISM, in logic, consists of three propositions; the first two called premises; the last the conclusion. See LOGIC.

SYLOES, a promontory of Africa.

SYLPH, in modern mythology and dæmonology, an ideal being, somewhat analogous to the fairy of the British (see FAIRY); supposed to attend with anxious care about all the minutiæ and paraphernalia of a fine lady.—Pope's Rape.

SYLVA. See PANCARPUS.

SYL'VAN, *adj.* & *n. s.* Fr. *sylvain.* Woody; shady; relating to woods: a wood-god; a rustic.

Cedar and pine, and fir, and branching palm,
A *sylvan* scene! and, as the ranks ascend,
Shade above shade, a woody theatre
Of stateliest view. *Milton's Paradise Lost.*

Eternal greens the mossy margin grace,
Watched by the *sylvan* genius of the place. *Pope.*

Her private orchards, walled on every side,
To lawless *sylvans* all access denied. *Id.*

SYLVANUS, a brave warrior among the Franks, under the emperor Constantius, who being, by the most deliberate villany and forgery of Dynames, compelled to declare himself emperor, was afterwards, when his innocence was discovered, murdered by Ursicinus, another traitor See CONSTANTINOPLE.

SYLVESTER (Joshua), born in 1563. He translated the works of Du Bartas; some pieces of Fracastorius from the Latin; and the Quatrains of Pibrac, with some other tracts from the French. He died in Holland, in 1618.

SYLVIA, or Ilia, or Rhea Sylvia, the mother of Romulus. See RHEA and ROME.

SYLVIA, in ornithology, a modern genus of birds, belonging to the order of passeres, formed by Dr. Latham, by limiting the motacilla to the wagtail, and arranging the other species formerly classed under that genus under the sylvia. See ORNITHOLOGY. The motacilla he thus describes:—The beak is subulated, slender, and somewhat indented at the point. The tongue seems torn at the end, and the tail is long. He thus characterises the sylvia:—The beak is subulated, straight, and small; the mandibles are nearly equal. The nostrils are obovate, and a little depressed. The exterior toe is joined at the under part to the base of the middle one. The tongue is cloven, and the tail is small. He makes thirteen species of the motacilla, and 174 species of the sylvia. See MOTACILLA.

SYLVIUS (Æneas), I. and II. kings of Alba, the son and grandson of Æneas the Trojan, by Lavinia. See ROME.

SYLVIUS (Æneas). See PIUS II.

SYLVIUS (James), or James Du Bois, a celebrated French anatomist and physician, the son of Nicholas Du Bois, a camblet weaver, born at Amiens, in Picardy, in 1478. He acquired a great knowledge of Greek and Latin, and some Hebrew, under his elder brother Francis Sylvius, or Du Bois, who was principal of the College of Tournay, at Paris, and a great promoter of learning. James wrote several works on anatomy, medicine, and pharmacy, which have been often printed, though he was much opposed by his contemporaries. He defended Galen against Vesalius. See ANATOMY, Index. He was also a good mathematician, and invented several useful machines. His great vice was avarice, which prevented him from taking the degree of M. D., though he went to Montpelier in 1520 on purpose; but he was reconciled to his brethren and admitted M. B. in June 1531. He read lectures on Hippocrates and Galen, which spread his fame far and wide. In 1535 he was appointed a professor in the college of Triquet, and in 1548 professor of physic in the Royal College at Paris; which office he retained till his death, in 1555. He was never married.

SYMA, or SYME, a town of Asia.—Lempr.

SYM'BOL, *n. s.*
SYMBOL'ICAL, *adj.*
SYMBOL'ICALLY, *adv.*
SYMBOLIZA'TION, *n. s.*
SYM'BOLIZE, *v. n.* & *v. a.*
} Fr. *symbole*; Gr. σύμβολον; Lat. *symbolum*. An abstract; compendium; comprehensive form; type; figurative representation: the adjective and adverb corresponding: to symbolize is to have some quality, or something in common with another, by symbolic representation: as a verb active, to make representative: symbolization corresponding.

The pleasing of colour *symbolizeth* with the pleasing of any single tone to the ear; but the pleasing of order doth *symbolize* with harmony. *Bacon.*

They both *symbolize* in this, that they love to look upon themselves through multiplying glasses. *Howel.*

The sacrament is a representation of Christ's death, by such *symbolical* actions as himself appointed. *Taylor.*

It *symbolically* teaches our duty, and promotes charity by a real signature and a sensible sermon. *Id.*

Salt, as incorruptible, was the *symbol* of friendship, which, if it casually fell, was accounted ominous, and their amity of no duration. *Browne.*

By this encroachment idolatry first crept in, men converting the *symbolical* use of idols into their proper worship, and receiving the representation of things unto them as the substance and thing itself. *Id.*

Some *symbolize* the same from the mystery of its colors. *Id. Vulgar Errours.*

The hieroglyphical *symbols of* Scripture, excellently intended in the species of things sacrificed in the dreams of Pharaoh, are oftentimes racked beyond their *symbolizations*. *Id.*

I affectedly *symbolized* in careless mirth and freedom with the libertines, to circumvent libertinism. *More.*

Aristotle and the schools have taught that air and water, being *symbolizing* elements, in the quality of moisture, are easily transmutable into one another. *Boyle.*

The soul is such, that it strangely *symbolizes* with the thing it mightily desires. *South's Sermons.*

Words are the signs and *symbols* of things; and as, in accounts, cyphers and figures pass for real sums, so words and names pass for things themselves. *Id.*

The heathens made choice of these lights as apt *symbols* of eternity, because, contrary to all sublunary beings, though they seem to perish every night, they renew themselves every morning. *Addison on Metals.*

Beginning with the *symbol* of our faith, upon that the author of the gloss enquires into the nature of faith. *Baker.*

A SYMBOL is a sign or representation of something moral, by the figures or properties of natural things. Hence symbols are of various kinds; as hieroglyphics, types, enigmas, parables, fables, &c.

SYMBOLUM, an ancient town of Macedonia, near Philippi; on the borders of Thrace.—Lempr.

SYME. See SYMA.

SYMI, or SIMI. See SIMI.

SYMMACHUS, a writer who flourished in the second century, and translated the Hebrew Bible into Greek. Only a few fragments of his work are extant.

SYMMACHUS, a senator and orator of Rome, who was consul A. D. 391. He wrote ten books of Epistles against the Christian religion; which are extant, and have been refuted by Ambrose, bishop of Milan, and Prudentius, the Christian poet. He was banished from Rome by Valentinian, but recalled and received into favor by Theodosius. Ammianus Marcellinus speaks of him as a man of great learning and modesty. Scioppius, Pareus, and other learned men, have written notes upon his epistles. The best editions are those of Geneva, 8vo., 1598; Paris, 4to., 1604; and Franckfort, 8vo., 1642.

SYM'METRY, *n. s.*
SYMME'TRIAN, *n. s.*
SYMMET'RICAL, *adj.*
SYM'METRIST, *n. s.*
} Fr. *symmetrie*; Gr. συν and μέτρον. Adaptation or agreement of parts: proportion; Lar-

mony: a symmetrian or symmetrist is one who studies proportion: symmetrical, proportionate.

His face was a thought longer than the exact *symmetrians* would allow. *Sidney.*

She by whose lines proportion should be
Examined, measure of all *symmetry*;
Whom had that ancient seen, who thought souls made
Of harmony, he would at next have said
That harmony was she. *Donne.*

Some exact *symmetrists* have been blamed for being too true. *Wotton's Architecture.*

Symmetry, equality, and correspondence of parts, is the discernment of reason, not the object of sense. *More.*

Nor were they only animated by him, but their measure and *symmetry* were owing to him. *Dryden.*

SYMMETRY is the just proportion of the several parts of any thing, so as to compose a beautiful whole.

SYMMETRY, in painting. See PAINTING.

SYMMONS (Charles), D. D., a native of Cardigan, which his father had represented in three successive parliaments, was born in 1749, and received the rudiments of his education at Westminster school, whence he removed to Glasgow, and subsequently to Clare-hall, Cambridge. Having graduated in 1776 as bachelor of divinity, he obtained two years afterwards the rectory of Narberth, and in 1794 that of Lampeter in Pembrokeshire. This last piece of preferment he narrowly escaped losing, in consequence of a sermon preached by him at Cambridge, before the presentation was made out, the discourse containing some whiggish sentiments little congenial to those then in power. The same cause operated to throw difficulties in the way of his doctor's degree, and he therefore found it advisable to enter himself ad eundum at Jesus College, Oxford, in which university he proceeded D. D. in March. Dr. Symmons was a warm admirer of literature, and a zealous supporter of the Literary Fund. His own writings consist of Inez, a dramatic poem, 1797; a second entitled Constantia, 1800; an octavo volume of miscellaneous poetry, partly of his own composition and partly that of his daughter, 1813; a Rhymed translation of the Æneid, 1817; and a Life of Milton, prefixed to an edition of that author's prose works. After his decease, which took place at Bath in the spring of 1826, his friend, Mr. Whittingham, published a posthumous biographical sketch of Shakspeare of his writing.

SYMONDSBOROUGH, a remarkable large borough of Flintshire, near Wellington in Devonshire, in the northern extremity of Hemyock. The people have a notion that a king called Symon was buried here.

SYMPATHETIC INK. A good sympathetic ink has been made from a solution of a mixture of sulphate of copper and muriate of ammonia, which appears of a bright yellow when exposed to heat, but disappears with cold or moisture.

SYM'PATHY, *n. s.* SYMPATHET'IC, or SYMPATHET'ICAL, *adj.* SYMPATHET'ICALLY, *adv.* SYM'PATHIZE, *v. n.* } Fr. *sympathie*; Greek συμπάθεια. Fellowfeeling; mutual sensibility; the quality of being affected by the affection of another: the adjective, adverb, and verb neuter correspond.

You are not young; no more am I: go to, then, there's *sympathy*: you are merry, so am I; ha! ha! then there's more *sympathy*; you love sack, and so do I; would you desire better *sympathy*?
Shakspeare. Merry Wives of Windsor.

They saw, but other sight instead, a crowd
Of ugly serpents: horror on them fell,
And horrid *sympathy*. *Milton.*

Or *sympathy*, or some connat'ral force,
Powerful at greatest distance to unite,
With secret amity, things of like kind,
By secretest conveyance. *Id. Paradise Lost.*

The thing of courage,
As roused with rage, with rage doth *sympathize*. *Milton.*

To confer at the distance of the Indies by *sympathetick* conveyances, may be as usual to future times as to us in a literary correspondence. *Glanville.*

Hereupon are grounded the gross mistakes in the cure of diseases, not only from *sympathetick* receipts, but amulets, charms, and all incantatory applications. *Browne.*

United by this *sympathetick* bond,
You grow familiar, intimate, and fond. *Roscommon.*

Green is a pleasing color, from a blue and a yellow mixed together, and by consequence blue and yellow are two colours which *sympathize*. *Dryden.*

Can kindness to desert like your's be strange?
Kindness by secret *sympathy* is tied;
For noble souls in nature are allied. *Id.*

There are such associations made in the minds of most men; and to this might be attributed most of the *sympathies* and antipathies observable in them. *Locke.*

There never was any heart truly great and generous, that was not also tender and compassionate: it is this noble quality that makes all men to be of one kind; for every man would be a distinct species to himself, were there no *sympathy* among individuals. *South's Sermons.*

Their countrymen were particularly attentive to all their story, and *sympathized* with their heroes in all their adventures. *Addison's Spectator.*

To you our author makes her soft request,
Who speak the kindest, and who write the best;
Your *sympathetick* hearts she hopes to move,
From tender friendship and endearing love. *Prior.*

Though the greatness of their mind exempts them from fear, yet none condole and *sympathize* more heartily. *Collier.*

All the ideas of sensible qualities are not inherent in the inanimate bodies; but are the effects of their motion upon our nerves, and *sympathetical* and vital passions produced within ourselves. *Bentley.*

SYMPATHY also signifies an agreement of affections and inclinations, or a conformity of natural qualities, humors, temperaments, which make two persons delighted and pleased with each other.

SYMPATHY may subsist either between different persons or bodies, or between different parts of the same body. It is either similar or dissimilar: similar, when the affection or action in the sympathiser is similar to the affection or action in the sympathant; and dissimilar when those are different.—Sympathy, too, is often an imitative faculty, sometimes involuntary, frequently without consciousness: thus we yawn when we see others yawn, and are excited to laugh by the laughing of others. Sympathy, according to Dr. Jackson, relates to the operations of the affec-

tions of the mind, to the operations of the imagination, and to the affections of the external senses. 1. The affections of the mind produce in the body different sensations and impressions, and, as sympathies of consciousness, determine in general the spirits to those parts which are most apt to be affected. The affections of the mind of one person will often work upon the spirits of many. Thus whole companies are sometimes disposed to be sad and melancholy or merry and jovial, when any one present is much inclined to either of those states of mind. Those tender sympathetic affections which lay hold of the mind at the representation of theatrical performances originate from the same principle, while they are the surest test of just execution in the actor, and of the expressive language of the author. Indeed all stage effect depends on sympathy. 2. It is probable that a connexion between the affections and sensations of the female mind and uterus is very materially concerned in the process of generation, and probably can alone give efficacy to those actions and impressions subservient to conception through the sympathising affections of the mind. But this is a subject of which we as yet know little; though the facts are numerous and incontrovertible; but physiologists seem unwilling to admit of them, because they cannot account for them. See SURGERY. 3. As affecting the senses, sympathies have been compared to unisons of sound in music, which produce agreeable sympathetic feelings; and the reverse produces disagreeable feelings. 'All concords and discords of music are sympathies and antipathies of sound.' A disagreeable sound will often set the teeth on edge. The most agreeable as well as odious objects operate in a secondary way in producing those sympathetic impressions and actions which they commonly give rise to. An increased secretion of saliva often takes place at the sight of a favorite dish. Many have attempted to account for the remarkable sympathy which takes place between parts of the body seemingly unconnected with each other; but these attempts are merely conjectures.

SYMPHLEGMA (Gr. συμπλεγμα, an embracing, from συν, with, and πλεκω, to fold or join), in painting and sculpture, a term used to denote a group of persons interlaced with each other. Thus we may, according to Winckelmann, call the children of Niobe a symphlegma. Pliny gives this name to two famous groups of wrestlers; the one of Cephessodorus, of which it was said that the hands of the figures appeared rather to be buried in flesh than in marble; and the other of Heliodorus, who represented the struggle of Pan and Olympus. But this appellation of symphlegma cannot be applied to two figures placed by each other's side, as Gort has imagined.

SYMPHONIA, in botany, a genus of plants, belonging to the class of monadelphia and order of pentandria.—There is one pistil: COR. globular, and the berry five-celled. There is only one species yet discovered, viz. S. globolifera.

SYM'PHONY, *n. s.* } Fr. *symphonie*; Gr.
SYMPHO'NIOUS, *adj.* } συν and φωνη. Concert or instruments; harmony of sounds: the adjective corresponding.

A learned searcher from Pythagoras's school, where it was a maxim that the images of all things are latent in numbers, determines the comeliest proportion between breadths and heights reducing symmetry to *symphony*, and the harmony of sound to a kind of harmony in sight. *Wotton.*

Up he rode,
Followed with acclamation and the sound
Symphonious of ten thousand harps, that tuned
Angelick harmonies. *Milton.*

Speak ye who best can tell, ye sons of light,
Angels! for ye behold him, and with songs
And choral *symphonies*, day without night,
Circle his throne rejoicing. *Id. Paradise Lost.*

The trumpets sound,
And warlike *symphony* is heard around;
The marching troops through Athens take their way;
The great earl marshal orders their array. *Dryden.*

SYMPHONY, in music, denotes a consonance of several sounds agreeable to the ear, whether vocal or instrumental. See HARMONY.

SYM'PHYSIS, *n. s.* Gr. συν and φυω. Defined below.

Symphysis, in its original signification, denotes a connascency, or growing together; and perhaps is meant of those bones which in young children are distinct, but after some years unite and consolidate into one bone. *Wiseman.*

SYMPHYSIS, in anatomy, one of the kinds of junctures or articulations of the bones. See ANATOMY.

SYMPHYTUM, comfrey, in botany, a genus of plants belonging to the class of pentandria, and order of monogynia; and in the natural system ranging under the forty-first order, asperifoliæ. The limb of the corolla is tubular and ventricose, and the throat is shut with awl-shaped rays. There are three species; of which S. officinale is a British plant. The stem is about two feet high, round, branched, green, and rough. The radical leaves are very large and rough; those on the stalks are decurrent and alternate. The flowers grow on loose spikes, and are either of a yellowish or purple color. It grows on the banks of rivers and flowers from May to October.

SYMPLEGADES, or Cyaneæ, two rugged islands at the entrance of the Euxine Sea; twenty stadia from the mouth of the Thracian Bosphorus: the one on the coast of Asia, and the other on that of Europe; separated by only twenty furlongs of water, which however foams and rages constantly, so as to render the passage very dangerous. They were first explored by the Argonauts. They were also called Planetæ, or Wanderers, from a mistaken idea that they moved or floated.

SYMPLOCE, συμπλοκη, in rhetoric, a figure, where the same word is repeated. See ORATORY.

SYMPLOCOS, in botany, a genus of plants belonging to the class of polydelphia, and to the order of polyandria: and in the natural system ranging under those the order of which is doubtful. The calyx is quinquefid and interior: the corolla is pentapetalous: the stamina are attached to the tube of the corolla in a fourfold series. There are five species; viz. 1. S. alstonia; 2. S. arechea; and, 3. S. cisponima; described by Mr. L'Heritier of the Academy of Sciences at

Paris. 4. S. Martinicensis, the only species described by Linnæus, is a native of Martinico. 5. S. tinctoria, a plant used by dyers, is also mentioned by L'Heritier.

SYMPO'SIAC, *adj.* Fr. *symposiaque;* Gr. συμποσιακος. Relating to merry makings, or a drinking party.

By desiring a secresy to words spoke under the rose, we only mean in society and compotation, from the ancient custom of *symposiack* meetings to wear chaplets of roses about their heads. *Browne.*

In some of those *symposiack* disputations amongst my acquaintance, I affirmed that the dietetick part of medicine depended upon scientifick principles. *Arbuthnot.*

SYMPOSIARCH, from συμποσιον, a banquet, and αρχον, governor, in antiquity, the director or manager of an entertainment. This office was sometimes performed by the person at whose charge the entertainment was provided; sometimes by another named by him; and at other times, especially in entertainments provided at the common expense, he was elected by lot, or by the suffrages of the guests.

SYMP'TOM, *n. s.* / SYMPTOMAT'IC, or / SYMTOMAT'ICAL, *adj.* / SYMTOMAT'ICALLY, *adv.* } Fr. *symptome;* Greek σύμπτωμα. Something that happens concurrently with something else: hence a sign or token: the adjective and adverb corresponding.

Symptomatical is often used to denote the difference between the primary and secondary causes in diseases; as a fever from pain is said to be *symptomatical*, because it arises from pain only; and therefore the ordinary means in fevers are not in such cases to be had recourse to, but to what will remove the pain; for, when that ceases, the fever will cease, without any direct means taken for that. *Quincy.*

The *symptoms*, as Dr. Sydenham remarks, which are commonly scorbutick, are often nothing but the principles or seeds of a growing, but unripe gout. *Blackmore.*

By fomentation and a cataplasm the swelling was discussed; and the fever, then appearing but *symptomatical*, lessened as the heat and pain mitigated. *Wiseman's Surgery.*

The causes of a bubo are vicious humours abounding in the blood, or in the nerves, excreted sometimes critically, sometimes *symptomatically.* *Wiseman.*

Ten glorious campaigns are passed, and now, like the sick man, we are expiring with all sorts of good *symptoms.* *Swift.*

SYMPTOM, in medicine, means any circumstance which indicates the existence, nature, or stage of a disease. Pain, weakness, drowsiness, convulsions, suppression of urine, difficulties of breathing and swallowing, coughs, distastes, nauseas, thirsts, swoonings, faintings, looseness, costiveness, dryness and blackness of the tongue, are the principal symptoms of diseases. See MEDICINE.

SYMUS, a mountain of Armenia, from which the Araxes rises.

SYNÆRESIS, or Crasis, contraction, in grammar, a figure whereby two syllables are united in one; as vemens, for vehemens, οφις for οφιας, τυχος for τυχεος, &c.

SYN'AGOGUE, *n. s.* Fr. *synagogue;* Gr. συναγωγη. An assembly of the Jews to worship: a place for such worship.

As his custom was, he went into the *synagogue* on the sabbath. *Gospel.*

Go, Tubal, and meet me at our *synagogue.* *Shakspeare.*

SYNAGOGUE, among the Jews, was a place where people met to worship. Authors are not agreed about the time when the Jews first began to have synagogues: some will have them as old as the ceremonial law, and others fix their beginning to the times after the Babylonish captivity. They erected synagogues not only in towns and cities, but also in the country, especially near rivers, that they might have water for their purifications and ceremonious washings. No synagogue was built in any town, unless there were ten persons of leisure in it; but there might be many in one town, or in one quarter of a town, provided it was very populous. Jerusalem is said to have contained 480. The chief things belonging to a synagogue were, 1. The ark or chest, made after the model of the ark of the covenant, containing the Pentateuch. 2. The pulpit and desk in the middle of the synagogue, in which he that was to read or expound the law stood. 3. The seats or pews for the people. 4. The lamps to give light at evening service, and the feast of dedication. 5. Rooms or apartments for the utensils and alm-chests. The synagogue was governed by a council or assembly, over whom was a president, called the ruler of the synagogue. These are sometimes called chiefs of the Jews, the rulers, the priests or elders, the governors, the overseers, the fathers of the synagogue. Their business was to punish the disobedient by censures, excommunication, or penalties, such as fines and scourging; to take care of the alms, which are frequently called by the name of righteousness. The chief ruler, or one of the rulers, gave leave to have the law read and expounded, and appointed who should do it. In every synagogue there were several ministers who had different offices assigned to them. Service was performed three times a day, viz. in the morning, in the afternoon, and at night; at the time of morning sacrifice, evening sacrifice, and after the evening sacrifice on Mondays, Thursdays, and Saturdays, there was a more forcible obligation upon the people to attend, than upon the other days. There are synagogues at London, Amsterdam, Rotterdam, Avignon, Metz, &c.

SYNALE'PHA, *n. s.* Greek συναλοιφη. A contraction, or excision of a syllable in Latin verse, as ill' ego.—Bailey.

Virgil, though smooth, is far from affecting it: he frequently uses *synalephas*, and concludes his sense in the middle of his verse. *Dryden.*

SYNALEPHA, or SYNALŒPHA, in grammar, or collisio, a contraction of syllables, performed principally by suppressing some vowel or diphthong at the end of a word, on account of another vowel or diphthong at the beginning of the next, as ill' ego for ille ego, &c.

Conticuer' omnes intentiqu' ora tenebant. *Virgil.*

SYNARTHRO'SIS, *n. s.* Gr. συν and αρθρω A close conjunction of two bones.

There is a conspicuous motion where the conjunction is called diarthrosis, as in the elbow; an ob

scure one, where the conjunction is called *synarthrosis*, as in the joining of the carpus to the metacarpus.
Wiseman's Surgery.

SYNARTHROSIS. See ANATOMY, Index.

SYNCELLUS, an ancient Byzantine historian, of whom we have met with no memoir; which is the more surprising that his works are still extant, and were published at Paris in folio, in 1652.

SYNCELLUS, or SINCELLUS, an ancient officer in the family of the patriarchs, and other prelates of the eastern church. The word, in the corrupt Greek, συγκηλλος, signifies a person who lies in the chamber with another; a chamber-fellow or chum. The syncellus was an ecclesiastic, who lived with the patriarch of Constantinople, to be a witness of his conduct; whence it is that the syncellus was also called the patriarch's eye; because his business was to observe and watch. The other prelates had also their syncelli, who were clerks living in the house with them, and even lying in the same chamber, to be witnesses of the purity of their manners. Afterwards the office degenerated into a mere dignity; and there were made syncelli of churches. At last it became a title of honor, and was bestowed by the emperor on the prelates themselves; whom they called pontificales syncelli, and syncelli Augustales.

SYNCONTHRO'SIS, *n. s.* Greek σὺν and χόνδρος.

Synchondrosis is an union by gristles of the sternon to the ribs. *Wiseman.*

SYN'CHRONISM, *n. s.* } Greek σὺν and
SYNCHRON'ICAL, *adj.* } χρόνος. Concur-
SYN'CHRONOUS. } rence of events

happening at the same time: both the adjectives corresponding.

The coherence and *synchronism* of all the parts of the Mosaical chronology, after the Flood, bear a most regular testimony to the truth of his history.
Hale.

It is difficult to make out how the air is conveyed into the left ventricle of the heart, the systole and diastole of the heart and lungs being far from *synchronical.* *Boyle.*

The variations of the gravity of the air keep both the solids and fluids in an oscillatory motion, *synchronous* and proportional to their changes.
Arbuthnot on Air.

SYNCHYSIS, in Latin prosody, that confused and intricate order of the words, which is so frequently used by the best Latin poets, and is commonly called the artificial order: as Saxa vocant Itali mediis quæ in fluctibus Aras.—Virgil.

SYNCOPATION, in music, denotes a striking or beating of time, whereby the distinction of the several times or parts of the measure is interrupted. However, it is more properly used for the connecting the last note of any measure or bar, with the first of the following measure, so as only to make one note of both. A syncope is sometimes also made in the middle of a measure. Syncopation is also used when a note of one part ends or terminates on the middle of a note of the other part. This is otherwise denominated binding. It is likewise used for a driving note; that is, when some shorter note at the beginning of a measure, or half measure, is followed by two, three, or more longer notes before another short note occurs, equal to that which occasioned the driving, to make the number even, e. gr. when an odd crotchet comes before two or three minims, or an odd quaver before two, three, or more crotchets. In syncopated or driving notes, the hand or foot is taken up, or put down, while the note is sounding.

SYN'COPE, *n. s.* } Fr. *syncope;* Gr. συγ-
SYN'COPIST. } κοπή. Fainting fit; contraction of a word; a contractor of words.

To outshine all the modern *syncopists*, and thoroughly content my English readers, I intend to publish a Spectator that shall not have a single vowel in it. *Spectator.*

The symptoms attending gunshot wounds are pain, fever, delirium, and *syncope.* *Wiseman.*

SYNCOPE, in grammar, an elision or retrenchment of a letter or syllable out of the middle of a word, as caldus for calidus.

SYNCOPE, in medicine, fainting; a deep and sudden swooning, wherein the patient continues without any sensible heat, motion, sense, or respiration, and is seized with a cold sweat over the whole body; all the parts, in the mean time, turning pale and cold, as if he were dead. See MEDICINE.

SYNDIC, in government and commerce, an officer in divers countries, entrusted with the affairs of a city or other community, who calls meetings, makes representations and solicitations to the ministry, magistracy, &c., according to the exigency of the case.

SYN'DICATE, *v. n.* Fr. *syndiquer;* Gr. σὺν and δικη. To judge; pass judgment on; censure. Not in use.

Aristotle undertook to censure and *syndicate* his master, and all law-makers before him. *Hakewill.*

SYN'DROME, *n. s.* Gr. συνδρομή. Concurrent action; concurrence.

All things being linked together by an uninterrupted chain of causes, every single motion owns a dependance on such a *syndrome* of prerequired motors
Glanville's Scepsis.

SYNEC'DOCHE, *n. s.* } Fr. *synecdoche;*
SYNECDOCH'ICAL, *adj.* } Gr. συνεκδοκή. A figure by which part is taken for the whole, or the whole for part: the adjective corresponding.

Because they are instruments of grace in the hand of God, and by these his holy spirit changes our hearts; therefore the whole work is attributable to them by a *synedoche;* that is, they do in this manner the work for which God ordained them.
Taylor's Worthy Communicant.

Should I, Lindamer, bring you into hospitals, and shew you there how many souls, narrowly lodged in *synedochical* bodies, see their earthen cottages moulder away to dust, those miserable persons, by the loss of one limb after another, surviving but part of themselves, and living to see themselves dead and buried by piecemeal? *Boyle.*

SYNEDOCHE. See ORATORY.

SYNECPHONESIS, in grammar, a coalition, whereby two syllables are pronounced as one; being much the same as Synaloepha and Synæresis.

SYNESIS, in Latin grammar, a figure whereby the construction of a sentence is regulated not by the words, but by the sense, as to gender

or number: as, in Livy, Latium Capuaque agro multati; instead of Latini et Capuani.

SYNESIUS, a celebrated father of the Christian church, who flourished under Theodosius II. He was born at Cyrene, in Africa, of noble parentage. In 410 he was appointed bishop of Ptolemais. His works consist of 155 Epistles, and some other curious tracts, written in very pure and elegant Greek. The best editions are those of Paris, in 8vo., 1605; folio, 1612, and 1633; and Amsterdam, 1749.

SYNEUROSIS. See ANATOMY.

SYNGE (Edward), a late eminent prelate of Ireland, was the son of Dr. Edward Synge, bishop of Cork, and born April 6th, 1659, at Inishonane. He was educated at Cork; admitted commoner and A. B. at Christ Church, Oxford; and finished his studies at Dublin. He was made vicar at Christ Church, in Cork, and after other promotions rose to be bishop of Raphoe, in 1714; and at last, in 1716, archbishop of Tuam, being a zealous whig. He wrote and published many excellent tracts on divinity, in 4 vols. 12mo; and died at Tuam, in 1741.

SYNGENESIA, συν and γενεσις, congeneration. The nineteenth class in Linnæus's artificial system; comprehending those plants which have the antheræ united into a cylinder. The orders are six: 1. Polygamia æqualis. 2. Polygamia superflua. 3. Polygamia frustranea. 4. Polygamia necessaria. 5. Polygamia segregata. 6. Monogamia. The first five orders contain the compound flowers, and form a class truly natural. See BOTANY.

SYNGNATHUS, in ichthyology, pipe fish, according to Linnæus, a genus belonging to the class of amphibia, and order of nantes, but arranged by Gmelin more properly under the class of pisces, and order of branchiostegi. The head is small; the rostrum somewhat cylindrical, long, and turned up at the point, where the mouth is placed, which is covered with a lid or valve. The gills are covered in the same manner. The body is covered with a strong crust, and has no ventral fins. There were formerly enumerated eight species. Of these, three are found in the British seas, viz. No. 1, 3, and 5.

1. S. acus, the needle fish, or shorter pipe fish, is thicker than the barbarus (No. 3), yet it has been seen of the length of sixteen inches. The middle of the body in some is hexangular, in others heptangular. The mouth is formed like that of the barbarus, the irides are yellow; close behind the head are the pectoral fins, which are small and short. On the lower part of the back is one narrow fin; beyond the vent the tail commences, which is long and quadrangular. At the extremity is a fin round and radiated. The body is covered with a strong crust, elegantly divided into small compartments. The belly is white; the other parts are brown.

2. S. æquoreus.

3. S. barbarus, or longer pipe fish. One described by Sir Robert Sibbald was two feet in length; that examined by Mr. Pennant only sixteen inches. The nose was an inch long, compressed sidewise, and the end of the lower mandible turned up; the aperture of the mouth was very small. The irides were red; behind each ear was a deep brown line. The body, in the thickest part, was equal to a swan's quill, hexangular from the end of the dorsal fin; thence to the tail quadrangular. The belly was slightly carinated, and marked along the middle with a dusky line. Under the tail, commencing at the anus, is a fulcus or groove, six inches and a half long, covered by two longitudinal valves, which conceal a multitude of young fish. On crushing this part, hundreds may be observed to crawl out.

4. S. hippocampus, the sea horse, which was classed by Artedi under the Syngnathus, is now, by later ichthyologists, arranged under TRICHECUS; which see.

5. S. ophidion, or little pipe fish, seldom exceeds five inches in length, is very slender, and tapers to a point. It wants both the pectoral and tail fins; is covered with a smooth skin, not with a crust. The nose is short, and turns a little up; the eyes are prominent. On the back is one narrow fin. This species is not viviparous: on the belly of the female is a long hollow, to which adhere the eggs in two or three rows. They are large, and not numerous. Serpent is used in several languages to express these fish: the French call one species orueul, from a sort of snake, like the blindworm; the Germans call it meherchlange; and the Corinth the sea adder.

6. S. Pelagicus, 7. S. tetragonus, 8. S. typhele, and S. æquoreus, are all natives of foreign countries.

SYNNADA, or SYNNAS, an ancient town of Phrygia, famous for marble quarries.—Strab. 12, Claud.

SYNNEURO'SIS, *n. s.* Gr. σὺν and νεῦρος. *Synneurosis* is when the connexion is made by a ligament. Of this in symphysis we find instances, in the connexion of the ossa pubis together, especially in women, by a ligamentous substance. In articulation, it is either round, as that which unites the head of the os femoris to the coxa; or broad, as the tendon of the patella, which unites it to the os tibiæ. *Wiseman's Surgery.*

SYNOCHA, and SYNOCHUS, in medicine, species of continued fever. See MEDICINE.

SYN'OD, *n. s.* } Fr. *synode*; Gr. σύνοδος.
SYNOD'ICAL, *adj.* } An assembly called for
SYNOD'ICALLY, *adv.* } consultation: it is used particularly of ecclesiastics. A provincial synod is commonly used, and a general council; conjunction of the heavenly bodies: the adjective and adverb follow both these senses.

The glorious gods sit in hourly *synod* about thy particular prosperity. *Shakspeare. Coriolanus.*

Since the mortal and intestine jars
'Twixt thy seditious countrymen and us,
It hath in solemn *synod* been decreed
T' admit no traffick to our adverse towns.
Shakspeare.

The opinion was not only condemned by the *synod*, but imputed to the emperor as extreme madness. *Bacon.*

Howe'er love's native hours are set,
Whatever starry *synod* met,
'Tis in the mercy of her eye,
If poor love shall live or die. *Crashaw.*

His royal majesty, according to these presbyterian rules, shall have no power to command his clergy to keep a national *synod*. *White.*

The various dignity of their several churches, and of their many functions, rules, and orders in them, by reason of the frequency of their *synodical* and processional meetings, have necessarily raised many questions of place among them. *Selden.*

Flea-bitten *synod*, an assembly brewed
Of clerks and elders ana, like the rude
Chaos of presbytery, where laymen guide,
With the tame woolpack clergy by their side.
Cleaveland.

Let us call to *synod* all the blest
Through heaven's wide bounds. *Milton.*
Their planetary motions and aspects
Of noxious efficacy, and when to join
In *synod* unbenign. *Id.*

It shall be needful for those churches *synodically* to determine something in those points. *Saunders.*

The diurnal and annual revolutions of the sun, to us are the measures of day and year; and the *synodick* revolution of the moon measures the month. *Holder.*

St. Athanasius writes a *synodical* epistle to those of Antioch, to compose the differences among them upon the ordination of Paulinus. *Stillingfleet.*

The second council of Nice, he saith, I most irreverently call that wise *synod*; upon which he falls into a very tragical exclamation, that I should dare to reflect so much dishonour on a council. *Id.*

As the planets and stars have, according to astrologers, in their great *synods*, or conjunctions, much more powerful influences on the air than are ascribed to one or two of them out of that aspect; so divers particulars which, whilst they lay scattered among the writings of several authors, were inconsiderable, when they come to be laid together, may oftentimes prove highly useful to physiology in their conjunctions. *Boyle.*

Parent of gods and men, propitious Jove!
And you bright *synod* of the powers above,
On this my son your gracious gifts bestow.
Dryden.

The moon makes its *synodical* motion about the earth in twenty-nine days twelve hours and about forty-four minutes.
Locke's Elements of Natural Philosophy.

The alterations made by the commissioners were brought to the convocation then sitting, where they were *synodically* agreed upon. *Nelson.*

Synod, in astronomy, a conjunction or con course of two or more stars or planets, in the same optical plane of the heavens.

Synod signifies also a meeting of ecclesiastical persons to consult on matters of religion. Of these there are four kinds, viz. 1. General or æcumenical, where bishops, &c., meet from all nations. These were first called by the emperors, afterwards by Christian princes; till in later ages the pope usurped to himself the greatest share in this business, and by his legates presided in them when called. 2. National, where those of one nation only come together, to determine any point of doctrine or discipline. The first of this sort held in England was that of Herudford or Hertfort, in 673; and the last was held by cardinal Pole, in 1555. 3. Provincial, where those only of one province meet, now called the convocation. 4. Diocesan, where those but of one diocese meet, to enforce canons made by general councils, or national and provincial synods, and to consult upon rules of discipline for themselves. These were not wholly laid aside, till, by the act of submission, 25 Hen. VIII. c. 19, it was made unlawful for any synod to meet but by royal authority. See Council and Convocation.

Synodals, or Synodies, were pecuniary rents (commonly of 2s.) paid to the bishop or archdeacon at the time of their Easter visitation, by every parish priest. They were thus called, because usually paid in synods; as anciently bishops used to visit and hold their diocesan synods once. They are sometimes also denominated synodalica; but more especially procurations.

Synodical Epistles are circular letters written by the synods to the absent prelates and churches; or even those general ones directed to all the faithful, to inform them of what had passed in the synod.

SYNOECIA, in Grecian antiquity, a feast celebrated at Athens in memory of Theseus's having united all the petty communities of Attica into one single commonwealth; the seat whereof was at Athens, where all the assemblies were to be held. This feast was dedicated to Minerva; and, according to the scholiast on Thucydides, it was held in the month Metagitnion.

SYNON'YMISE, *v. a.* } Lat. *synonyma*; Gr.
Syson'ymous, *adj.* } συνωνυμος. To express the same thing in different words: the adjective corresponding.

This word fortis we may *synonymise* after all these fashions, stout, hardy, valiant, doughty, courageous, adventurous, brave, bold, daring, intrepid.
Camden's Remains.

These words consist of two propositions, which are not distinct in sense, but one and the same thing variously expressed; for wisdom and understanding are *synonymous* words here. *Tillotson.*

Fortune is but a *synonymous* word for nature and necessity. *Bentley's Sermons.*

When two or more words signify the same thing, as wave and billow, mead and meadow, they are usually called *synonymous* words. *Watts's Logick.*

SYNOP'TICAL, *adj.* Gr. συνοψις. Affording a view of many parts at once.

We have collected so many *synoptical* tables, calculated for his monthly use. *Evelyn's Calendar.*

SYNOVIA, in anatomy, a term first used by Paracelsus and his school for the nutritious juice proper and peculiar to each part; as the synovia of the joints, &c.

SYNOVIAL Glands. See Anatomy.

SYNTAGM, Syntagma, Gr. συνταγμα, from συν, with, and τασσω, to order. A disposition of things according to order in literature: a regular treatise on any subject.

SYNTASIS, from συν with, and τεινω, to stretch, in surgery, a preternatural distension of the parts.

SYN'TAX, *n. s.* } Gr. συνταξις. A system;
Syntax'is. } a number of things joined together: that part of grammar which teaches the construction of words.

They owe no other dependance to the first than what is common to the whole *syntax* of beings.
Glanville.

I can produce a hundred instances to convince any reasonable man that they do not so much as understand common grammar and *syntax*. *Swift.*

Syntax, in grammar, the proper construction

or due disposition of the words of a language into sentences and phrases. See GRAMMAR.

SYN'THESIS, *n. s.* } Gr. συνθεσις. The act
SYNTHET'IC, *adj.* } of joining: opposed to analysis: conjoining; compounding: opposed to analytic.

The *synthesis* consists in assuming the causes discovered and established as principles, and by them explaining the phenomena proceeding from them, and proving the explanations. *Newton's Opticks.*

Synthetick method is that which begins with the parts, and leads onward to the knowledge of the whole: it begins with the most simple principles and general truths, and proceeds by degrees to that which is drawn from them, or compounded of them; and therefore it is called the method of composition. *Watts's Logick.*

SYNTHESIS, in logic, denotes a certain branch or method, opposite to analysis. In the synthetic method we pursue the truth by reasons drawn from principles before established or assumed, and propositions formerly proved; thus proceeding by a regular chain to the conclusion. Such is the method in Euclid's Elements, and most demonstrations of the ancient mathematicians, which proceed from definitions and axioms to prove propositions, &c., and from those propositions proved to prove others. This method we also call composition, in opposition to analysis or resolution. See ANALYSIS and ANALYTIC.

SYPHÆUM, an ancient town of the Bruttii, in Italy. See MURANUM.

SYPHAX, king of the Masæsyli, in Numidia. For his adventures, see NUMIDIA. He married Sophonisba. See SOPHONISBA. He died in prison at Rome, A. A. C. 201.

SYPHILIS. See MEDICINE, Index.

SY'PHON, *n. s.* Gr. σιφων. A tube; pipe.

Take your glass, *syphon*, or crane; and draw it off from its last fæces into small bottles. *Mortimer.*

SYPHON. See HYDROSTATICS. Some uncommon phenomena in nature may be accounted for upon the principles of the syphon; as, for instance, that of reciprocating springs.

SYRACOSIA, festivals anciently held in Syracuse, for ten days annually, during which the women were chiefly employed in sacrificing. Syracosia was also the name of another annual festival, celebrated near the lake where it was supposed that Pluto had carried off Proserpina.

SYRACUSA, SYRACUSÆ, ancient names of Syracuse.

SYRACUSE, a celebrated city of Sicily, the capital of the island. It was built, according to Thucydides and Strabo, by Archias, one of the Heraclidæ, who came from Corinth into Sicily in the second year of the eleventh Olympiad, or about 732 years before the Christian era. It was named Syracusæ from Syraco, a marsh near it. This city was of a triangular form, and in its most flourishing state extended 180 stadia, or twenty-two English miles and four furlongs, in circumference, and was divided into four districts, viz. Ortygia, Acradina, Tycha, and Neapolis. There was also a fifth district, called Epipolæ; but, as it was thinly inhabited, it is often omitted by geographers. Each of the four chief districts formed separate cities, and were fortified with three citadels, and three-fold or triple walls. Syracuse had also two spacious harbours, separated from each other by the island of Ortygia. See ORTYGIA. The greatest harbour was above 5000 paces in circumference, and its entrance 500 paces wide. The city was well built, and the houses were stately and magnificent.

What form of government first prevailed in the city is not known. The history is obscure till the time of Gelon, who was born in Gela, in Sicily. He signalised himself in a war carried on by Hippocrates tyrant of Gela against the Syracusans, whom he defeated in a pitched battle, and had well nigh taken their city. Having thus become very powerful, he soon seized on the sovereignty. Putting himself at the head of some Syracusan exiles, he marched towards that place, where he was received with loud acclamations by the faction to which they belonged; and by their means obtained possession of the city. Gelon, to people the capital of his new dominions, first demolished the neighbouring city of Camarina, and transplanted the inhabitants to Syracuse. Soon after, entering into a war with the Megareans, he defeated them, took and razed their cities, and in like manner transplanted the people. Syracuse thus became very powerful, and full of inhabitants; and the friendship of Gelon was courted both by Athens and Lacedæmon at the time of the Persian invasion. His assistance, however, was afterwards rejected, as he insisted upon being made commander-in-chief either of the fleet or the army. In the mean time the Carthaginians had entered into a treaty with the Persians; by which it was agreed that the former should attack those of the Greek name in Sicily and Italy, to divert them from assisting one another. Sicily was accordingly invaded by the Carthaginians with a vast army; but they were utterly overthrown by Gelon and his father-in-law Theron, prince of Agrigentum, as is related under the article CARTHAGE. After this victory, the people out of gratitude obliged him to take upon himself the title of king, which till that time he had refused. A decree also passed without opposition, by which the crown was settled on his two brothers Hiero and Thrasybulus after his death. The new king spent the remainder of his short reign in studying the happiness of his people. He died A. A. C. 471, after reigning four years.

Gelon was succeeded by his brother Hiero, whose character is differently drawn by historians. He was twice engaged in a war with the Agrigentines, and drove from their habitations the people of Catan and Naxus, settling in their room a colony of Syracusans and Peloponnesians. Hiero I. died A. A. C. 459, and was succeeded by Thrasybulus; who, proving a tyrant, was in ten months driven out, and a popular government restored, which continued fifty-five years.

Several persons for some time aspired at the sovereignty; to prevent which they had recourse to petalism; but, being productive of great inconveniences, the law was repealed soon after it had been enacted. See PETALISM. About this time the Syracusans entered into a war with the Siculi, which terminated in the subjection of the

latter. Syracuse now became so powerful that it in a manner gave law to the whole island. The Leontines disputing the supremacy of the Syracusans, their territory was laid waste, and their city reduced to great straits. Leontini was an Athenian colony; and this furnished the Athenians, who had already meditated the conquest of Sicily, with a pretence to attack the Syracusans with their whole force. But the Leontines, sensible that their pretended allies aimed at the conquest of the whole island, concluded a peace with Syracuse. In A.A.C. 416, a dispute happening between the inhabitants of Ægesta, or Segesta and Selinus concerning some lands which the latter had seized, the Segestines applied for assistance to Agrigentum, Syracuse, and even to Carthage. But, as none of these states chose to interest themselves in their quarrel, they applied at last to the Athenians, who joyfully accepted of the opportunity of again interfering in the affairs of Sicily. With the most sanguine expectations the Athenians landed 7000 men in Sicily, under Nicias, possessed themselves of a strong post, and put the Syracusans to flight.

In the mean time the Syracusans received assistance from the Lacedæmonians under the command of an experienced officer named Gylippus, who arrived just in time to prevent Syracuse from surrendering. At the head of 7000 foot and 200 horse he made directly for Epipolæ, where Nicias had fortified himself in a castle named Labdalon; he drew up his small army under the walls; and sent a herald to Nicias to tell him that he would allow him only five days to leave Sicily. Nicias returned no answer; but Gylippus soon after stormed the fort, and put to the sword all the Athenians in it. This opened a way into the city, where he was received with loud acclamations. The fortune of the war was again changed. The Athenians gained an advantage by land, but were next day defeated with great loss. The Syracusans received fresh supplies from Corinth, and the Athenians from Attica. Many engagements both by sea and land took place, in which the success was ultimately in favor of the Syracusans. At last the Athenian affairs were totally ruined by the loss of a sea-fight, in which sixty of their ships were taken or destroyed, and the rest left quite unserviceable. In this desperate situation it was determined to abandon their ships, and retire that night to the city of their confederates. But this measure was delayed from a piece of false intelligence; and Nicias did not march out till the third day after. The Athenians and their allies also marched out to the number of 40,000; but finding themselves shut up on all sides, and being obliged to fight their way through every outlet, they soon sunk into despair. Nicias did his utmost to encourage them; and at last they marched out in two bodies. The vanguard, led by Nicias, continued to advance in good order; but half the rear, commanded by Demosthenes, lost their way in the night, and were obliged to surrender. Nicias, being informed of this misfortune, offered to pay the whole expense of the war, provided he was allowed to march off with his men. But, this being rejected, he set out, though galled all the way by showers of darts from his enemies. Arriving at a river called Asmarus, they rushed into it without order; in which confusion the Syracusan cavalry attacked them so desperately that 18,000 perished, and the river, for many miles, was dyed with their blood. The remainder surrendered, on condition of having their lives saved; but the terms were shamefully broken by the Syracusans. The generals were first ignominiously whipped, and then put to death: the soldiers were sent to labor in quarries, where they were allowed only two small measures of flower and one of water a day; and where, being crowded, they suffered inexpressible miseries for many months. Most of them perished by this cruel treatment, and the few who survived were sold for slaves.

The war was scarcely ended when a new and formidable invasion by the Carthaginians took place; but the event of that expedition was as unfortunate to the Carthaginians as the former had been, of which a particular account is given under the article CARTHAGE. See also AGRIGENTUM. In the mean time, however, a considerable revolution had happened in Syracuse. Dionysius, a man of great valor and eloquence, acquired such influence with the populace, that step by step he attained to sovereign power, possessed himself of the citadel, where all the arms and provisions were kept, and publicly took the title of king of Syracuse, A.A.C. 404. The Syracusans did not tamely submit to their new master: but Dionysius managed matters so well, that their frequent revolts answered no other purpose than more certainly to entail slavery on themselves; and he was allowed to possess the throne, without much opposition, till his death, A.A.C. 366. See DIONYSIUS I., and SICILY.

On the death of Dionysius, he was succeeded by his son, Dionysius II. He was naturally of a mild and peaceable temper, averse from cruelty, and inclined to learning; but his father, to whom all merit, even in his own children, gave umbrage, stifled as far as possible his good qualities by a mean education. He no sooner ascended the throne than Dion, brother to Aristomache the other wife of Dionysius the elder, undertook to correct the faults of his education, and to inspire him with thoughts suitable to the high station in which he was placed. For this purpose he sent for the philosopher Plato, under whose care he put the young king. This produced a reformation on Dionysius; but the courtiers, dreading the effects of the philosopher's instructions, prevailed on him to banish Dion, and to keep Plato himself in a kind of imprisonment in the citadel. At last, however, he set him at liberty; upon which Plato returned to his own country. Dion, in the mean time, visited several of the Grecian cities, and at last took up his residence in Athens; but the honors which were every where paid him raised such jealousies in the breast of the tyrant that he stopped his revenue and caused it to be paid in to his own treasury. In a short time Dionysius again sent for Plato, but, finding it impossible to dissolve the friendship between him and Dion, disgraced, and placed him in a very dangerous situation, in the midst of assassins who hated him. See PLATO.

Not daring, however, to offer him any violence, he allowed him soon after to depart; revenging himself on Dion, whose estate he sold, and gave his wife Arete in marriage to Timocrates, one of his own flatterers. Dion now resolved to revenge himself on the tyrant for the many injuries he had sustained, and at once to deliver his country from the oppression under which it groaned. He began with raising foreign troops privately, by proper agents. Many Syracusans of distinction entered into his scheme, and gave him intelligence of what passed in the city; but of the exiles only twenty-five joined him, with about 800 men. He arrived at the port of Minoa, near Agrigentum. Here they received intelligence that Dionysius had set sail for Italy with a fleet of eighty galleys. On this Dion resolved to take advantage of the tyrant's absence; and immediately set sail for Syracuse. On his march he prevailed upon the inhabitants of Agrigentum, Gela, Camarina, and other cities, to join him. As soon as he entered the territories of Syracuse, multitudes flocked to him; and, as nobody appeared to oppose him, he boldly entered the city, where he quickly found himself at the head of 50,000 men. Seven days after Dion's arrival, Dionysius returned and entered the citadel by sea. Finding his affairs in a desperate situation, he had recourse to artifice; and having amused the Syracusans by a feigned negociation, until he observed that they kept a negligent guard, he attacked them all at once with such fury that he had almost taken the city. But Dion encouraged the soldiers by his example so much that he at last obtained a complete victory; for which they presented him with a crown of gold. Dionysius was obliged to fly to Italy.

It was not long, however, before the ungrateful Syracusans began to confer quite different rewards on their benefactor. Dion, having opposed a proposal for a new division of lands, was obliged to leave the city and reside some time at Leontini, where he was received with respect. In the mean time the citadel still continued in the hands of the adherents of Dionysius. Being blocked up on all sides, they were reduced to great straits, and were actually making proposals of capitulation, when Nypsius, an experienced general, and greatly attached to Dionysius, appeared with a numerous squadron of galleys, and a large fleet of transports laden with provisions. The general landed his men, and got them into the citadel; but almost all his galleys and ships laden with corn were sunk or taken. This victory proved the ruin of the Syracusans; for, giving themselves up to riot and debauchery, the enemy sallied out in the night-time from the citadel, and massacred the citizens without mercy. An embassy was then sent to Dion, entreating him to return and save the city a second time. To this he agreed, and instantly set out on his march; but in the mean time, as the soldiers of Dionysius, satiated with the slaughter, had retired into their fortress, the ungrateful Syracusans began to repent of their having sent an embassy to Dion. The chief commanders, therefore, sent messengers to stop his march; but, as some of his friends sent deputies to him at the same time, contradicting this message, he proceeded on his journey. The infatuated mob seized the gates to dispute his entrance; but they paid dear for their frenzy. The Dionysians again sallied out upon them, and made a second massacre. As they knew that Dion was hastening to the relief of the city, they endeavoured to destroy it entirely before his arrival; for, after they had murdered all the inhabitants they could find, they set fire to the houses, by which great numbers perished. But, during this confusion, Dion arrived; and, having briskly attacked the enemy, at last defeated them with great slaughter, driving the remainder into the citadel. The citadel soon after surrendered; and Dion allowed Apollocrates the tyrant's son, who commanded there, to retire with five galleys to his father. As soon as Dion entered the citadel, he was met by his sister and wife Areta, whom he received with affection, notwithstanding her having lived so long with Timocrates. He then left the Syracusans in possession of the citadel, rewarded his followers, dismissed his guards, and lived like a private citizen. In a short time after he lost his life, through the base treachery of Calippus, or Gylippus, who pretended to be his intimate friend, and who immediately after caused his wife and sister to be carried to prison. See Dion.

Calippus, having thus removed Dion, soon made himself master of Syracuse, where he committed all manner of cruelties; but was driven out, and forced to fly to Rhegium, where he was murdered with the same dagger wherewith he had killed Dion. In 350 B. C. Dionysius again made himself master of Syracuse; and, being exasperated by his past misfortunes, tyrannized worse than ever. The Syracusans first had recourse to Icetas tyrant of Leontini; but, as the Carthaginians took this opportunity to invade them with a powerful fleet and army, they were obliged to apply to the Corinthians. By them Timoleon, a celebrated commander, was sent to assist the Syracusans, whom he found in a very distressed situation; Icetas being master of the city, the Carthaginians of the harbour, and Dionysius of the citadel. As all parties were equally the enemies of Dionysius, he found it impossible to hold out, and therefore surrendered himself to Timoleon, by whom he was sent to Corinth; where at last he was reduced to the necessity of teaching a school for his support.

After the expulsion of the tyrant, Timoleon withdrew to Catana, leaving only 400 Corinthians, under the command of an experienced officer named Leon, to guard the citadel. These were immediately besieged by Icetas and the Carthaginians, but Timoleon relieved them in spite of all opposition; and having dispersed emissaries through the army of Mago the Carthaginian general, exhorting the mercenary Greeks to forsake him, he was so much intimidated that, in spite of all the remonstrances Icetas could make, he set sail for Africa, leaving his colleague to carry on the war in the best manner he could. The day after the departure of Mago, Timoleon assaulted the city so briskly that the troops of Icetas were driven from the walls, and the Corinthians became masters of the place. Timoleon

invited the inhabitants to assist in demolishing the citadel and other castles, which he called nests of tyrants; after which he caused edifices to be erected in the place where the citadel had stood, for the administration of justice. He found the city in a most miserable situation, and almost a desert. He supplied the city with inhabitants from Corinth and other cities of Greece, and distributed the lands among them gratis; but sold the houses, and with the money arising f om the sale established a fund for the support of the poor. Having thus restored Syracuse, he in like manner delivered all the Greek cities of Sicily from the tyrants who had taken possession of them, all of whom he put to death. After this he resigned his authority, and led a retired life, honored in the highest degree by the Syracusans, and by all the cities in Sicily. After his death he was honored as a god.

For twenty years the Syracusans enjoyed the fruits of Timoleon's victories; but, new disturbances arising, another tyrant started up, who exceeded all that had gone before him in cruelty and other vices. This was the celebrated Agathocles, of whose exploits against the Carthaginians, some account is given under the articles Agathocles, Agrigentum, Carthage, and Sicily. But further particulars belong to this article. In two years he subdued all the Greek part of Sicily. He next committed great devastations in the Carthaginian territories, their general Hamilcar not offering to disturb him. This perfidious conduct greatly incensed the people of those districts against Hamilcar, whom they accused before the senate. He died, however, in Sicily; and Hamilcar the son of Gisco was appointed to succeed him in the command of the forces. The last place that held out against Agathocles was Messana, whither all the Syracusan exiles had retired. Pasiphilus, Agathocles's general, cajoled the inhabitants into a treaty; which Agathocles paid no regard to, but, as soon as he was in possession of the town, cut off all those who had opposed his government; for, as he intended to prosecute the war with the utmost vigor against Carthage, he wished to destroy as many of his Sicilian enemies as possible. The Carthaginians in the mean time having landed a powerful army in Sicily, an engagement ensued, in which Agathocles was defeated with the loss of 7000 men. After this defeat he was obliged to shut himself up in Syracuse, which the Carthaginians immediately invested, and most of the Greek states in the island submitted to them. Agathocles seeing himself stripped of almost all his dominions, and his capital itself in danger of falling into the hands of the enemy, determined to transfer the war into Africa, and lay siege to the enemy's capital. For this purpose he contrived to carry over 14,000 men, and land them with little opposition. As soon as his forces were landed, Agathocles burnt his fleet, that his soldiers might have no possibility of flying. He first advanced to a place called the Great City. This, after a feeble resistance, he took and plundered. Hence he marched to Tunis, which surrendered on the first summons; and Agathocles levelled both places with the ground.

The Carthaginians were at first thrown into the greatest consternation; but, recovering themselves, the citizens took up arms, and in a few days they had an army of 40,000 foot and 1000 horse, with 2000 armed chariots. The command of this army they entrusted to Hanno and Bomilcar, two generals between whom there subsisted a great animosity. This occasioned the defeat of their whole army, with the loss of their camp. Upon this defeat the Carthaginians, according to their barbarous superstition, offered up 200 children, and other 300 voluntary human sacrifices. In Sicily, Hamilcar still resolved to storm the city, did his utmost to conceal from the Syracusans the intelligence of Agathocles's victory; but in vain, for Agathocles got it conveyed by a galley. Hamilcar then erected scaling ladders, and began his attack upon Syracuse, but, though at first he was somewhat successful, he was soon repulsed with great loss. Raising the siege, he over-ran the country and took some towns in alliance with Syracuse; after which he renewed his attack on the city in the night, but was completely defeated, his troops slaughtered, and himself taken prisoner, carried into Syracuse, and beheaded.

About this period the Agrigentines, finding the Carthaginians and Syracusans had greatly weakened each other, thought it a proper time to seize the sovereignty of the whole island, and therefore commenced a war against both; in which they had such success that they took many capital towns both from the Carthaginians and Syracusans.—In the mean time Agathocles was extremely successful in Africa. He took most of the towns of note in the Carthaginian territories; and hearing that Elymas king of Libya, their ally, was coming against him, he entered Upper Libya, and gave him a complete overthrow, slaughtering a great number of his troops with his general at their head. After this he advanced against the Carthaginians with such expedition that he surprised and defeated them, with the loss of 2000 killed, and a great number taken prisoners. He next prepared for the siege of Carthage itself; and advanced within five miles of that city; but, notwithstanding the great losses they had sustained, the Carthaginians, with a powerful army, encamped between him and their capital. In this situation Agathocles received advice of the defeat of the Carthaginian forces before Syracuse, along with the head of Hamilcar. Upon this he immediately rode up to the enemy's camp, and, showing them the head, gave them an account of the total destruction of their army before Syracuse. This threw them into such consternation that in all human probability Agathocles would have made himself master of Carthage, had not an unexpected mutiny arisen in his camp, which gave the Carthaginians time to recover from their terror. The year following an engagement happened, in which neither party gained any great advantage; but, soon after, the tyrant, notwithstanding all his victories, found himself unable to carry on the war alone: and therefore endeavoured to gain over Ophellas, one of the captains of Alexander the Great. In this he succeeded: Ophellas brought an army to his assistance through

many trials; in reward for which, Agathocles cut him off by treachery, and then by promises persuaded his troops to serve under himself.

Agathocles now, finding himself at the head of a numerous army, assumed the title of king of Africa, intending to complete his conquests by the reduction of Carthage. He began with the siege of Utica, which was taken by assault. After this he marched against Hippo Diarrhytus, the Biserta of the moderns, which was also taken by storm; and after this most of the people bordering upon the sea coasts, and even those who inhabited the inland parts, submitted. But in the midst of this success the Sicilians formed an association to recover their liberty; which obliged the tyrant to return home, leaving his son Archagathus to carry on the war in Africa. Archagathus, after his father's departure, greatly extended the African conquests. He sent Eumachus at the head of a large detachment to invade some of the neighbouring provinces, while he himself, with the greatest part of his army, observed the motions of the Carthaginians. Eumachus, falling into Numidia, first took the great city of Tocas, and conquered several of the Numidian cantons. Afterwards he besieged and took Phellina; which was attended with the submission of the Asphodelodians, a nation (says Diodorus) as black as the Ethiopians. He then reduced several other cities; and, being at last elated with such a run of good fortune, resolved to penetrate into the more remote parts of Africa. Here he at first met with success; but, hearing that the barbarous nations were advancing in a formidable body to give him battle, he abandoned his conquests, and retreated with the utmost precipitation towards the sea-coasts, after having lost many men. This unfortunate expedition made a great alteration for the worse in the affairs of Arcagathus. The Carthaginians, hearing of Eumachus's bad success, resolved to repair their former losses. They divided their forces into three bodies; one they sent to the sea-coasts; another into the Mediterranean parts, and the last to Upper Africa. Archagathus divided his forces likewise into three bodies; one he sent to observe the Carthaginian troops on the coasts, and advance afterwards into Upper Africa; another, under Æschrion, he sent into the heart of the country; and with the last, which he led in person, he kept nearer Carthage, preserving a communication with the other two, to send them succors, or recall them, as the exigency should require. The Carthaginian troops sent into the heart of the country were commanded by Hanno, a general of great experience, who, being informed of the approach of Æschrion, laid an ambuscade for him, into which he was drawn and cut off with 4000 foot and 200 horse. Himilco, who commanded the Carthaginian forces in Upper Africa, having advice of Eumachus's march, immediately advanced against him. An engagement ensued, in which the Greeks were almost totally cut off, or perished with thirst after the battle; out of 8000 foot only thirty, and of 800 horse only forty having escaped. Archagathus, receiving the news of these two defeats, immediately called in the detachments he had sent out. He was, however, soon hemmed in on all sides in such a manner, as to be reduced to the last extremity for provisions, and ready every moment to be swallowed up by his numerous enemies. In this distress, he sent an express to his father informing him of his losses. Hereupon Agathocles, leaving the care of the Sicilian war to Leptines, procured the assistance of eighteen Etruscan ships, with which he fought the Carthaginian squadron then on the coast, took five of their ships and made prisoners of their men. Having thus become master of the port, and secured a passage into it for trading vessels, plenty was soon restored; of which, taking a sufficient supply for himself, he immediately sailed for Africa. Upon his arrival he found his forces to consist of 22,000 Greeks, Samnites, Etruscans, Celtes, and Africans; besides 1500 horse. He offered the enemy battle, but they declined. He, however, forced them to action, attacked the camp with his usual bravery, and in all probability would have gained a complete victory, had not his mercenaries deserted him. The barbarous sacrifice made by the Carthaginians, and its dreadful consequences to their whole army, are related under CARTHAGE, as well as its consequences to Agathocles, who with difficulty escaped from his enemies and his own enraged soldiers, who murdered his sons, and made peace with Carthage. After all this reverse of fortune, Agathocles returned to Italy, gathered a new army, relieved Corcyra, and forced Cassander to raise the siege of it; burned the Macedonian fleet; avenged the murder of his wives and children; met with his old troops, who had deserted him in Africa; defeated and massacred them all; ravaged the coasts of Italy; and took Hipponium. At last he was poisoned, some say by his grandson, others by one Moenon, A. A. C. 289, in the twenty-eighth year of his reign, and ninety-fifth of his age.

After Agathocles's death, a succession of tyrants followed, till at last the city, being held by two rivals, Toenion and Sosistratus, who made war within the very walls, Pyrrhus king of Epirus was invited into Sicily, to put an end to these destructions. He willingly complied with the invitation: and was every where received with loud acclamations as the deliverer not only of Syracuse, but of all Sicily. Puffed up with the expectation of reducing the whole island, he caused his son to take upon him the title of king of Sicily; but in the mean time having displeased the Sicilians, by his arbitrary behaviour, they deserted from him in such numbers that he was glad to set out for Italy. He embarked in the ships which he had brought with him from Italy; but was met at sea by the Carthaginians, who sunk seventy of his vessels, and dispersed or took the rest; so that he saved himself in Italy only with twelve vessels, the poor remains of a fleet of 200 sail.

After the departure of Pyrrhus, Hiero II. the son of Hierocles, a descendant of Gelon the first king of Syracuse, was chosen general of the forces, along with another named Artemidorus. The two generals earnestly wished to put an end to the confusion and disorder which reigned in the city; for which reason they entered it at the head of their forces. On this occasion Hiero

discovered extraordinary talents for government. By mere dint of insinuation and address, without shedding blood or hurting a single citizen, he so gained the affections of all, that he was invested with the whole civil as well as military power in the state. Soon after this he married the daughter of one of the first citizens; and, having distinguished himself by his exploits against the Mamertines, was unanimously elected king of Syracuse, A. A. C. 265. Some time after Hiero's accession to the throne, he again defeated the Mamertines, and reduced them to such straits that they were obliged to call in the Romans to their assistance. The consequences of this have been fully related under the articles ROME and CARTHAGE. Hiero, who had allied himself with the Carthaginians, being himself defeated by the Romans, and finding his allies unable to protect him against the power of that republic, concluded an alliance with them, and continued faithful to them even in the time of the second Punic war, when they were in the greatest distress. In his reign flourished the celebrated mathematician Archimedes, whose genius he employed in fortifying the city of Syracuse, by innumerable machines, in such a manner as rendered it absolutely impregnable to every method of attack known at that time. See ARCHIMEDES. Hiero II. died about A. A. C. 211.

Hiero was succeeded by his grandson Hieronymus; but he imprudently forsook the counsels of his grandfather, and entered into an alliance with the Carthaginians. Soon after this he was murdered in consequence of his tyranny and cruelty, and the greatest disorders took place in the city; which Hannibal, though then in Italy, found means to foment, in hopes of keeping the Syracusans in his interest. This indeed he effected; but as his own affairs in Italy began to decline (see CARTHAGE) he could not prevent Marcellus from landing in Sicily with an army which the Sicilians were unable to resist. Syracuse was soon invested; but the machines invented by Archimedes baffled all attempts to take it by assault. These were so stupendous and powerful, that ships were dashed to pieces by the huge rocks they discharged, and the troops were more annoyed by the showers of arrows and stones than modern armies are by musketry. The consuls, finding themselves thus defeated in every attempt, turned the siege into a blockade, reduced most of the other places in the island, and defeated the forces which were sent against them; and at last Marcellus made himself master of Syracuse itself, of which the following account is given by Mr. Hooke:—'He took the opportunity of a festival, when the soldiers and citizens had drunk plentifully, to make a detachment scale the walls of Tyche, in that part of it which was nearest to Epipolæ, and which was ill guarded. He presently after possessed himself of Epipolæ; whereupon the inhabitants of Neapolis, as well as Tyche, sent deputies to him and submitted. Marcellus granted life and liberty to all of free condition, but gave up those quarters of the city to be plundered. Notwithstanding this there was a great deal yet to do. Acradina and Ortygia, which were strongly fortified, still held out; Hippocrates and Himilco arrived with their troops to the relief of the besieged, and the Romans were forced to exert all their bravery and skill to maintain the advantages they had gained. But now a plague made terrible havock in both armies. At the first breaking out of the pestilence the Sicilians, who served under Hippocrates and Himilco, disbanded themselves and returned to their respective homes; but all the Carthaginian soldiers perished together with those two generals. The Romans suffered less by the infection; because, having been a long time before Syracuse, they were seasoned to the air and water of the country. About this time Bomilcar arrived on the coast of Sicily from Carthage with a fleet of 130 galleys and 700 ships of burden; but was long hindered by contrary winds from doubling the Cape of Pachynum. Epicides, fearing the Carthaginians might sail back to Africa, left the command of Acradina to the generals of the mercenaries, and went to Bomilcar in order to persuade him to fight the Roman fleet. The admiral would not engage, but sailed away to Tarentum with all his galleys, ordering his ships of burden to return to Africa. Epicydes, thus frustrated of his hopes, and knowing himself unable to defend a city already half taken, retired to Agrigentum; whereupon the Syracusans massacred the commanders appointed by him, chose new prætors to govern in the town, and sent deputies to Marcellus to treat of peace. In the mean time the deserters, fearing to be given up to the vengeance of the Romans, persuaded the mercenaries that they also would have the same fate. Instantly the soldiers ran to arms, put to death the new prætors, together with many of the Syracusans, and plundered part of the city. After this slaughter they chose six generals, three to command in Acradina, and three in Ortygia. Upon the return of the deputies from Marcellus, the mercenaries finding that their case was different from that of the deserters, and that there was no design against their lives, became perfectly satisfied, and the negociations went on. During the course of the treaty, Marcellus found means to corrupt Mericus, a Spaniard, one of the six generals chosen by the soldiers, and engaged him to admit the Romans into that part of the city where he commanded. Mericus, the better to accomplish this design, feigned an extraordinary zeal for the preservation of the place; pretended not to like that deputies should have leave to go out and in at pleasure; and proposed that, for the greater security of the town, each general should have a distinct quarter assigned him, and be responsible for any neglect of duty in it. The motion was agreed to; and upon the division, that district of Ortygia which extended from the fountain of Arethusa to the mouth of the great port fell to his care. Marcellus, informed of what was done, took his measures accordingly. He sent a body of troops to that side where Mericus commanded, and the Spaniards admitted them at the gate of Arethusa At the same time the proconsul ordered a false attack to be made on Acradina; which drawing almost all the soldiers of the garrison thither, Ortygia was in a manner left defenceless Foreseeing this he had detached another party of soldiers to take advantage of it. These entered

Ortygia almost without fighting; upon which the deserters made their escape, the Romans giving them way; and the Syracusans in Acradina, thus delivered from the fear of the deserters, immediately opened their gates to Marcellus, who thereby became master of the whole city. And now the conqueror, who is said to have wept during the siege with compassion for the inhabitants, gave up both Ortygia and Acradina to be plundered by his army, after he had secured the late king's treasures for the use of the republic, and the statues, paintings, and principal ornaments of Syracuse to illustrate his triumph. The soldiers had orders to spare the lives of the citizens; but they were cruel in their avarice, slew many of them, and among the rest the incomparable Archimedes. He was very intent on a demonstration in geometry, and calmly drawing his lines, when a soldier entered the room and clapped a sword to his throat. "Hold (said Archimedes) one moment, and my demonstration will be finished." But the soldier, equally regardless of his prayer and his demonstration, killed him instantly. There are different accounts of the manner of his death, but all agree that Marcellus regretted it extremely, and showed a singular favor to his relations for his sake.'

The apostle Paul spent three days in this city in his voyage to Rome, and Christianity was early planted in it. It continued subject to the western empire till its declension, when, the island of Sicily being ravaged by different barbarians, the capital also underwent various revolutions. In 675 it was taken and plundered by the Saracens, who, about 827, had subdued all Sicily, and destroyed much of its ancient grandeur (see CONSTANTINOPLE); but in 1090 it was recovered by Roger, earl of Sicily. It has since shared the fortune of the rest of Sicily. Near this port there was a sea engagement, in 1718, between the Spaniards and the British, in which the former were defeated and obliged to leave Sicily; but, in 1735, they retook Syracuse. Like the rest of Sicily it is much subject to earthquakes; and, in 1693, was almost totally destroyed by one.

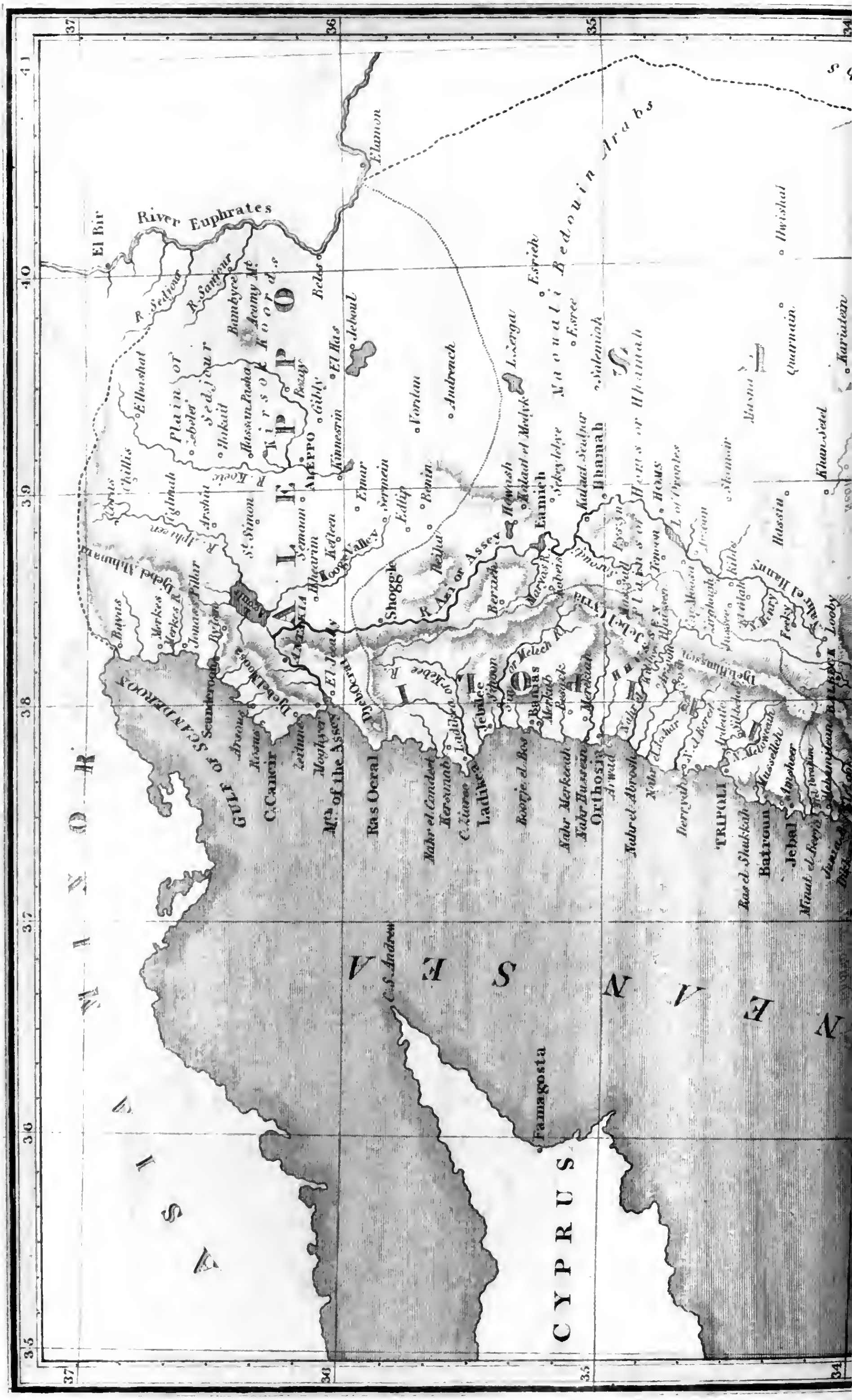
At present the only inhabited part of Syracuse is a south-east portion, containing Ortygia and part of Acradina. It is insulated, walled, and entered by drawbridges. The streets are regular but narrow; the houses tolerably built. The population is not above 15,000. The cathedral or principal church is the ancient temple of Minerva.

SYRIA, a very ancient country or kingdom of Asia, lying between the Mediterranean on the west, the Euphrates on the east, and Arabia Deserta, Phœnicia, and Palestine on the south, or, as Crutwell describes it, 'this name is given to the whole space contained between two lines drawn the one from Alexandretta to the Euphrates, and the other from Gaza in the desert of Arabia; bounded on the east by this desert, and on the west by the Mediterranean.' But Lempriere says that ancient Syria, whose boundaries are not accurately ascertained by the ancients, was bounded on the east by the Euphrates, north by mount Taurus, west by the Mediterranean, and south by Arabia.

This country appears in the patriarchal age to have been divided into a great number of cantons or petty principalities. Very early after the flood it went by the general name of Aram, from Aram the youngest son of Shem, who settled in it. Hence the different cantons were named Aram-naharaim, Aram-zobah, Aram-maachah, and Aram-zehob. Within a few centuries afterwards it had obtained its present name of Syria; for we find Bethuel the nephew, and Laban the grand-nephew of Abraham, styled Syrians, even in the patriarchal age. See Gen. xxv. 20. It is a piece of learned folly, therefore, to quote Plutarch's derivation of this name from the fabulous hero Syrus, the son of Apollo. Much more credit is due to those etymologists who suppose it to be a contraction of the name Assyria, which the best historians, etymologists, and chronologists, derive from Ashur, the second son of Shem. See ASSYRIA. Lempriere makes it so very extensive as to have comprehended 'Phœnicia, Seleucia, Judea or Palestine, Mesopotamia, Babylon, and Assyria;' which last name, he adds, was used indifferently with Syria by some ancient authors. But, be that as it may, all the petty states, provinces, principalities, and cantons, into which Syria Proper was originally divided, appear to have been afterwards reduced under subjection to the four principal ones, Zobah, Damascus, Hamath, and Geshur. Afterwards the whole country was divided into two parts only; viz. Cœlesyria and Phœnicia; though the Phœnicians, Idumeans, Jews, Gazites, and Azorites, inhabiting the whole country of the Philistines, were included. After the death of Alexander, Syria, in the great extent of the word, was divided, according to Strabo, into Comagene, Seleucis of Syria, Cœlesyria, Phœnice on the sea-coast, and Judea in the midland. Ptolemy, however, subdivides these; and in the Proper Syria reckons only Comagene, Pieria, Cyrrhistica or Cyrrhestica, Seleucis, Cassiotis or Casiotis, Chalybonitis, Chalcidice or Chalcidene, Apamene, Laodicene, Phœnicia Mediterranea, Cœlesyria, and Palmyrene. It has long been, and still is, named by the Arabs, the descendants of Ishmael, Barr el Sham, or the country of Shem.

The history of the ancient Syrians, till the time of their being carried away by the king of Assyria, is altogether unknown, excepting a few particulars to be gleaned from Scripture, which it is unnecessary here to repeat. During the continuance of the empires of Babylonia and Persia, the history of Syria affords nothing peculiar, being involved in that of these countries; but after the death of Alexander the Great, who had subdued all these empires, it became a very considerable kingdom, which makes a conspicuous figure in ancient history.

At the death of Alexander, the name of Syria was not confined to Syria properly so called, but comprehended all those vast provinces of Upper Asia which formed the Persian empire; being, in its full extent, bounded by the Mediterranean upon one side, and the river Indus on the other. Seleucus, one of the generals of Alexander the Great, after the death of that conqueror, being made governor of Babylon, was tempted, by the example of Alexander's other captains, to set up for himself. Eumenes, who had sincerely at


ASIA MINOR
River Euphrates
El Bir
Elamon
Beles
R. Sedjour
R. Sadjour
Bambyce
Plain of Sedjour
Kirs of Koords
ALEPPO
Kinnesrin
Jeboul
El Has
Gibly
Kiffeen
Semaan
St. Simon
Arshit
R. Aphreen
Jebel Alhmara
Chillis
Killis
Azaz
Elbushat
Hassan Pasha
Zebda
Hakalt
Rooge Valley
Edlip
Sarmein
Ermar
Benin
Nordan
Andreneh
L. Zerga
Esrieh
Esree
Salemiah
Nuowali Bedouin Arabs
Shoggle
R. Aasi or Assey
Berzin
Kalaat el Medyk
Hamah
Famieh
Sekeylebye
Kalaat Seuhar
Hemess or Hhamah
Homs
L. of Orontes
Hassia
Khan Sefel
Quarnain
Hwishal
Kariatein
Jebel Ansarie
Beylan
Merkes
Jonas's Pillar
Scanderoon
GULF OF SCANDEROON
Arsous
Rosus
C. Cancir
Zeitunie
Mts. of the Assey
Ras Oeral
Nahr el Condeel
Kerounah
C. Ziaret
Ladikea
Jebilee
Sytoon
Baneas
Merkab
Boorje el Bas
Nahr Merkeah
Nahr Hussein
Orthosia
Arwad
Nahr el Abrosh
Nahr el Kebeer
Tortosa
Tripoli
Batroun
Ras el Shakkah
Jebal
Minat el Berjeh
Jounie
Ibrahim
Ameoheer
Looby
Jebel Libnann
Nahr el Hawie
C. S. Andrew
Famagosta
CYPRUS
SEA
34
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Drawn by J. Assheton.

Engraved on Steel by J. Shury.

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heart the interest of Alexander's family, solicited his assistance against Antigonus, who had openly revolted; but Seleucus not only refused his assistance, but attempted to destroy Eumenes himself with his whole army, by cutting the sluices of the Euphrates, and laying under water the whole plain where they were encamped. Eumenes, however, escaped the danger without the loss of a man. Upon this Seleucus endeavoured to gain over his troops; but, finding that impossible, he made a truce with Eumenes, and granted him a safe passage through his province; but at the same time sent an express to Antigonus, desiring him to fall upon him before he was joined by the governors of Upper Asia. Antigonus did not fail to follow his advice; but, having thus prevailed against Eumenes through treachery, he next thought of bringing Seleucus himself under subjection. On his return to Babylon, therefore, after having been feasted with his whole army by Seleucus, he demanded an account of the revenues of his province. This being refused, Antigonus was so much exasperated that Seleucus, not thinking himself a match for him, fled into Egypt. By the flight of Seleucus, Antigonus was left master of all his provinces; but, his son Demetrius being afterwards defeated by Ptolemy at Gaza, Seleucus began to think of recovering what he had lost. Being furnished by Ptolemy with 1000 foot and 200 horse, he set out with that slender force to attempt the recovery of Babylon. Nothing could have a more desperate appearance than this undertaking; yet Seleucus on his arrival at Carrhæ in Mesopotamia, partly by force and partly by persuasion, prevailed on the Macedonians, who garrisoned that place, to revolt from Antigonus and join him. Being thus reinforced, he entered the territories of Babylon, where new supplies were continually added to his army; his ancient subjects flocking to him from all parts, and declaring themselves ready to stand by him with their lives and fortunes. This happened in consequence of the lenity with which they had been treated by Seleucus; whereas Antigonus was universally detested on account of his severity. As he approached the city, those who favored Antigonus retired into the citadel, but were soon obliged to surrender; and in that fortress Seleucus found his children, friends, and domestics, whom Antigonus had kept prisoners ever since his flight into Egypt. Seleucus having thus made himself master of Babylon, in A. A. C. 312, began to prepare for encountering Antigonus, who he knew would soon attack him with all his force. Nicanor, governor of Media under Antigonus, first advanced against him at the head of 10,000 foot and 7000 horse; but Seleucus, with only 3000 foot and 400 horse, having drawn him into an ambush, cut off almost the whole of his army, and the surviving soldiers willingly enlisted under him. The consequence of this victory was the submission of all Media and Susiana; which alarming Antigonus, he sent his son Demetrius with an army of 5000 Macedonian foot, 10,000 mercenaries, and 4000 horse. Seleucus was then in Media; and Patrocles, whom he had left to take care of Babylon, finding his force inadequate to that purpose, compelled the inhabitants to leave the city and disperse themselves in the adjacent countries, while he himself, with what troops he had, retired into two forts, which he thought could easily be defended. When, therefore, Demetrius entered Babylon, he was surprised to find it deserted, upon which he instantly attacked the forts. One was quickly reduced; but, as the other held out till the expiration of the time which had been allowed him by his father, he left 5000 foot and 1000 horse under Archelaus to carry on the siege. With the rest he marched away, suffering his soldiers to live at discretion as he went along; which so provoked the Babylonians that they were ever after attached to Seleucus as if he had been their natural prince. On the return of Seleucus to Babylon, he easily drove out the troops left by Antigonus, recovered the castle which he had garrisoned, and settled his authority on such a firm foundation that it could never afterwards be moved. Having then marched again into Media, he defeated and killed with his own hand Nicanor, whom Antigonus had sent against him; after which, having settled the affairs in Media, he reduced all Persia, Bactria, and Hyrcania, subjecting to his new kingdom these and all the other provinces on this side the Indus which had been conquered. Seleucus, being now master of all the countries which lie between the Euphrates and the Indus, took the title of king of Babylon and Media. But not satisfied with these possessions, ample as they were, he crossed the Indus, to conquer those regions which had submitted to Alexander beyond that river. But, during the time that the generals of Alexander had been making war upon his family and upon one another, Sandrocottus, a native of India, had driven out the Macedonians and made himself master of the whole country. See SANDROCOTTUS. He opposed Seleucus with an army of 600,000 men, and a prodigious number of elephants; which intimidated the Macedonian so much that he offered to leave Sandrocottus in quiet possession of his dominions, provided he would furnish him with 500 elephants. To this Sandrocottus readily assented; upon which Seleucus marched back into the west against Antigonus, and, in conjunction with Lysimachus and Ptolemy, engaged and totally defeated and killed him at Ipsus. See ANTIGONUS I. After this Seleucus marched into Upper Syria, which he reduced entirely, and built the city of Antioch on the Orontes. In the same country he built several other cities; one of which he called Seleucia, from his own name; another Apamea, from his wife Apama, the daughter of one Artabazus a Persian; and a third Laodicea, from his mother Laodice. He first entered into an alliance with Demetrius, and married Stratonice his daughter; but soon after assisted Lysimachus and Ptolemy to deprive him of the best part of his dominions. Thus, Demetrius being reduced so low that he could give him no farther jealousy, Seleucus built another city, called likewise Seleucia, seated where Bagdad now stands. Besides these, he built many others; sixteen of which he called Antioch, from his brother or son Antiochus; nine Seleucia; three Apamea; one Stratonicea; and six Laodicea, from his relations

above-mentioned. In 284 Seleucus entered into a war with Lysimachus, with whom he had hitherto lived in amity. Out of thirty-six general officers, left by Alexander the Great, they two only survived, and both were upwards of seventy years old; yet both were filled with the ambition and animosity of young men. The two armies met at a place called Curopidion in Phrygia, where an obstinate engagement took place. Victory was long doubtful; but at last Lysimachus was run through with a spear, and died on the spot; on which his troops fled, and left Seleucus master of all their baggage. This victory added to the possessions of Seleucus all those provinces which had formerly been subject to Lysimachus. He exulted much in his good fortune; boasting that he was now the last of Alexander's captains, and by this victory became, as he styled it, the conqueror of conquerors; whence he is generally called Nicator, or the conqueror. His triumph, however, was but short lived; for seven months after, as he was marching towards Macedon to take possession of that kingdom, he was treacherously murdered by Ptolemy Ceraunus, on whom he had conferred innumerable favors. Philetærus, prince of Pergamus, purchased his body at a great price from Ptolemy, and sent it to his son Antiochus; who, with extraordinary pomp, burned it in Seleucia on the sea-coast, erecting on the place a magnificent chapel, called from his surname Nicatorium.

Seleucus was succeeded by his son Antiochus Soter, who reigned nineteen years. He resigned to Antigonus Gonatas all pretensions to the crown of Macedon; and, having engaged in a war with Eumenes king of Pergamus, he was defeated by him, and obliged to yield up part of his dominions. He died in 261 B. C.

Antiochus I. was succeeded by his son Antiochus II., blasphemously surnamed Theos, or the God, who having engaged in a war with Ptolemy Philadelphus, king of Egypt, the Parthians and Bactrians took an opportunity to revolt, and could never afterwards be reduced. In 246 B. C. the God was poisoned by his wife Laodice, whom he had divorced for Berenice daughter to Ptolemy, with whom he made peace on the revolt of the Bactrians. On the death of Ptolemy, Antiochus had divorced Berenice, and took back Laodice; who, to secure herself against the effects of his fickle disposition, poisoned him, and raised to the throne her own son, named Seleucus Callinicus.

Laodice, not thinking herself safe as long as Berenice lived, began immediately to concert measures for putting both her and her son to death. Berenice attempted to save herself by retiring to Daphne, where she shut herself up in an asylum built by Seleucus Nicator. There she was closely besieged by the sons of Seleucus; of which the cities of Asia having intelligence, formed a confederacy in her favor. Her brother the king of Egypt also hastened to her relief with a considerable army; but, before either of these could come to her assistance, both she and her son were barbarously murdered, with all the Egyptians who attended them. Ptolemy, on hearing the melancholy news of his sister's death, determined to take the most severe vengeance on her murderers. Joining his forces to those of the Asiatics, he carried every thing before him. Having first killed the cruel Laodice, he made himself master of all Syria and Cilicia; then, passing the Euphrates, he subdued all the country as far as Babylon and the Tigris; and had not the progress of his arms been interrupted by a sedition, which obliged him to return to Egypt, it is probable that he would have subdued the whole Syrian empire. As soon as he was returned, Seleucus attempted to revenge himself; but his fleet being destroyed by a violent storm, and his army defeated by Ptolemy, he concluded a truce for ten years. During all this time Arsaces, the prince of Parthia, had established himself so firmly on the throne, that it was in vain to think of dispossessing him. However, as soon as his other affairs would permit, Seleucus undertook an expedition against Arsaces, by whom he was utterly defeated, taken prisoner, and carried into Parthia, where he died four years after. He was succeeded by his eldest son Seleucus III., surnamed Callinicus, or the Thunderer, a weak prince, and was poisoned by two of his officers, when he had reigned one year.

Antiochus, surnamed the Great, brother of Seleucus III., ascended the throne in 225 B. C. In the beginning of his reign two of his generals, Alexander and Molo, rebelled against him. The former had been appointed governor of Persia, and the latter of Media; but they, despising the king's youth, refused to obey. The occasion of this revolt is said to have been their dread of the cruelty of Hermias, the king's prime minister; and as they hoped to draw into their schemes Achæus, governor of Asia Minor, they doubted not of success. In this, however, they failed. Epigenes, the commander of the troops about the king's person, advised him to march without delay against the rebels; but as Hermias reproached him with treachery, and a design to betray him into the hands of his enemies, Antiochus sent two of his generals into the east, while he himself undertook an expedition against Ptolemy Philadelphus, to recover Cœlesyria. In this attempt, however, he was disappointed; and the generals whom he had sent into the east were totally defeated, and their troops cut off; upon which he determined to lay aside his Syrian enterprise, and march in person against the rebels. This was again opposed by Hermias; but, as he found it impossible to alter the king's mind, the treacherous minister found means to get Epigenes, the author of this project, executed, under pretence of holding a correspondence with Molo, one of the rebel chiefs. Antiochus in the mean time pursued his march against the rebels, whom he defeated in a pitched battle; upon which their chiefs killed themselves. On his return he received the submission of the Atropatii, a barbarous people in Media, and put to death his prime minister Hermias, whose treachery he at last discovered. During his life, however, the traitor, by accusing Achæus of treason, had obliged him to revolt in his own defence; so that the king had still two important wars on his hands, viz. that with Ptolemy, king of Egypt, and the other against Achæus. After some deliberation he resolved to march first

against the king of Egypt; and was at first very successful, reducing many cities in Cœlesyria and Palestine, and defeating the Egyptians in a pitched battle; but in 217 B. C., being worsted in the battle of Raphia, he was obliged to abandon all his conquests; of which Ptolemy immediately took possession, and Antiochus was obliged to cede them to him, that he might pursue war against Achæus. Antiochus, having made vast preparations for his expedition, soon reduced Achæus to such distress that he was obliged to shut himself up in the city of Sardis, which he defended for some time with great bravery; till at last, being betrayed by two Cretans, he was delivered up to the king, and by his order put to death. Antiochus then undertook an expedition against the Parthians, whom he obliged to conclude a peace on very advantageous terms. He then turned his arms against the king of Bactria, whom he also compelled to agree to his terms; one of which was, that he should give him up all his elephants. For the confirmation of the treaty, the king of Bactria sent his son to Antiochus; who, being taken with his majestic mien and agreeable conversation, gave him one of his daughters in marriage. He then crossed Mount Caucasus, and entered India; where, having renewed his alliance with Sophagasenus, the king of that country, he received a number of elephants, which increased his stock to 150. See INDIA. From India he marched into Arachosia, Drangiana, and Carmania, establishing order and discipline in all those countries; then, passing through Persia, Babylonia, and Mesopotamia, he returned to Antioch, after an absence of seven years.

In the year 204 B. C. Antiochus made an easy conquest of Judea; but treated the Jews with great kindness and humanity. In the same year he entered into a league with Philip V. of Macedon, on purpose to deprive Ptolemy Epiphanes, the infant king of Egypt, of all his dominions. The Egyptians, however, put the young king under the tuition of the Romans; who immediately required the confederate princes to desist from any enterprise against the king of Egypt, under the penalty of incurring the displeasure of the republic. After delivering this message, M. Æmilius Lepidus, one of the ambassadors, repaired to Egypt, where he took upon himself the office of regent and guardian to the young king. Having regulated affairs there in the best manner he could, he returned to Rome, after having appointed one Aristomenes, an Acarnanian, to be chief minister to the king. Aristomenes, being a man of prudence and fidelity, acquitted himself very well in his new station. Having taken care to recruit his army as well as he could, he sent one Scopas, a man of great authority among the Ætolians, into that country, to raise auxiliaries. Scopas soon raised an army of 6000 Ætolians, at that time reputed the best soldiers in the world; and, having joined the Egyptian army, reduced all Judea, put a garrison into the castle at Jerusalem, and on the approach of winter returned to Alexandria, loaded with booty. These exploits, owever, were performed when Antiochus was absent in Asia Minor; and no sooner was he returned than the face of affairs was changed. Scopas was defeated in a pitched battle, where one half of his men were destroyed. He himself escaped to Sidon, where he shut himself up with 10,000 of his soldiers; but, Antiochus having invested the place, Scopas was reduced to the necessity of surrendering at discretion. The king pursued his conquests; recovered all Palestine and Cœlesyria; after which he invaded Asia Minor, in hopes of reducing it also, and restoring the Syrian empire to the same extent it had in the time of Seleucus Nicator. The free cities in Asia Minor immediately had recourse to the Romans, who sent an embassy to Antiochus on the occasion; but, as both parties treated each other haughtily, no satisfaction was given, but every thing tended to an open rupture. While matters were in this situation, Hannibal the Great, being obliged to leave his own country, fled to Antiochus; from whom he met with a gracious reception. As Hannibal had, while a child, sworn perpetual enmity against the Romans, he used all his eloquence to persuade Antiochus to make war with them; and, as the many victories which he had gained over them left no room to doubt of his capacity, Antiochus doubted nothing of being able, by his assistance, to conquer that haughty people. Several embassies passed between the two nations; but chiefly with a design on the part of Antiochus to gain time. Hannibal endeavoured to draw his countrymen into the confederacy against Rome, but without effect. Antiochus, having strengthened himself by several alliances, at last resolved to begin the war in earnest. To consult on the measures proper to be taken, he called a council of war; but excluded from it the only man whose advice he ought to have followed; viz. Hannibal. The reason of this was, that he had become jealous of him from the too great intimacy, as he thought, which he had kept with the Roman ambassadors. However, in this council, it was agreed that the war should be immediately commenced. The king himself was prevailed upon by the Ætolians to pass over into Greece, and entirely to reject the advice which Hannibal had formerly given, of sending him with an army into Italy. Here he was made generalissimo of the Greek forces; but made none of those efforts that had formely obtained him the title of Great. Indeed it now plainly appeared, not only that he was incapable of carrying on war against such enemies as the Romans, but even of accepting proper advice when it was given him. In another council in which Hannibal was admitted, that commander advised the king, before he undertook any thing else, to use his utmost endeavours to gain over Philip V. of Macedon; which, he said, was a step so important, that if it could be gained they might, without much ado, become masters of all Greece. But, if Philip could not be prevailed on to make war on the Romans, he was of opinion that the king should send his son Seleucus into Macedon at the head of an army, and thus prevent Philip from giving the Romans any assistance. But he still maintained that the only way to defeat the Romans was to send an army into Italy. This

advice was again rejected; and the king imprudently became the aggressor by falling on a body of 500 Romans before war had been declared. He also made Philip his enemy by entertaining the regent of Athamania, who was a pretender to the crown of Macedon. To complete all, he himself fell in love, though above fifty years of age, with a beautiful young woman of Chalcis, whom he married; and became so great a slave to this passion that he entirely neglected his affairs; the army gave themselves up to dissipation and debauchery, and every trace of military discipline vanished. In 191 B.C. Antiochus was roused from his lethargy by a declaration of war against him at Rome, and set out for Ætolia. His army at this time amounted to no more than 10,000 foot, and 500 horse. He had been made to believe that he would receive a vast reinforcement in Ætolia; but all the troops he could raise there amounted to only 4000 men. With this force, so exceedingly inadequate to the purpose, he was obliged to oppose the Roman army, who were advancing in conjunction with the Macedonians, and had already made surprising progress. Antiochus seized the straits of Thermopylæ; but was driven from them by the Romans, the king himself being the first that fled. Almost his whole army was destroyed in the battle or in the pursuit, and Antiochus returned with disgrace into Asia.

Soon after his return Antiochus equipped a fleet of 200 sail; on which he immediately embarked for the Thracian Chersonesus, now Crim Tartary, where he fortified the cities of Lysimachia, Sestus, and Abydos, with others in that neighbourhood, to prevent the Romans from crossing the Hellespont. In the mean time Polyxenidas, the Syrian admiral, sent intelligence to the king that the Roman fleet had appeared off Delos; upon which he desired him to seek them out and engage them at all events. He did so, and was defeated with the loss of forty ships taken or sunk in the engagement. This was soon after revenged by the destruction of the Rhodian fleet by the artifice of Polyxenidas; but in the end the king's affairs went every where to wreck. Having laid siege to the city of Pergamus, he was obliged to raise it with loss; the Phœnician fleet commanded by Hannibal was defeated by the Rhodians; and soon after the Syrian fleet under Polyxenidas was utterly defeated by the Romans. Antiochus was so much disheartened, by these repeated defeats, that he appeared like one infatuated. Instead of fortifying more strongly those cities which lay on the frontiers of his kingdom, he entirely deserted them; and thus Lysimachia and Abydos, the two keys to Asia, fell into the hands of the Romans without the least resistance. The arrival of the Romans in Asia, struck Antiochus with such terror, that he instantly sued for peace. The terms he offered were indeed very advantageous, but by no means agreeable to the expectations of the Romans. They therefore gave him this final answer:—1. That, since he had drawn upon himself the war, he should defray the whole expense of it. 2. That he should restore liberty in general to all the Greek cities in Asia: and, 3. That, to prevent future hostilities, he should relinquish all Asia on this side Mount Taurus. These terms, however, still appeared to him so intolerable that he resolved to continue the war; and determined also to take the most imprudent method of carrying it on, namely, by hazarding all on the event of a general engagement. The king encamped near Magnesia, and strongly fortified his camp. The Romans insulted him in his trenches, and proposed to attack his fortifications, if he continued to decline an engagement. At last the king, thinking it would be shameful for him longer to refuse an engagement, fought a battle, which issued in his entire defeat. No fewer than 50,000 foot, and 4000 horse were killed; 1500 were taken prisoners, and fifteen elephants. In the consular army there were but 300 foot killed, and twenty-five horse.

Antiochus retired to Sardis with as many of his forces that had escaped the slaughter as he could draw together. From Sardis he soon marched to rejoin his son Seleucus, who had fled to Apamea. As for the consul, he took advantage of the king's defeat and flight, making himself master of all the neighbouring countries. Deputies hastened to him from all parts; the cities of Thyatira, Magnesia, Trallis, Magnesia in Caria, all Lydia, and Ephesus itself, though highly favored by Antiochus, declared for the Romans. Polyxenidas, upon the news of the king's defeat, left the port of Ephesus, and sailed to Patara, where he landed with a very small guard, and returned by land into Syria. The consul took the road to Sardis, which opened its gates to him. Antiochus, finding his affairs in a bad situation both by sea and land, hastened to conclude a peace, which he obtained on the following terms:—He was to confine his dominions within Mount Taurus; to pay 15,000 Euboic talents for the expenses of the war; to deliver up Hannibal and some other foreigners who were obnoxious to the Romans. For the fulfilment of these articles he gave seventy hostages, one of whom was his youngest son Antiochus. The peace being ratified by the Sarati, the Greek cities were by the Romans restored to their liberty, the provinces of Caria and Lydia given to the Rhodians, and all the rest that had belonged to Antiochus on that side of Mount Taurus bestowed upon Eumenes.

Antiochus did not long survive his misfortune at Magnesia. Some tell us, that, being greatly puzzled how to raise the sum he had engaged to pay to the Romans, he seized on the riches which had for many ages been deposited in a temple of Jupiter Belus in the province of Elymais; upon which the populace rose in arms, and slew him and all his attendants. Others inform us that he was killed at an entertainment by one of his guests. Antiochus the Great died in 187, and with him the glory of the Syrian empire.

Antiochus the Great was succeeded by his son Seleucus IV., surnamed Philopator, A.A.C. 187, who reigned only twelve years, dying in 175, and leaving the Syrian throne to his son, or his brother according to Alstidius, Antiochus IV., surnamed Epiphanes, the most barbarous and bloody tyrant that ever reigned in Syria. The Romans now gave laws to the kings of Syria; insomuch that, when Antiochus Epiphanes hesitated at obeying the commands of the

senate; one of the ambassadors drew a circle round him with a rod on the floor, and told him he should not go out of that spot before he had told him what he was to do. But the most horrible transactions of this prince are his wars with the Jews, and persecutions of them; of which a full account is given under the article Jews.

After the miserable death of the monster Epiphanes, at Tabæ, the Syrian throne fell a prey to a series of tyrants, impostors, and usurpers, of whom it is sufficient to give the following brief chronological list: Antiochus V., surnamed Eupator, succeeded his wicked father in 164; but reigned only two years. He was succeeded in 162 by Demetrius I., surnamed Soter, a brother of Antiochus Epiphanes, who had only reigned eleven years, when, in 151, the crown was claimed by Alexander Balas an impostor, who pretended to be a son of Epiphanes; and being supported in this false claim by Ptolemy Philometer, king of Egypt, by the kings of Pergamus and Cappadocia, and by the Romans, defeated and killed Demetrius, and reigned five years, some say six; but was at last killed in Arabia, A.A.C. 146. See Alexander Balas. Demetrius II., surnamed Nicator, the lawful heir, being the son of Demetrius I., then succeeded; but he being taken prisoner two years after by the Parthians, in 144, the throne was seized by Antiochus VI., surnamed Entheus, who reigned two years along with a usurper named Diodotus Tryphon, who afterwards assumed the sole power for other three years, till A.A.C. 139, when he was expelled by Antiochus VII., surnamed Zidetes, and also Pius and Soter, the son of Demetrius I., and brother of Demetrius II., who reigned ten years. But Demetrius II., being now liberated by the Parthians, was restored to his kingdom; but had reigned only three years, when Alexander Zebina, a new impostor, who pretended to be the son of the impostor Alexander Balas, being assisted and supported by Ptolemy Physcon, the tyrant of Egypt, expelled Demetrius a second time in 126, and reigned three years. In 123, however, the usurper Zebina was justly dethroned and killed by Antiochus VIII., surnamed Grypus, the son of Demetrius II. See Alexander Zebina. Grypus reigned twenty-nine years in all; but, in his ninth year, his brother Antiochus Cyzicenus rebelled against him, and in his eleventh, A.A.C. 112, erected Cœlesyria into a separate kingdom, wherein he reigned for eighteen years, and hence is ranked as Antiochus IX. by chronologists. On the death of these two brothers, A.A.C. 94 and 93, Seleucus V., a third son of Antiochus VIII., claimed the crown of Syria, but was opposed by four other pretenders, viz. Antonius Eusebes, Philip, Demetrius III. surnamed Eucerus, and Antiochus X. surnamed Pius, all claiming as descendants of the royal house of the Seleucidæ. These claimants involved the country in a civil war for six years; when Philip, overcoming them all, reigned two years alone. But Aretas seized Cœlesyria in 85; and, two years thereafter, Tigranes king of Armenia, taking advantage of the dissensions of the Seleucidæ, and being invited by a party of the Syrians themselves, reduced the whole country in 83, and governed it for eighteen years with more tranquillity than it had enjoyed for a long period. Antiochus XI., however, surnamed Asiaticus, or the XIII. as he is styled by some (for there were other two usurpers of the name), the son of Cyzicenus, who had been skulking in Cilicia, claimed the crown, in A.A.C. 69, and was supported against Tigranes by Lucullus the Roman general, who defeated Tigranes, and declared Antiochus king of Syria. But his reign was short, only four years: for Tigranes, attempting to recover the kingdom, was defeated by Pompey the Great, who, disregarding Antiochus's claim, reduced the whole kingdom to a Roman province, A.U.C. 691, and A.A.C. 65.

From being a province of the Roman republic, Syria became, on the division of the Roman empire, subject to the emperors of the East; but in A.D. 634 it was invaded by the Saracens, who completed the conquest of it in 640, when it was confirmed to them by the treaty made with Constantine IV. See Constantinople, and Saracens.

In A.D. 970 Syria was conquered by the Fatemite Khalifs, soon after their conquest of Egypt. See Egypt. But the emirs of Damascus revolted in 1067; and those of Aleppo in 1068. In 1096 the crusades from Europe commenced; and the Christians conquered that part of Syria called the Holy Land, which they kept possession of for above 100 years. See Crusades. In 1166 Nureddin, or Nuroddin, emir of Damascus, defeated the Egyptians, and conquered the greatest part of Syria; and his nephew, the famous Saladin, soon after, on the death of the khalif Aded, seized the government of Egypt, put an end to the power of the Fatemites, and erected a new dynasty. See Egypt. But in 1259 all Syria was over-run and conquered by the Tartars under Hulaku.

The Tartars did not long retain possession of Syria. It was soon recovered by the sultans of Egypt; who also, in 1291, totally expelled the Christian crusaders. Syria was again overrun and ravaged by Tamerlane in 1400; but he did not attempt to retain it. After this period it underwent the revolutions of Egypt, till both were conquered by the Turks under Selim I. in 1517. See Egypt.

Ever since the above conquest, by Selim, this country continued in the undisturbed possession of the Turks, till the invasion of Egypt by the French in 1798. Soon after that event Buonaparte over-ran Syria, and took Gaza and Jaffa, or Joppa, &c.; but found a fatal stop put to his victorious career by British valor, at Acre, or St. Jean D'Acre, the ancient Ptolemais; where the brave Sir Sidney Smith gained immortal fame by the defence of that small town.

The present state of Syria differs little from that of the rest of Asiatic Turkey. Its open plains, separated by no defined boundary from Arabia, Persia, and Asia Minor, are variously occupied by wandering tribes of Turks and Greeks, who form, as elsewhere, the basis of the population. The only tribes which can be considered as appropriate to Syria are the tenants of the heights of Lebanon, the most remarkable of which are the Druses and Maronites.

SYRINGA, the lilac, or pipe tree, in botany, a genus of plants belonging to the class of diandria, and order of monogynia; and in the natural system ranking under the forty-fourth order, sepiariæ. The corolla is quadrifid, and the capsule is bilocular. There are three species, viz. 1. S. Persica, the Persian lilac, is a native of Persia. It has lanceolate leaves, and was cultivated in Britain in the middle of the seventeenth century, about 1658, or earlier. 2. S. suspensa, the hanging lilac, is a native of Japan. 3. S. vulgaris, the common lilac, is originally a native of Persia. It is distinguished by oval heart-shaped leaves, and was cultivated in Britain about 1597 by Mr. John Gerard.

SYR'INGE, *n. s.* & *v. a.* Gr. συριγξ. A pipe through which any liquor is squirted: to spout by a syringe.

The heart seems not designed to be the fountain or conservatory of the vital flame, but as a machine to receive the blood from the veins, and force it out by the arteries through the whole body, as a *syringe* doth any liquor, though not by the same artifice.
Ray.

A flux of blood from the nose, mouth, and eye, was stopt by the *syringing* up of oxycrate.
Wiseman's Surgery.

The SYRINGE is a well-known instrument, serving to imbibe or suck in a quantity of fluid, and to squirt or expel the same with violence. It is formed from the Greek συριγξ, or the Latin syrinx, a pipe. A syringe is only a single pump, and the water ascends in it on the same principle as in the common sucking pump. See HYDROSTATICS.

SYRINGOIDES LAPIS, a fossil stone.

SYRINX (Gr. συριγξ, a pipe), in mythological painting and sculpture, a nymph of Arcadia, daughter of the river Ladon. Pan became enamoured of her and attempted to offer her violence; but Syrinx escaped, and at her own request was changed by the gods into a reed, called syrinx by the Greeks. The god made himself a pipe with the reeds into which his favorite nymph had been changed, and upon this pipe he is often introduced playing, in pictures. The syrinx, or Pan's pipe, is frequently found figured upon ancient monuments. It is composed of seven tubes of unequal size. Ordinarily it is placed in the hands of fauns and satyrs (the followers of Pan); but is sometimes also the accompaniment of rustics. Upon the sarcophagus of Tyrrania, preserved in the Museum at Arles, and of which a description and engraving are included in the second volume of Millin's Monumens Antiques Inédits (plate 37) is depicted a syrinx in a case or box. It is occasionally found on the earlier Christ an monuments as an emblem of our holy faith; the divine founder of Christianity having been regarded as the shepherd of his spiritual flock, and the syrinx being the common musical instrument of the husbandman or shepherd.

SYRMA (Gr. συωμα, the train of a gown, from σύρω, to drag along), in archaiology, a very long tunic descending even to the heels, but which nevertheless had not an amplitude greater than the thickness of the body.

SYRNA, the wife of Podalirius, the son of Æsculapius.

SYRNA, an ancient town of Caria, built by Podalirius, where he was afterwards worshipped.

SYRO-GRECIAN (from Syria and Grecian), an epithet applied to the empire of the Seleucidæ in Syria, being founded by the Greeks in Syria. See SYRIA.

SYRO-GRECIANS, the people of Syria, under the Seleucidæ, being a mixture of Greeks and Syrians.

SYRO-MACEDONIAN (from Syria and Macedon), a word synonymous with Syro-Græcian.

SYRO-MACEDONIAN ERA. See SELEUCIDÆ.

SYRO-PHŒNICIA, a country lying between Syria and Phœnicia, inhabited, according to Bochart, by natives of both nations mixed.

SYROS, in ancient geography, an island in the Ægean Sea, one of the Cyclades; about twenty miles in circumference, and very fertile in corn, wine, and fruits. The climate is mild, and the inhabitants long-lived. *Hom. Od.* xv. 504. *Strabo* 10.

SYROS, a town of Caria. *Paus.* iii. c. 26.

SYRTES, in ancient geography, two large sand-banks in the Mediterranean, on the coast of Africa; the one near Leptis, the other near Carthage. As they often shifted, and were sometimes very high, sometimes very low under water, they were very dangerous, and often fatal to ships. *Mela* i. c. 7. ii. c. 7.

SYRTICA REGIO, the SYRTIC REGION, a country of Africa, one of the three great divisions of ancient Libya. It comprehended the coast of Barbary between Tripoli and Barca; and was so named from

SYRTIS, an island and a spacious gulf of Africa, on the coast of Barbary, between the above limits; now called Sidra. The quicksands in the gulf shifted, whence the word was used as an appellative.

SYR'TIS, *n. s.* Lat. *syrtis.* A quicksand; a bog.

A boggy *syrtis*, neither sea, nor good dry land.
Milton.

SYRUS, in fabulous history, the son of Apollo by the nymph Sinope. See SINOPE. He is fabled to have given his name to Syria. *Plut. in Luc.*

SYRUS (Publius), a Syrian mimic poet, who flourished about forty-four years B. C. He was originally a slave sold to a Roman patrician called Domitius, who brought him up with great attention, and gave him his freedom when of age. He gained the esteem of the most powerful men at Rome, and reckoned J. Cæsar among his patrons. He soon eclipsed the poet Laberius, whose burlesque compositions were in general esteem. There remains of Syrus a collection of moral sentences, written in iambics, and placed in alphabetical order.

SYSIGAMBIS, or SISYGAMBIS, the mother of Darius III. king of Persia. She was so very kindly treated by Alexander the Great, that, though she had been able to survive the death of her son, and the overthrow of his empire, she could not survive that of Alexander, but killed herself when he died. See MACEDON.

SYSSARCOSIS, in anatomy (from συν, with, and σαρκος, flesh), a kind of articulation by the intervention of flesh. *Ash.*

SYSTEM, *n. s.* } Fr. *systeme*; Gr. *συστημα*. Any com-
SYSTEMAT'ICAL, *adj.* } plexure or combination of things together; a scheme which unites many things in order or mutual dependence: the adjective and adverb corresponding.

SYSTEMAT'ICALLY, *adv.* }

I treat of the usefulness of writing books of essay, in comparison of that of writing *systematically*. *Boyle.*

He presently bought a *system* of divinity, with design to apply himself straightway to that study. *Fell.*

It will be necessary, in a discourse about the formation of the world, to give you a brief account of some of the most principal and *systematical* phenomena that occur in it. *Bentley.*

The best way to learn any science is to begin with a regular *system*, or a short and plain scheme of that science well drawn up into a narrow compass. *Watts.*

Now we deal much in essays, and unreasonably despise *systematical* learning; whereas our fathers had a just value for regularity and *systems*. *Id.*

Aristotle brings morality into *system*, by treating of happiness under heads, and ranges it in classes according to its different objects, distinguishing virtues into their several kinds, which had not been handled *systematically* before. *Baker.*

SYSTEM, in general (from *συστημα*, composition,) denotes a chain of principles and conclusions, or the whole of any doctrine, the several parts whereof are bound together, and depend on each other.

SYSTEM, in music, an assemblage of the rules for harmony, deduced from some common principle by which they are reunited; by which their connexion one with another is formed; whence, as from their genuine source, they natively flow; and to which, if we would account for them, we must have recourse.

SYSTOLE, *n s.* Fr. *systole*; Gr. *συστολη*. In anatomy. The contraction of the heart.

The *systole* resembles the forcible bending of a spring, and the diastole its flying out again to its natural site. *Ray.*

SYSTOLE, in anatomy, is the opposite state to the diastole, or dilatation of the heart. See ANATOMY.

SYSTYLE, in architecture, that manner of placing columns where the space between the two shafts consists of two diameters, or four modules. See ARCHITECTURE.

SYTHAS, a river of Peloponnesus, running through Sicyonia, into the bay of Corinth. *Paus.* ii. 7.

SYXHANDEMAN (Sax.), a man of the middle rank, under the Anglo-Saxon government: a man worth 600 shillings. *Ash.*

SYZYGIA, or SYZYGY (from *συζυγια*, conjunction), in astronomy, a term equally used for the conjuction and opposition of a planet with the sun. The word is formed from the Greek *συζυγια*, which properly signifies conjunctio. On the phenomena and circumstances of the syzygies a great part of the lunar theory depends. See ASTRONOMY.

SZEGEDIN, a large town of East Hungary, in the county of Csongrad, opposite to the confluence of the rivers Theyss and Maros. It is surrounded by a mound and moat, and has a brick fort erected by the Turks in the sixteenth century. This is one of the principal towns of Hungary, containing manufactures of woollens, leather, and toys, on a small scale, but all of importance in a country where manufactures are in their infancy. Its commercial intercourse is considerable. The inhabitants possess a number of barges, some of the size of 200 or 250 tons, with which they navigate not only the Maros and the Theyss, but the Danube: their exports consisting chiefly of the products of the adjacent country, viz. corn, cattle, wool, tobacco, and timber. Cotton they import from Turkey, and make the object of a transit trade: salt from Transylvania. The tobacco raised in this neighbourhood is in good repute. As to religion, the Catholics and the followers of the Greek church predominate. Here is a monastery of Minorites; a school taught by the Piarist monks; a gymnasium or classical school; and a small philosophical seminary. Other public buildings are several hospitals, a work-house, and theatre. This town fell, in the beginning of the sixteenth century, into the hands of the Turks, and continued in their possession above a century and a half, being retaken by the Austrians only in 1686, some time after the route of the Turkish army by Sobieski. Population 26,000. 100 miles S. S. E. of Pest, and thirty north of Csongrad.

SZOLNOK, Belso or Inner, a palatinate of Transylvania, bordering on Hungary on the north, and the district of Nosnerland on the east, having a territorial extent of 1335 square miles, with about 110,000 inhabitants.

SZOLNOK, Koscep or Middle, a palatinate of Transylvania, bounded by Hungary entirely on the north, and partly on the west. Its area is 835 square miles, and its population 50,000.

T.

T is used, 1. as a letter; 2. as an abbreviation; 3. as a word; and 4. it was anciently used as a numeral. I. As a letter, T, or t, is the nineteenth of our alphabet, and the fifteenth consonant. The sound is formed by a strong expulsion of the breath through the mouth, upon a sudden drawing back of the tongue from the fore part of the palate, with the lips at the same time open. The proper sound of *t* is expressed in most words beginning or ending with that letter, as in take, tell, hot, put. *Ti* before a vowel has the sound of *si*, or rather of *shi*, as in creation, except when *s* precedes, as in question; and in derivatives from words ending in *ty*, as mighty, mightier. Anciently this syllable *ti* was considered as distinct from the vowel that followed it, and such words as na-ti-on, sta-ti-on, &c., formed trisyllables in poetry, as appears from the version of

the Psalms still used in our churches. But now, in modern improved English, *ti* is not considered as a distinct syllable, but only as softening the *t* to the sound of *sh*, as if the words were spelt na-shon, sta-shon, &c. *Th* has two sounds; the one hard, as thou, father; the other soft, as thing, think. The sound is hard in these words, the, then, than, there, with their derivatives and compounds; and in the words that, this, thus, thy, they; and in all words in which *th* comes between two vowels, as whether, rather; and between *r* and a vowel, as burthen: but it is soft in thane, thank, thatch, thaw, theatre, theft, thence, theocracy, and all other derivatives of ΘΕΟΣ, theorem, theory, thesis, and all other words of Greek derivation, thick, thief, thigh, thin, third, thirst, thistle, though, thong, thorn, thorough, thought, thousand, thrall, thrash, thread, threat, three, thrice, thrift, thrive, throat, throne, throng, through, throw, thrumb, thrush, thrust, thump, thunder, thursday, thwack, thwart, &c., and all their compounds and derivatives. But in the word thither, and its compounds, *th* sounds soft in the first syllable and hard in the second; and in thyme the *h* is not sounded. II. As an abbreviation T was used among the Roman writers for Titus, Titius, &c.; Tab. for Tabularius; Tab. P. H. C. Tabularius Provinciæ Hispaniæ Citerioris; Tar. Tarquinius; Ti. Tiberius; Ti. F. Tiberii filius; Ti. L. Tiberii libertus; Ti. N. Tiberii Nepos; T. J. A. V. P. V. D. tempore judicem arbitrumve postulat ut det; T. M. P. terminum posuit; T. M. D. D. terninum dedicavit; Tr. trans. tribunus; Tr. M. or Mil. tribunus militum; TR. PL. DES. tribunus plebis designatus; TR. ÆR. tribunus ærarii; TRV. CAP. triumviri capitales; T. P. or TRIB. POT. tribunicia potestate; Tul. H. Tullus Hostilius. In music T stands for tutti, all or altogether. III. As a word it is used without a vowel, both in surgery and mechanics. IV. As a numeral T was used among the ancients for one hundred and sixty; and with a dash at top, thus $\overline{\text{T}}$, it signified one hundred and sixty thousand.

T, *adj.*, is used as a distinction for a peculiar kind of bandage in surgery.

T, *n. s.* T Square, or Tee Square, in drawing and mechanics, an instrument so named from its resemblance to a capital T.

TAANATH-SHILOH, a town of Israel, in Ephraim, ten miles east of Shechem. It existed under the name of Thenath as late as A. D. 400.

TAAS, or Taaes, a considerable city of Yemen, in Arabia, between Mocha and Sana, forty-eight miles from Mocha. It is surrounded by mountains, which are said to be very productive of plants. They are in the possession of several sheiks, who are independent of, and even hostile to the Imam, and Niebuhr was not allowed to make any excursions among them. The city is described by Sir Henry Middleton as about half the size of Sana.

TAAUT, Taautes, Taautos, Taautus, or Thoth, a Phœnician deity, the same with Hermes of Egypt, and Mercury of the Greeks and Romans. See Hermes, Mercury, Mysteries, Polytheism, and Thoth. But Mr. Lempriere makes him the same with Saturn, for which he quotes Varro.

TAB, the ancient Arosis, a river of Persia which rises in the mountains of Fars, divides that province from Khusistan, and falls into the Persian gulf near Endian. At that place it is eighty yards wide, and navigable for boats of twenty tons.

TABAGO, or Taboga, a mountainous island in the Pacific, near the coast of Mexico, about three miles long and two broad. On the north side the high land declines with a gentle descent, and near the strand the soil is a black mould, and deep. This side of the island makes a very pleasant appearance, and seems to be a garden of fruit trees. The principal products are plantains and bananas. There was formerly a small town here near the sea, but it was ruined by privateers. Before it is a good road, about a mile from the shore, where ships may ride very safely in sixteen or eighteen fathom water. Eighteen miles south of Panama.

TABANUS, the breeze-fly, a genus of insects belonging to the order of diptera. The mouth is extended in a fleshy proboscis, terminated by two lips. The rostrum is furnished with two pointed palpi placed on each side of the proboscis, and parallel to it. Gmelin has enumerated thirty-eight species; of which three only are found in Great Britain; viz. 1. T. bovinus, or great horse fly, has a gray head; the eyes almost of a black brown, occupying the greatest part of it. The thorax is of a gray color; the abdomen is yellowish, with a triangular white spot on the middle of every ring, which constitutes a longitudinal band of spots, the point of which is directed towards the thorax. The thighs are blackish, and the legs yellow. The wings are dusky, with brown veins of a deeper dye. This insect is the terror of horned cattle, horses, &c. Its mouth is armed with two sharp hooks which penetrate their hide; while with its proboscis, which is shaped like a sting, it sucks their blood, of which it is very greedy. The puncture of the tabanus is keen and painful. The insect is very common in damp woods and meadows, especially during the great heats, when it is most troublesome. The horned cattle are sometimes so molested by their stings that they go mad, run down precipices, tear themselves on the stumps of trees, stones, &c. 2. T. concutiens has a brown head; eyes green and brown, with black spots; the thorax brown with black spots; the abdomen above, yellow with triangular brown spots; yellow legs, and white wings with black and brown spots. The length is four lines and a half. 3. T. pluviatilis is of an ashen gray color; its eyes are green, with brown streaks. The thorax is brown, marked with about seven longitudinal gray lines; the wings, which are brown and ash-colored, are dotted over with small white spots, and have a black spot on the margin; the legs are surrounded with brown and white rings alternately. This species is very common in meadows, and is about four lines in length.

TABARCA Neuva, a small island of Spain, in the Mediterranean, on the coast of Valencia. It is almost destitute of trees and water, but is inhabited by the descendants of a colony of Spaniards, who were, in 1771, redeemed from

slavery in Barbary by the government, and settled here.

TABASCO, an island, or rather neck of land, in the south-west part of the gulf of Mexico, at the bottom of the gulf of Campeachy, on which is built the town of Tabasco. It is about thirty-six miles in length, and seven or eight broad. Near it, on the continent, are great plains abounding in cattle, sheep, &c., and a wild animal called the mountain cow, or tapir, which subsists on moss. It is separated from the continent by the river.

Tabasco River, a river of North America, which runs into the bay of Campeachy, long. 93° 40′ W., lat. 18° 15′ N.

TABASHEER, a Persian word, signifying a hard substance found in the cavities of the bamboo or Indian reed, and highly valued as a medicine in the East Indies. From the experiments of Dr. Russel it appears that the tabasheer is the juice of the bamboo thickened and hardened. Its medical effects are mentioned in a Persian work of Mahommed Monein Hosemy, by Mr. Williams, a surgeon in the East Indies. It is useful in bilious vomitings, the bloody flux, palpitations of the heart, faintings, cases of debility from heat; also in the piles, acute burning fevers, pustules in the mouth, thrush; and, with oxymel, is of great service against restlessness, melancholy, and hypochondriacal affections. The habitual internal use of it is prejudicial to the virile powers, and to the lungs. Its correctives are the gum of the pine and honey.

TAB'BY, *n. s.* Fr. *tabis;* Ital. *tabi, tabino.* A kind of waved silk: hence a striped appearance of any other kind.

A *tabby* cat sat in the chimney-corner. *Addison.*

On her *tabby* rival's face
She deep will mark her new disgrace. *Prior.*

Brocades, and *tabies,* and gauses. *Swift.*

TABBYING, a passing the silk or stuff under a calendar, the rolls of which are made of iron or copper variously engraven, which, bearing unequally on the stuff, renders the surface thereof unequal, so as to reflect the rays of light differently, making the representation of waves thereon.

TAB'EFY, *v. n.* Lat. *tabefacio.* To waste; to extenuate.

Meat eaten in greater quantity than is convenient *tabefies* the body. *Harvey on Consumptions.*

TABELLARIÆ Leges, in Roman antiquity, laws made by suffrages delivered upon tabellæ, tablets, and not viva voce. There were four of them, viz. the Gabinian, by Gabinius, A. U. C. 614; the Cassian, by Cassius, A. U. C. 616; the Papirian, by Papirius Carbo, A. U. C. 622; and the Cælian, by Cælius, A. U. C. 646.—Cic. de Legg. iii. c. 16.

TABELLIO, in the Roman law, an officer or scrivener, much the same with our notaries public, who are often called tabelliones.

TAB'ERNACLE, *n. s.* & *v. n.* Fr. *tabernacle;* Lat. *tabernaculum.* A temporary habitation; casual dwelling: to house; enshrine.

The word was made flesh, and *tabernacled* amongst us, and we beheld his glory. *John* i. 14.

They sudden reared
Cælestial *tabernacles,* where they slept
Fann'd with cool winds. *Milton's Paradise Lost.*

The greatest conqueror did not only compose his divine odes, but set them to musick: his works, though consecrated to the *tabernacle,* became the national entertainment, as well as the devotion of his people. *Addison.*

The Tabernacle, under the Hebrew theocracy, was a kind of building in the form of a tent, set up, by command of God, for the performance of religious worship, sacrifices, &c., during the journeying of the Israelites in the wilderness; and, after their settlement in Canaan, used for the same purpose till the building of the temple. It was divided into two parts; the one covered, and properly called the tabernacle; and the other open, called the court.—See Exodus xxv.—xxvii.

Tabernacles, Feast of, a solemn festival of the Hebrews, observed after harvest, on the fifteenth day of the month Tisri, instituted to commemorate the goodness of God, who protected the Israelites in the wilderness, and made them dwell in booths when they came out of Egypt. On the first day of the feast they began to erect booths of the boughs of trees, and in these they continued seven days. The booths were placed in the open air, and were not covered with cloths, nor made too close by the thickness of the boughs; but so loose that the sun and the stars might be seen, and the rain descend through them. For further particulars see Leviticus xxiii.

TABERNÆ, in Roman antiquity, were houses made of boards, shops, or warehouses. Such shops set up in conquered countries gave rise to towns; as, 1. T. Rhenanæ, a town of Germany, at the conflux of the Rhine and the Felbach; now called Rhine-Zabern. 2. T. Riguæ, a town of ancient Gaul, on the Moselle; now called Bern Castle. 3. T. Tres. See Tres Taberne. 4. T. Triboccorum, a town of Gaul, in the ci-devant province of Lower Alsace, now in the department of the Lower Rhine, called Saverne. See Saverne.

TABERNÆMONTANA, in botany, a genus of plants belonging to the class of pentandria, and order of monogynia; and in the natural system arranged under the thirtieth order, contortæ. There are two horizontal follioles, and the seeds are immersed in pulp. There are eight species, all foreign plants.

TAB'ID, *adj.* Fr. *tabide;* Lat. *tabidus.* Wasted by disease; consumptive.

The *tapid* disposition, or the ulcer or ulcers of the lungs, which are the foundation of this disease, is very different from a diminution of the body, and decay of strength from a mere relaxation. *Blackmore.*

In *tabid* persons milk is the best restorative, being chyle already prepared. *Arbuthnot on Aliments.*

TA'BLE, *n. s., v. n.,* & *v. a.* Ta'blebook, *n. s.* Ta'blecloth, Ta'bleman, Ta'bletalk, Tab'let, Tab'ular, *adj.* Tab'ulated. — French *table;* Latin *tabula.* Any flat or level surface, for exhibition or otherwise; a picture; synopsis; index;

a raised surface or board at which meals are partaken: hence an entertainment; persons sitting at table: the palm of the hand: to table is to board; live at the table: also to note down in a table or catalogue: 'to turn the tables' is to change the condition or fortune entirely: the compounds are of obvious meaning: tablet is a diminutive of table; also a medicine in a square form: tabular is set down in tables; laminated: tabulated, flat of surface.

Upon the castle hill there is a bagnio paved with fair *tables* of marble. *Sandys.*

He was the writer of them in the *tables* of their hearts. *Hooker.*

Give me some wine, fill full,
I drink to the general joy of the whole *table.*
Shakspeare.

What might you think,
If I had played the desk or *table-book*? *Id. Hamlet.*

I never loved myself,
Till now, infixed, I beheld myself
Drawn in the flattering *table* of her eye.
Shakspeare.

We may again
Give to our *tables* meat, sleep to our nights. *Id.*

I could have looked on him without admiration, though the catalogue of his endowments had been *tabled* by his side, and I to peruse him by items.
Id. Cymbeline.

Monsieur the nice,
When he plays at *tables*, chides the dice.
Shakspeare.

Let me praise you while I have a stomach,
—No, let it serve for *table-talk.*
Id. Merchant of Venice.

It hath been anciently in use to wear *tablets* of arsenick, or preservatives against the plague; as they draw the venom to them from the spirits. *Bacon.*

In clericals the keys are lined, and in college they use to line the *tablemen.* *Id. Natural History.*

I will end with Odo holding master doctor's mule, and Anne with her *tablecloth.* *Camden's Remains.*

All these true notes of immortality
In our heart's *table* we shall written find. *Davies.*

I have no images of ancestors
Wanting an ear or nose; no forged *tables*
Of long descents, to boast false honors from.
Ben Jonson.

Mistress of a fairer *table*
Hath not history nor fable. *Id.*

His Jalysus or Bacchus he so esteemed, that he had rather lose all his father's images than that *table.*
Peacham.

We are in the world like men playing at *tables*, the chance is not in our power, but to play it, is; and when it is fallen, we must manage it as we can.
Taylor.

Nature wipes clean the *table-book* first, and then pourtrays upon it what she pleaseth.
More against Atheism.

You will have no notion of delicacies, if you *table* with them; they are all for rank and foul feeding.
Felton.

If there is nothing else to discourage us, we may safely come to the Lord's *table*, and expect to be kindly entertained by him when we do. *Kettlewell.*

If it be thus, the *tables* would be *turned* upon me; but I should only fail in my vain attempt. *Dryden.*

Put into your *table-book* whatsoever you judge worthy. *Id.*

His fate makes *table-talk*, divulged with scorn,
And he a jest into his grave is born. *Id. Juvenal.*

I prepared to pay, in verses rude,
A most detested act of ingratitude:
Ev'n this had been your elegy which now
Is offered for your health, the *table* of my vow.
Dryden.

It was by the authority of Alexander, that through all Greece the young gentlemen learned before all other things, to design upon *tablets* of boxen wood.
Id.

They that are honest would be arrant knaves if the *tables* were *turned.* *L'Estrange.*

Children at a *table* never asked for any thing, but contentedly took what was given them.
Locke on Education.

It might seem impertinent to have added a *table* to a book of so small a volume, and which seems to be itself but a *table:* but it may prove advantageous at once to learn the whole culture of any plant.
Evelyn's Kalendar.

Nor hath the fruit in it any core or kernel; and differing from other apples, yet is a good *table* fruit.
Mortimer.

Many of the best diamonds are pointed with six angles, and some tabulated or plain, and square.
Grew's Museum.

He improves by the *table-talk*, and repeats in the kitchen what he learns in the parlour. *Guardian.*

This shuts them out from all *table* conversation and the most agreeable intercourses.
Addison's Spectator.

Among the Romans, the judge or prætor granted administration, not only according to the *tables* of the testament, but even contrary to those *tables.*
Ayliffe's Parergon.

The pillared marble, and the *tablet* brass,
Mouldering, drop the victor's praise. *Prior.*

All the nodules that consist of one uniform substance were formed from a point, as the crusted ones, nay, and most of the spotted ones, and indeed all whatever except those that are *tabular* and plated.
Woodward on Fossils.

No fair adversary would urge loose *table-talk* in controversy, and build serious inferences upon what was spoken but in jest. *Atterbury.*

There are books extant which the atheist must allow of as proper evidence; even the mighty volumes of visible nature, and the everlasting *tables* of right reason; wherein, if they do not wilfully shut their eyes, they may read their own folly written by the finger of God in a much plainer and more terrible sentence than Belshazzar's was by the hand upon the wall. *Bentley's Sermons.*

The nymph the *table* spread,
Ambrosial cates, with nectar rosy red. *Pope.*

Nature's fair *table-book*, our tender souls,
We scrawl all o'er with old and empty rules
Stale memorandums of the schools.
Swift's Miscellany.

A Table is a moveable piece of furniture, usually made of wood or stone, and supported on pillars or feet, for the reception of things placed on it.

Table, in mathematics, a system of numbers calculated to be ready at hand for expediting astronomical, geometrical, and other operations.

Tables, Laws of the Twelve, were the first set of laws of the Romans; thus called either because the Romans then wrote with a style on thin wooden tablets covered with wax; or rather because they were engraved on tables or plates of copper, to be exposed in the most noted part of the public forum. After the expulsion of the kings, as the Romans had no fixed system of

law ample enough to take in the various cases that might occur, they resolved to adopt the best laws of the Greeks. One Hermodorus was appointed to translate them, and the decemviri arranged them in ten tables. After much care they were enacted and confirmed by the senate and people, A. U. C. 303. In 304 they found something wanting, which they supplied from the laws of the kings, and from certain customs which use had authorised; all these being engraven on two other tables made the law of the twelve tables so famous in the Roman jurisprudence, the source of the civil or Roman law.

Tables of the Law, in Jewish antiquity, two tables on which was written the decalogue, or ten commandments, given by God to Moses on mount Sinai.

Table Mountain, a mountain of the Cape of Good Hope colony, which see.—Also a mountain of the United States, in Pendleton district, South Carolina, near the north-west border of the state, 3168 feet higher than the surrounding country, and about 4000 above the level of the sea. It presents on one side a tremendous precipice of solid rock, about 900 feet nearly perpendicular.

TA'BOR, *n. s.* & *v. n.*
Ta'borer, *n. s.*
Ta'boret,
Taborine',
Tabrere,
Tab'ret.
} Old Fr. *tabourin, tabour.* A small drum; a drum beaten with one stick to accompany a pipe: to strike as on a tabor or lightly: taborer and tabrere are names of the player on this instrument: taboret and taborine, small kinds of tabors.

Wherefore didst thou steal away, that I might have sent thee away with mirth and with *tabret?*
Gen. xxxi. 27.

And her maids shall lead her as with the voice of doves, *tabouring* upon their breasts. *Nah.* ii. 7.

I saw a shole of shepherds outgo,
Before them yode a lusty *tabrere,*
That to the merry hornpipe plaid,
Whereto they danced. *Spenser's Pastorals.*

Would I could see this *tabourer.* *Shakspeare.*

Trumpeters,
With brazen din blast you the city's ear,
Make mingle with our rattling *tabourines,*
That heaven and earth may strike their sounds together,
Applauding our approach.
Id. Antony and Cleopatra.

If you did but hear the pedlar at the door, you would never dance again after a *tabour* and pipe.
Id. Winter's Tale.

Some blow the bagpipe up, that plays the country round:
The *tabour* and the pipe some take delight to sound.
Drayton.

Morris dancers danced a maid marian, and a *tabour* and pipe. *Temple.*

They shall depart the manor before him with trumpets, *tabourets,* and other minstrelsy. *Spectator.*

Tabor, in ancient geography, a mountain of Galilee, near Kadesh, about twelve miles from Tiberias. It has the form of a sugar-loaf, in the midst of an extensive plain, and is thirty stadia in height.—Josephus. The ascent is so easy that one may ascend on horseback. On the top there is a plain two miles in circumference. Flavius Josephus, the historian and governor of Galilee, caused the summit of this mountain, for two miles and a half, to be surrounded with walls. The inhabitants of Tabor long braved the power of the Roman armies; but, being deprived of water, they were forced to surrender to Placidius the general of Vespasian. Several churches and monasteries were built upon this mountain by St. Helen. Tabor was also the seat of a bishop, dependent on the patriarch of Jerusalem. When Godfrey of Bouillon seized on this mountain, he repaired the ancient churches. Under Baldwin I., in 1113, the Saracens retook Tabor. It again fell into the hands of the Christians; but the Catholic standard was by Saladin pulled down the year after, and all the churches destroyed. The Christians retook it in 1253, and rebuilt them. Pope Alexander IV. granted Tabor to the Templars who fortified it again. At length, in the course of 1290, the sultan of Egypt destroyed and laid waste the buildings of this mountain which could never be repaired afterwards; so that it is now uninhabited.

Tabor, a city given by the Zebulonites to the Merarites. 1 Chron. vi. 77.

Tabor, a circle of Bohemia, bounded on the north by the circle of Czaslau, on the east by Moravia, and on the south and west by the circle of Budweis. Its extent is 1270 square miles; population nearly 160,000. Its soil is fertile, and adapted both to tillage and pasturage. Here are manufactures of woollen, cotton, and linen; and the higher grounds contain productive mines. Bohemian is the only language spoken.

Tabor, a town of Bohemia, the capital of a circle, is situated on a hill, on the river Luschnitz, eighty-eight miles west by north of Brunn, and forty-nine south by east of Prague. It is fortified, and naturally strong; but has been frequently taken It contains 3800 inhabitants. The Hussites called it Hradistic Hory Tabor, or the camp of Mount Tabor; and as it was their capital they took from it the name of Taborites.

TABORITES, or Thaborites, in ecclesiastical history, were a branch or sect of the Hussites, who, towards the beginning of the fifteenth century, dividing into several parties, one of them retired to a little mountain or rock, situate in Bohemia, fifteen leagues from Prague, and there put themselves under the conduct of Ziska. They now built a fort or castle, and a regular city, which they called Tabor or Thabor, either from the general word thabor, which in the Sclavonic language signifies castle; or from the mountain Tabor, mentioned in Scripture; and hence they became denominated Thaborites. The other party were denominated Calixtins.

The Taborites demanded the erection of a new church and hierarchy, in which Christ alone should reign, and all things should be carried on by a divine direction and impulse. In maintaining these demands, some of their leaders went so far as to flatter themselves with the chimerical notion, that Christ would descend in person upon earth, armed with fire and sword, to extirpate heresy, and purify the church. This enthusiastic class of Hussites alone, Mosheim says, we are to look upon as accountable for all those acts of violence which are too indiscriminately laid to the charge of the Hussites in gene-

ral, and to their two leaders, Ziska and Procopius, in particular. After the time of the council of Basil, in 1433, which endeavoured, though without success, to reconcile the Taborites with the Roman pontiff, they began to review their religious tenets, and their ecclesiastical discipline, with a design to render them more perfect. This review, conducted with great prudence and impartiality, gave a rational aspect to the religion of this sect, who withdrew themselves from the war with Sigismund, in which they were engaged, abandoned the doctrines, which, upon serious examination, they found to be inconsistent with the genius and spirit of the gospel, and banished from their communion all those whose disordered brains or licentious manners might expose them to reproach. The Taborites, thus new-modelled, were the same with those Bohemian brethren (or Picards, i. e. Beghards, as their adversaries call them) who joined Luther and his successors at the Reformation, and of whom there are at this day many of the descendants and followers in Poland and other countries.—Mosh. Eccl. Hist. vol. iii.

TABOUROT (Stephen), a French poet, born at Dijon in 1549. He was king's advocate in the parliament of Dijon; and was a man of genius, but addicted to trifles; and his poetry was licentious agreeably to the taste of the times. He published Les Bigarrures, Paris, 1582; and Les Touches, Paris, 1585; with some other pieces; in all of which he assumed the whimsical title of Lord of Accords. He died July 24th, 1561, aged forty-six.

TABRACA, an ancient sea-port town of Africa, near Hippo. It was made a Roman colony. The forests abounded with monkeys. Plin. v. 3.

TACAMAHAC, or Tacamahaca, in pharmacy, a solid resin, improperly called a gum in the shops. It exudes from a species of poplar, and is in repute for mitigating pains and aches, and is also reckoned a vulnerary. See Materia Medica.

TACARIGUA, a large lake of South America, in the province of Venezuela, not to be confounded with the lake of Valencia, to which the Indians give the same name. This lake is in fact a bay, except that a bar of quicksand frequently cuts off its communication with the sea. Its form is circular. It measures about seven leagues from the sea on the north-east, to its deepest recess on the south-east, and abounds in all kinds of sea fish. It is particularly remarkable for the great number of alligators which are seen in it.

TACCA, in botany, a genus of plants belonging to the class of dodecandria and order of trigynia. The flower is above. The corolla has six petals, and is vaulted. The calyx is hexaphyllous; the fruit a dry, angular, three-celled berry. There is only one species; viz. T. pinnatifida.

TACFARINAS, a Numidian, who, after serving some time in the Roman legions, became a general in his own country, and commanded an army against its conquerors in the reign of Tiberius. Tac. Ann. ii.

TACHA. See Tachau.

TACHAMPSO, an island in the Nile, near Thebais. The Egyptians held one-half of it, and the Æthiopians the other. Herodot. ii.

TACHE', *n. s.* From tack. Any thing taken hold of; a catch; a loop; a button.

Make fifty *taches* of gold, and couple the curtains together with the *taches*. *Exod.* xxvi. 6.

TA'CIT, *adj.* } Fr. *tacite;* Lat. *tacitus.* Silent; implied;
TA'CITLY, *adv.* } not expressed by words:
TACITURN'ITY, *n. s.* } the adverb corresponding: taciturnity, habitual silence.

The secretest of natures
Have not more gift in *taciturnity*. *Shakspeare.*

As there are formal and written leagues respective to certain enemies, so is there a natural and *tacit* confederation amongst all men against the common enemy of human society, pirates. *Bacon's Holy War.*

Some women have some *taciturnity*,
Some nunneries some grains of chastity.
Donne.

In elective governments there is a *tacit* covenant, that the king of their own making shall make his makers princes. *L'Estrange.*

Captiousness not only produces misbecoming expressions and carriage, but is a *tacit* reproach of some incivility. *Locke.*

While they are exposing another's weaknesses, they are *tacitly* aiming at their own commendations. *Addison.*

Indulgence to the vices of men can never be *tacitly* implied, since they are plainly forbidden in scripture. *Rogers's Sermons.*

Too great loquacity, and too great *taciturnity* by fits. *Arbuthnot.*

TACITA, in the Roman mythology, the goddess of Silence. King Numa Pompilius paid particular veneration to her.

TACITUS (Caius Cornelius), a celebrated Roman historian, and one of the greatest men of his time, born about A. U. C. 809. He applied himself early to the bar, in which he gained high reputation. Having married the daughter of Agricola, the road to public honors was open to him under Vespasian and Titus; but during the sanguinary tyranny of Domitian, he and his friend Pliny retired from public affairs. The reign of Nerva restored these luminaries of literature to Rome, and Tacitus was engaged, in 850, to pronounce the funeral oration of the venerable Virginius Rufus, the colleague of the emperor in the consulship, and afterwards succeeded him as consul A. D. 97. It is supposed that he died in the end of the reign of Trajan. His works which remain are, 1. Five books of his History. 2. His Annals. 3. A Treatise on the Different Nations who then Inhabited Germany. 4. The Life of Agricola. 5. A Treatise on Eloquence. No ancient author has obtained a more splendid reputation than Tacitus. Kings, princes, and authors of all ranks have read and admired him, though a spirit of liberty runs through his whole works. Never were description and sentiment so beautifully blended, nor the actions and characters of men delineated with such precision; in short he has all the merits of other authors without their defects. There have been five translations of his works into English.

Tacitus (M. Claudius), an excellent emperor of Rome, who succeeded Aurelian A. D. 275. See Rome.

TACK, *v. a.* Breton *tacher*. See ATTACH. To fasten to any thing; join; unite: to hold tack is to last; hold out.

Martilmas beefe doth bear good *tacke*,
When countrey folke do dainties lacke. *Tusser.*

There's but a shirt and a half in all my company; and the half shirt is two napkins *tacked* together, and thrown over the shoulders like a herald's coat without sleeves. *Shakspeare.*

Of what supreme almighty power
Is thy great arm, which spans the east and west,
And *tacks* the centre to the sphere! *Herbert.*

If this twig be made of wood
That will hold *tack*, I'll make the fur
Fly 'bout the ears of that old cur. *Hudibras.*

True freedom you have well defined:
But living as you list, and to your mind,
And loosely *tacked*, all must be left behind.
Dryden.

I *tacked* two plays together for the pleasure of variety. *Id.*

At each *tack* our little fleet grows less,
And, like maimed fowl, swim lagging on the main.
Id.

Frame so as to be covered with the hair-cloth, or a blanket *tacked* about the edges. *Mortimer.*

The symmetry of clothes fancy appropriates to the wearer, *tacking* them to the body as if they belonged to it. *Grew.*

They serve every turn that shall be demanded, in hopes of getting some commendam *tacked* to their sees, to the great discouragement of the inferior clergy. *Swift.*

TACK, *v. n.* Probably from tackle. To turn a ship.

This verseriam they construe to be the compass, which is better interpreted the rope that turns the ship; as we say, makes it *tock* about. *Browne's Vulgar Errours.*

Seeing Holland fall into closer measures with us and Sweden, upon the triple alliance, they have *tacked* some points nearer France. *Temple.*

On either side they nimbly *tack*,
Both strive to intercept and guide the wind.
Dryden.

They give me signs
To *tack* about, and steer another way. *Addison.*

TACK, in ship-building, a rope used to confine the foremost lower corners of the courses and stay-sails in a fixed position when the wind crosses the ship's course obliquely; also the rope employed to pull out the lower corner of a studding-sail or driver to the extremity of its boom. The mainsail and foresail of a ship are furnished with a tack on each side, which is formed of a thick rope tapering to the end, and having a knot wrought upon the largest end by which it is firmly retained in the clue of the sail. One tack is thus always fastened to the windward, at the same time that the sheet extends the sail to the leeward.

TACK is also applied by analogy to that part of any sail to which the tack is usually fastened. A ship is said to be on the starboard or larboard tack when she is close hauled, with the wind upon the starboard or larboard side; and in this sense the distance which she sails in that position is considered as the length of the tack; although this is more frequently called BOARD. See that article.

To TACK is to change the course from one board to another, or turn the ship about from the starboard to the larboard tack, in a contrary wind. Thus a ship being close hauled on the larboard tack, and turning her prow suddenly to windward, receives the impression of the wind on her head-sails, by which she falls off upon the line of the starboard tack. Tacking is also used, in a more enlarged sense, to imply that manœuvre in navigation by which a ship makes an oblique progression to the windward in a zigzag direction. This, however, is more usually called beating or turning to windward. See NAVAL TACTICS, NAVIGATION, and SAILING.

TAC'KLE, *n. s.* } TAC'KLED, *adj.* } TACK'LING, *n. s.* } Welsh *tacel*; Belg. *tackel*, a rope; Isl. *tang*. An arrow: all the instruments of sailing in a ship: tackled is, made of ropes; tacked together: tackling, a synonyme of tackle.

The *takil* smote, and in it went. *Chaucer.*

After at sea a tall ship did appear,
Made all of heben and white ivory,
The sails of gold, of silk the *tackle* were,
Mild was the wind, calm seemed the sea to be.
Spenser.

My man shall
Bring thee cords, made like a *tackled* stair,
Which to the high top-gallant of my joy
Must be my convoy in the secret night. *Shakspeare.*

Tackling, as sails and cordage, must be foreseen and laid up in store. *Bacon's Advice to Villiers.*

They wondered at their ships and their *tacklings*. *Abbot.*

As for *tackle*, the Bœotians invented the oar; Dædalus, and his son Icarus, the masts and sails. *Heylin.*

A stately ship
With all her bravery on, and *tackle* trim,
Sails filled, and streamers waving,
Courted by all the winds that hold them play.
Milton.

She to her *tackle* fell,
And on the night let fall a peal
Of blows so fierce, and pressed so home,
That he retired. *Hudibras.*

I will furnish him with a rod, if you will furnish him with the rest of the *tackling*, and make him a fisher. *Walton.*

Ere yet the tempest roars,
Stand to your *tacle*, mates, and stretch your oars.
Dryden.

Being at work without catching any thing, he resolved to take up his *tackle* and be gone. *L'Estrange.*

Red sheets of lightning o'er the seas are spread;
Our *tacking* yield, and wrecks at last succeed.
Garth.

If he drew the figure of a ship there was not a rope among the *tackle* that escaped him. *Addison's Spectator.*

TACQUET (Andrew), a Jesuit of Antwerp, who flourished in the seventeenth century. He was a most laborious writer in mathematics; and published a Treatise on Astronomy, an edition of Euclid, and many other tracts. His works were collected and printed at Antwerp in one large volume, folio, 1669. He died in 1660.

TACTICS, *n. s.* Gr. τακτικη. The art of ranging men in the field of battle.

When Tully had read the *tacticks*, he was thinking on the bar, which was his field of battle. *Dryden.*

TACTICS, MILITARY AND NAVAL, in their general acceptation, relate to those evolutions, manœuvres, and positions, which constitute the

main spring of military and naval finesse: they are the means whereby discipline is made to support the operations of a campaign, and are, in every regular service, studied for the purpose of training all the component parts according to one regular plan or system; whereby celerity, precision, and strength, are combined, and the whole rendered completely efficient.

The Greeks were skilful in this part of the *military* art; having public professors of it, called tactici, who taught and instructed their youth. We have an account of the progress of this art among them in Thucydides, Xenophon, and Polybius. Ælian also hath a particular book on this subject; and there is a great deal of it in Arrian, in his History of Alex. M. and in Mauritius, and Leo Imperator. But the Romans may be considered the first nation whose military array could be termed regular, and whose forces maintained that order which rendered each inferior individual subject to the control of certain subaltern officers commanding small bodies, corresponding with our sections; which being again compacted, under officers of a second class, formed small divisions, as in our platoons, or companies; and which divisions, being collected under a third class of officers, constituted what we term battalions. The soldiers of ancient Italy were not only inured to great hardships, as a part of their usual exercise, but were taught many evolutions suited to the modes of warfare in those days. Time has occasioned a considerable change in that particular; for, since the invention of gunpowder, our battles have frequently been decided by distant cannonades: and by no means resemble those arduous conflicts in which the heroes of old used to engage, individually contending for the day, and causing the whole field to resemble an infinity of single combats. In this practice all barbarous nations seem uniformly to agree: the sword, the tomahawk, the club, &c., being the chief instruments; though in some instances the javelin, or spear, or the bow and arrow, may be primarily resorted to. Hence such warfare is far more sanguinary than that carried on with fire arms; which rarely do much execution, unless when aided by artillery, and then only when at such distances as to be within reach of case shot. It will no doubt surprise most of our readers, but it is strictly true, that, taking the average quantity of musket ammunition expended, as a sum to be divided by the number of killed and wounded, not more than one shot in fifty will be found to take effect. Thus, after a battalion of 1000 men may have fired twenty rounds per man, making in all 20,000 discharges of musketry, they will have made terrible havoc if 400 of the enemy be disabled. Hence we find that the great features in decisive actions are few indeed; and they depend chiefly on tactics. Thus where a large force is brought to bear upon any particular point, while the enemy is kept in ignorance as to the object in view; or where certain advantages of locality are gained, merely by dint of superior science in the art of conducting troops by the shortest means, and in the greatest order; or where by certain evolutions a small force is made to supply the purpose of a larger, or to resist, independently of entrenchments, &c., a more numerous body: all these evince the presence of the man of tactics, and qualify him for the designation of an able general.

We have also another branch, which is in a degree secondary, because it depends greatly on the success of the former; namely, the arrangement, or disposition, of a line, in such manner as may allow each description of force to act with effect; this can be done only when the nature of the service to be performed is suited to the nature of the troops by which it is to be attempted. In this we necessarily mean to restrict the operations of infantry to storming parties, cavalry to champaign operations, and artillery to situations where it can be duly protected, while rendering essential service. Hence the able tactician always arranges his force in such manner as to allow each to perform its duty without interfering with the evolutions of any other class; and, in what is called manœuvring his army, never fails to estimate the distances, and the time in which each may execute the assigned duty; so that the whole may coincide with one great intention, and insure success by the accurate execution of its respective functions; were it to be otherwise, the whole must be subject to disorder; one failure often leading to the most serious consequence; the same as is caused by the want of a cog, or tooth, of any wheel in a piece of machinery. From this it may be seen how great a superiority that commander must possess who, by means of this science, fully comprehends the most ready arrangement of troops, where change of position becomes necessary; and who has, in the first instance, so disposed them as to be able to make those changes (even under the disadvantages ever attendant upon such necessity) with celerity, and in good order.

Tactics, Naval, relate to those operations, in the management of a vessel, which enable her to attain any particular object, such as reaching a port, avoiding danger, gaining an advantage over an enemy, &c. In a more extended sense, they denote those manœuvres, stratagems, and deceptions, employed by the commander of a fleet, for the purpose of gaining a weather-gage, cutting off any part of a line, or attacking any particular portion thereof, in such manner as may either defeat the views of a hostile fleet, or subject it to loss and discomfiture. The old system of tactics in this, as well as in the military branch, was burdened with ceremonies, and with received opinions, which were held to be inviolable: the difference of one or two ships in favor of the enemy, was considered a sufficient excuse for a variety of precautions generally amounting to forbearance from engaging the superior power; and, although we certainly can count a number of gallant exploits performed by our fleets when somewhat inferior to the enemy, it has been reserved for latter times to exhibit what could be done by the British navy, even when opposed to nearly double their own force. This wonderful change was introduced by Rodney; who, in the year 1782, engaged the French fleet under count de Grasse; when, by boldly cutting off a part of its rear, he compelled nearly half the enemy's

force to surrender; the rest sought their safety in flight. Since that date admiral Jervis, by a skilful manœuvre, cut off a large portion of a Spanish fleet, near Cape St. Vincent's (whence the peerage bestowed on him received its designation); but the late lord Nelson appears most conspicuous in that mode of attack which, in general, secured a victory. The battle of the Nile was doubtless a master-piece of tactical science; it merits notice from its simplicity, and, if we may be so bold as to use the term, its infallibility. The manœuvre he used was, to throw two of his ships upon every one of the weathermost of the enemy's line, by causing his fleet to divide as it approached them; consequently including each French ship between two of ours. The residue, which were moored in a line a-head, fully expected to see ours range up their whole length, and oppose ship to ship. They saw their error when it was too late; being to leeward, it was impossible for them to render efficient aid, and they fell in detail; with the exception of a very small portion, which escaped by putting out to sea, whither we were not in a condition to follow with any hopes of overtaking them.

In the battle of Trafalgar, in which the immortal Nelson quitted his earthly frame, the combined fleets were drawn up in the form of a crescent, and awaited our attack, which was made in a double column, apparently bearing down upon their centre. This novel mode of coming into action kept the enemy completely in suspense; it threatened every part of their line. If our two columns had turned the same way, they would have been able to do infinite damage in that quarter, before the other wing of the enemy could come up to succor their overpowered friends: if the two columns should cut through the centre, they must destroy it, and effectually separate the two wings, so as to leave them ignorant of each others fate. Such was the fact: the enemy, though superior in numbers, lost no less than nineteen sail of the line.

Perhaps nothing can place a fleet in a more dangerous state, and render it less able to resist an attack, than making sail before the wind, in a line of battle a-head, to avoid a pursuing enemy. In such a case, whenever the rear of that line can be brought to action, it becomes subject to an accumulating force, in consequence of the pursuing fleet thickening upon it; while the van of its own line, being to leeward, must make many tacks, or at least two long ones, before it can succor its rear. The disadvantage must be very great even if all the ships, on both sides, sail upon an exact equality; but, as that is never the case, many of the flying ships will be probably driven completely to leeward, and never be able to afford the smallest assistance. Yet British seamen, even when compelled to retire before a very superior force, generally manage, by some well-contrived device, to intimidate their pursuers, or to put on so good a face as to convince them of the dear price at which the victory is to be bought. Of this we cannot quote a more appropriate instance than the escape of five sail of our ships, under the command of admiral Cornwallis, from no less than nineteen sail of French ships of the line: an escape resulting entirely from the manœuvres of the British admiral; whereby he fully convinced the French that a large force was at hand. The present unparalleled state of discipline, throughout our navy, would, of itself, give us the command of the ocean; but we are greatly indebted, at the same time, to an excellent code of signals, both for the day and the night, whereby every operation and manœuvre may be directed with readiness and perspicuity.

When orders are given to clear ship for action, the boatswain and his mates whistle, and call at the various hatchways, to warn all who are between decks; the hammocks, or beds, are instantly unhooked, packed, and sent on deck, to be put into the nettings on the waist, forecastle, quarters, poop, &c., where they serve as an excellent defence against musketry. While some of the seamen are thus employed between decks, others are aloft securing the yards in chain slings, so as to prevent them from falling when the haul-yards may be severed by cannon shot; materials for repairing the rigging are also placed in readiness; shot plugs, for stopping holes, near or under the surface of the water, are dispensed; and every attention is paid to ascertain that the pumps are in order, so as to clear the hold in case of leaks. The decks are cleared of every incumbrance, by the removal of chests, &c., into the hold; the various gun tackles are inspected; and all the necessary implements, such as powder ladles, worms, rammers, sponges, &c., are duly supplied. All being ready, the surgeon and his mate, together with the chest of medicines, instruments, bandages, &c., are prepared in the cock pit; that is, down the hatchway, below the ordinary reach of the enemy's shot. The officers and men repair to their posts, the powder room is opened, the hatches are all laid, the marines drawn up on the forecastle, quarter-deck, and poop, the guns are run out and levelled, and the courses (that is, the lower sails) are clued up, to prevent their being set on fire by the discharges from the cannon; also to render the ship more manageable.

The greatest attention is always paid to taking a good aim before a gun is fired; that every shot may hit some part of the enemy's hull; the nearer to the water's edge the better. The captain, master, purser, &c., remain on deck to fight the ship, and to note down all occurrences, while the signal master attends to and answers whatever signals may be thrown out of the commander of the fleet, or division. It is ever a primary object to place the ship in such a position as may annoy the enemy most; yet, at the same moment, evade his principal defences: this is best done by laying diagonally upon her quarter, or bow, and especially across her stern, so as to rake her fore and aft; whereby her guns will soon be dismounted, and the men driven from their quarters. This description of the manner in which the battle is carried on by each ship will serve as an illustration of the whole; but it may be necessary to add that the disposition of a fleet must be suited to the position the adversary may have assumed. When an enemy opposes a direct line, opposite to that of

his own fleet, the admiral rarely does more than make the signal for line of battle abreast, perhaps a cable's length asunder, thus coming at once to close engagement, ship opposed to ship, or rather the two fleets intermixed alternately, their heads laying different ways: if they should pass each other, it is usual to put about, and resume the engagement in the same manner. When the enemy bear down in a line a-head, it is customary to receive them in the same manner, to prevent their cutting off a part of the line; this depends greatly on the direction of the wind; but, if it be on the beam, that is full on the side, or in any direction affording the means of aiding your van, without delay, by a press of sail, such a mode of attack will subject the enemy to have his own line cut, as was done by Rodney; or doubled upon, as in the battle of the Nile.

During an engagement, as the courses are commonly hauled up, the top-gallant sails and stay-sails are also furled. The movement of each ship is chiefly regulated by the main and fore-top sails, and the jib, reserving the mizen to fill, or to be thrown a-back, as an aid, either to accelerate the ship, or as a check to prevent her passing the enemy. The frigates, tenders, and other small vessels generally lay to, or hover about in the rear, to repeat signals, or to aid crippled ships. These, not being considered as ships of the line, are not attacked, except by vessels of their own class; therefore, when a fleet is not well manned, it is common to take all the spare hands from such to assist on board the fighting ships. When a fleet is superior in numbers, it is proper to keep some of them in reserve, stationing them behind the weaker parts of the line to succor such as may, by the loss of masts, &c., become unmanageable, and to take advantage of any opportunity to chase, and lay aboard of whatever of the enemy's ships may quit the line for the purpose of escaping. In order to observe what is going on, the admiral generally removes to some frigate, on board which he hoists his flag; near him should be some of the best sailing cutters, brigs, &c., to convey orders which could not be accurately delivered by signal, or by telegraph.

Boarding is most commonly resorted to by privateers, in their attacks upon merchant vessels; but among ships of the line is rarely practised. Our commanders are perhaps more forward than those of any other nation, except the Turks, in this kind of enterprise, which is replete with hazard. The best mode of boarding, especially if there be any swell, is to keep on the enemy's weather quarter; now and then, if the sailing of your ship will allow yawing, so as to throw your fire into her stern: when, by this means, you have done any execution, it will be proper to pass close under the enemy's stern, raking her fore and aft with your guns double shotted, and then lay her aboard upon her lee beam, having your tops well manned to fire upon the enemy's decks, on which also grenades, stink pots, fire balls, &c., should be discharged. Having grappled the ship to your adversary's chains, your boarders jump into her, under the cover of the fire of your small arms. In case of repulse, the attack to leeward is most favorable to the retreat of your men; besides, it is far easier to cast off from the enemy, than it would be if you were to windward of her.

The writers on naval tactics have been but few, indeed, considering the importance of the subject; and the only countries that have produced writers on this subject, so far as we know, are France and Britain, particularly the former. One would be led to imagine that Britain, from its insular situation, having bred so great a number of excellent seamen, and having so often been engaged in naval contests, would naturally have produced a number of writers on this, as well as on subjects of much less consequence to it as a nation. The reader will, however, no doubt be surprised to hear, that till lately we had only the treatise on naval tactics, entitled An Essay on Naval Tactics, &c., by John Clerk, esq., of Elden, near Edinburgh; most of the other treatises published in Britain on this subject being either translations from the French, or remarks upon the French authors. Some of the principal French treatises on naval tactics are the following: 1. L'Art des Armées Navales, ou Traité des Evolutions Navales, par Paul L'Hoste, 1 vol. folio, printed at Lyons, 1727. This book was translated and published by Christopher O'Bryen, esq., in 4to., in 1762. 2. Tactique Navale, ou Traité des Evolutions et des Signaux, par M. le Viscompte de Morogues, 4to., Paris, 1763. 3. Le Manœuvrier, par M. Bourdé de Villehuet. 4. L'Art de Guerre en Mer, ou Tactique Navale, &c., par M. le Viscompte de Grenier. Translations of the two last have appeared in English in 4to., in 1788, under the name of the Chevalier de Sauseuil; and a translation of parts of the three last is in the second volume of the Elements and Practice of Rigging and Seamanship, published at London in 1794. Other books on evolutions and tactics are Théorie de la Manœuvre des Vaisseaux, Paris, 1689. Pilot's Theory of working Ships applied to Practice, &c., translated by Stone, 1743. De la Manœuvre des Vaisseaux, ou Traité de Mechanique et de Dynamique, &c., par M. Bouguer. The British Mars, &c., by William Flexney, 1763. A Sea Manual, by Sir Alexander Schomberg, 1789. A View of the Naval Force of Great Britain, &c., by an Officer of Rank, 1791; and the ingenious treatise on Naval Tactics by captain Hamstead.

TAC'TILE, *adj.* Fr. *tactile;* Lat. *tactilis, tactum.* Susceptible of touch.

> At this proud yielding word
> She on the scene her *tactile* sweets presented.
> *Beaumont's Psyche.*

We have iron, sounds, light, figuration, *tactile* qualities; some of a more active, some of a more passive nature. *Hale.*

TACUNGA, a province of Quito, bounded east by the valley of Vicioso, north by the province of Quito, north-west by that of Esmeraldas and also Guayaquil, south-west by that of Chimbo, and south by that of Ambato. It is twenty-one leagues long from east to west, and fourteen wide from north to south; and of a cold temperature, but abounds in pasturage. It produces also wheat, barley, and rye, and wools of many

kinds. It likewise abounds throughout with nitre. Tacunga, the capital, is situated in an extensive plain to the south of Quito, near the Cordillera of the Andes.

TADCASTER, a market-town of Barkstone-Ash wapentake, west-riding of York, situate on the river Wharfe, over which is a good stone bridge, nine miles S.S.W. of York, and 187 north by west from London. The town is neat, well-built, and pleasant. Besides the church, here is a free grammar-school, a hospital, and some charity-schools. It was anciently a Roman station, called Calcaria. The neighbourhood produces much limestone. Market on Thursday. Fairs, the last Wednesday in April, May, September, and October. It is a vicarage.

TADMOR. See Palmyra.

TAD'POLE, *n. s.* Sax. tad, toad, and pola, a young one. A young shapeless frog or toad.

I'll broach the *tadpole* on my rapier's point.
Shakspeare.

Poor Tom eats the toad and the *tadpole*. *Id.*

A black and round substance began to dilate, and after a while the head, the eyes, the tail, to be discernible, and at last become what the ancients called gyrinus, we a porwigle or *tadpole*.
Browne's Vulgar Errours.

The result is not a perfect frog, but a *tadpole*, without any feet, and having a long tail to swim with. *Ray.*

TÆNARIA, festivals held in honor of Neptune at Tænarus.

TÆNARUS, a promontory of Laconia, the most southern point of the Morea, where Neptune had a temple. It is now called Matapan. It had a large and deep cavern, whence issued a black unwholesome vapor (probably fixed air, or carbonic acid gas), whence the poets feigned that it was one of the entrances to hell, through which Hercules dragged the triple-headed infernal dog Cerberus up to the earth. Pausanias says that this cavern was the resort of a large serpent whose bite was mortal, and which Hercules killed and carried to Eurystheus; and that this gave rise to the story of his chaining the dog of hell.

Tænarus, a town of Laconia, forty stadia from the cape, famous for beautiful green marble.

Tænarus, a son of Neptune who gave name to the cape, town, and festivals.

TÆNIA, in architecture, a member of the Doric capital resembling a square fillet, serving instead of a cymatium, being made fast to a capital below the triglyphs, whereof it seems the base.

Tænia, in entomology, the tape-worm, a genus of animals belonging to the class of vermes and order intestina. The body is long, depressed, and jointed like a chain, and contains a mouth and viscera in each joint. According to Gmelin there are ninety-two species; all which inhabit the intestines of various animals, particularly of quadrupeds. The tænia appears destined to feed on such juices of animals as are already animalised, and is therefore most commonly found in the alimentary canal, and in the upper part, where there is the greatest abundance of chyle; for chyle seems to be the natural food of the tænia. As it is thus supported by food which is already digested, it is destitute of the complicated organs of digestion. Seven species are peculiar to man. See Entomology.

TÆNIAS, a part of lake Mœotis. Strabo.

TAENSA, a town and settlement of West Florida, on the east channel of the Mobile, on the side of an ancient Indian town. The wax tree abounds near it See Myrica.

TAF, or Taaffe, a river of Wales, which rises among the hills in Brecknockshire, from two sources, forming two streams, the Greater and Lesser Taf, which unite their waters below the village of Coed-y Cymmer, on their entrance into Glamorganshire; and thence proceed by Merthyr Tydvil. About twelve miles below this town it receives the Bangoid Taf, a mountain stream which flows into it from the eastward. Lower down it is joined by the Cynon from the west, and a few miles lower by the two Rhonddas. It then proceeds nearly southwards by Llandaff, and afterwards by Cardiff, towards the southern sea, which it enters in the small bay of Pinarth. In dry weather the Taf contains little water; but is a handsome stream when swollen by the land floods, and navigable for small craft as far as Cardiff. Over this river the noted bridge of Pont-y-Prydd is built.

TAF'FETA, *n. s.* Fr. and Span. *taffetas*. A thin silk; flimsy talk.

All hail, the richest beauties on the earth!
—Beauties no richer than rich *taffata*. *Shakspeare.*

Never will I trust to speeches penned;
Taffata phrases, silken terms precise,
Three piled hyperboles. *Id. Love's Labour Lost.*

Some think that a considerable diversity of colours argues an equal diversity of nature; but I am not of their mind, for not to mention the changeable *taffety*, whose colours the philosophers call not real, but apparent. *Boyle on Colours.*

Taffeta, or Taffety, in commerce, a fine smooth silken stuff, remarkably glossy. There are taffeties of all colors, some plain and others striped with gold, silver, &c., others checquered, others flowered, &c., according to the fancy of the workmen.

TAFFI (Andrew), an eminent Italian artist, born at Florence in 1213. Having learned the art of designing in Mosaic from some Greek artists employed in decorating the church of St. Mark in Venice, the chief of whom was Apollonius, he introduced it into Italy. His chief work is a Mosaic piece of our Saviour dead in a chapel at Florence. He died in 1294.

TAFILELT, a large district to the south-east of the Atlas chain, and tributary to the empire of Morocco. It consists of a vast single plain, presenting an unvaried surface, traversed by two rivers running in opposite directions, one of which loses itself in the desert of Angad, the other in the sands of the Sahara. Brackish water is every where found at the depth of twelve feet. The inhabitants live in a patriarchal manner, and are said to be remarkably honest. Dates are the chief produce and wealth. A great number of Shereefs, who boast of themselves as the descendants of Mahomet, live here. Sigilmessa was once the chief place, but the town called Tafilelt has now supplanted it. The province is stated by Jackson to contain 650,000 inhabitants.

TAG, *n. s.* & *v. a.* Isl. *tag*, the point of a lace; Goth. and Swed. *tagg*. A point put to the end of a string; any thing paltry and mean: to fit any thing with a tag; to join (probably for tack).

If *tag* and rag be admitted, learned and unlearned, it is the fault of some, not of the law. *Whitgift.*

Will you hence
Before the *tag* return, whose rage doth rend
Like interrupted waters? *Shakspeare. Coriolanus.*

The *tag*-rag people did not clap him and hiss him. *Shakspeare.*

They feed on *tag* worms and lugges. *Carew.*

There are other worms; as the marsh and *tagtail.* *Walton.*

His courteous host
Tags every sentence with some fawning word,
Such as my king, my prince, at least my lord. *Dryden.*

'Tis *tagged* with rhyme, like Berecynthian Atys,
The mid-part chimes with art, which never flat is. *Id.*

He invited *tag*, rag, and bob-tail, to the wedding. *L'Estrange.*

Compelled by you to *tag* in rhimes
The common slanders of the times. *Swift.*

Resistance, and the succession of the house of Hanover, the whig writers perpetually *tag* together. *Id. Miscellanies.*

TAGANROG, a town of the south-east of European Russia, in the government of Ekaterinoslav, near the north-west extremity of the sea of Azoph, fortified by Peter the Great. It stands on the cliff of a lofty promontory, containing 6000 inhabitants; and, being the staple of all the mercantile intercourse between the interior of Russia and foreign countries, through the medium of the Don, its traffic is extensive.

TAGARA, a city of ancient India, the metropolis of a large district called Ariaca, which comprehended the greatest part of the Subah of Aurengabad and the south part of Concan. Arrian says that it was situated about ten days' journey to the east of Pultanah; which, according to the rate of travelling in that country with loaded carts, might be about 100 British miles. This fixes its situation at Deoghir, a place of great antiquity, and famous through all India on account of the pagodas of Elousa. It is now called Dowlat-abad.

TAGES, in the mythology, a son of Genius and grandson of Jupiter, who first taught the Etrurians augury. He was found by a Tuscan ploughman in the form of a clod, and immediately assumed a human shape to teach them augury.—Cicero. Had this divine clod taught them agriculture, instead of augury it would have been a better allegory.

TAGETES, marigold, in botany, a genus of plants belonging to the class of syngenesia and order of polygamia superflua; and in the natural system ranging under the forty-ninth order, compositæ. The receptacle is naked; the pappus consists of five erect awns or beards; the calyx is monophyllous, quinquedentate, and tubular; and there are four persistent florets of the ray. There are three species; viz. 1. T. erecta, the African marigold, is a native of Mexico, but has been cultivated in British gardens since 1596. It has a stem subdivided and spreading. There are many varieties:—1. Pale yellow, or brimstone color, with single, double, and fistulous flowers. 2. Deep yellow, with single, double, and fistulous flowers. 3. Orange-colored, with single, double, and fistulous flowers. 4. Middling African, with orange-colored flowers. 5. Sweet-scented African. These are all very subject to vary; so that unless the seeds are very carefully saved from the finest flowers they are apt to degenerate: nor should the same seeds be too long sown in the same garden. Those who wish to have these flowers in perfection should exchange their seeds with some person of integrity at a distance, where the soil is of a different nature, at least every other year. If this is done the varieties may be continued in perfection. They flower from the beginning of July till the frost sets in.

2. T. minuta, the small marigold.

3. T. patula, the French marigold, has a simple erect stem, and the peduncles are scaly and multiflorous. It has been cultivated in the British gardens since 1596. There are several varieties; some have larger flowers than others, and their color varies greatly; some are beautifully variegated and others quite plain; but all these are accidents arising from culture, for seeds saved from the most beautiful flowers will degenerate, if they are sown in the same garden for several years together without changing the seeds. These plants have a strong disagreeable scent, especially when handled; for which reason they are not planted near habitations; the flowers of the sweet-scented sort being preferred, especially for small gardens.

TAGUS, Tajo, or Tejo, a large river of Spain, issues from a spring in the mountains of Albaracin, between Arragon and Old Castile, at the distance of little more than 100 miles from the Mediterranean. Pursuing a westward course to the Atlantic, it passes the palace of Aranjuez, the cities of Toledo, Talavera, Alcantara, Abrantes, and Lisbon, and flows into the sea seven miles below the capital of Portugal. Long before reaching Lisbon it receives the tide, and its volume of water is large throughout; but in so mountainous a country as Spain river navigation is very limited: that of this river is not at present carried farther than Abrantes in Portugal. Several places on or near its banks, such as Santarem, Almaraz, and Talavera, were the scenes of military operations in the last war.

TAHPANHES, or Tehaphnehes, or Hanes, an ancient city of Egypt, supposed to be the same with Daphnæ, about sixteen miles south of Pelusium, on the east bank of the Nile. To this city the remnant of the Jews left by Nebuchadnezzar retired, after the murder of Gedaliah. It was afterwards taken by Nebuchadnezzar.—Jer. xliii. 1—11. Ezek. xxx. 18.

TAIL, *n. s.* & *v. n.* } Sax. tæȝl; Goth. *tagl.*
Tail'ed, *adj.* } That which terminates certain animals behind; the continuation of the vertebræ of the back hanging behind; the lower, hinder, or pendant part of a thing: 'to turn tail' is to fly: to tail, to pull by the tail, a foolish word of Butler's: tailed is furnished with a tail.

The Lord shall make thee the head, and not the *tail*; and thou shalt be above, and not beneath. *Deut.* xxviii. 13.

Would she *turn tail* to the heron, and fly quite

out another way; but all was to return in a higher pitch. *Sidney.*

Oft have I seen a hot o'er-weening cur
Run back and bite, because he was withheld,
Who having suffered with the bear's fell paw,
Hath clapt his *tail* betwixt his legs, and cried.
Shakspeare.

Duretus writes a great praise of the distilled water of those *tails* that hang upon willow trees.
Harvey on Consumptions.

With the helm they turn and steer the *tail*.
Hudibras.

The conquering foe they soon assailed,
First Trulla staved, and Cerdon *tailed*. *Id.*

This sees the cub, and does himself oppose,
And men and boats his active *tail* confounds.
Waller.

The lion will not kick, but will strike such a stroke with his *tail* that will break the back of his encounterer. *More.*

Rouzed by the lash of his own stubborn *tail*,
Our lion now will foreign foes assail. *Dryden.*

Snouted and *tailed* like a boar, footed like a goat.
Grew.

The *tail* fin is half a foot high, but underneath level with the *tail*. *Id.*

TAIL, in anatomy, is the train of a beast, bird, or fish; which in land animals serves to drive away flies, &c., and in birds and fishes to direct their course, and assist them in ascending or descending in the air or water.

TAIL, or FEE-TAIL, in law, is a conditional estate or fee, opposed to fee simple. See FEE. A conditional fee, at the common law, was a fee restrained to some particular heirs exclusive of others; as to the heirs of a man's body, by which only his lineal descendants were admitted, in exclusion of collateral heirs; or to the heirs male of his body, in exclusion both of collaterals and lineal females also. It was called a conditional fee, by reason of the condition expressed or implied in the donation of it, that, if the donee died without such particular heirs, the land should revert to the donor. For this was a condition annexed by law to all grants whatsoever, that, on failure of the heir specified in the grant, the grant should be at an end, and the land return to its ancient proprietor. They therefore called it a fee simple on condition that he had issue. So that, as soon as the grantee had any issue born, his estate was supposed to become absolute by the performance of the condition; for these three purposes:—1. To enable the tenant to alienate the land, and thereby to bar the donor of his interest in the reversion. 2. To subject him to forfeit it for treason. 3. To empower him to charge the land with rents, commons, and other encumbrances, so as to bind his issue. But, if the tenant did not alienate the land, the course of descent was not altered; for if the issue had afterwards died, and then the tenant or original grantee had died, without making any alienation, the land, by the terms of the donation, could descend to none but the heirs of his body, and therefore must have reverted to the donor. To subject the lands therefore to the ordinary course of descent, the donees of these conditional fee simples took care to alienate as soon as they had issue; and afterwards repurchased the lands, which gave them a fee simple absolute, that would descend to the heirs general, according to the common law. And thus stood the old law with regard to conditional fees: which things, says Sir Edward Coke, are necessary to be known for the sake of annuities, and such like inheritances as are not within the statutes of entail, and therefore remain as the common law. On the other hand the nobility, who wished to perpetuate their possessions in their own families, procured the statute of Westminster the second, de donis conditionalibus, to be made; which paid a greater regard to the intentions of a donor than to the propriety of such intentions. This restraint revived the ancient feudal restraints originally laid on alienations, by enacting that from thenceforth the will of the donor be observed; and that the tenements so given (to a man and his heirs) should at all events go to the issue, or, if none, should revert to the donor. Upon this act the judges determined that the donee had no longer a conditional fee-simple, but they divided the estate into two parts, leaving in the donee a new kind of particular estate, which they denominated a fee tail; and vesting in the donor the ultimate fee simple of the land, expectant on the failure of issue; which expectant estate is what we now call a reversion. And hence Littleton says that tenant in fee tail is by virtue of this statute. About 200 years intervened between the making of the statute de donis and the application of common recoveries to this intent, in the twelfth of Edward IV.; which were then openly declared by the judges to be a sufficient bar of an estate tail. For though the courts had, so long before as the reign of Edward III., very often hinted that a bar might be effected upon these principles, yet it was never carried into execution; till Edward IV., observing (in the disputes between the houses of York and Lancaster) how little effect attainders for treason had on families whose estates were protected by the sanctuary of entails, gave his countenance to this proceeding, and suffered Taltarum's case to be brought before the court; wherein, in consequence of the principle then laid down, it was in effect determined that a common recovery suffered by tenant in tail should be an effectual destruction thereof. These common recoveries are fictitious proceedings, introduced by a kind of pia fraus, to elude the statute de donis, which was found so intolerably mischievous, and which yet one branch of the legislature would not then consent to repeal; and that these recoveries are now become by long use a most common assurance of lands; and are looked upon as the legal mode of conveyance by which a tenant in tail may dispose of his lands and tenements; so that no court will suffer them to be shaken or reflected on, and even acts of parliament have by a 'side-wind' countenanced and established them. This expedient having greatly abridged estates tail, with regard to their duration, others were soon invented to strip them of other privileges. The next that was attacked was their freedom from forfeitures for treason. For, notwithstanding the large advances made by recoveries, in the compass of about sixty years, towards unfettering these inheritances, and thereby subjecting the lands to forfeiture, the rapacious prince then reigning, finding them fre-

quently resettled in a similar manner to suit the convenience of families, had address enough to procure a statute, whereby all estates of inheritance (under which estates tail were covertly included) are declared to be forfeited to the king upon any conviction of high treason. The next attack which they suffered was by stat. 32 Hen. VIII. c. 28, whereby certain leases made by tenants in tail, which do not tend to the prejudice of the issue, were allowed to be good in law, and to bind the issue in tail. But they received a more violent blow in the same session of parliament by the construction put upon the statute of fines, by stat. 32 Hen. VIII. c. 36, which declares a fine duly levied by tenant in tail to be a complete bar to him and his heirs, and all persons claiming under such entail. This was agreeable to the intention of Henry VII., whose policy it was to lay the road as open as possible to the alienation of landed property, to weaken the overgrown power of his nobles. But, as they were not easily brought to consent to such a provision, it was couched, in his act, under obscure expressions. And the judges, though willing to construe that statute as favorably as possible for the defeating of entailed estates, yet hesitated at giving fines so extensive a power by mere implication, when the statute de donis had expressly declared that they should not be a bar to estates tail. But the statute of Henry VIII., when the doctrine of alienation was better received, and the king's will more implicitly obeyed, established that intention. Yet, to preserve the property of the crown from infringement, all estates tail created by the crown are excepted. And the same was done with regard to common recoveries, by stat. 34 & 35 Hen. VIII. c. 20, which enacts that no feigned recovery had against tenants in tail, where the estate was created by the crown, and the reversion continues in the crown, shall be of any force and effect; which is allowing indirectly their full force and effect with respect to ordinary estates tail, where the royal prerogative is not concerned. Lastly, by stat. 36 Hen. VIII., all estates tail are rendered liable to be charged for payment of debts due to the king by record or special contract; as since, by the bankrupt laws, they are also subjected to be sold for the debts contracted by a bankrupt. And, by the construction put on the stat. 43 Eliz. c. 4, an appointment by tenant in tail of the lands entailed to a charitable use is good without fine or recovery. Estates tail, being thus by degrees unfettered, are now reduced again to almost the same state, even before issue born, as conditional fees were in at common law, after the condition was performed by birth of issue. For, 1. The tenant in tail is now enabled to alienate his lands and tenements by fine, by recovery, or by certain other means; and thereby to defeat the interest as well of his own issue, though unborn, as also of the reversioner, except in the case of the crown: 2. He is now liable to forfeit them for high treason: and, lastly, He may charge them with reasonable leases, and also with such of his debts as are due to the crown on specialties, or have been contracted with his fellow subjects in a course of extensive commerce.

TAIL'LAGE, *n.s.* Fr. *tailler*. Defined below.

Taillage originally signifies a piece cut out of the whole; and, metaphorically, a share of a man's substance paid by way of tribute. In law, it signifies a toll or tax. *Cowell.*

TAIL'LE, *n.s.* Fr. *taille*. See below.

Taille, the fee which is opposite to fee-simple, because it is so minced or pared that it is not in his free power to be disposed of who owns it; but is, by the first giver, cut or divided from all other, and tied to the issue of the donee. This limitation, or *taille*, is either general or special. *Taille* general is that whereby lands or tenements are limited to a man, and to the heirs of his body begotten; and the reason of this term is, because how many soever women the tenant, holding by this title, shall take to his wives, one after another, in lawful matrimony, his issue by them all have a possibility to inherit one after the other. *Taille* special is that whereby lands or tenements be limited unto a man and his wife, and the heirs of their two bodies begotten. *Cowell.*

TAI'LOR, *n. s.* Fr. *tailleur*, from *tailler*, to cut. One whose business is to make clothes.

I'll entertain a score or two of *tailors*,
To study fashions to adorn my body.
Shakspeare. Richard III.

Here's an English *tailor* come for stealing out of a French hose; come, *tailor*, you may roast your goose. *Shakspeare.*

The knight came to the *tailor's* to take measure of his gown. *Camden.*

The world is come now to that pass that the *tailor* and shoe-maker may cut out what religion they please. *Howel.*

In Covent-garden did a *tailor* dwell,
That sure a place deserved in his own hell. *King.*

It was prettily said by Seneca, that friendship should not be unript, but unstitcht, though somewhat in the phrase of a *tailor*. *Collier.*

TAINT, *v.a., v.n.*, & *n. s.* TAINT'LESS, *adj.* TAIN'TURE *n. s.* Fr. *teindre*; of Lat. *tingo*. To imbue or impregnate with any thing; corrupt; spoil; be infected: used in a bad sense generally: the noun substantive and adjective corresponding.

We come not by the way of accusation
To *taint* that honour every good tongue blesses.
Shakspeare.

Her offence
Must be of such unnatural degree
That monsters it; or your forevouched affection
Fallen into *taint*. *Id. King Lear.*

Now I
Unspeak mine own detraction; here abjure
The *taints* and blames I laid upon myself.
Shakspeare.

See here the *tainture* of thy nest,
And look thyself be faultless. *Id.*

Sirens *taint*
The minds of all men, whom they can acquaint
With their attractions. *Chapman's Odyssey.*

They the truth
With superstitions and traditions *taint*. *Milton.*

Those pure immortal elements
Eject him *tainted* now, and purge him off
As a distemper. *Id.*

My hellhounds shall lick up the draff and filth,
Which man's polluting sin with *taint* hath shed
On what was pure. *Id.*

Nothing *taints* sound lungs sooner than inspiring the breath of consumptive lungs.
Harvey on Consumptions.

A father that breeds his son at home, can keep him better from the *taint* of servants than abroad. *Locke.*

There is found in the summer a spider called a *taint*, of a red color, and so little that ten of the largest will hardly outweigh a grain.
Browne's Vulgar Errours.

But is no rank, no station, no degree,
From this contagious *taint* of sorrow free? *Prior.*

Salts in fumes contract the vesicles, and perhaps the *tainted* air may affect the lungs by its heat.
Arbuthnot on Air.

With wholesome herbage mixt, the direful bane
Of vegetable venom *taints* the plain. *Pope.*

No humours gross, or frowzy streams,
Could from her *taintless* body flow.
Swift's Miscellanies.

A sweet-bread you found it *tainted* or fly-blown.
Swift.

The yellow tinging plague
Internal vision *taints*. *Thomson's Spring.*

The spaniel, struck
Stiff by the *tainted* gale, with open nose
Draws full upon the latent prey. *Thomson.*

TAI-TONG, a city of the first rank in China, in Chan-si, in a mountainous country; abounding with medicinal and other plants. It is well fortified, has a strong garrison, and four cities of the second rank, and seven of the third, in its jurisdiction. Its territories abound with lapis lazuli, and a particular kind of jasper called yieche, which is as white and beautiful as agate; marble and porphyry are also common; and a great revenue is produced from the skins which are dressed here. 155 miles west of Pekin.

TAKA, a considerable district of Nubia, in the track between Shendy and Suakin. It is about three days journey in length, and one in breadth, and of extreme fertility. Its inhabitants are largely composed of Bedouin Arabs. Its dhourra is of the best quality, and is sold in the market of Jidda twenty per cent. higher than that of Egypt. Its camels and oxen are equally celebrated. The people are hospitable, but accused of treachery to strangers. The chief articles imported are tobacco, natron, spices, especially cloves, incense, beads, and hardware: in return for which they give dhourra.

The chief tribe are the Bisharein, who have their bouza huts, and their public women. Wives make no difficulty in receiving strangers into their tents; 'but,' says Burckhardt, with great simplicity, 'this never happened to me: for whenever I presented myself before a tent, the ladies greeted me with loud screams, and waved their hands for me to depart instantly.' These people eat the blood of animals coagulated over the fire, and the liver and kidneys raw; but the milk of the camel and dhourra are their principal articles of food. Like the Bishareins of Atbara, those of Taka are treacherous, revengeful, and addicted to theft. 'A Hadendoa seldom scruples to kill his companion on the road in order to possess himself of the most trifling article of value, if he entertains a hope of doing it with impunity; but the retaliation of blood exists in full force. Among the Hallenga, who draw their origin from Abyssinia, a horrible custom is said to attend the revenge of blood; when the slayer has been seized by the relatives of the deceased, a family feast is proclaimed, at which the murderer is brought into the midst of them, bound upon an angareyg, and, while his throat is slowly cut with a razor, the blood is caught in a bowl, and handed round amongst the guests, every one of whom is bound to drink of it at the moment the victim breathes his last.'—Burckhardt.

TAKE, *v. a.* & *v. n.* } Saxon tæcan; Goth.
TA'KER, *n. s.* } *taka*; Swed. *taga*,
TA'KING. } barb. Lat. *tago* of *tango*.

To receive; lay hold on; seize; snatch; arrest; surprise; captivate; entrap; exact; obtain in any way; adopt; employ; swallow; to perform any action; follow; pursue; convey; receive mentally; admit; assume; endure; bear. Such are the principal senses: Dr. Johnson observes, 'This verb, like prendre in French, is used with endless multiplicity of relations. Its uses are so numerous that they cannot easily be exemplified; and its references to the words governed by it so general and lax, that they can hardly be explained by any succedaneous terms. But commonly that is hardest to explain which least wants explication.' It takes the adjuncts *away, care, course, down, from, head, heed to, in, in hand, notice, oath, off, order with, out, part, place, time, up, upon*, as exemplified below. The verb neuter means to direct the course; have a tendency to; please; gain reception; have a designed effect; catch; fix; and has the adjuncts *after, in with, on, to, up, up with, with*, &c. A taker is one who takes: a taking, seizure; distress or strong affection of mind.

Enoch walked with God, and he was not, for God *took* him. *Gen.* v. 24.

I will *take* you to me for a people, and I will be to you a God. *Exodus* vi. 7.

Thou shalt not *take* the name of the Lord in vain.
Exodus.

Take no usury of him or increase. *Lev.* xxv. 36.

Hath God assayed to *take* a nation from the midst of another? *Deut.* iv. 34.

No man shall *take* the nether or the upper millstone to pledge. *Id.* xxiv. 6.

Thou art *taken* in thy mischief. 2 *Sam.* xvi. 8.

Take us the foxes that spoil the vines.
Cant. ii. 15.

Peradventure we shall prevail against him, and *take* our revenge on him. *Jer.* xx. 10.

He put forth a hand, and *took* me by a lock of my head. *Ezek.* viii. 3.

They shall not *take* shame. *Mic.* ii. 6.

Wheresoever he *taketh* him he teareth him; and he foameth. *Mark* ix. 18.

If any *take away* from the book of this prophecy, God shall *take away* his part out of the book of life.
Rev. xx. 19.

Five hundred asses yearly *took* the horse,
Producing mules of greater speed and force.
Sandys.

No purposes whatsoever which are meant for the good of that land will prosper, or *take* good effect.
Spenser.

Damasco, without any more ado, yielded unto the Turks; which the bassa *took* in so good part, that he would not suffer his soldiers to enter it.
Knolles's History of the Turks.

This great bassa was born in a poor country village, and in his childhood *taken* from his Christian parents by such as *take up* the tribute children.
Id.

I will frown as they pass by, and let them *take* it as they list. *Shakspeare. Romeo and Juliet*

La you! if you speak ill of the devil, how he *takes* it at heart. *Id. Twelfth Night.*

Appoint a meeting with this old fat fellow,
Where we may *take* him, and disgrace him for it. *Shakspeare.*

More than history can pattern, though devised
And played to *take* spectators. *Id.*

Strike her young bones,
You *taking* airs with lameness! *Id.*

That hand which had the strength, even at your door,
To cudgel you, and make you *take* the hatch. *Id.*

This I *take* it
Is the main motive of our preparations. *Id.*

You must forsake this room, and go with us;
Your power and your command is *taken off*,
And Cassio rules in Cyprus. *Id.*

The smooth pates now wear nothing but high shoes; and, if a man is through with them in honest *taking up*, they stand upon security. *Id.*

I *take* not *on* me here as a physician:
Nor do I, as an enemy to peace,
Troop in the throngs of military men:
But rather
To purge the' obstructions which begin to stop
Our very veins of life. *Shakspeare. Henry IV.*

How will my mother, for a father's death,
Take on with me, and ne'er be satisfied! *Shakspeare.*

He will hang upon him like a disease:
He is sooner caught than the pestilence,
And the *taker* runs presently mad. *Id.*

What a *taking* was he in, when your husband asked who was in the basket! *Id.*

The words are more properly *taken* for the air or æther than the heavens. *Raleigh.*

The queen, hearing of a declination of monarchy, *took* it so ill as she would never after hear of the other's suit. *Bacon.*

A following hath ever been a thing civil, and well *taken* in monarchies, so it be without too much popularity. *Id.*

You *take* me right, Eupolis; for there is no possibility of an holy war. *Id. Holy War.*

If any of the family be distressed, order is *taken* for their relief: if any be subject to vice, or *take* ill courses, they are reproved. *Id. New Atlantis.*

Before I proceed, I would *take* some breath. *Bacon.*

It appeared in his face, that he *took* great contentment in this our question. *Id.*

Men die in desire of some things which they *take to* heart. *Id.*

They that come abroad after these showers are commonly *taken* with sickness. *Id.*

They meant to *take* a *course* to deal with particulars by reconcilements, and cared not for any head. *Id.*

To stop schisms, *take off* the principal authors by winning and advancing them, rather than enrage them by violence. *Id.*

A great vessel full being drawn into bottles, and then the liquor put again into the vessel, will not fill the vessel again so full as it was, but that it may *take in* more. *Id.*

Though he would have turned his teeth upon Spain, yet he was *taken order with* before it came to that. *Id.*

Men once placed *take in with* the contrary faction to that by which they enter. *Id. Essays.*

Our gracious master is a precedent to his own subjects, and seasonable mementos may be useful: and, being discreetly used, cannot but *take* well *with* him. *Id.*

Berry coffee and tobacco, of which the Turks are great *takers*, condense the spirits, and make them strong. *Id.*

When news were brought that the French king besieged Constance, he posted to the sea-coast to *take* ship. *Camden.*

The knight coming to the taylor's to *take* measure of his gown, perceiveth the like gown cloth lying there. *Id.*

Why, now you *take* me; these are rites
That grace love's days, and crown his nights:
These are the motions I would see. *Ben Jonson.*

The dear sale beyond the seas increased the number of *takers*; and the *takers* jarring and brawling one with another, and foreclosing the fishes, taking their kind within harbour, decreased the number of the taken. *Carew.*

Should a great beauty resolve to *take* me *in* with the artillery of her eyes, it would be as vain as for a thief to set upon a new-robbed passenger. *Suckling.*

His wind he never *took* whilst the cup was at his mouth, but observed the rule of drinking with one breath. *Hakewill.*

If I renounce virtue, though naked, then I do it yet more when she is thus beautified on purpose to allure the eye, and *take* the heart. *Decay of Piety.*

God's decrees of salvation and damnation have been *taken up* by some of the Romish and reformed churches, affixing them to men's particular entities, absolutely considered. *Hammond.*

The parliament *took upon* them to call an assembly of divines, to settle some church controversies, of which many were unfit to judge. *Sanderson.*

Scaliger, comparing the two orators, says, that nothing can be *taken* from Demosthenes, nor added to Tully. *Denham.*

Few like the Fabii or the Scipios are,
Takers of cities, conquerors in war. *Id.*

The diminution of the power of the nobility they *took* very heavily. *Clarendon.*

They silenced those who opposed them, by traducing them abroad, or *taking* advantage against them in the house. *Id.*

Resolutions *taken* upon full debate were seldom prosecuted with equal resolution. *Id.*

He *took* himself to have deserved as much as any man, in contributing more, and appearing sooner, in their first approach towards rebellion. *Id.*

Till there were a perfect reformation, nothing would prosper that they *took in hand*. *Id.*

The bill for *taking away* the votes of bishops was called a bill for *taking away* all temporal jurisdiction. *Id.*

He alone
To find where Adam sheltered *took* his way. *Milton.*

Take to thee from among the cherubim
Thy choice of flaming warriors. *Id.*

I hope you will not expect from me things demonstrated with certainty; but will *take* it well that I should offer at a new thing. *Graunt.*

I am contented to dwell on the Divine Providence, and *take* up any occasion to lead me to its contemplation. *Hale.*

Tygers and lions are not apt to *take* the water. *Id.*

She saw in what a *taking*
The knight was, by his furious quaking. *Hudibras.*

I ought to have a care
To keep my wounds from *taking* air. *Id.*

Beasts, that converse
With man, *take after him*, as hogs
Get pigs all th' year, and bitches dogs. *Id.*

Turkeys *take* down stones, having found in the gizzard of one no less than seven hundred. *Browne's Vulgar Errours.*

Princes were so *taken up* with wars that few could write or read besides those of the long robes. *Temple.*

Chemists *take*, in our present controversy, something for granted, which they ought to prove. *Boyle.*

When the frost and rain have *taken* them, they grow dangerous. *Temple.*

The firm belief of a future judgment is the most forcible motive to a good life, because *taken* from this consideration of the most lasting happiness and misery. *Tillotson.*

Be thou advised, thy black design forsake;
Death, or this counsel, from Lucippus *take*. *Waller.*

An honest man may *take* a knave's advice,
But ideots only may be cozened twice. *Dryden.*

In fetters one the barking porter tied,
And *took* him trembling from his sovereign's side. *Id.*

Old as I am, I *take* thee at thy word,
And will to-morrow thank me with my sword. *Id.*

I *took* not arms till urged by self-defence. *Id.*

A long sigh he drew,
And, his voice failing, *took* his last adieu. *Id. Fables.*

Her lovers' names in order to run o'er,
The girl *took* breath full thirty times and more. *Dryden.*

Distressed myself, like you, confined I live,
And therefore can compassion *take* and give. *Id.*

If I have been a little pilfering, I *take* it bitterly of thee to tell me of it. *Id.*

Our phœnix queen was pourtrayed too so bright,
Beauty alone could beauty *take* so right. *Id.*

At first they warm, then scorch, and then they *take*,
Now with long necks from side to side they feed;
At length grown strong their mother fire forsake,
And a new colony of flames succeed. *Id.*

Few are so wicked as to *take* delight
In crimes unprofitable. *Id.*

I *took* your weak excuses. *Id.*

Take my esteem:
If from my heart you ask or hope for more,
I grieve the place is *taken up* before. *Id.*

I can be as quiet as any body with those that are quarrelsome, and be as troublesome as another when I meet with those that will *take* it. *L'Estrange.*

The cat presently *takes* a tree, and sees the poor fox torn to pieces. *Id.*

The ass *takes up with* that for his satisfaction, which he reckoned upon before for his misfortune. *Id.*

Give them one simple idea, and see that they *take* it right, and perfectly comprehend it. *Locke.*

Upon this assurance he *took* physick. *Id.*

He that should demand of him how begetting a child gives the father absolute power over him, will find him answer nothing; we are to *take* his word for this. *Id.*

A multitude, how great soever, brings not a man any nearer to the end of the inexhaustible stock of number, where still there remains as much to be added as if none were *taken* out. *Id.*

I *take* liberty to say that these propositions are so far from having an universal assent, that to a great part of mankind they are not known. *Id.*

Time is *taken* for so much of minute duration as is measured out by the great bodies of the universe. *Id.*

It is not in the power of the most enlarged understanding to frame one new simple idea in the mind not *taken in* by the ways aforementioned. *Id.*

Were the pleasure of drinking accompanied, the moment a man *takes off* his glass, with that sick stomach which, in some men, follows not many hours after, no body would ever let wine touch his lips. *Id.*

The least things are *taken up* by the thumb and forefinger: when we would *take up* a greater quantity, we would use the thumb and all the fingers. *Ray.*

If you slit the artery, thrust a pipe into it, and cast a straight ligature upon that part containing the pipe, the artery will not beat below the ligature; yet do but *take* it *off*, and it will beat immediately. *Id.*

No beast will eat sour grass ti'l the frost hath *taken* it. *Mortimer.*

Upon the sea-coast are parcels of land that would pay well for the *taking in*. *Id.*

Madam, were I as you, I'd *take* her counsel. *Philips.*

So soft his tresses, filled with trickling pearl,
You'd doubt his sex, and *take* him for a girl. *Tate.*

I *took* a walk in Lincoln's Inn Garden. *Tatler.*

The Carthaginian *took* his seat, and Pompey entered with great dignity in his own person. *Id.*

Honeycomb, on the verge of threescore, *took* me aside, and asked me whether I would advise him to marry? *Addison's Spectator.*

The husband's affairs made it necessary for him to *take* a voyage to Naples. *Id.*

Doctor Moore, in his Ethicks, reckons this particular inclination, to *take* a prejudice against a man for his looks, among the smaller vices in morality, and names it a prosopolepsia. *Id.*

Lovers flung themselves from the top of the precipice into the sea, where they were sometimes *taken up* alive. *Addison.*

Lacqueys were never so saucy and pragmatical as now, and he should be glad to see them *taken down*. *Id.*

Take off all their models in wood. *Id.*

We *took up* arms, not to revenge ourselves,
But free the commonwealth. *Id.*

Arnobius asserts that men of the finest parts and learning, rhetoricians, lawyers, physicians, despising the sentiments they had once been fond of, *took up* their rest in the Christian religion. *Id. on the Christian Religion.*

These heads are sufficient for the explication of this whole matter; *taking in* some additional discourses, which make the work more even. *Burnet.*

Tell an ignoramus in place to his face that he has a wit above all the world, and, as fulsome a dose as you give him, he shall readily *take* it *down*, and admit the commendation, though he cannot believe the thing. *South.*

Is a man unfortunate in marriage? Still it is because he was deceived; and so *took* that for virtue and affection which was nothing but vice in a disguise. *Id.*

This grated harder upon the hearts of man than the strangeness of all the former articles that *took up* chiefly in speculations. *Id.*

It concerns all, who think it worth while to be in earnest with their immortal souls, not to abuse themselves with a small confidence; a thing so easily *taken up*, and so hardly laid down. *Id. Sermons.*

I *take* thee at thy word. *Rowe's Ambitious Stepmother.*

Heightened revenge he should have *took*;
He should have burnt his tutor's book. *Prior.*

Wise men are overborn when *taken* at a disadvantage. *Collier of Confidence.*

Though he that is full of them thinks it rather an ease than oppression to speak them out, yet his auditors are perhaps as much *taken up* with themselves. *Government of the Tongue.*

The living fabrick now in pieces *take*,
Of every part due observation make;
All which such art discovers. *Blackmore.*

We always *take* the account of a future state into our schemes about the concerns of this world. *Atterbury.*

Young gentlemen ought not only to *take* along with them a clear idea of the antiquities on medals and figures, but likewise to exercise their arithmetick in reducing the sums of money to those of their own country. *Arbuthnot on Coins.*

Tiberius, noted for his niggardly temper, only gave his attendants their diet; but once he was *taken* with a fit of generosity, and divided them into three classes. *Arbuthnot.*

Cleombrotus was so *taken with* this prospect that he had no patience. *Wake.*

Charity, *taken* in its largest extent, is nothing else but the sincere love of God and our neighbour. *Id.*

Your present distemper is not so troublesome as to *take* you *off* from all satisfaction. *Id.*

Men in their loose unguarded hours they *take*,
Not that themselves are wise, but others weak.
Pope.

Some tories will *take* you for a whig, some whigs will *take* you for a tory. *Id.*

Not foes nor fortune *take* this power *away*,
And is my Abelard less kind than they? *Id.*

Take part in rejoicing for the victory over the Turks. *Id.*

I am possessed of power and credit, can gratify my favourites, and *take* vengeance on my enemies. *Swift.*

As I *take* it, the two principal branches of preaching are, to tell the people what is their duty, and then to convince them that it is so. *Id.*

Though so much of heaven appears in my make,
The foulest impressions I easily *take*. *Id.*

With a two foot rule in his hand measuring my walls, he *took* the dimensions of the room. *Id.*

Miss Betsy won't *take to* her book. *Id.*

This man always *takes time*, and ponders things maturely, before he passes his judgment. *Watts.*

A student should never satisfy himself with bare attendance on lectures, unless he clearly *takes up* the sense. *Id.*

TALAVERA DE LA REYNA, an ancient town of Spain, in New Castile, on the right bank of the Tagus, over which there is a bridge of thirty-five arches, 1200 feet in length. It is surrounded by a fertile plain of vast extent, intersected by the river. Part of the old ramparts are in preservation, but they are little more than an object of curiosity; it is, in a military sense, altogether open. Here are several well built churches, in particular that of the Hieronymites; and two public walks, one on the north, the other on the south of the town. But the dwelling houses are seldom more than one story in height; and the streets are badly paved and crossed by a number of narrow lanes. Its population, including the suburbs, is about 8000. Silk manufactures, established here about the year 1748, are still carried on; and in the neighbouring village of Cervera are manufactures of soap, hats, and earthenware, on a small scale. Talavera contains many Roman monuments; but it does not, as some imagine, correspond to the ancient Ebora. It fell into the hands of the Moors in 714, continued long in their possession, and, when the Christians succeeded in re-occupying the inland provinces, was repeatedly taken and retaken. In the beginning of the twelfth century it was sacked by the Moors. This place has given birth to several men of eminence, of whom the best known is Mariana the historian. It is memorable for the battle fought on 27th and 28th July 1809, between a French army, amounting to 47,000 men, and an allied force, in which there were 19,000 British, and between 30,000 and 40,000 Spaniards; and in which the French, after making several desperate attacks, were repulsed. Sixty-three miles W. S. W. of Madrid.

TALBOT (William), D D., an eminent English prelate, born in 1659, and educated at Oxford. In the reign of James II. he preached with great courage and zeal against popery; for which, after the revolution, he was promoted to be dean of Worcester, and afterwards bishop of Salisbury. In 1722 he was made bishop of Durham; published several sermons; and died in 1730.

TALBOT (Catherine), an ingenious lady, was the only child of Edward, second son of bishop Talbot, and born five months after the decease of her father, who died early. Her mother, therefore, accepted the invitation of Dr. Secker, afterwards archbishop of Canterbury, the friend of her late husband, to become a part of their family. Here Miss Talbot received an excellent education, which she much improved by her own application. On the death of the archbishop in 1768, who bequeathed £400 to Mrs. and Miss Talbot, they removed to a habitation of their own; and after a while, in consequence of the declining health of Miss Talbot, to the house of the marchioness De Gray at Richmond, where the latter died of a cancer in her forty-ninth year. This lady was the intimate friend of Mrs. Carter, with whom she kept up a literary correspondence of considerable interest. Her works are Reflections on the Seven Days of the Week, Essays on Various Subjects, Letters to a Friend on the Future State, Dialogues, Prose Pastorals, Imitations of Ossian, Allegories, and poetry.

TALC, or TALK, in the old system of mineralogy, a species of fossil formerly arranged under the magnesian earths; and, in Magellan's edition of Cronstedt's Mineralogy, ranked as a species of Mica. See MICA. There are two varieties, viz.: 1. T. Muscovy, called also lapis specularis, is very common in Russia, and Cyprus; and in the Alps, the Appennines, and many mountains of Germany. It is imported in large quantities into England, and is used by the lantern-makers instead of horn in their nicer works; by the painters to cover miniature pictures; and by the microscope-makers to preserve small objects for viewing by glasses. The ancients used it instead of glass in their windows. It differs from plaster stone in this, that it does not, after being calcined and wetted with water, swell and concrete into a hard stony substance. Muscovy talc and lapis specularis were long considered as the same, but a distinction is now discovered between them. See MINERALOGY. Talc is employed, in places where it is found in considerable quantity, in compositions for earthen vessels, tests and cupels, &c. From its smoothness, unctuosity, and brightness, it has been celebrated as a cosmetic; and former chemists submitted it to a variety of operations, for procuring from it oils, salts, tinctures, magisteries, &c. But all their labors proved in vain.

2. T. Venetian, is not so named from being a production of the territories of Venice (for it is seldom met with in that country), but as an article of Venetian commerce. It abounds in England, Norway, Hungary, Bohemia, Spain, and in many countries of Asia. With half its weight of alkaline salt, it may, in a strong fire, be brought into perfect fusion, though not to perfect transparency; with equal weight, or less of borax, it runs into a beautiful, pellucid, greenish yellow

glass. Talc does not melt with any other earth, nor even bake or cohere with any but the argillaceous; mixtures of it with them all are nevertheless brought into fusion by a remarkably less quantity of saline matter than the ingredients separately would require. Thus equal parts of talc and chalk, with only one-fourth their weight of borax, melt in a moderate heat into a fine transparent greenish glass, of considerable hardness and great lustre. On substituting gypseous earths to chalk, the fusion is as easy, and the glass as beautiful; in color not green, but yellow like the topaz. Talc, with half its weight of sand, and a quantity of nitre equal to both, yields also a transparent topaz yellow glass. See other experiments by Mr. Pott, in Mem. de l' Acad. de Berlin, 1746.

Talc, in the new system of mineralogy, is reckoned by Dr. Thomson a species quite distinct from mica; and is subdivided into three varieties; viz. 1. The scaly talc; 2. The Venetian or common talc; and 3. The shistose talc. See Mineralogy.

TALCITE, *n. s.* A name given by Kirwan to scaly talc. See Mineralogy.

TALE, *n. s.* } Sax. talc, from tellen, to
Tale'bearer, } tell. A narrative; a story;
Tale'bearing. } information; something told: hence a number reckoned; numerical account: commonly a slight or petty account of some trifling or fabulous incident: as, 'a tale of a tub:' a talebearer is an informer; tattler: always used in an ill or reproachful sense: the other noun substantive corresponding.

We spend our years as a *tale* that is told.
Psalm xc. 9.

Number may serve your purpose with the ignorant, who measure by *tale*, and not by weight. *Hooker.*

My conscience hath a thousand several tongues,
And every tongue brings in a several *tale*,
And every *tale* condemns me for a villain. *Shakspeare.*

Hermia, for aught I could read,
Could ever hear by *tale* or history,
The course of true love never did run smooth. *Id.*

Birds live in the air freest, and are aptest by their voice to tell *tales* what they find, and by their flight to express the same. *Bacon.*

Twelve returned upon the principal pannel, or the *tales*, are sworn to try according to their evidence.
Hale.

Money being the common scale
Of things by measure, weight, and *tale*;
In all the' affairs of church and state,
'Tis both the balance and the weight. *Hudibras.*

For every bloom his trees in spring afford,
An autumn apple was by *tale* restored.
Dryden's Virgil.

The herald for the last proclaims
A silence, while they answered to their names,
To shun the fraud of musters false:
The *tale* was just. *Id. Knight's Tale.*

The liberty of a common table is a tacit invitation to all intruders; as buffoons, spies, *tale-bearers*, flatterers. *L'Estrange.*

In great families, some one false, paultry *talebearer*, by carrying stories from one to another, shall inflame the minds, and discompose the quiet, of the whole family. *South.*

Reasons of things are rather to be taken by weight than *tale*. *Collier on Cloaths.*

The said Timothy was extremely officious about their mistress's person, endeavouring, by flattery and *talebearing*, to set her against the rest of the servants.
Arbuthnot.

This story prepared their minds for the reception of any *tales* relating to other countries. *Watts.*

TAL'ENT, *n. s.* Lat. *talentum.* So much weight: hence a sum of money; the value differing according to different ages and countries: faculty; power; ability; quality; disposition.

Five *talents* in his debt,
His means most short, his creditors most straight.
Shakspeare.

Many who knew the treasurer's *talent* in removing prejudices, and reconciling himself to wavering affections, believed the loss of the duke was unseasonable
Clarendon.

Though the nation generally was without any ill *talent* to the church in doctrine or discipline, yet they were not without a jealousy that popery was not enough discountenanced. *Id.*

He, Agelius, though otherwise a very worthy man, yet, having no *talent* for disputation, recommended Sisinnius, his lector, to engage in a conference.
Waterland.

Two tripods cast in antick mould,
With two great *talents* of the finest gold. *Dryden.*

He is chiefly to be considered in his three different *talents*, as a critick, satirist, and writer of odes. *Id.*

It is the *talent* of human nature to run from one extreme to another. *Swift.*

'Tis not my *talent* to conceal my thoughts,
Or carry smiles and sunshine in my face,
When discontent sits heavy at my heart.
Addison's Cato.

They are out of their element, and logick is none of their *talent*. *Baker on Learning.*

Persons who possess the true *talent* of raillery are like comets; they are seldom seen, and all at once admired and feared. *Female Quixote.*

Talent, Attic. The common Attic talent of weight contained sixty Attic minæ, or 6000 Attic drachmæ; and weighed, according to Dr. Arbuthnot, 56 lbs. 11 oz. 17½ gr. English troy weight. There was another Attic talent, by some said to consist of eighty, by others of 100 minæ.

Talent, Egyptian and Antiochian. The Egyptian talent was 80 minæ; the Antiochian also 80; the Ptolematic of Cleopatra 86⅔; that of Alexandria 96; and the Insular talent 120.

Talent, Grecian, Syrian, Tyrian, &c. In the valuation of money, the Grecian talent, according to Dr. Arbuthnot, was equal to 60 minæ, or, reckoning the mina at £3 4*s.* 7*d.*, equal to £193 15*s.* The Syrian talent in this valuation consisted of 15 Attic minæ; the Ptolemaic of 20; the Antiochian of 60; the Euboic of 60; the Babylonic of 70; the Greater Attic of 80; the Tyrian of 80; the Eginean of 100; the Rhodian of 100; and the Egyptian of 80 minæ. There is another talent much more ancient, which Dr. Arbuthnot calls the Homeric talent of gold, which seems to have weighed six Attic drachms or three darics, a daric weighing very little more than a guinea.

Talent, Jewish. Talents, as a species of money, among the Hebrews, was sometimes used for a gold coin, the same with the shekel of gold, called also stater, and weighing only four drachms. The Hebrews reckoned by these talents as we do by pounds, &c. Thus a million of gold, or million of talents of gold, among them, was a million of shekels or nummi; the nummus of gold being the same weight with

the shekel, viz. four drachms. But the Hebrew talent weight of silver, which they called cicar, was equivalent to that of 3000 shekels, or 113 lbs. 10 oz. 1 dwt. 10⅔ gr. English troy weight, according to Arbuthnot.

TALENT, ROMAN. Among the Romans there were two kinds of talents, the little and the great talent; the little was the common talent; and, whenever they say simply talentum, they are to be understood of this. The little talent was 60 minæ or Roman pounds; the mina or pound estimated at 100 drachmæ or denarii; it was also estimated at twenty-four great sesterces, which amounted to 60 lbs. The great talent exceeded the less by one-third part. Budæus computes, that the little talent of silver was worth £75 sterling, and the great £99 6*s.* 8*d.* sterling. The greater of gold was worth £1125 sterling.

TALESSE. See TALASSEE.

TALETUM, a town of Laconia, on mount Taygetus, famous for its temple of Apollo. Horses were sacrificed in it. *Paus.*

TALHAIARN, a celebrated bard of Wales, who flourished in the middle of the seventh century. He composed among other poems a poetical prayer, which became a general formula among the bards.

TALIACOTIUS (Gaspar), chief surgeon to the great duke of Tuscany, was born at Bononia, in Italy, in 1553. He wrote a Latin treatise entitled Chirurgia Nota de Curtis Membris, in which he teaches the art of engrafting noses, ears, lips, &c., giving representations of the instruments and proper bandages.

TALIESSIN, the most famous of the ancient bards of Wales. He flourished in the sixth century, under princes Elphin and Urien. About eighty of his poems are preserved, and published in the Welsh Archæology.

TALIO, lex talionis, or the law of retaliation; a species of punishment, in the Mosaic law, whereby an evil is returned similar to that committed against us by another; as an 'eye for eye, tooth for tooth.' This law was first inserted in the XII. tables amongst the Romans; but afterwards set aside, and a power given to the prætor to fix upon a sum of money for the damage.

TAL'ISMAN, *n. s.* } Gr. τελεσμα.—Skin-
TALISMAN'IC, *adj.* } ner. Arab. *talia azman* is to try fortune. A magical character. See below. The adjective corresponding.

The figure of a heart bleeding upon an altar, or held in the hand of a Cupid, has always been looked upon as *talismanick* in dresses of this nature. *Addison.*

Of *talismans* and sigils knew the power,
And careful watched the planetary hour. *Pope.*

If the physicians would forbid us to pronounce gout, rheumatism, and stone, would that serve like so many *talismans* to destroy the diseases? *Swift.*

TALISMANS are magical figures cut or engraved with superstitious observations on the characterisms and configurations of the heavens, to which some astrologers have attributed wonderful virtues, particularly that of calling down celestial influences. The talismans of Samothrace, so famous of old, were pieces of iron formed into certain images, and set in rings; these were esteemed preservatives against all kinds of evils. There were likewise talismans taken from vegetables, and from minerals.

TALK', *v. n.* & *n. s.* }
TALK'ATIVE, *adj.* }
TALK'ATIVENESS, *n. s.* } Belgic *taelen*, or from TALE. To speak in conversation; speak fluently and familiarly;
TALK'ER, }
TALK'Y, *adj.* } converse; prattle: oral conversation; speech; report; rumor: talkative, loquacious: the noun substantives following correspond: talky, consisting of talk: resembling talk.

Will ye speak wickedly for God, and *talk* deceitfully for him. *Job* xiii. 7.

The princes refrained *talking*, and laid their hand on their mouth. *Id.* xxix. 9.

Let me *talk* with thee of thy judgments. *Jer.* xii. 1.

The children of thy people still *talk* against thee. *Ezekiel.*

How can he get wisdom that driveth oxen, is occupied in their labours, and whose *talk* is of bullocks? *Ecclus.* xxxviii.

If I have held you overlong, lay hardly the fault upon my old age, which in its disposition is *talkative.* *Sidney.*

Perceiving his soldiers dismayed, he forbad them to have any *talk* with the enemy. *Knolles's History of the Turks.*

I will buy with you, sell with you, *talk* with you; but I will not eat with you. *Shakspeare.*

We do remember; but our argument
Is all too heavy to admit much *talk.* *Id.*

Keep me company but two years,
Thou shalt not know the sound of thine own tongue.
—Farewell; I'll grow a *talker* for this jeer. *Id.*

As God remembers that we are but flesh, unable to bear the nearer approaches of divinity, and so *talks* with us at once with Moses through a cloud; so he forgets not that he breathed into us the breath of life, a vital active spirit. *Decay of Piety.*

The greatest *talkers* in the days of peace have been the most pusillanimous in the day of temptation. *Taylor.*

Hypocrites austerely *talk*
Of purity. *Milton.*

The crystalline sphere, whose balance weighs
The trepidation *talked.* *Id.*

What delight to be by such extolled,
To live upon their tongues and be their *talk*,
Of whom to be despised were no small praise? *Id.*

Here free from court compliances he walks,
And with himself, his best adviser, *talks.* *Waller.*

Consider well the time when Petavius first began to *talk* in that manner. *Waterland.*

We will consider whether Adam had any such heir as our author *talks* of. *Locke.*

This ought to weigh with those whose reading is designed for much *talk* and little knowledge. *Id.*

I hear a *talk* up and down of raising our money, as a means to retain our wealth, and keep our money from being carried away. *Id.*

If it were desirable to have a child a more brisk *talker*, ways might be found to make him so, but a wise father had rather his son should be useful when a man, than pretty company. *Id. on Education.*

My heedless tongue has *talked* away this life. *Rowe.*

I am ashamed I cannot make a quicker progress in the French, where every body is so courteous and *talkative.* *Addison.*

We call this *talkativeness* a feminine vice; but he that shall appropriate loquacity to women, may perhaps sometimes need to light Diogenes's candle to seek a man. *Government of the Tongue.*

It is a difficult task to *talk* to the purpose, and to put life and perspicuity into our discourses.
Collier on Pride.

The coxcomb bird so *talkative* and grave,
That from his cage cries cuckold, whore, and knave;
Though many a passenger he rightly call,
You hold him no philosopher at all. *Pope.*

In various *talk* the instructive hours they past,
Who gave the ball, or paid the visit last. *Id.*

Learned women have lost all credit by their impertinent *talkativeness* and conceit. *Swift.*

Talking over the things which you have read with your companions, fixes them upon the mind. *Watts.*

Let me give for instance some of those writers or *talkers* who deal much in the words Nature or Fate. *Id.*

TALK, *n. s.* } From TALC, which see. Fr.
TALK'Y, *adj.* } *talc.* A mineral: the adjective corresponding.

Venetian *talk* kept in a heat of a glass furnace, though brittle and discoloured, had not lost much of its bulk, and seemed nearer of kin to *talk* than mere earth. *Boyle.*

Stones composed of plates are generally parallel, and flexible and elastick: as *talk*, cat-silver or glimmer, of which there are three sorts, the yellow or golden, the white or silvery, and the black.
Woodward on Fossils.

The *talky* flakes in the strata were all formed before the subsidence along with the sand. *Id.*

TALL, *adj.* } Fr. *taille;* Ital. *taglia;*
TALL'NESS, *n. s.* } Span. *talle;* Welsh *tál.* High in stature; lofty; sturdy: the noun substantive corresponding.

An hideous giant, horrible and high,
That with his *tallness* seemed to threat the sky.
Spenser.

Bring word how *tall* she is.
Shakspeare. Antony and Cleopatra.

I'll swear thou art a *tall* fellow of thy hands, and that thou wilt not be drunk; but I know thou art no *tall* fellow of thy hands, and that thou wilt be drunk; but I would thou wouldst be a *tall* fellow of thy hands. *Id. Winter's Tale.*

The eyes behold so many naked bodies, as for *tallness* of stature could hardly be equalled in any country. *Hayward.*

Two of nobler shape,
Erect and *tall.* *Milton.*

Winds rushed abroad
From the four hinges of the world, and fell
On the vext wilderness, whose *tallest* pines,
Though rooted deep as high, and sturdiest oaks,
Bowed their stiff necks. *Milton's Paradise Regained.*

May they encrease as fast, and spread their boughs,
As the high fame of their great owner grows!
May he live long enough to see them all
Dark shadows cast, and as his palace *tall!*
Methinks I see the love that shall be made,
The lovers walking in that amorous shade. *Waller.*

They lop, and lop, on this and that hand, cutting away the *tall*, sound, and substantial timber, that used to shelter them from the winds. *Davenant.*

TAL'LAGE, *n. s.* Fr. *taillage.* Impost; excise.

The people of Spain were better affected unto Philip than to Ferdinando, because he had imposed upon them many taxes and *tallages.*
Bacon's Henry VII.

TALLARD (Camillus d'Hostun), count of, a celebrated French general, born at Provence in 1652. He commanded the army on the Rhine in 1702, and in 1703 was made a marshal; when he defeated the prince of Hesse-Cassel, and took Landau. In 1704 he was sent with an army of 40,000 men against the duke of Marlborough and prince Eugene; but was defeated and taken prisoner at the battle of Hochstet, and brought over to England, where he was detained seven years. Upon his return to Paris he was created a duke, and made secretary of state in 1726. He died in 1728.

TALLEYRAND-PERIGORD (Alexandre Angelique de) the son of the marquis de Talleyrand, and uncle of the celebrated statesman of the same name, was born at Paris in 1736. He obtained various benefices in the church early in life, and became royal almoner, and grand vicar of Verdun: before he was thirty he was appointed coadjutor of the archbishop of Rheims, whom he succeeded in 1777. Nominated a member of the second assembly of the Notables, and afterwards a deputy of the States General, he vainly endeavoured to defend the privileges of the clergy. At length he retired to Aix-la-Chapelle, and subsequently resided at Weimar and Brunswick. Louis XVIII. having invited him to Mittau, he accompanied that prince to England; and on the death of the cardinal de Montmorenci, in 1808, succeeded him as grand almoner. At the restoration he had at first great influence in ecclesiastical affairs, but his councils were afterwards neglected. In 1816 he resigned the archbishopric of Rheims, and the following year was appointed to that of Paris and made a cardinal. The execution of the concordat of 1817 meeting with obstacles, he did not take possession of his see till 1819, and the remainder of his life was devoted to the regulation of its concerns. He died October 20th 1821.

TALLIEN (Jean Lambert), one of the leaders in the French revolution, was originally a porter and then a steward, after which he became a clerk under government. In 1791 he was editor of the Moniteur; and about the same time was made secretary-general of the commune of Paris. During the reign of terror he did some praiseworthy actions, and M. Hue, valet-de-chambre to Louis XVI., and Madame de Stael, were indebted to him for their lives. The end of that dreadful anarchy in the downfall of Robespierre will hand the name of Tallien down to posterity with honor, when his other deeds are forgotten. He had formed an attachment for Madame Cabarus; but at this period the connexion was broken off and she was thrown into a dungeon. Robespierre, being afraid of Tallien, offered her life and liberty if she would betray him. But, though her lover had been faithless, she rejected the proposal, and sent privately this note to Tallien:—'The minister of police has announced to me that to morrow I am to appear at the tribunal—that is to say, I am to ascend the scaffold, I dreamt last night that Robespierre was no more, and that my prison doors were opened. A brave man might have realised this dream; but, thanks to your cowardice, no one remains capable of its accomplishment.' Tallien answered—'Be as prudent as I shall prove brave; and above all be tranquil.' The next day he hurried to the tribune, and, regardless of all danger, attacked Robespierre to his face with

such eloquence that the hearers were electrified. Then, snatching a dagger from his bosom, he swore that he would bury it in the tyrant's heart if he were not publicly denounced. The moment was critical—the fate of Tallien hung on a thread—but the assembly joined him, the miscreant fell, and Madame Cabarus was saved. Tallien accompanied Buonaparte to Egypt, but died in penury at Paris, aged fifty-four, in 1820.

TALLIS (Thomas), an English musician of the sixteenth century, reckoned one of the most eminent that ever England bred. But his abilities were wholly devoted to sacred music. He is said to have been organist of the chapel royal to Henry VIII., Edward VI., Mary I., and Elizabeth. It is certain he was organist along with Bird under Elizabeth; and these two published an admired collection of Hymns for the Church Service. He composed the Morning, Evening, and Communion Services, in four parts, with the preces, responses, and litany; and several anthems. He died 23d of November 1585, and was buried in Greenwich church.

TAL'LOW, *n. s.* } Swed. and Dan.
TAL'LOWCHANDLER. } *talge;* Belg. *talk.* The grease or fat of an animal; coarse suet: the tallowchandler is the dealer in and melter of the fat.

She's the kitchen wench, and all grease; and I know not what use to put her to, but to make a lamp of her, and run from her by her own light. I warrant her rags, and the *tallow* in them, will burn a Lapland winter. *Shakspeare.*

The new world is stocked with such store of kine and bulls, brought hither out of Europe since the first discovery, that the Spaniards kill thousands of them yearly, for their *tallow* and hides only. *Heylyn*

Nastiness, and several nasty trades, as *tallowchandlers*, butchers, and neglect of cleansing of gutters, are great occasions of a plague. *Harvey on the Plague.*

Snuff the candles close to the *tallow*, which will make them run. *Swift.*

TALLOW, in commerce, is the fat of certain animals melted and clarified. It is procured from most animals, but chiefly from bullocks, sheep, hogs, and bears. Some kinds of tallow are used as unguents in medicine, some for making soap and dressing leather, and some for making candles. See ANATOMY, CHEMISTRY, and FAT.

TALLOW, MOUNTAIN, a mineral substance, specimens of which were lately found in a bog on the borders of Loch Fyne in Scotland. This curious mineral was first observed by some peasants on the coast of Finland in 1736; and it was afterwards found in one of the Swedish lakes. It has the color and feel of tallow, and is tasteless. It melts at 118° Fahrenheit, and boils at 290°. When melted it is transparent and colorless: on cooling it becomes opaque and white, though less so than at first. It is insoluble in water, but soluble in hot alcohol, oil of turpentine, olive oil, and naphtha, but precipitates as these liquids cool. Its specific gravity in the natural state is 0·6078, but it is then full of air-bubbles. After fusion its density is 0·983, which is something above ordinary tallow. It does not combine with alkalies nor form soap. Thus it differs from every class of bodies known. From the fixed oils in not saponifying; from the volatile oils and bitumen in being tasteless and destitute of smell. In volatility and combustibility it resembles naphtha.—Edin. Phil. Journ. xi. 214.

TALLOW, PINEY, a concrete inflammable substance, obtained by boiling in water the fruit of the vateria Indica, a tree of the Malabar coast. It partakes of the nature of both wax and oil, and from its appearance may not inaptly be termed a tallow. It is employed in the town of Mangalore as an external application for bruises and rheumatic pains. It melts at 97½° Fahrenheit; is generally white, sometimes yellow, and is greasy to the touch with some degree of waxiness. Specific gravity 0·926 at 60°. It is not soluble in alcohol, which takes merely two per cent. of elain. Fixed alkalies saponify it. It forms excellent candles, coming freely from the mould. Its ultimate constituents are,

Carbon	. .	77·0 =	10 atoms
Hydrogen	. .	12 3 =	9
Oxygen	. .	10·7 =	1

Dr. Babington in Journal of Science, xix. 177.

TALLOW TREE. See CHINA. Sir George Staunton says that the candles made of the vegetable tallow are firmer than those made of animal tallow, and free from all offensive smell. They are not, however, equal to those of wax or spermaceti; but the latter is not within the reach of the Chinese, and the art of blanching the former is little known to them. The tallow tree has been transplanted to Carolina, and flourishes there as well as in China.

TAL'LY, *n. s.*, *v. a.*, & *v. n.* See TAILLE. Fr. *tailler*, to cut. A stick notched or cut in conformity to another stick, and used to keep accounts by: hence to suit; fit: be fitted; conform.

So right his judgment was cut fit,
And made a *tally* to his wit. *Hudibras.*

So suited in their minds and persons,
That they were framed the *tallies* for each other:
If any alien love had interposed,
It must have been an eye sore to beholders. *Dryden.*

The only talents in esteem at present are those of Exchange Alley; one *tally* is worth a grove of bays. *Garth.*

I found pieces of tiles that exactly *tallied* with the channel. *Addison on Italy.*

Nor sister either had nor brother;
They seemed just *tallied* for each other. *Prior.*

Have you not seen a baker's maid
Between two equal panniers swayed?
Her *tallies* useless lie and idle,
If placed exactly in the middle. *Id.*

They are not so well *tallied* to the present juncture. *Pope.*

From his rug the skewer he takes,
And on the stick ten equal notches makes;
With just resentment flings it on the ground,
There take my *tally* of ten thousand pound. *Swift.*

The TALLY is used by bakers, brewers, &c. And this was the ancient way of keeping all accounts, one part being kept by the creditor, the other by the debtor, &c. Hence the tallier of the exchequer, whom we now call the teller

Tally Court, a court where the two deputy chamberlains of the exchequer and the tally-cutter attend; and a tally is generally the king's acquittance for money paid or lent, and has written on it words proper to express on what occasion the money is received.

Tally-Cutter, an officer in the court of exchequer, who cuts or marks the tally. See Tally.

Tally-Man, a person that sells or lets goods, clothes, &c., to be paid by so much a-week.

TALMA (Francis Joseph), the late Roscius of the French drama, was born at Paris about the year 1770, and is said to have given the first indication of his histrionic talent when only eight years old, in an old tragedy entitled Tamerlane, performed by boys. But soon after his father, who had settled in London, sent for him to England; and after a few years spent at a boarding-school in Lambeth, articled him to a surgeon. At this period his fondness for theatrical amusements introduced him to sir John Gallini, manager of an amateur French company which performed at the Hanover Square rooms, and he appeared in several comedies, especially as count Almaviva in Beaumarchais' comedy of the Barber of Seville. The performances of Kemble and Siddons are said to have decided Talma's taste. He returned to Paris, and, through the interest of Molé the actor, made his debût on the boards of the théâtre Français in the part of Seide, in Voltaire's tragedy of Mahomet. After performing a variety of insignificant characters, accident lifted him to the summit of his profession. Chenier's tragedy of Charles IX. was put in rehearsal, when Saintfal, the principal actor, returned his part, saying, with a sneer to the author, 'give it to young Talma.' Chenier took him at his word; Talma accepted the part with delight, and devoted all his energies to the study of it, and to a strict fidelity of costume; so that the audience, equally surprised and delighted, continued to him, throughout the representation, the tumultuous approbation with which they first greeted his appearance. His greatest triumph, however, was yet to follow. Ducis had translated the Othello of Shakspeare; but, not daring to contend so far against French prejudices as to exhibit the murder of Desdemona on the stage, he had furnished a new catastrophe. Talma was bold enough to prefer the original termination, and, after considerable hesitation, resolved, with the consent of the author, to risk it. His success astonished even himself, and was most honorably rewarded. From this moment he became the paramount tragedian, and continued at the summit of his profession, by which he acquired a handsome fortune, till his death. He was generally esteemed by men of rank and talents for his powers of fascination also in private society, and was a great favorite with the emperor Napoleon. In 1825 he published 'Reflexions' on his art, which display a considerable variety of study and research. The death of Talma took place at Paris October 19th, 1826, after a distressing illness arising from an obliteration of a portion of the large intestines. Before his death he embraced his theatrical friends Jouy, Arnault, and Duvilliers, and expired ejaculating the name of Voltaire!

TAL'ON, *n. s.* Fr. and Span. *talon*, of Lat. *talus*. The claw of a bird of prey.

It may be tried whether birds may not be made to have greater or longer *talons*.

Bacon's Natural History.

Upward the noble bird directs his wing,
And, towering round his master's earth born foes,
Swift he collects his fatal stock of ire,
Lifts his fierce *talon* high, and darts the forked fire.

Prior.

Talmud is the name of two Jewish works, the Talmud of Jerusalem and the Talmud of Babylon. Each of these is composed of two parts; the Mishna, which is the text, and is common to both, and the Gemara or commentary. See Gemara and Mishna. The Mishna, which comprehends all the laws, institutions, and rules of life, which, besides the ancient Hebrew Scriptures, the Jews thought themselves bound to observe, was composed, according to their own unanimous testimony, about the close of the second century. It was the work of Rabbi Juda Hakkadosh, who was the ornament of the school at Tiberias, and is said to have occupied him forty years. The commentaries and additions which succeeding rabbies made were collected by Rabbi Johanan Ben Eliezer, in the fifth, sixth, or seventh century, under the name of Gemara, that is, completion; because it completed the Talmud. A similar addition was made to the Mishna by the Babylonish doctors in the sixth or seventh century. The Talmud of Babylon is most valued by the Jews; and this is the book which they mean, when they talk of the Talmud in general. An abridgment of it was made by Maimonides in the twelfth century, in which he rejected some of its greatest absurdities. The last edition of the Talmud of Babylon, printed at Amsterdam, is in 12 vols. folio. The Talmud of Jerusalem is in one large folio.

TALOOK, an Arabic word, which signifies literally attachment, connexion, dependence. In Bengal, however, where it occurs perpetually in the enumeration of the districts and subdivisions of that province contained in the institutes of Akber, it signifies a tenure of land. Hence the talook of Cashinat, the talook of Meheys the headman, the talook of Ahmed Khan, &c. See A Dissertation concerning the Landed Property of Bengal, by Sir Charles Rouse Boughton.

TALPA, in zoology, the mole, a genus of quadrupeds belonging to the order of feræ and class of mammalia. It has six unequal foreteeth in the upper jaw, and eight in the lower; one tusk on each side in each jaw; seven grinders on each side above, and six below. There are seven species, viz. 1. T. aurea, the gilded mole, or Siberian mole of Pennant, has three toes on the fore feet, with very large claws; five on the hind, with weak claws; but no tail. The snout is shorter than that of the European (No. 3); the nose naked; the head and body four inches; the fur above varied with glossy green, golden, and reddish copper color; the lower a cinereous brown. They inhabit the Cape of Good Hope and Siberia.

2. T cristata, the crested mole, or sorex cristatus of Gmelin, has five toes on each foot; a short tail; and the nose long and surrounded at

the point with ten or fifteen short radiated tendrils forming a star; the body is thick and round, and covered with a fine short dusky fur. They feed on roots, and inhabit North America.

3. T. Europæa, the European mole, is the only species found in Britain. They inhabit the whole of Europe, except Ireland, where no moles are found. They are also common in the North of Asia and Africa. They chiefly frequent moist fields exposed to the sun, meadows, and gardens; through which they form subterraneous roads in every direction in search of worms, on which and the larvæ of insects they feed, and not on vegetables, though they do great damage by loosening the roots of plants. They are most active before rain, as the worms are then in motion. The penis of the male is exceedingly long in proportion: they pair and propagate in spring, the female bringing four or five young at a birth, which are placed in nests made of moss, leaves, and dried grass, under the largest hillocks of the field; these are constructed with wonderful ingenuity, consisting of an interior hillock, surrounded with a ditch, which communicates with several galleries, on purpose to carry off the moisture; and the nest is covered over with a dome of earth, like the flat arch of an oven. Moles are destroyed by a paste composed of palma christi and white hellebore, or by flooding the fields which they infest; though, in the latter case, they sometimes escape by ascending trees. This species is five inches and three-quarters in length, and its tail about one inch. It has a large head, without any external ears, and eyes so very small, and so completely hid in the fur, as to make it vulgarly believed that it has none. As they live entirely below ground, they have certainly no occasion for eyes; and as they probably find their food by the smell, which is acute, eyes may serve merely to warn them when they happen to emerge from the ground to return to their subterraneous dwelling. There are four varieties, viz. i. T. Europæa alba, the white mole, with fur uniformly white. ii. T. Europæa cinerea, the gray mole, has narrow fore paws; the fur is of a cinereous color. iii. T. Europæa nigra, the black mole, has fur uniformly black. iv. T. Europæa variegata, the variegated mole, has fur variegated with white spots.

4. T. flava, the yellow or American mole, has five toes on each foot, the fur is of a yellowish-brown color at the tips, and dark gray at the roots; the head is brightest; the rump dark; the belly deep brown; the feet and tail white. They inhabit North America.

5. T. fusca, the brown mole, the sorex aquaticus, or aquatic shrew, of Gmelin, has five toes on all the feet, which are palmated; the tail and feet short and white; two fore teeth in the upper, and four in the lower jaw. The head and body are five inches and a half long; the tail not an inch; the nose is slender; the upper jaw longer than the under. They inhabit North America. This and the cristata were formerly ranked under the genus sorex; but, as they have the manners and figure of the moles, they are very properly restored to this genus by Mr. Pennant.

6. T. longicaudata, the long tailed mole of Pennant, has five toes on all the feet, which are broad, naked, and palmated; the fore feet have strong short claws; the hind feet long and slender ones, and are scaly. The head and body are from four to six inches long; the tail two, sometimes three. They inhabit North America.

7. T. rubra, the red American mole, has three toes on the fore feet, four on the hind, and a short tail. It is of a pale-red color, and in form resembles the European, but is larger, and the root of the tail is thicker. They inhabit America.—Kerr's Animal Kingdom, vol. i. p. 199—203.

TALTHYBIUS, a celebrated herald in the Grecian camp, during the Trojan war, the friend and minister of Agamemnon, who sent him to bring away Briseis from Achilles. He died at Ælgium, in Achaia. Hom. Il. i. v. 320, &c., Paus. vii. c. 23.

TALUD, or Talus, in architecture, the inclination or slope of a work; as of the outside of a wall, when its thickness is diminished by degrees, as it rises in height, to make it the firmer.

Talus, in fortification, the slope of a work, whether of earth or masonry.

Talus, in history, partly fabulous, the nephew of Dædalus, and, like his uncle, a great mathematical genius, having invented the saw, compasses, and other mechanical instruments. But this merit occasioned his murder. See Dædalus. The poets fabled that he was turned into a partridge.

TAMANDUA, or Tamanoir, in zoology. See Myrmecophaga.

TAMAR, in Scripture history, a name common among the Israelitish women, as, 1. The wife of Er and Onan, Judah's sons, and mother of Pharez and Zarah by himself; 2. A daughter of David and full sister of Absalom, ravished by her brother Amnon. See Absalom and Amnon. 3. A daughter of Absalom.

TAMARACA, a province of Brasil, bounded north by the province of Paraiba, and south by that of Olinda, east by the sea, and west by the country of the Indians. It is seven leagues along the coast, but thirty or forty in the interior of the country, and takes its name from an island which it has opposite to it near the continent, producing large quantities of Brasil wood, cotton, cocoa-nuts, sugar, melons, citrons, &c., besides a good deal of timber for fuel and other purposes. It is about nine miles in length, three in breadth, and about twenty-two in circuit. It has a commodious haven on the south side, and good fresh water. The entrance into the port is by a channel of between fifteen and sixteen feet water, commanded by a castle, built on an eminence, and formerly taken by the Dutch. The French had formerly a canton or settlement on this coast, but the Portuguese obliged them to evacuate it. The capital, called Nostra Segnora de Conceizao, or da Tamaraca, stands at the entrance into the river of the latter name; and near it is a small castle with a redoubt; about four miles north of the mouth of the river is the famous point denominated Punta Pedro.

Tamaraca, the capital of the above district, is situated on the top of a mountain, and has a magnificent parish church. Fourteen miles north of Olinda, and sixty-four south of Paraiba. Long. 35° 6′ W., lat. 7° 59′ S.

TAMARIL, a town of Spain in Catalonia; two miles north-east of Tarragona.

TAM'ARIND, *n. s.* Lat. *tamarindus*; Pers. *tamar*. A fruit.

Lenitives are cassia, *tamarinds*, manna.
Wiseman's Surgery.

Lay me reclined
Beneath the spreading *tamarind*, that shakes,
Fanned by the breeze, its fever cooling fruit.
Thomson.

The flower of the *tamarind* tree consists of several leaves, which are so placed as to resemble a papilionaceous one in some measure; but these expand circularly, from whose many-leaved flower-cup rises the pointal, which afterward becomes a flat pod, containing many flat angular seeds surrounded with an acid blackish pulp. *Miller.*

TAMARIND TREE, or TAMARINDUS, in botany, a genus of plants arranged by Linnæus under the class of triandria and order of monogynia; but Woodville, Schreber, and other late botanists, have found that it belongs to the class of monadelphia and order of triandria. In the natural system it is ranked under the lomentaceæ. There is only one species, viz.

T. Indica, a native of both Indies, of America, of Arabia, and Egypt. It was cultivated in Britain before 1633. It rises to thirty or forty feet, sending off numerous large branches, which spread to a considerable extent, and have a beautiful appearance; the trunk is erect, and covered with rough bark of a grayish or ash color; the leaves are small and pinnated, and of a yellowish green color; the flowers resemble the papilionaceous kind, and grow in lateral clusters; the calyx consists of four leaves, and the corolla of three petals, of a yellowish hue, and beautifully diversified with red veins; the fruit is a pod of a roundish compressed form, from three to five inches long, containing two, three, or four seeds, in a dark pulpy matter. The flowers appear, according to Jacquin, in October and November; but, according to Dr. Wright, during the whole of June and July. The pulp of the tamarind, with the seeds connected together by numerous tough strings or fibres, are brought to us freed from the outer shell, and commonly preserved in syrup. The fruit produced in the East Indies is more esteemed than that of the West, and is distinguished by the greater length of the pods, and the pulp being dryer and of a darker color. This fruit, the use of which was first learned of the Arabians, contains a large proportion of acid, with the saccharine matter, and is therefore not only employed as a laxative, but also for abating thirst and heat in various inflammatory complaints, and putrid disorders, especially those of a bilious kind; in which the cathartic, antiseptic, and refrigerant qualities of the fruit have been found equally useful. When intended merely as a laxative, it may be joined with manna, or purgatives of a sweet kind, by which it is rendered safer and more effectual. Three drachms of the pulp are usually sufficient to open the body; but, to prove moderately cathartic, one or two ounces are required. It is an ingredient in electuarium e cassia, and electuarium e senna or lenitive electuary. See MATERIA MEDICA, and PHARMACY.

The pulp consists, according to Vauquelin, of bitartrate of potash 300, gum 432, sugar 1152, jelly 576, citric acid 864, tartaric acid 144, malic acid 40, feculent matter 2880, water 3364; in 9752 parts.

TAMARIS, a river of Spain. Lempr.

TAM'ARISK, *n. s.* Lat. *tamarice*.

The flowers of the *tamarisk* are rosaceous. *Miller.*

Tamarisk is a tree that grows tall, and its wood is medicinal. *Mortimer's Husbandry.*

TAMARISK, TAMARIX, in botany, a genus of plants belonging to the class of pentandria, and order of tryginia; and in the natural system ranging under the thirteenth order, succulentæ. The calyx is quinquepartite; the petals are five; the capsule is unilocular and trivalvular, and the seeds pappous. There are only two species known: viz.—1. T. Gallica, French tamarisk, which grows upon the sea coasts. When burnt it affords sulphate of soda. See CHEMISTRY, Index. ii. T. Germanica, German tamarisk.

TAMARUS, a mountain of Epirus. Strabo.

TAMARY. See SOCOTORA and TAMARA.

TAMASA, a river of Asia, in Mingrelia.

TAMASCAL, the name given in California to a kind of sand-bath employed by the natives in the cure of the venereal disease. It is prepared by scooping a trench in the sand, two feet wide, one foot deep, and of a length proportioned to the size of the patient; a fire is then made through the whole extent of it, as well as upon the sand which was dug out of the hollow. When the whole is thoroughly heated, the fire is removed, and the sand stirred about, that the warmth may be equally diffused. The sick person is then stripped, laid down in the trench, and covered up to his chin with heated sand. In this position a very profuse sweat soon breaks out, which gradually diminishes according as the sand cools. The patient then rises and bathes in the sea, or the nearest river. This process is repeated till a complete cure is obtained. While the patient is undergoing the operation of the tamascal, he drinks a considerable quantity of a warm sudorific, prepared by the decoction of certain herbs, chiefly of the shrub called by the Spaniards Gouvernante.

TAMASEA, a plain of Cyprus, sacred to Venus. Plin. 5.

TAMBARINE', *n. s.* Fr. *tambourin*. A tabor; a small drum. It should be TAMBOURIN, which see.

Calliope with muses moe,
Soon as thy oaken pipe began to sound,
Their ivory lutes and *tambarines* forego.
Spenser's Pastorals.

TAMBOV, a large province of European Russia, lying to the west of those of Penza and Saratov, between lat. 51° 30′ and 55° 20′ N., and long 39° 40′ and 43° 40′ E. Its territorial extent is calculated at about 21,000 square miles, and its population at 1,135,000. It is level, and occupied by extensive steppes. Many tracts are woody and marshy, but in general a sandy soil pervades the north, and a black and fertile mould the south. It is well watered both by rivers and small lakes. The winter is severe, but in summer the heat is such that the Polish cochineal and Spanish fly are common. The steppes contain various beasts of game, and the

mineral products are iron, sulphur, and saltpetre. In 1808, on making a statistical survey, there were found in this government twenty-seven large manufacturing establishments, and the capital employed in trade was returned at £500,000 sterling. The province is divided into twelve circles.

Tambov, a considerable town, the capital of the above government, is situated on the river Zna. It is the see of a Greek bishop; with a seminary, gymnasium, and schools for the families of the better classes. It has a large monastery, in which there are two churches; and the town contains fourteen other churches. It has manufactures of woollens, canvas, linen, and alum, and a considerable carrying trade; but the chief employment of the inhabitants is agriculture. Inhabitants 10,700. 286 miles south-east of Moscow.

TAMBOUR, in architecture, a term applied to the Corinthian and Composite capitals, as bearing some resemblance to a drum, which the French call tambour. Some choose to call it the vase, and others campana or the bell.

Tambour is also used for a little box of timber work, covered with a ceiling, withinside the porch of certain churches; both to prevent the view of persons passing by, and to keep off the wind, &c.; by means of folding doors, &c.

Tambour also denotes a round course of stone, several whereof form the shaft of a column, not so high as a diameter.

Tambour, in the manufactures, is a species of embroidery. The tambour is an instrument of a spherical form, upon which is stretched, by a string and buckle, a piece of linen or thin silken stuff; which is wrought with a needle of a particular form, and by means of silken or gold and silver threads, into leaves, flowers, or other figures.

TAMBOURIN, a tabor or small drum: also a dance performed on the French stage. The air is lively and the movements are quick. See Music.

TAME, *adj.* & *v. a.* Tame'able, *adj.* Tame'ly, *adv.* Tame'ness, *n. s.* Ta'mer. } Sax. tame; Belg. *taem*; Dan. *tam*. Subdued; gentle; domestic; crushed; depressed: to reduce from wildness; reclaim; make gentle: the adjective, adverb, and noun substantives corresponding.

If you should need a pin,
You could not with more *tame* a tongue desire it.
Shakspeare.

A most poor man, made *tame* to fortune's blows,
Who, by the art of known and feeling sorrows,
Am pregnant to good pity. *Id. King Lear.*

If the heavens do not their visible spirits
Send quickly down to *tame* the offences,
Humanity must perforce prey on itself. *Id.*

A puling cuckold would drink up
The lees, and dregs of a flat *tamed* piece.
Shakspeare.

True obedience, of this madness cured,
Stoop *tamely* to the foot of majesty. *Id. Henry IV.*

They cannot *tame*
Or overcome their riches; not by making
Baths, orchards, fish-pools, letting in of seas
Here, and then there forcing him out again.
Ben Jonson.

Ganzas are supposed to be great fowls of a strong flight, and easily *tameable*; divers of which may be so brought up as to join together in carrying the weight of a man. *Wilkins.*

Praise him, each savage furious beast,
That on his stores do daily feast,
And you, *tame* slaves of the laborious plough,
Your weary knees to your Creator bow.
Roscommon.

A race unconquered, by their clime made bold,
The Caledonians, armed with want and cold,
Have been for ages kept for you to *tame*. *Waller.*

What courage *tamely* could to death consent,
And not by striking first the blow prevent? *Dryden.*

Has he given way?
Did he look *tamely* on, and let them pass? *Addison.*

Thales the Milesian said, That of all wild beasts a tyrant is the worst, and of all *tame* beasts a flatterer. *Id.*

Such a conduct must appear rather like *tameness* than beauty, and expose his authority to insults.
Rogers.

He, great *tamer* of all human art,
Dulness! whose good old cause I yet defend. *Pope.*

Can you love and reverence your prelate, whom you *tamely* suffer to be abused? *Swift.*

TAMERLANE, or Timur Bek, a celebrated prince and conqueror. As he very early exhibited uncommon courage, he had at the age of twenty-five attained the highest dignities. He spent nine years in different countries, travelling for improvement. He conquered the three great empires of Persia, India, and Egypt; plundered Bagdad, Delhi, Cairo, and other rich cities; and took prisoner Bajazet I. emperor of the Turks; so that his power, riches, and magnificence became immense. There remain vast monuments of his grandeur in the cities, towns, castles, and walls, which he built; in the rivers and canals which he dug, as well as in the bridges, gardens, palaces, hospitals, mosques, and monasteries, which he erected in the various parts of Asia. Timur, according to the historian Arabshah, was very corpulent and yet tall. He had a large forehead, and a big head. His countenance was agreeable, and his complexion fair. He had a large beard, was very strong, and well limbed; had broad shoulders, thick fingers, and long legs. His constitution was amazingly vigorous; but he was maimed in one hand, and lame of the right side. His eyes appeared full of fire; his voice was loud and piercing; and, when far advanced in years, his understanding was sound, his body vigorous and robust. He died on the first of April 1405, aged seventy-one, in the thirty-sixth year of his reign. See Bagdad, India, Moguls, Persia, and Syria.

TAMESIS, in ancient geography, a river of South Britain, now called the Thames. Cæs. de Bel. Gal. v. c. ii.

TAMMEAMEA, or Tamahama, king of the Sandwich isles, in the Pacific Ocean, who at the death of Captain Cook, in 1780, had arrived at manhood, but had no concern in that event. Tirrioboo, the king of Owhyhee, the largest of the Sandwich Islands, having offended his principal officers, he was put to death, and Tammeamea was chosen to succeed him. He soon showed extraordinary talents for his situation, and it was a part of his policy to encourage the settlement of Europeans in his dominions.

When Vancouver visited Owhyhee, Tammeamea put himself under the protection of that officer, as the representative of the king of Great Britain; and, as the price of his submission, he was assisted in building a fine vessel. Tammeamea afterwards formed a fleet, with which he conquered the adjoining islands, and traded to China. He subsequently erected a fort on the island of Vahou, and obtained from the Russians some artillery; while, by encouraging the trading of his subjects with navigators, he added to his own wealth and importance as well as that of his people. This enterprising monarch died in March, 1819. Rhio Rhio, the son and successor of Tammeamea, having made a visit to this country, together with his queen, in 1824, both their majesties died in London, after a few months' residence.

TAM'PER, *v. a.* Derived by Skinner from Lat. *tempero*: by others considered as a frequentative of tempt. To try in a meddling way; meddle; be busy with physic; practise secretly.

That key of knowledge, which should give us entrance into the recesses of religion, is by so much *tampering* and wrenching made useless.
Decay of Piety.

Others *tampered*
For Fleetwood, Desborough, and Lambert.
Hudibras.

'Tis in vain
To *tamper* with your crazy brain,
Without trepanning of your skull
As often as the moon's at full. *Id.*

'Tis dangerous *tampering* with a muse,
The profits small, and you have much to lose:
For, though true wit adorns your birth or place,
Degenerate lines degrade the attainted race.
Roscommon.

He tried washes to bring him to a better complexion, but there was no good to be done; the very *tampering* cast him into a disease. *L'Estrange.*

TAMTAM, a flat drum used by the Hindoos, resembling a tabor, but it is larger, and sounds louder.

TAMUS, black briony, in botany, a genus of plants belonging to the class of diœcia, and order of hexandria; and in the natural system ranging under the eleventh order, sarmentaceæ. The male and female flowers are both sexpartite; there is no corolla; the style is trifid; the berry is trilocular and inferior, and contains two seeds. There are only two species known:—1. T. communis, the common black briony; is a native of England, but has not been observed growing wild in Scotland. It has a large root, which sends forth several long slender stems: the leaves are large, heart-shaped, dark green, and grow on long foot-stalks: the flowers are greenish, and the berry red. It flowers from May to August, and is common in hedges. 2. T. elephantipes is a native of the Capé of Good Hope, and was first described by L'Heritier.

TAMWORTH, a borough and market-town, partly in Staffordshire and partly in Warwickshire, at the conflux of the rivers Tame and Anker, near the great navigable canal, eight miles south-east of Litchfield, and 114 north-west of London. The church is an ancient irregular building, containing several curious monuments; and the town is large and well-built, and has two bridges. In the town are places of worship for dissenters, a hospital, and a grammar-school. It is governed by two bailiffs, being one for each county: twenty-four burgesses, town-clerk, &c., with a high steward, recorder, and under steward. It was first incorporated by queen Elizabeth, and returns two members to parliament, one for each part of the town, the number of voters being about 250. The returning officers are the bailiffs. The town has a considerable manufacture of narrow cloths, and is noted for good ale. Calico-printing and tanning are now the principal trades carried on here. Here are two banking houses. Tamworth-castle is the seat of the earl of Leicester. Market on Tuesday. Fairs, May 4th, July 26th, and October 24th. It is a curacy.

TAN, *v. a.* Fr. *tanner;* Belg. *tannen;* Arm. *tann,* oak; Teut. *tan,* the fir. To impregnate or imbue with bark; imbrown, particularly by the sun.

His face all *tanned* with scorching sunny ray,
As he had travelled many a summer's day
Through boiling sands of Araby and Ind. *Spenser.*

Like sun-parched quarters on the city gate,
Such is thy *tanned* skin's lamentable state. *Donne.*

A brown for which heaven would disband
The galaxy, and stars be *tanned.* *Cleaveland.*

A human skull covered with the skin, having been buried in some limy soil, was *tanned* or turned into a kind of leather. *Grew's Museum.*

Black cattle produce tallow, hides, and beef; but the greatest part of the hides are exported raw for want of bark to *tan* them. *Swift.*

They sell us their bark at a good price for *tanning* our hides into leather. *Id. Miscellanies.*

Tanners use that lime which is newly drawn out of the kiln, and not slacked with water or air. *Moxon.*

TAN, the bark of the oak after it has been ground and used by the tanner. The smaller sort is generally made up in little square cakes called turf, and sold for firing. The coarser sort is sometimes dried in the sun, and used by bakers for heating their ovens, &c., but its chief use is for hot-beds, to raise pine apples and other plants. William III. introduced the use of it from Holland, for raising orange trees; after which it was discontinued till about 1719, when ananas were first brought into England. It came into general use, and has ever since been much used by gardeners for foreing, &c., by its strong and lasting fermentation. The smaller the tan, the quicker it heats; but the larger sort acquires heat more gradually and retains it longer: gardeners therefore use the one or the other, or a mixture of both, according to the purpose for which it is wanted. It is some time after the tan comes out of the pit before it begins to heat; but, having lain a week or two, it ferments, and, if put into hot-beds properly prepared, will retain a moderate heat for three or four months. When useless for the hot-house it is still an excellent manure

TAN is sometimes, though improperly, used for the bark itself, which is the chief ingredient in the tanning of leather. Oak bark, on account of its great astringency and gummy resinous properties, is preferred to all other substances for the purpose of tanning, as it not only preserves the

leather from rotting, but also, by condensing the pores, renders it impervious to water. See TANNING.

TAN, in chemistry, is a substance found in most vegetables, which, not having hitherto been resolved into component parts, is therefore considered as simple.

TANA, a large river of Lapland, forming the boundary between Russia and Sweden for 150 miles. It traverses part of Finmark, and falls into the Arctic Ocean in lat. 71° N., long. 31° 30′ E., at a gulf to which it gives name. A large quantity of salmon is caught here

TANACETUM, tansy, in botany, a genus of plants belonging to the class of syngenesia, and order of polygamia superflua; and in the natural system ranging under the forty-ninth order, compositæ. The receptacle is naked; the pappus somewhat emarginated; the calyx imbricated and hemispherical; the florets of the radius are trifid, and scarcely distinguishable. Gmelin has enumerated seven species, of which only one is a native of Britain, viz. T. vulgare, common tansy, grows three or four feet high; the leaves are bipinnated and serrated; the flowers yellow, and terminate the branches in flat umbels. It is found on the borders of fields and dry banks; it abounds at Wark, and Ford-castle near Kelso; on the side of Gareloch on the west coast of Ross-shire; and in Breadalbane. It flowers generally in August. There is a variety with curled leaves, called curled tansy. It has a bitter taste, and an aromatic smell disagreeable to many people. It is good for warming and strengthening the stomach; the young leaves are therefore used as an ingredient in puddings, &c. It is rarely used in medicine, though extolled as a good emmenagogue. A drachm of the dried flowers has been found beneficial in hysteric disorders arising from suppression. The seeds and leaves were formerly in esteem for destroying worms in children, and are reckoned good in colics and flatulencies. In some parts of Sweden and Lapland, a bath with a decoction of tansy is used to assist parturition. See MATERIA MEDICA.

TANÆCIUM, in botany, a genus of the angiospermia order, belonging to the didynamia class of plants; and in the natural method ranking under the twenty-fifth order, putamineæ. The calyx is monophyllous, tubulated, truncated, and entire; the corolla long, monopetalous, and white; the tube cylindrical; the lymbi erect, spreading, and nearly equal: the fruit a berry covered with a thick bark, large, oblong, internally divided into two parts; in the pulp are contained a number of seeds. There are only two species, viz. 1. T. jaroba, and 2. T. parasiticum, both natives of Jamaica. They grow by the sides of rivers, and climb on trees and bushes. This genus is omitted by Mr. Lee.

TANAGER, in ancient geography, a river of Italy, in Lucania, remarkable for its beautiful cascades and meanders, through a fine picturesque country. Virg. Geor. iii. v. 151. It is now called Negro.

TANAGRA, an ancient town of Bœotia, near the Euripus, between the Asopus and Thermodon, famous for cock-fighting.

TANAGRA TANAGER, in ornithology, a genus of birds belonging to the order of passeres. The beak is conical, acuminated, emarginated almost triangular at the base, and inclining a little towards the point. Dr. Latham has described forty-four species, all of which are of foreign extraction.

TANDY (James Napper), born in Ireland in 1757, a merchant at Dublin, who, being an enemy to the ascendancy of England, attempted to bring about a revolution. In 1791 he published a plan of reform, and was appointed secretary of a Catholic association, though himself a Protestant dissenter. He was also nominated colonel of the volunteers of Dublin; but rendered himself so obnoxious to the government, that to avoid being arrested he fled to France. Here the executive directory gave him a commission as general of brigade in an expedition against Ireland, in August, 1798, under general Rey. On its failure he took refuge at Hamburg; but, being delivered up to the English minister, he was taken to Ireland, tried for high treason, and received sentence of death. But the judgment was not executed, and, being liberated after the peace of Amiens, he went to France, and died at Bordeaux, in August, 1803.

TANETUM, an ancient town of Italy, in Mutina, now called Tonedo.

TANFANÆ LUCUS, a sacred grove in Germany, in the country of the Marsi, between the Ems and Lippe. Tac. An. i. c. 51.

TANG, *n. s.* & *v. n.* Dut. *tanghe*, acrid; Lat. *tango*. A strong taste; taste left in the mouth: obsolete. To ring with (for twang.)

Be opposite with a kinsman, surly with thy servants; let thy tongue *tang* arguments of state; put thyself into the trick of singularity.
Shakspeare. Twelfth Night.

She had a tongue with a *tang*,
Would cry to a sailor, Go hang. *Id. Tempest.*

There is a pretty affectation in the Allemain, which gives their speech a different *tang* from ours.
Holder.

Sin, taken into the soul, is like a liquor poured into a vessel; so much of it as it fills it also seasons; so that although the body of the liquor should be poured out again, yet still it leaves that *tang* behind it. *South.*

It is strange that the soul should never once recal over any of its pure native thoughts, before it borrowed any thing from the body; never bring into the waking man's view any other ideas but what have a *tang* of the cask, and derive their original from that union. *Locke.*

There was not the least *tang* of religion, which is indeed the worst affectation in any thing he said or did. *Atterbury.*

TAN'GENT, *n. s.* } Fr. *tangent;* Lat. *tan-*
TAN'GIBLE, *adj.* } *gens.* For the definition of tangent see below: tangible, perceptible to the touch.

Tangible bodies have no pleasure in the consort of air, but endeavour to subact it into a more dense body. *Bacon.*

By the touch, the *tangible* qualities of bodies are discerned, as hard, soft, smooth. *Locke.*

Nothing in this hypothesis can retain the planets in their orbs, but they would immediately desert them and the neighbourhood of the sun, and vanish away

in *tangents* to their several circles into the mundane space. *Bentley's Sermons.*

TANGENT OF AN ARCH is a right line drawn perpendicularly from the end of a diameter passing to one extremity of the arch, and terminated by a right line drawn from the centre through the other end of that arch, and called the secant. See GEOMETRY.

TANGIER, a celebrated sea-port of Fez, in Morocco, is situated on the straits of Gibraltar, a few miles to the east of cape Spartel. It was known under the name of Tingis or Tinja to the Romans, who took it under Sertorius. On the invasion of the Saracens, it was surrendered to them by count Julian. In modern times Tangier has been a subject of eager contest between the Moors and Portuguese. In 1437 it was besieged by prince Ferdinand; but his army was defeated, and capitulated. In 1471 Alonzo of Portugal succeeded in obtaining possession of it; and about two centuries after, in 1662, it became the property of England, being ceded to Charles II. as a marriage portion with the princess Catharine of Portugal. The English, however, abandoned it in 1684. Tangier became afterwards a distinguished station of piracy, for which its situation at the mouth of the straits gave it great advantages; but the disuse of this nefarious practice has greatly diminished its importance. It now subsists chiefly by supplying the British garrison of Gibraltar with cattle and vegetables, permission for which purpose was given by Muley Ismael, the grandfather of the present emperor. The bay is encumbered by the ruins of the mole and fortification, and is not very safe during winter in westerly winds. The best anchorage is at the eastern point. There are still some batteries facing the bay: 108 miles N. N. W. of Fez, and thirty-eight W. S. W. of Gibraltar. Long. 5° 50′ W., lat. 35° 42′ N.

TAN'GLE, *v. a., v. n.,* & *n. s.* See ENTANGLE. To implicate; knit together; ensnare; entrap; embroil: be entangled: a tangle is a knot of interwoven or complicated things.

She means to *tangle* mine eyes too,
'Tis not your inky brows, your black silk hair,
Your bugle eye-balls, nor your cheek of cream.
Shakspeare.

I do, quoth he, perceive
My king is *tangled* in affection to
A creature of the queen's, lady Anne Bullen. *Id.*

You must lay lime to *tangle* her desires
By wailful sonnets, whose composed rhimes
Shall be full fraught with serviceable vows. *Id.*

When my simple weakness strays,
Tangled in forbidden ways,
He, my Shepherd! is my guide,
He's before me, on my side. *Crashaw.*

He leading swiftly rowled
In *tangles,* and made intricate seem strait,
To mischief swift. *Milton's Paradise Lost.*

Now ly'st victorious
Among thy slain self-killed,
Not willingly, but *tangled* in the fold
Of dire necessity. *Id. Agonistes.*

With subtile cobweb cheats,
They 're catched in knotted law-like nets;
In which when once they are entangled,
The more they stir, the more they 're *tangled.*
Hudibras.

TANGROLIPIX, sultan of the Turks, in the eleventh century, a barbarous but not ungenerous conqueror, and the first of the Turks who made inroads upon the Eastern empire. He and his nephew, Cutlu-Moses, ravaged Iberia. Tangrolipix also conquered Persia in 1030, and founded a new dynasty of Turkish sultans, who reigned there for a century. See PERSIA.

TANJORE. A district of the Southern Carnatic, Hindostan, situated between 10° and 12° of N. lat. To the north it is bounded by the Cauvery; on the south by the sea; to the east it has also the sea; and on the west Trichinopoly and the polygar's territory.

This principality is entitled to the second rank among the provinces of Hindostan for agriculture and valued rent, the first being assigned to the district of Burdwan in Bengal. For the purposes of irrigation, prodigious mounds have been raised at Coilady to prevent the waters of the Cavery from rejoining those of the Coleroon after they have separated near Trichinopoly. From this southern branch of the river canals are conducted in all directions, which, by means of embankments and reservoirs, are diverted into every field, and fertilize a tract of country from Devicotta to Point Calymere, which would otherwise remain a barren sand. The inhabitants of this district are uncommonly industrious and expert in husbandry; there is consequently but a very small proportion of waste land compared with what is seen in some of the neighbouring territories. The dry and wet cultivation are nearly equal, being about fifty per cent. each.

It appears that, in 1807, the province consisted of 5873 townships. Of this number there are 1807 townships, in which one individual holds the whole undivided lands; 2202 of which the property is held by several persons having their distinct and separate estates; and 1774 the landed property, in which is held in common by all the Meerassdars, or proprietors of the village, who contribute labor, and receive a share of the crop in the proportion of their respective properties.

The principal articles exported to Madras are indigo, cocoa nuts, rice, grain, paddy, lamp-oil, with some piece goods. The remaining articles, from their description, appear to have been first received from the eastward, Ceylon, or the Malabar coast, and afterwards sent to Madras. These consist of betel nut, tin, pepper, tortoise-shell, benjamin, arrack, Trincomale wood, and hing. The imports into this province from Madras are small in quantity and value, and are composed chiefly of articles for the European troops and residents, with some iron hoops, camphor, raw silk, silk piece goods, anchors, iron of various sorts, gunnies, planks, and long pepper-roots. The sea-ports of most commerce are Tranquebar, Nagore, Negapatam, Carical, and Devicotta.

The Hindoo religion has been preserved in considerable splendor here, and the ancient places of worship, with their vast endowments, remain untouched. In almost every village there is a pagoda with a lofty gateway of massive architecture, where a great number of Brahmins are maintained; and on all the great roads are

choultries, built for the accommodation of pilgrims. The Brahmins are here the chief holders of land, and perform almost every office of husbandry, except holding the plough. They are all extremely loyal to the British, who grant 45,000 pagodas annually for the support of the poorer temples.

In remote times Tanjore was distinguished geographically by the name of Chola Desa, from whence originated by several corruptions the word Coromandel, and in native manuscripts its sovereign is still designated the Cholia rajah. The present race are descended from Eccojee, a Mahratta chief (the brother of Sevajee), who, in A. D. 1675, conquered the city and province, which have been retained by the same dynasty ever since, the Mahratta being the proper language of the Tanjore court. The expedition of the British troops into Tanjore, in 1749, was the first warfare in which they were engaged against the forces of a native prince; and it proved unsuccessful as to its main object, the restoration of a deposed rajah of Tanjore, who had applied for assistance to the governor of Fort St. David. Sersajee, the present rajah, is the adopted son of Tuljajee, who died A. D. 1786, and was carefully educated under the celebrated Danish missionary Mr. Schwarts; yet he continued a staunch adherent to the Brahminical doctrines and superstitions. In every other respect he is a man of liberal sentiments, and particularly indulgent to the Danish missionaries who live in his country. While yet an independent prince he protected their schools, and extended his kindness to the Roman Catholics also, who, in 1785, were estimated at 10,000 persons.

In 1799 the territory of Tanjore was subjected by treaty to the British authority; on this event the rajah reserved to himself several palaces, the Tranquebar tribute of 2000 chuckrums, a clear allowance of one lack of rupees annually, and one-fifth of the surplus revenues after payment of the civil and military disbursements, which amounts to nearly twice as much more. He was allowed, as a particular favor, to retain the two forts of Tanjore, which he keeps in excellent repair, and garrisoned with 1500 men. The province now forms one of the districts of the Madras presidency, and the arrangement has proved equally advantageous to the inhabitants and to the British.

Tanjore. A city in the Southern Carnatic, the capital of the above district, comprehends two fortresses, both of which are given up to the rajah; but, on the exigence of war, the British have a right to re-occupy them. The small fort is a mile in circumference, very strong, and in good repair. The walls are lofty, and built of large stones, and on the corners of the ramparts are cavaliers. The ditch, which is broad and deep, is cut out of the solid rock, and has a well formed glacis. It joins on one side to the large fort where the rajah resides, which is fortified in a similar manner. In the small fort is the celebrated pagoda, the chief building of which is perhaps the finest specimen of the pyramidical temple in Hindostan. Within is a bull carved from a block of black granite, an excellent example of Hindoo sculpture. From one of the cavaliers there is a beautiful view. The pagoda forms the foreground; then appears the large fort with the rajah's palace and temples, behind which a rich country is seen covered with rice fields and clumps of trees, and beyond all a chain of lofty mountains. The river Cavery here is at the highest when the periodical rains prevail in Mysore. In early ages this was the great seat of learning in the South of India, and here the almanacs were framed, according to which the year 1800 of the Christian era corresponds with the year 1722 of Salivahanam, and the 4901 of the Cali Yug; which reckoning differs one year in the former era, and seven in the latter from that used in Karnata. The British were repulsed from before Tanjore in A. D. 1749, and it was besieged without success by M. Lally in 1758. Travelling distance from Madras, 205 miles; from Seringapatam, 237; and from Calcutta 1235 miles.

TANIS, in ancient geography, a large lake of Egypt, now called Menzaleh. See Menzaleh.

Tanis, an ancient city of Egypt, seated near the lake, on one of the eastern mouths of the Nile.

TAN'IST, *n. s.* } An Irish word. Erse *an*
Tan'istry. } *taanister*. The holder of a life estate: tanistry corresponding. Obsolete.

Presently after the death of any of their captains they assemble themselves to chuse another in his stead, and nominate commonly the next brother; and then next to him do they chuse next of the blood to be *tanist*, who shall next succeed him in the said captainry. *Spenser on Ireland.*

The Irish hold their lands by *tanistry*, which is no more than a personal estate for his life-time that is *tanist*, by reason he is admitted thereunto by election. *Id.*

If the Irish be not permitted to purchase estates of freeholds, which might descend to their children, must they not continue their custom of *tanistry?* which makes all their possessions uncertain. *Davies on Ireland.*

By the Irish custom of *tanistry*, the chieftains of every country, and the chief of every sept, had no longer estate than for life in their chieferies; and, when their chieftains were dead, their sons or next heirs did not succeed them, but their *tanists*, who were elective, and purchased their election by strong hand. *Id.*

Tank, in the language of Hindostan, is a place enclosed for receiving aud retaining the rain. During the periodical rains the tanks are filled, and thus in the dry season furnish water for the rice fields and cattle. Some of them are of great extent, measuring 300 or 400 feet on the side; they are of a quadrangular form, and lined with granite, descending in regular steps from the margin to the bottom.

TANK, *n. s.* Fr. *tanque*. A large cistern or bason.

Handle your pruning-knife with dexterity; go tightly to your business; you have cost me much, and must earn it; here's plentiful provision, rascal; sallading in the garden, and water in the *tank*; and, in holy days, the licking of a platter of rice when you deserve it. *Dryden's Don Sebastian.*

TANK'ARD, *n. s.* Fr. *tanquaerd*; Belgic *tankaerd*. A large vessel with a cover, for strong drink.

Hath his *tankard* touched your brain
Sure they 're fallen asleep again. *Ben Jonson.*

Marius was the first who drank out of a silver *tankard*, after the manner of Bacchus. *Arbuthnot.*

When any calls for ale, fill the largest *tankard* cup top full. *Swift.*

TANNA, an island in the South Pacific, one of the New Hebrides, was discovered by captain Cook in the year 1774; about twenty-two miles in length, and ten in breadth. The inhabitants would not suffer Cook, or any of his company, to advance far into the island. The produce, as far as could be seen, is bread-fruit, plantains, cocoa-nuts, a fruit like a nectarine, yams, tarra, a sort of potato, sugar-cane, wild figs, a fruit like an orange, which is not eatable, and some other fruits and nuts. Hogs did not seem to be scarce, but they saw not many fowls. Land birds are not more numerous than at Otaheite; but they saw some small birds with a very beautiful plumage, which they had never seen before, and a great variety of trees and plants. The people are of the middle size, but few.

TANNER (Dr. Thomas), an English prelate and celebrated antiquarian, born in 1674. He was admitted of Queen's College, Oxford. In 1697 he was chosen fellow. In 1722 he was made archdeacon of Norwich; and in 1731 bishop of St. Asaph. He died at Oxford in 1735; and after his death was published an elaborate work, said to have employed him for forty years, entitled Bibliotheca Britannica Hibernica, sive, de Scriptoribus qui in Anglia, Scotia, et Hibernia, ad sæculi XVII. initium floruerunt, &c.

TANNIN, in chemistry and the arts, one of the immediate principles of vegetables, was first distinguished by Seguin from the gallic acid, with which it had been confounded under the name of the astringent principle. He gave it the name of tannin, from its use in the tanning of leather; which it effects by its characteristic property, that of forming with gelatine a tough insoluble matter. It may be obtained from vegetables by macerating them in cold water; and precipitated from this solution, which contains likewise gallic acid and extractive matter, by hyperoxygenised muriate of tin. From this precipitate, immediately diffused in a large quantity of water, the oxide of tin may be separated by sulphureted hydrogen gas, leaving the tannin in solution.

Professor Proust has since recommended another method, the precipitation of a decoction of galls by powdered carbonate of potash, washing well the greenish-gray flakes that fall down with cold water, and drying them in a stove. The precipitate grows brown in the air, becomes brittle and shining like a resin, and yet remains soluble in hot water. The tannin in this state, he says, is very pure.

Sir H. Davy, after making several experiments on different methods of ascertaining the quantity of tannin in astringent infusions, prefers for this purpose the common process of precipitating the tannin by gelatin; but he remarks that the tannin of different vegetables requires different proportions of gelatin for its saturation; and that the quantity of precipitate obtained is influenced by the degree in which the solutions are concentrated.

M. Chenevix observed that coffee berries acquired by roasting the property of precipitating gelatin; and Mr. Hatchett has made a number of experiments, which show that an artificial tannin, or substance having its chief property, may be formed, by treating with nitric acid matters containing charcoal. It is remarkable that this tannin, when prepared from vegetable substances, as dry charcoal of wood, yields, on combustion, products analogous to those of animal matters. From his experiments it would seem that tannin is, in reality, carbonaceous matter combined with oxygen; and the difference in the proportion of oxygen may occasion the differences in the tannin procured from different substances, that from catechu appearing to contain most.

Bouillon Lagrange asserts that tannin by absorbing oxygen is converted into gallic acid. It is not an unfrequent practice, to administer medicines containing tannin in cases of debility, and at the same time to prescribe gelatinous food as nutritious. But this is evidently improper, as the tannin, from its chemical properties, must render the gelatin indigestible. For the chief use of tannin, see the following article.

According to Berzelius, tannin consists of hydrogen 4·186 + carbon 51·160 + oxygen 44·654. And the tannate of lead is composed of,

Tannin	100	26·923
Oxide of lead	52	14·

But there is much uncertainty concerning the definite neutrality of this compound.

TANNING. The several kinds of leather are prepared from the skins of animals macerated for a long time with lime and water, to promote the separation of the hair and wool, and of the fat and fleshy parts, in which recourse is also had to the assistance of mechanical pressure, scraping, and the like. The skin, when thus deprived of its more putrescible part, and brought considerably toward the state of mere fibre, is tanned by maceration with certain astringent substances, particularly the bark of the oak tree.

The hide consists almost wholly of gelatin, and all that is necessary is to divest it of the hair, epidermis, and any flesh or fat adhering to it. This is commonly done, after they have been soaked in water some time, and handled or trodden to cleanse them from filth, by immersing them in milk of lime. Some, instead of lime, use an acescent infusion of barley or rye-meal, or spent tan; and others recommend water acidulated with sulphuric acid. Similar acidulous waters are afterwards employed for raising or swelling the hide, when this is necessary. The skins, thus prepared, are finally to undergo what is properly called the tanning. This is usually done by throwing into a pit, or cistern made in the ground, a quantity of ground oak-bark that has already been used, and on the skins and fresh bark in alternate layers, covering the whole with half a foot of tan, and treading it well down. The tanning may be accelerated by adding a little water. As it is a long time before the hide is thoroughly tanned in this mode, at least many months, during which the bark is renewed three or four times; M. Seguin steeps the skins in a

strong infusion of tan, and assists its action by heat. Chaptal observes, however, that this requires an extensive apparatus for preparing the liquor and skins: the leather imbibes so much water that it remains spongy a long time, and wrinkles in drying; and it is extremely difficult so to arrange the hides in a copper as to keep them apart from each other, and free of the sides of the vessel.

The following account of M. Seguin's practice was transmitted to England in the year 1796:—To tan a skin is to take away its putrescent quality, preserving, however, a certain degree of pliability. This is effected by incorporating with the skin, particles of a substance which destroys their tendency to putrefaction.

The operations relating to tanning are therefore of two kinds:—the first is merely depriving the skin of those parts which would oppose its preservation, or which adhere to it but little, such as hair and flesh; the other consists in incorporating with it a substance, which shall prevent its putrefying. The operations of the first kind are technically termed, unhairing and fleshing; the operations of the second kind belong to tanning, properly so called. Fleshing is an operation merely mechanical; unhairing is a mechanical operation, if performed by shaving; or a chemical operation, if effected by dissolution or decomposition of the substance which connects the hair with the skin.

According to the ancient method, the dissolution of this substance was effected by means of lime; the decomposition either by the vinous fermentation of barley, by the acetous fermentation of oak-bark, or by the putrid fermentation produced by piling the hides one upon another. Unhairing by means of lime would often take twelve or fifteen months; this operation with barley, or the acetous part of tan, could not be performed in less than two months. The slowness of these operations, which the experiments of Seguin have shown may be finished in a few days, and in a more advantageous manner, by means of the same substances, proves that the nature of those operations was not understood by those who performed them. Those of tanning, properly so called, were as little known as the details we are about giving will prove, which we compare with the least improved routine now in practice. Whatever the method of unhairing was, the mode of tanning was always the same for skins unhaired with lime, or those prepared with barley or tan. This mode of operating would take eighteen months or two years, often three years, when it was wished to tan the hides thoroughly.

Among the substances for tanning, gall-nut, sumach, and the bark of oak, to which may be added catechu, appear the most proper, at least in the present state of our knowledge. In the middle departments of France, oak-bark is preferred, because it is the cheapest and most abundant substance. To use it, it is first ground to powder; then, according to the old mode, it is put into large holes dug in the ground, which are filled by alternate layers of ground bark and unhaired hides. As the principle which effects the tanning cannot act in the interior of the skin, unless carried in by some liquid in which it is first dissolved, tanning is not produced by the immediate action of the powdered bark upon the skin, but only by the action of the dissolution of the tanning principle originally contained in the bark. The tan therefore has the tanning property only when wetted so much as not to absorb all the water thrown on it. But as tanners put in their vats only a small portion of water compared to what would be necessary to deprive the bark of all the tanning principle which it contains, the bark put into the vats preserves, when taken out, a portion of its tanning principle.

This waste is not the only disadvantage of the old modes of proceeding; they are, besides, liable never to produce in the skins a complete saturation with the tanning principle. For, as the property of attraction is common to all bodies, according to the different degree of saturation, the water containing in solution a certain quantity of the tanning principle will not part, to a fixed weight of skins, with as much as the same quantity of water will in which a greater quantity of the principle is dissolved.

As the water which, in the old manner of proceeding, is in the vats, can contain but a small portion of the tanning principle, owing to the nature of the operation, it can give but a small portion of it to the skin, and even this it parts with by slow degrees. Hence, the slowness in the tanning of skins, according to the old method, which required two whole years, and sometimes three, before a skin was well tanned to the centre. Hence, also, the imperfection of skins tanned by that method; an imperfection resulting from the non-saturation of the tanning principle, even when it had penetrated the centre.

The important desideratum was, therefore, to get together, within a small compass, the tanning principle, to increase its action, and produce in the hide a complete saturation in a much shorter time than that necessary for the incomplete tanning produced in vats. But, first of all, it was necessary to analyse the skin, analyse the leather, and analyse the oak-bark. The principles of these three substances were to be insulated, and their action upon one another determined, the influence of their combination upon that action known, and the circumstances most productive of its greatest action found out.

Seguin, by following this method, has determined:—1. That the skin deprived of flesh and hair is a substance which can easily, by a proper process, be entirely converted into an animal jelly (glue). 2. That a solution of this last mentioned substance, mixed with a solution of tan, forms immediately an imputrescible and indissoluble compound. 3. That the solution of tan is composed of two very distinct substances; one of which precipitates the solution of glue, and which is the true tanning substance; the other which precipitates sulphate of iron, without precipitating the solution of glue, and which produces only the necessary disoxygenation of the skin, and of the substance which connects the hair to the skin. 4. That the operation of

tanning is not a simple combination of the skin with the principle which precipitates the glue, but a combination of that principle with the skin disoxygenised by the substance, which in the solution of tan is found to precipitate the sulphate of iron; so that every substance proper for tanning should possess the properties of precipitating the solution of glue, and of precipitating the sulphate of iron. 5. That the operation of tanning consists in swelling the skins by means of an acidulous principle; to disoxygenise, by means of the principle which in the solution of bark precipitates the solution of sulphate of iron, that substance which connects the hair to the skin, and thus produce an easy unhairing; to disoxygenise the skin by means of the same principle, and to bring it by this disoxygenation to the middle state between glue and skin; and then to combine with it, after this disoxygenation and while it is in this middle state, that particular substance in oak-bark, as well as in many other vegetables, which is found to precipitate the solution of glue, and which is not, as has been hitherto conceived, an astringent substance.

Agreeably to these discoveries, there only remains, in order to tan speedily and completely, to condense the tanning principle so as to accelerate its action. Seguin, to effect this, follows a very simple process. He pours water upon the powdered tan, contained in an apparatus nearly similar to that made use of in saltpetre works. This water, by going through the tan, takes from it a portion of its tanning principle, and by successive filtrations dissolves every time an additional quantity of it, till at last the bark rather tends to deprive it of some than to give up more. Seguin succeeds in bringing these solutions to such a degree of strength, that, he says, he can, by taking proper measures, tan calf-skin in twenty-four hours, and the strongest ox-hides in seven or eight days. These solutions, containing a great quantity of the tanning principle, impart to the skin as much of it as it can absorb, so that it can then easily attain a complete saturation of the principle, and produce leather of a quality much superior to that of most countries famous for their leather.

'On the above I have only to remark,' says Dr. Ure, 'that every new art or considerable improvement must unavoidably be attended with many difficulties in the establishment of a manufactory in the large way. From private enquiry I find that this also has its difficulties, which have hitherto prevented its being carried into full effect in this country Of what nature these may be I am not decidedly informed, and mention them in this place only to prevent manufacturers from engaging in an undertaking of this kind, without cautious enquiry.'

M. Desmond has recommended to saturate water with tannin by affusion on successive portions of oak-bark, or whatever may be used; and, when the bark will give out no more tannin, to extract what gallic acid still remains in it, by pouring on fresh water. To the latter, or acidulous liquor, he adds $\frac{1}{1000}$th part by measure of sulphuric acid; and in this steeps the hide, till the hair will come off easily by scraping. When raising is necessary, he steeps the hide ten or twelve hours in water acidulated with $\frac{1}{500}$th part by measure of sulphuric acid; after which they are to be washed repeatedly, and scraped with the round knife. Lastly, the hides are to be steeped some hours in a weak solution of tannin, then a few days in a stronger, and this must be renewed as the tannin is exhausted, till the leather is fully tanned.

For the softer skins, as calves, goats, &c., he does not use the acid mixture, but milk of lime. Of substances used for tanning Sir H. Davy observes, that one pound of catechu is nearly equal to two pound and a quarter of galls, three of sumach, seven and a half of the bark of the Leicester willow, eight and a half of oak-bark, eleven of the bark of the Spanish chestnut, eighteen of elm-bark, and twenty-one of common willow bark, with respect to the tannin contained in them. He observes, too, that leather slowly tanned in weak infusions of barks appears to be better in quality, being both softer and stronger than when tanned by strong infusions; and he ascribes this to the extractive matter they imbibe. This principle, therefore, affects the quality of the material employed in tanning; and galls which contain a great deal of tannin make a hard leather, and liable to crack, from their deficiency of extractive matter.—Vide Ann. de Chim. et de Phys.—Philos. Trans.—Philos. Mag.—Chaptal's Chem.

A more practical view of this useful art may be thus given:—When the hides which are to be tanned are raw (in which state they are called green hides), they are put to steep in water, in order to clear them of the blood and filth they may have collected in the slaughter-house. They are left to soak in the water for some time, and, if the hides are dry, they are steeped a longer time, sometimes for fourteen days; less in hot weather, or more in cold. They are drawn out once or twice to see if they are well softened. The neighbourhood and the command of water are necessary to these operations. Without these the hides cannot be prepared.

After the hides have been well softened, they next proceed to cleanse or free them from the hair. With this intention several different methods are employed; that which is the oldest, and still most generally followed, consists in the application of lime. In all tanneries, pits are formed under-ground, having their sides lined with stone or brick, in which lime-stone is slaked so as to form milk of lime. These pits are divided into three kinds, according to the greater or less strength of the lime. The hides intended to be scoured are first put into the weakest of these pits, wherein they are allowed to remain until the hair readily yields to the touch. If this liquor be not sufficiently active, they are removed to the next in gradation. The time they are soaked is longer or shorter in proportion to the strength of the lime, the temperature of the air, and the nature of the hides. It has been proposed to substitute lime-water in place of the milk of lime. But, though the lime-water acts at first with sufficient strength, its action is not sufficiently permanent, and, in order to succeed in clearing the hides by this means, it is necessary to renew it occasionally; and in this way the

hides may be prepared in a few days. In some tanneries, after they have been kept in the pits for a short time, they pile them up in a heap on the ground, in which state they are suffered to remain during eight days; after which they return them into the same pits whence they were taken, and this process is repeated till the hair can be easily scraped off.

In many countries they mix a large quantity of ashes with the lime; but the only effect this mixture appears to produce, is that of rendering the leather less consistent than when lime is solely employed. Many attribute the bad qualities of leather to the too great use of lime, which has a tendency to burn and render it brittle. Hence, in several well-conducted tanneries, in manufacturing leather for some particular uses, the employment of lime is carefully avoided. Hides may, indeed, be cleansed by subjecting them to an incipient fermentation, which may be produced in a variety of ways. But, in whatever manner the first part of the operation has been conducted, as soon as it is perceived that the hair is in a fit state to be removed, it is scraped off, on a wooden horse, by means of a crooked knife, which is not so sharp in any part of its edge as to injure the hide, or by a whet-stone. This operation is not only intended to remove the hair, but likewise the scurf and filth which collect on the skin at the root of the hair.

After removing the hair and filth, the next object is to free the hides from the adhesion of any part of the muscle, or fat, and to render them soft and pliant. Those which are intended for particular kinds of work, such as calves' skin for the upper leather of shoes, and neats' leather for shoulder-belts, do not require to be raised or swelled. As soon, therefore, as they are cleansed and freed from the flesh, &c., they are laid in a pit. The hides intended for the soles of shoes, and other strong leathers, are afterwards raised by means of processes which vary in different countries. When lime is employed, the operation is commenced by putting the cleansed skins into the weakest of the lime-pits, and afterwards passing them successively through the two others. They are kept about a week in each of the two weakest pits, and another in the strongest. During this operation care is taken to withdraw them, and pile them up in a heap, every two or three days, putting them again into the pit after it has been well stirred. Lime hardens the skin, and in those tanneries where it is used, the hides are put into a ley of pigeon's dung in order to soften them, and this process is termed graining. They are daily withdrawn from the ley, and laid up in a heap for half an hour. This operation is usually continued for ten or fifteen days. Sometimes also acid compositions are employed for raising the hides; and this operation is greatly accelerated by using the acids warm, as well as by the method practised in this country, of removing them from a weaker liquor into a stronger, until they be properly raised or swelled.

The skin, being thus prepared, is next subjected to the operation of tanning; and to this purpose vegetable astringents are employed. Those vegetables answer best which contain the greatest portion of the astringent principle, now known under the name of tannin. Sir H. Davy has demonstrated that caoutchouc, or Japan earth, contains more of this principle than any other vegetable with which we are acquainted; but oak bark is the substance most commonly employed in our climates; for it is not only very abundant in Europe, but likewise contains much tannin. Every species of oak, however, does not supply us with bark of the same quality; the white oak is inferior to the green oak which grows in the south, while this in its turn yields in the value of its bark to that procured from the roots of the kermes-bearing oak, which is employed in southern climates for tanning strong leathers. But, whatever kind of bark be employed, it is ground down to powder. The tan-pits are sometimes of a round, and at others of a square form, dug out to a considerable depth in the earth, and lined with wood or mason-work; their size being in proportion to the extent of the works. The method of tanning is different in different countries. According to calculation, from five to six pounds of tan is required to each pound of strong leather; and 1 cwt. of hides yields from fifty-two to sixty-six pounds of leather.

We will now detail another method chiefly taken from Sir H. Davy's memoir on the subject. After the skin has been cleaned, it is submitted to other operations before it is immersed in the tan liquor. According to Sir Humphry's account of the practices of the art, the large and thick hides which have undergone incipient putrefaction, are introduced for a short time into a strong infusion of oak bark, and after this they are acted on by water impregnated with a little sulphuric or acetic acid; in consequence of which they become harder and denser than before, and fitted after being tanned, for the purpose of forming the stouter kinds of sole leather. The lighter and thinner skins are treated in a different manner: they are macerated for some days in a ley formed from the infusion of pigeons' dung in water, which contains a little carbonate of ammonia; the skin is thus deprived of its elasticity, and becomes more soft. The tanning liquor is prepared by infusing bruised oak bark in water; and skins are tanned by being successively immersed in such infusions, saturated in different degrees with the astringent principles of the bark. The first leys in which they are immersed are weak, but towards the completion of the process they are used as strong as possible; and, in preparing stout sole leather, the skins are kept in an ooze, approaching to saturation, by means of layers of oak bark.

The infusion of oak bark, especially that obtained by the first maceration, contains principally tannin and extractive matter; the gallic acid, if present, as has been supposed, being at least in an inconsiderable proportion. In the course of the maceration of the skins in these liquors, the tannin combines gradually with the gelatin, which, in an organised form, principally constitutes the skin, and forms with it a compound insoluble in water, dense and impermeable to that fluid, while it possesses at the same time a certain degree of elasticity. The extractive matter also enters into the combination; for

when skin in a large quantity has exerted its full action on a small quantity of infusion, it at length abstracts the whole dissolved matter, and renders it colorless. From this extractive matter color is derived, and the skin may perhaps be rendered more dense.

It has been supposed that the gallic acid, frequently contained in vegetable astringents, facilitates the action of their tanning, in converting skin into leather. According to the theory of the operation, as given by Seguin, skin is gelatin in a hardened state from slight oxidisement; the gallic acid in some measure de-oxidizes it, and hence reduces it to that state in which it combines more easily with gelatin. There is little proof given, however, of this theory; and it appears sufficiently established that the operation can be performed without the presence of this acid; and indeed in the tan liquor prepared by one maceration from oak bark it is scarcely discoverable, and, if it do exist in it, it is in intimate combination with the extractive matter.

The operation of tanning, as now described, requires a number of months, from the skins being successively and slowly introduced into infusions of different degrees of strength. We have seen that Seguin, after his discovery of tannin, proposed to abridge the process by introducing the skins more speedily into strong infusions of the tanning substance; and in this way, according to the excellent report given on the art of tanning by Pelletiere and Lelivre, in which his method is fully described, the whole could be finished in about twenty days, and leather obtained equal in quality to that prepared by the old method. There is reason, however, to doubt of the superiority of this method. Mr. Nicholson, in some observations on this subject, when a patent was taken out for Seguin's method in this country, stated that, from information acquired from the manufacturers, he found that they had previously been sufficiently acquainted with the powers of the strong tanning infusions; and that it had been even proposed to employ them so as to abridge the process. But the leather thus prepared was by no means equal to that prepared in the old method. The advantage of the slow and gradual process appears to be, that the whole substance of the skin is penetrated and equally changed; while in the more rapid method the external parts must be more acted on; and the texture probably will be more unequal. It appears also, from Sir H. Davy's experiments, to combine with a larger quantity of the extractive matter contained in the astringent infusion; and hence too the advantage of the immersions in the weak liquors, as these contain more of this than the strong infusions. It must be confessed, however, that for any thing theory can discover, the common process appears to be unnecessarily protracted, and some advantage might probably be derived from adopting some of the manipulations of Seguin. The skin in drying increases in weight from the fixation of the vegetable matter: the quantity of this seldom exceeds one-third of its weight.

Of tawing, leather-dressing and dyeing, and other processes.—The dressing and preparing of the skins of lambs, sheep, goats, and other thin hides, though in many particulars closely resembling the method used with the thick cow and ox hides, forms a totally distinct branch of business, and is one in which a good deal of practical skill and nicety of manipulation are required to succeed perfectly. The processes are various according to the article required, and this branch of the manufacture supplies the immense demand of white and dyed leather for gloves, the morocco leather of different colors and qualities for coach-linings, book-binding, pocket-books, and thin leather for an infinite number of smaller purposes. Of these the white leather alone is not tanned, but finished by the process of tawing; the colored leather receives always a tanning independently of the other dyeing materials. The previous preparation of each, or that in which the skin is thoroughly cleansed and reduced to the state of simple membrane in which it is called pelt, is essentially the same whether for tawing or dyeing. It is thus performed at Bermondsey, near London, a place long celebrated for all branches of the leather business.

By far the greater number of the skins are imported: if lambs they are thus prepared:—The skins are soaked for a time in water to cleanse them from any loose dirt and blood, and put upon the beam commonly used for the purpose, which is a half cylinder of wood covered with leather, and scraped on the flesh side with the semicircular blunt knife with two handles used in this operation. They are then covered with a coat of lime of the consistence of paint on the flesh side, and hung up in considerable numbers in a small close room heated by flues, where they remain to putrefy for a given time. During this process a thick slime works up to the surface of the skin, by which the regularity of the process is ascertained, and the wool is loosed so that it readily comes off with a slight pull. Each skin is then returned to the beam, the wool taken off, and all the lime worked off with the knife, and the rough edges pared away. The skin is then put into a pit filled with lime-water, and kept there from two to six weeks, according to the nature of the skin, which has the effect of checking the further putrefaction, and produces a very remarkable hardening and thickening of its substance, and probably also it detaches a further portion of the slime. The skin is again well worked, and much of its substance pared down, and all inequalities smoothed with the knife. Pains and judgment are required in these operations, on the one hand not to endanger the substance of the skin by the putrefaction, and on the other hand to work out every particle of the lime, of which the least if retained will prevent the skin from dressing well in the subsequent processes, and from taking the dye uniformly and well. The skin is then again softened and freed from the lime. All the thickening produced by the lime is thus removed, and the skin is now highly purified, and is a thin extensible white membrane called in this state a pelt, and is fit for any subsequent operation of tawing or dyeing, or oil-dressing, or shammoying.

The method of bringing kid and goats' skins to the state of pelt is nearly the same as for lambs, except that the lining is used before the

hair is taken off, the hair being of but little importance and only sold to the plasterers; but the lambs' wool, which is more valuable, would be greatly injured by the lime. Kids' skins will take a longer time in tanning than lambs'.

If the pelts are to be tawed they are put into a solution of alum and salt in warm water, in the proportion of three pounds of alum and four pounds of salt to every 120 middle sized skins, and worked therein till they have absorbed a sufficient quantity. This again gives the skin a remarkable degree of thickness and toughness.

The skins are now taken out and washed in water, and then again put into a vat of bran and water, and allowed to ferment till much of the alum and salt is got out, and the unusual thickening produced by it is for the most part reduced. They are then taken to a room with a stove in the middle, and stretched on hooks, and kept there till fully dry. The skins are now converted into a tough, flexible, and quite white leather; but to give them a glossy finish, and to take off the harshness of the feel still remaining, they are again soaked in water and put into a large pail containing the yolks of eggs beat up with water. Here the skins are trodden for a long time, by which they so imbibe the substance of the egg that the liquor above them is rendered almost perfectly limpid; after which they are hung up in a loft to dry, and finished by glossing with a warm iron.

The essential difference, therefore, between tanning and tawing is that in the former case the pelt is combined with tan and other vegetable matter, and in the latter with something that it imbibes from the alum and salt (possibly alumine), and which is never again extracted by the subsequent washing and branning.

The Morocco leather, as it is called, prepared from sheep skins chiefly, and used so largely for coach-linings, pocket-books, and the best kind of book-binding, is thus made:—The skin, cleansed and worked in the way already described, is taken from the lime-water, and the thickening brought down, not by bran-liquor as in tawing, but by a bath of dogs' or pigeons' dung diffused in water, where it remains till suppled, and till the lime is quite got out and it becomes a perfectly white clean pelt. If intended to be dyed red, it is then sewed up very tight in the form of a sack with the grain side outwards, and is immersed in a cochineal bath of a warmth just equal to what the hand can support, and is worked about for a sufficient time till it is uniformly dyed. The sack is then put into a large vat containing sumach infused in warm water, and kept for some hours till it is sufficiently tanned. The skins intended to be black, or any color but red, are merely sumached without any previous dyeing. After some further preparation, the color of the red skins being finished with a weak bath of saffron, the skins when dry are grained and polished in the following way:—They are stretched very tight upon a smooth inclined board, and rubbed over with a little oil. Those intended for black leather are previously rubbed over with an iron liquor, which, uniting with the gallic acid of the sumach, instantly strikes a deep and uniform black. They are then rubbed by hand with a ball of glass with much manual labor, which polishes them and makes them very firm and compact. Lastly, the graining or ribbed surface by which this kind of leather is distinguished, is given by rubbing the leather very strongly with a ball of box-wood, round the centre of which a number of small equidistant parallel grooves are cut, forming an equal number of narrow ridges, the friction of which gives the leather the desired inequality of surface.

The process for the real Morocco leather, as prepared from goat-skins at Fez and Tetuan, is thus described by M. Broussonet:—The skins are first cleansed, the hair taken off, limed, and reduced with bran nearly in the way already described for the English morocco leather. After coming from the bran they are thrown into a second bath made of white figs mixed with water, which is thereby rendered slimy and fermentable. In this bath the skins remain four or five days, when they are thoroughly salted with sal-gem, or rock salt alone, after which they are fit to receive the dye, which for the red is cochineal and alum, and for the yellow pomegranate bark and alum. The skins are then tanned, dressed, suppled with a little oil, and dried.

Much excellent leather, and of various colors, is manufactured in different parts of Russia; of which the processes are given in Mr. Tooke's View of the Russian Empire, vol. iii. The saffian, or manoquin, which is prepared largely at Astracan, is manufactured only from the skins of goats and bucks; the usual colors of these are red and yellow. The shagreen, which is also manufactured at Astracan, consists of hides of horses and asses; but of these only a small part is used, cut from the crupper-line along the back about thirty-four inches upon the crupper, and twenty-eight along the back. The chief dyes of shagreen are green, blue, and black.

Various processes have been invented to render leather for shoes and boots water-tight, which is effected by an additional dressing with an oily or resinous matter; the following recipe is said to be effectual:—One pound of linseed-oil; half a pound of mutton suet; six ounces of bees-wax, and four of resin, are to be melted, thoroughly incorporated, and applied, while warm, to the upper-leather and the soles.

TANSILLO (Lewis), a celebrated Italian poet, born at Nola, about 1510. His poem, entitled Il Vindemiatore, i. e. the Vintager, being very indecent, all his poems were proscribed. To make some reparation for this error, he wrote La Lagrime de St. Pietro, i. e. the Tears of St Peter; which being presented to Pope Paul IV. he took off the interdict from all his poems, except the Vintager. He died about 1569.

TANTALIDES, in fabulous history, the descendants of Tantalus, as Atreas, Agamemnon, Menelaus, &c.

TAN'TALIZE, *v. a.* TAN'TALISM, *n. s.* TANT'LING. } From Tantalus, whose punishment was to starve among fruits and water which he could not touch. To torment by the show of unattainable pleasure: tantalism is a punishment of this kind: tantling, one who is seized with unattainable hopes.

Hard life,
To be still hot Summer's *tantlings*, and
The shrinking slaves of Winter. *Shakspeare.*
Thy vain desires, at strife
Within themselves, have *tantalized* thy life. *Dryden.*

The maid once sped was not suffered to *tantalize* the male part of the commonwealth. *Addison.*

A lively representation of a person lying under the torments of such a *tantalism*, or platonick hell. *Id. Spectator.*

TAN'TAMOUNT, *n. s.* French, *tantamount.* Equivalent.

If one-third of our coin were gone, and men had equally one-third less money than they have, it must be *tantamount*; what I scape of one-third less, another must make up. *Locke.*

TANTALUS, in fabulous history, king of Phrygia and Paphlagonia, was the son of Jupiter and the nymph Plota. He one day entertained the gods at his table; when, to prove their divinity, he served up his son Pelops cut in pieces. All the deities except Ceres perceived his cruelty and impiety, and would not touch his provisions. That goddess inadvertently eat a part of his left shoulder. Pelops, however, was restored to life; and an ivory shoulder given him in the room of that which had been eaten; but Tantalus was thrown into Tartarus, where he was punished with perpetual hunger and thirst. He was chained in a lake: the water of which reached up to his chin, but retired when he attempted to drink. The branch of a tree loaded with fruit hung down even to his lips, but on his attempting to pluck the fruit, the branch sprung upwards.

TANTALUS, a son of Thyestes, the first husband of Clytemnestra. Paus. 2

TANTALUS, in ornithology, a genus of birds belonging to the order of grallæ. The bill is long, subulated, and somewhat crooked; the face naked; the tongue short; and the feet have four toes palmated on the under part. There are, according to Dr. Latham, twenty-three species; of which the most remarkable is the T. ibis. the ibis, the bird so much valued by the ancient Egyptians for its utility in freeing the country from serpents, but now no longer found in Egypt. Mr. Bruce found a bird in Abyssinia, which, after comparing it with the description of the ancient writers, and the embalmed ibis of Egypt, he concludes is the same with the Egyptian ibis. It is minutely described by Mr. Bruce. It has a beak shaped like that of a curlew, two-thirds straight, and the remaining third crooked; the upper part of a green horny substance, and the lower part black. It measures four inches and a half from the occiput to the place where it joins the beak. The leg, from the lower joint of the thigh to the foot, is six inches; the bone round and very strong; and, from the lower joint of the thigh to where it joins the body, is five inches and a half. The height of the body from the sole to the middle of the back is nineteen inches; the aperture of the eye one inch; the feet and legs black; three toes before armed with sharp and straight claws; and a toe behind. The head is brown, and the plumage of the same color down to the back, or the place where the neck and back are joined. The throat is white, as well as the back, breast, and thighs; the largest feathers of the wing are of a deep black for thirteen inches from the tail; and six inches up the back from the extremity of the tail is black likewise.

TANTALUS's CUP. See HYDROSTATICS.

TAP, *v. a.* & *n. s.* } Fr. *tapper*; Belg. *tap-*
TAP'STER, *n. s.* } *pen.* To touch or strike lightly; to pierce or broach a vessel. It is used likewise of the liquor: a pipe out of which the liquor spouts: a tapster is one whose business it is to draw beer.

The oath of a lover is no stronger than the word of a *tapster*; they are both the confirmers of false reckonings. *Shakspeare.*

This is the right fencing grace, *tap* for *tap*, and so part fair. *Id. Henry IV.*

That blood already, like the pelican,
Hast thou *tapt* out, and drunkenly carouzed. *Shakspeare.*

The world is come now to that pass that the vintner and *tapster* may broach what religion they please; and the apothecary may mingle her as he pleases. *Howel.*

Some put under the trees raised of seed, about four inches below the place where they sow their seeds, a small piece of tile to stop the running down of the *taproot*, which occasions it to branch when it comes to the tile. *Mortimer's Husbandry.*

He has been *tapping* his liquors, while I have been spilling my blood. *Addison.*

Each shakes her fan with a smile, then gives her right hand woman a *tap* upon the shoulder. *Id. Spectator.*

As at hot cockles once I laid me down,
And felt the weighty hand of many a clown,
Buxoma gave a gentle *tap*. *Gay's Pastorals*

Wait with patience till the tumour becomes troublesome, and then *tap* it with a lancet. *Sharp's Surgery.*

A gentleman was inclined to the knight of Gascoigne's distemper, upon hearing the noise of a *tap* running. *Derham.*

Though the painting grows decayed,
The house will never lose its trade;
Nay, though the treacherous *tapster* Thomas
Hangs a new angel two doors from us. *Swift.*

So Huron-leeches, when their patient lies
In feverish restlessness with unclosed eyes,
Apply with gentle strokes their ozier rod,
And *tap* by *tap* invite the sleepy god. *Harte.*

TAPANOOLY, a British settlement of Sumatra, on the island of Puchong Keechil, at the bottom of the Bay of Tapanooly, on the northwest shore, distant about two miles and a half or three miles. The Bay of Tapanooly, with the island of Mansalar, forms one of the finest ports in the world.

TAPAYOS, or TAPAJOS, a magnificent river of Brasil, in the capitania of Matto Grosso, which derives its copious sources from numerous branches rising in the interior mountains. It is one of those great rivers which come from the south and feed the vast stream of the Amazons. Its course is north for more than 600 miles between the Chingu and the Madera, and it falls into the Amazons in long. 55° W. lat. 2° 24′ 50″ S.

TAPE, *n. s.* Sax. tæppan; Isl. and Swed. *tepp.* A narrow fillet or band of linen.

Will you buy any *tape*, or lace for your cape,
My dainty duck, my dear-a? *Shakspeare*

This pouch that s tied with a *tape*
I'll wager that the prize shall be my due *Gay.*

On once a flock-bed, but repaired with straw,
With *tape*-tied curtains never meant to draw. *Pope.*

TA'PER, *n. s., adj.,* & *v. n.* Saxon, tapep; Goth. *tap;* Swed. *top.* A wax candle; a light: the adjective means pyramidal or conical, from the form of a taper: the verb neuter, to grow gradually smaller or towards a point.

Get me a *taper* in my study, Lucius:
When it is lighted, come and call me. *Shakspeare.*

If any snatch the pure *taper* from my hand, and hold it to the devil, he will only burn his own fingers, but shall not rob me of the reward of my good intention. *Taylor.*

There the fair light,
Like Hero's *taper* in the window placed,
Such fate from the malignant air did find,
As that exposed to the boisterous wind. *Waller.*

To see this fleet,
Heaven, as if there wanted lights above,
For *tapers* made two glaring comets rise. *Dryden.*

Her *taper* fingers, and her panting breast,
He praises. *Id.*

The back is made *tapering* in form of a pillar, the lower vertebres being the broadest and largest; the superior lesser and lesser, for the greater stability of the trunk. *Ray.*

From the beaver the otter differs in his teeth, which are canine; and in his tail, which is feline, or a long *taper.* *Grew.*

Such be the dog,
With *tapering* tail, that nimbly cuts the wind. *Tickell.*

TAPER, or TAPERING, is understood of a piece of timber, or the like, when thick at one end and gradually diminishing to the other; as is the case in pyramids, cones, &c.

TAPER also denotes a kind of tall wax candle, placed in a candlestick, and burnt at funeral processions and in other church solemnities. Tapers are made of different sizes; in some places, as Italy, &c, they are cylindrical; but in most other countries, as England, France, &c., they are conical or taper; whence the name; unless we derive it in the adjective sense, from the substantive taper, Saxon, tapen, or tapon, cereus, wax-candle. Both kinds are pierced at bottom for a pin in the candlestick to enter. There are two ways of making tapers, the first with the ladle, the second by hand. See CANDLE.

TAPER, PASCHAL, among the Romanists, is a large taper, whereon the deacon applies five bits of frankincense, in holes made for the purpose, in form of a cross; and which he lights with new fire in the ceremony of Easter Saturday. The pontifical makes pope Zosimus the author of this usage; but Baronius will have it more ancient, and quotes a hymn of Prudentius to prove it. F. Papebroch gives the original of the paschal taper in his Conatus Chronico-Historicus, &c. Though the council of Nice regulated the day whereon Easter was to be celebrated, it enjoined the patriarch of Alexandria to make a yearly canon thereof, and to send it to the pope. As all the other moveable feasts were regulated by that of Easter, a catalogue of them was made every year; and this was written on a consecrated taper, cereus. This taper, according to the abbot Chastelain, was not made to be burnt; it had no wick, and was only a column of wax, made to write the list of moveable feasts on for a year. For the ancients, when any thing was to be written to last for ever, engraved it on marble or steel; when it was to last a long while they wrote it on Egyptian paper; and when it was only to last a short time they wrote it on wax. They came at last to write the moveable feasts on paper, but they still fastened it to the paschal taper.

TAPER-BORED (taper and bored) is applied to a piece of ordnance when it is wider at the mouth than towards the breech.

TAP'ESTRY, *n. s.* Fr. *tapesterie, tapisserie, tapis;* Lat. *tapetum;* Gr. ταπης. Cloth woven in regular figures. See below.

In the desk
That's covered o'er with Turkish *tapestry,*
There is a purse of ducats. *Shakspeare.*

The casements are with golden tissue spread,
And horses' hoofs, for earth, on silken *tap'stry* tread. *Dryden.*

One room is hung with *tapestry,* in which are wrought the figures of the great persons of the family. *Addison.*

TAPESTRY. The art of weaving tapestry is borrowed from the Saracens; accordingly the workmen employed in this manufacture in France were formerly called Sarazins or Sarazinois. Guicciardini ascribes the invention of tapestry hangings to the inhabitants of the Netherlands; but he has not mentioned at what time the discovery was made. This art was brought into England by William Sheldon near the end of Henry VIII.'s reign. In 1619 a manufacture was established at Mortlake, in Surry, by Sir Francis Crane, who received £2000 from king James to encourage it. The first manufacture of tapestry at Paris was set up under Henry IV. in 1606 or 1607 by several artists whom that monarch invited from Flanders. Under Louis XIV. the manufacture of the Gobelins was instituted, which introduced very beautiful cloths, remarkable for strength, for elegance of design, and a happy choice of colors. The finest paintings are copied, and eminent painters have been employed in making designs for the work.

Tapestry is distinguished by the workmen into two kinds, viz. high and low warp; though the difference is rather in the manner of working than in the work itself; which is in effect the same in both; only the looms, and consequently the warps, are differently situated; those of the low warp being placed flat and parallel to the horizon, and those of the high warp erected perpendicularly. The English anciently excelled all the world in the tapestry of the high warp; and they still retain their former reputation, though with some little change: their low warps are still admired; but the high ones are quite laid aside by the French. The French, before the Revolution, had three considerable tapestry manufactures besides that of the Gobelins; the first at Abusson in Ouvergne, the second at Fellettin in the Upper Marche, and the third at Beauvais. They were all equally established for the high and the low warp; but they had all laid aside the high warp excepting the Gobelins. There were admirable low warps likewise in Flanders generally exceeding those of France; the chief and almost only Flemish manufactures were a

Brussels, Antwerp, Oudenard, Lisle, Tournay, Bruges, and Valenciennes. The usual widths of tapestry are from two to three ells Paris measure.

The loom on which it is wrought is placed perpendicularly: it consists of four principal pieces; two long planks or cheeks of wood, and two thick rollers or beams. The planks are set upright, and the beams across them, one at the top and the other at the bottom, or about a foot from the ground. They have each their trunnions, by which they are suspended on the planks, and are turned with bars. In each roller is a groove from one end to the other, capable of containing a long round piece of wood, fastened with hooks to tie the ends of the warp to. The warp, which is a kind of worsted, or twisted woollen thread, is wound on the upper roller; and the work, as fast as wove, is wound on the lower. Withinside the planks, which are seven or eight feet high, fourteen or fifteen inches broad, and three or four thick, are holes pierced from top to bottom, in which are put thick pieces of iron, with hooks at one end serving to sustain the coat stave; these pieces of iron have also holes pierced by putting a pin in which the stave is drawn nearer or set farther off; and thus the coats or threads are stretched or loosened at pleasure. The coatstave is about three inches diameter, and runs all the length of the loom; on this are fixed the coats or threads, which make the threads of the warp cross each other. It has much the same effect as the spring-stave and treddles have in the common looms. The coats are little threads fastened to each thread of the warp with a kind of sliding knot, which forms a sort of mash or ring. They serve to keep the warp open for the passage of broaches wound with silks, woollens, or other matters used in the piece of tapestry. In the last place there are a number of little sticks of different lengths, but all about an inch in diameter, which the workman keeps by him in baskets, to make the threads of the warp cross each other by passing them across; and, that the threads thus crossed may retain their proper situation, a packthread is run among them above the stick. The loom being thus formed, and mounted with its warp, the first thing the workman does is to draw on the threads of this warp the principal lines and strokes of the design to be represented on the piece of tapestry; by applying cartoons made from the painting he intends to copy to the side that is to be the wrong side of the piece, and then, with a black lead pencil, following and tracing out the contours thereof on the thread of the right side; so that the strokes appear equally both before and behind. The original design of the work is hung up behind the workmen, and wound on a long staff, from which a piece is unrolled from time to time as the work proceeds. Besides the loom, &c., here described, there are three other principal instruments required for working the silk or the wool of the woof within the threads of the warp; these are a broach, a reed, and an iron needle. The broach is made of hard wood, seven or eight inches long, and two-thirds of an inch thick, ending in a point with a little handle. This serves as a shuttle, the silks, woollens, gold, or silver, to be used in the work being wound on it. The reed or comb is also of wood, eight or nine inches long, and an inch thick on the back, whence it grows less and less to the extremity of the teeth, which are more or less apart, according to the greater or less degree of fineness of the intended work. Lastly, the needle is made in form of the common needle, only bigger and longer. Its use is to press close the wool and silks when there is any line or color that does not fit well. All things being prepared for the work, and the workman ready to begin, he places himself on the wrong side of the piece, with his back towards the design: so that he works as it were blindfold, seeing nothing of what he does, and being obliged to quit his post, and go to the other side of the loom whenever he would view and examine the piece, to correct it with his pressing-needle. To put silk, &c., in the warp, he first turns and looks at the design; then, taking a broach full of the proper color, he places it among the threads of the warp, which he brings across each other with his fingers, by means of the coats or threads fastened to the staff; this he repeats every time he has to change his color. Having placed the silk or wool, he beats it with his reed or comb; and, when he has thus wrought in several rows over each other, he goes to see the effects they have, in order to reform the contours with his needle, if there be occasion. As the work advances it is rolled upon the lower beam, and they unrol as much warp from the upper beam as suffices them to continue the piece: the like they do of the design behind them. When the pieces are wide several workmen may be employed at once. The high warp tapestry goes on much more slowly than the low warp, and takes up almost twice the time and trouble. All the difference that the eye can perceive between the two kinds consists in this, that in the low warp there is a red fillet, about one-twelfth of an inch broad, running on each side from top to bottom, which is wanting in the high warp.

The loom or frame whereon the *low warp* is wrought is much like that of the weavers: the principal parts are two strong pieces of wood forming the sides of the loom, and bearing a beam or roller at each end; they are sustained at bottom with other strong pieces of wood in manner of trestles; and to keep them firm they are fastened to the floor with a kind of buttresses, which prevent any shaking, though there are sometimes four or five workmen leaning on the fore-beam at once. The rollers have each their trunnions, by which they are sustained: they are turned by large iron pins, three feet long. Along each beam runs a groove, wherein is placed the wich, a piece of wood about two inches diameter, and almost the length of the roller: this piece fills the groove entirely, and is fastened therein, from space to space, by wooden pins. To the two wiches are fastened the two extremities of the warp, which is wound on the farther roller, and the work, as it advances, on the nearer. Across the two sides, almost in the middle of the loom, passes a wooden bar, which sustains little pieces of wood, not unlike the beam of a balance: to these pieces are fastened strings, which bear certain spring-staves, where-

with the workman, by two treddles under the loom whereon he sets his feet, gives a motion to the coats, and makes the threads of the wasp rise and fall alternately. Each loom has more or fewer of these spring-staves, and each staff more or fewer coats, as the tapestry consists of more or fewer threads. The design or painting the tapestry worker is to follow is placed under the warp; where it is sustained from space to space with strings, by which the design is brought nearer the warp. The loom being mounted, two instruments are used in working it, viz. the reed and the flute. The flute does the office of the weaver's shuttle; it is made of hard polished wood, three or four lines thick at the ends, and somewhat more in the middle, and three or four inches long. On it are wound the silks or other matters to be used as the woof of the tapestry. The comb or reed is of wood or ivory; it has usually teeth on both sides; it is about an inch thick in the middle, but diminishes each way to the extremity of the teeth: it serves to beat the threads of the woof close to each other, as fast as the workman has passed and placed them with his flute among the threads of the warp. The workman is seated on a bench before the loom, with his breast against the beam, only a cushion or pillow between them; and, in this posture, separating with his fingers the threads of the warp that he may see the design underneath, and taking a flute mounted with a proper color, he passes it among the threads, after having raised or lowered them by the treddles moving the spring-staves and coats. Lastly, To press and close the threads of the silk or yarn, &c., thus placed, he strikes each course (i. e. what the flute leaves in its passing and coming back again) with the reed. See Weaving.

TAP'ET, *n. s.* Latin, *tapetia.* Worked or figured stuff.

To their work they sit, and each doth chuse
What story she will for her *tapet* take. *Spenser.*

TAPHIÆ, in ancient geography, islands in the Ionian Sea, between Achaia and Leucadia, called also Teleboides, from Taphius and Telebous. The Taphians made war against Electryon, king of Mycenæ, and killed all his sons. Upon this he promised his daughter Alcmena, with his kingdom, to any man who should avenge him of the Taphians. This was accomplished by Amphitryon.—Hom. Od. i. 181, &c. See Alcmena.

TAPHIANS, the natives of the Taphiæ. They were expert sailors, but addicted to piracy.—Plin. iv. c. 12.

TAPHIASSUS, or Taphius, a mountain of Locris, on the confines of Ætolia.—Lempr.

Taphius, and Telebous, in fabulous history, the sons of Neptune, by Hippothoe, the daughter of Nestor: they reigned in the Taphiæ, and gave their names to them.—Strabo, 10.

TAPHIUSA, a town near Leucas, famous for a particular stone, called taphiusius.—See Plin. 36, c. 21.

TAPHRÆ, an ancient town on the isthmus of Taurica Chersonesus; now called Prekop.—Mela ii. c. i. Plin. iv. c. 12.

TAPIOCA, a species of starch which the Brasilians make from the roots of the cassada plant. See Jatropha.

TAPIR, in zoology, the elephant hog, a genus of quadrupeds of the order of belluæ, resembling the hippopotamus. The fore feet have each four hoofs; the hind feet three. There is only one species, viz.—T. Americanus, the American tapir. The nose of the male extends far beyond the lower jaw, is slender, and forms a sort of proboscis; it is capable of being contracted or extended at pleasure, and its sides are sulcated. The extremities of both jaws end in a point, and there are ten cutting teeth in each. Between them and the grinders there is a vacant space; and there are ten grinders in each jaw. The ears are erect, the eyes small, and the body is shaped like that of a hog. The back is arched; the legs are short; and the hoofs small, black, and hollow. The tail is very small. The animal grows to the size of a heifer half a year old. The hair is short: when young it is spotted with white; when old of a dusky color. They inhabit the woods and rivers of the east side of South America, from the isthmus of Darien to the Amazon. They sleep during day in the darkest and thickest forest adjacent to the banks, and go out in the night time in search of food. They feed on grass, sugar-canes, and fruits. If disturbed they run to the water; and swim very well, or sink below; and, like the hippopotamus, walk on the bottom as on dry ground. They make a sort of hissing noise. This is the largest of the American animals.

TAPLIN (William), an eminent veterinary surgeon. He was one of the first scientific cultivators of his art in England, and contributed not a little to its improvement by his writings. His principal publications are, the Gentleman's Stable Directory, or the Modern System of Farriery, 1790, 2 vols. 8vo.; Practical Observations upon Thorn Wounds, Punctured Tendons, and Ligamentary Lameness in Horses, with Instructions for their Treatment and Cure, 8vo; and a Compendium of Experimental Farriery, originally suggested by Reason and confirmed by Practice, 1796, 8vo. He also published a tract on the Preservation of Game; and other pieces. He is said to have been deranged in the latter part of his life owing to domestic misfortunes. He died in London in January 1807.

TAPORICA, or Itaporica, an island in the Bay of Todos Santos, Brasil, the largest, most populous and fertile, of all those in the bay. This island defends the entrance of the bay; upon the point or extremity is the fort of San Antonio, and a town called Vieja, in lat. 13° S.

TAPPAHANNOCK, a port of entry and the capital of Essex, county Virginia, on the south-west bank of the Rappahannock; it is fifty-five miles E. S. E. from Fredericksburg, and fifty north-east from Richmond. Its situation is low and unhealthy. It contains a court-house, a jail, and an Episcopal church. All the shipping belonging to the towns on the Rappahannock is entered at the custom-house of this place.

Tapping, in general, the act of piercing a hole in a vessel, and applying a tube or canula in the aperture, for the commodious drawing off the liquor contained therein.

Tapping, in surgery. See Surgery.

TAPSUS. 1. A maritime town of Africa (Sil. Ital. 3). 2. A peninsula on the east coast of Sicily.

TAPYRI, an ancient nation, who resided near Hyrcania.—Dionys. Perieg.

TAQUARI, a river of Brasil, on the borders of Paraguay, which runs a western course from the mountains and falls into the Paraguay opposite the lake of Marmore, by many mouths, the largest of which is in long 54° W., lat. 19° 15′ S

TAQUASO, a large river of South America, in the province of Darien. Its course is from north-east to south-west for a great distance, when it turns west and enters the sea in the gulf of San Miguel. Its sands abound in fine gold.

TAQUILE, or Taquuna, an island of the great lake of Chucuito, or Titicaca, in the district of the province of Paucarolla, in Peru. In the higher grounds of this island are some plains on which are to be seen the ruins of some large old towns built of stone.

TAR, *n. s.* & *v. a.* Sax. ȝaȝe; Belg. *tarre;* Dan. *tiere.* Liquid pitch; the turpentine of the pine or fur drained out by fire; a sailor: to smear with tar: hence to tease; provoke: or, as Johnson thinks, from Gr. ταραττα.

Then, foaming *tar,* their bridles they would champ,
And trampling the fine element would fiercely ramp.
Spenser.

There has been much to do on both sides; and the nation holds it no sin to *tarre* them on to controversy. *Shakspeare.*

Two curs shall tame each other; pride alone
Must *tar* the mastiffs on, as 'twere the bone. *Id.*

A man will not lose a hog for an halfpennyworth of *tar.* *Camden's Remains.*

In senates bold, and fierce in war,
A land commander, and a *tar.* *Swift's Miscellanies.*

Tar is prepared in great quantities in Norway, Sweden, Germany, Russia, and North America, and in other countries where the pine and fir abound. For the method of obtaining it, see Pinus. Becher, the celebrated chemist, first proposed to make tar from pit-coal. Manufactures for this purpose have been established many years ago in the ci-devant bishopric of Liege, and in several parts of England. In 1781 the earl of Dundonald obtained a patent for extracting tar from pit-coal by a new process of distillation. See Chemistry, Index, and Coal. Tar, which is well known for its economical uses, is properly an empyreumatic oil of turpentine, and has been much used as a medicine both internally and externally. See Materia Medica and Pharmacy.

Tar Water, or water impregnated with the soluble parts of tar, was, about a century ago, a very popular remedy; but is now almost entirely out of use.

TARANIS, a name of Jupiter, among the ancint Gauls.—Lucan, i. 146.

TARANTAISE, a province of Sardinia, in Savoy, between Faucigny, Savoy proper, Maurienne, and Aosta. Its superficial extent is about 780 square miles; its surface rugged and uneven, covered with mountains and rocks, and little susceptible of culture. The least sterile parts are brought into surprising cultivation, and made to produce corn, saffron, fruit, and chestnuts: the pastures nourish a fine race of cattle. A number of the inhabitants, however, go out to seek employment in more favored countries. Population 39,000.

TARANTO, or Tarento, an ancient and considerable town of Naples, in the province of Otranto, eighty miles W. N. W. of the city of that name. It is built on a small island in the great bay called the Gulf of Taranto, and has several advantages as a maritime position, having behind it, towards the north and east, a great maritime inlet called Mare Piccolo (little sea), which extends into the interior, while it communicates with the sea by two channels, one on each side of the island, or rather islet, occupied by the town. Taranto contains 18,500 inhabitants, and has a castle of some strength.

TARAN'TULA, *n. s.* Ital. *tarantula;* Fr. *tarantule.* An insect whose bite is said to be cured by music.

This word, lover, did no less pierce poor Pyrocles than the right tune of musick toucheth him that is sick of the *tarantula.* *Sidney.*

He that uses the word *tarantula,* without having any idea of what it stands for, means nothing at all by it. *Locke.*

TARAS, a son of Neptune, who built Tarentum.

Taras, an ancient name of Tarentum.

TARASCO, an ancient town of Gaul, now Tarascon.

TARASCON, a considerable town in the south-east of France, on the Rhone, and opposite to the town of Beaucaire, with which it communicates by a bridge of boats. There are manufactures of woollens, silk, stockings, and an export trade in wine, brandy, olive-oil, and other products. Of public buildings the principal is the castle, a structure of hewn stone fortified in the Gothic manner, and surmounted by a platform, affording a fine view of the adjacent country. Some of the churches are likewise handsome. Inhabitants 12,000. Nine miles north of Arles, and fifty-five north-west of Marseilles.

TARAXACUM, in botany, dandelion. See Leontodon and Materia Medica.

TARAXIPPUS, a deity worshipped in Elis, who superintended the races and other games. His statue was placed near the race ground, and his protection implored to the horses and their riders.—Paus. vi. 20.

TARBELLÆ, a name of the Pyrenees, from

TARBELLI, an ancient people of Gaul, at the foot of the Pyrenees.—Cæs. de Bell. Gall.

TARBES, an inland town in the south-west of France, and the capital of the department of the Upper Pyrenees, is situated on the left bank of the Adour. It is the see of a bishop, and is surrounded with a wall defended by an old castle. Here are a public square, cathedral, several fine churches, the residence of the bishop, a theatre, and an hospital, and the streets of the town are tolerably broad and well paved. The houses, though low, are not badly built of brick or gray marble, and covered with slate. Here are, also, on a small scale, manufactures of linen, handkerchiefs, paper, knives, and small copper articles. There is here also a royal stud. Inhabitants 8000. On the 20th of March, 1814, the French army under Soult were forced from their position here by the British under the duke of Wellington. Twenty-two miles east by south of Paris.

TARCHON, an Etrurian chief, who assisted Æneas against the Rutuli; and built Tarquinii. Virg. Æn. viii. 603.

TARCHONANTHUS, flea-bane, in botany, a genus of plants belonging to the class of syngenesia, and to the order of polygamia æqualis, and in the natural system ranging under the forty-ninth order, compositæ. The receptacle is villous, and the pappus plumy; the calyx is monophyllous, turbinated, and half divided into seven segments. There are only three species, viz. T. camphoratus, ericoides, and glaber.

TAR'DY, *adj.* & *v. a.* Lat. *tardus*; Fr. *tardif*. Slow; sluggish; dilatory; unwary: to delay; hinder: tardigradous, moving slowly: the adverb and noun substantives correspond with tardy.
TARDIGRA'DOUS, *adj.*
TAR'DILY, *adv.*
TAR'DINESS, *n. s.*
TAR'DITY.

Nor should their age by years be told,
Whose souls more swift than motion climb,
And check the *tardy* flight of time. *Sandys.*

He was indeed the glass,
Wherein the noble youth did dress themselves;
Speaking thick, which nature made his blemish,
Because the accents of the valiant;
For those that could speak low and *tardily*,
Would turn their own perfection to abuse,
To seem like him. *Shakspeare. Henry IV.*

A *tardiness* in nature,
Which often leaves the history unspoke
That it intends to do. *Id. King Lear.*

I chose
Camillo for the minister, to poison
My friend Polixenes; which had been done,
But that the good mind of Camillo *tardied*
My swift command. *Id. Winter's Tale.*

Suppose some observable *tardity* in the motion of light, and then ask how we should arrive to perceive it? *Digby.*

Death he as oft accused
Of *tardy* execution, since denounced
The day of his offence. *Milton's Paradise Lost.*

Yield, scoundrel base, quoth she, or die,
Thy life is mine, and liberty:
But if thou think'st I took thee *tardy*,
And dar'st presume to be so hardy
To try thy fortune o'er afresh,
I'll wave my title to thy flesh. *Hudibras.*

It is but a slow and *tardigradous* animal, preying upon advantage, and otherwise may be escaped. *Browne.*

The *tardy* plants in our cold orchards placed,
Reserve their fruit for the next age's taste:
There a small grain in some few months will be
A firm, a lofty, and a spacious tree. *Waller.*

When certain to o'ercome, inclined to save,
Tardy to vengeance, and with mercy brave. *Prior.*

If they take them *tardy*, they endeavour to humble them by way of reprisal: those slips and mismanagements are usually ridiculed. *Collier on Pride.*

You may freely censure him for being *tardy* in his payments. *Arbuthnot.*

TARE, *n. s.* Dut. *teeren*, to consume.—Skinner. A weed that grows among corn.

Through hatred of *tares*, the corn in the field of God is plucked up. *Hooker.*

The liberal contributions such teachers met with, served to invite more labourers, where their seed-time was their harvest; and by sowing *tares* they reaped gold. *Decay of Piety.*

My country neighbours begin not to think of being in general, which is being abstracted from all its inferior species, before they come to think of the fly in their sheep, or the *tares* in their corn. *Locke.*

TARE, or VETCH, in botany. See RURAL ECONOMY.

TARE, in commerce, is an allowance for the outside package that contains such goods as cannot be unpacked without detriment; or for the papers, threads, bands, &c., that enclose or bind any goods imported loose; or though imported in casks, chests, &c., yet cannot be unpacked and weighed neat.

TARENTINES, the ancient inhabitants of Tarentum, long famous for their bravery, and afterwards equally infamous for their luxury and effeminacy.

TARENTINE WAR, a war which lasted ten years, between the Tarentines assisted by Pyrrhus, and the Romans. See EPIRUS, ROME, and TARENTUM.

TARENTUM, TARENTUS, or TARAS, an ancient city of Italy in Calabria, seated near the mouth of the Galesus, and capital of a republic. It was founded by a colony of Spartans, under Phalanthus, about A. A. C. 707. The government was democratical, though they had occasionally some monarchs. It was for some time the residence of Pythagoras, who taught the citizens his philosophy, inspired them with the love of virtue, and rendered them superior to their neighbours, both in the cabinet and the field. They were long independent, and maintained their superiority over thirteen tributary cities; when they could arm 100,000 foot and 3000 horse. Becoming rich, they grew voluptuous and indolent; so that the delights of Tarentum became proverbial. In the pride of their prowess, however, they quarrelled with the Romans, and invited Pyrrhus into Italy. See ROME. But the war ended, after ten years, in the total conquest of their republic, its annexation to that of Rome, and the capture of 30,000 prisoners.

TARGE, *n. s.* Sax. ꝛaꝛga; Fr. *targe*; Ital. *targa*; Span. *tarja*; Welch, *tarian*; Erse *taargett*. A kind of buckler or small shield borne on the left arm: one armed with a target.
TAR'GET.
TARGET'IER

Glancing on his helmet made a large
And open gash therein, were not his *targe*
That broke the violence. *Spenser.*

I took all their seven points in my *target*. *Shakspeare.*

For horsemen and for *targetiers* none could with him compare. *Chapman.*

The arms she useth most is the *target*, to shroud herself under, and fence away the blow. *Howel's England's Tears.*

Those leaves
They gathered, broad as Amazonian *targe*. *Milton.*

The Greeks the gates approached, their *targets* cast
Over their heads, some scaling ladders placed
Against the walls. *Derham.*

TARGIONIA, in botany, a genus of plants belonging to the class of cryptogamia, and natural order of algæ. The calyx is bivalved, including a globular body. There is only one species, viz.—T. hypophylla, the vetch tare, a native of Great Britain. It has leaves about a quarter of an inch long, of a heart-shape, inverted, and growing prostrate in a clump together; their

upper surface is green, covered with whitish papillæ, and their lower surface is black. The fructification grows at the great end of the leaf on the lower side, and consists of two concave valves of a reddish-black color, enclosing a chocolate colored globule, resembling the seed of a tare or vetch, full of a yellow powder. The leaves increase by shooting out young offsets from their sides like the polypus. This plant is found in the north of England, and near Tarbat of Kintyre in Scotland.

TARGUM, תרגום, a paraphrase on the pentateuch in the Chaldee language. It signifies paraphrases or expositions, because they are rather comments and explications than literal translations of the text. They are written in the Chaldee tongue, which became more familiar to the Jews after their captivity in Babylon, than the Hebrew itself. But though the custom of making these expositions in the Chaldee language be very ancient among the Hebrews, yet have they no targums before the era of Jonathan and Onkelos.

i. *The* Targum of Jerusalem is only upon the Pentateuch; nor is that entire or perfect.

ii. *The* Targum of Jonathan, the son of Uziel, is upon the greater and lesser prophets. He flourished under Herod the Great, about A. A. C. 30.

iii. *The* Targum of Joseph the Blind is upon the Hagiographa. This author is much more modern, and less esteemed than those above-mentioned.

iv. *The* Targum of Onkelos is the most of all esteemed, and copies are to be found in which it is inserted verse for verse with the Hebrew. It is so short and so simple that it cannot be suspected of being corrupted. This paraphrast wrote only upon the books of Moses; and his style approaches nearly to the purity of the Chaldee, as it is found in Daniel and Ezra. This targum is cited in the Mischna, but was not known either to Eusebius, St. Jerome, or Origen. See Onkelos.

TARICHÆUM, a fortified town of Judea.—Cicero ad Div. xii. c. 14.

TAR'IFF, *n. s.* Span. *tarifa*; Fr. *tarif*. A cartel of commerce.

This branch of our trade was regulated by a *tariff*, or declaration of the duties of import and export.
Addison.

Tarif is a table or catalogue containing the names of different sorts of merchandise, with the duties to be paid as settled by authority among trading nations.

TARIN (Peter), a French physician and author, born at Courtenai, about the end of the seventeenth century. He published, 1. Adversaria Anatomica, 4to. 2. An Anatomical Dictionary, 4to. 3. Osteographia, 4to. 4. Anthropeomia, or the Art of Dissecting, 2 vols. 12mo. 5. A Treatise on Ligaments. 6. Observations on Medicine and Surgery, 3 vols. 12mo.: and, 7. A Description of the Muscles, 4to. He died in 1761.

TARLETON (Richard), a celebrated English actor, born about the beginning of the sixteenth century at Condover in Shropshire; whence he was brought to London, and patronised by Robert, earl of Leicester. Stowe says he was one of the twelve whom, in 1583, queen Elizabeth appointed her players at Barn-Elms; allowing them wages and liveries as grooms of the chambers. He wrote a dramatic piece, called The Seven Deadly Sins. He died about 1589.

TARN, a fertile department of the south of France, formed of a part of the province of Languedoc, and adjacent to the departments of the Aveyron and Upper Garonne. It has the mountains of Languedoc on the east, and commands, at a distance, a prospect of the Pyrenees; but its whole surface may be termed an undulating plain, traversed by several chains of small hills. Its principal river is the Tarn, a large stream flowing from the north-east to the Garonne. The climate is steady and temperate, and the products are wheat, barley, maize, hemp, flax, vines, and fruit of different kinds. Here are also occasional tracts of fine pasture. Of corn, enough is raised to afford a small annual export. The culture of the vine is extensive; but the wines, with the exception of the kind called vin du Cog, do not keep sufficiently to admit of export. Here are, on a small scale, mines of iron and coal; some silk also is cultivated. This department is divided into four arrondissements, viz. Albi (the chief town), Castres, Lavaur, and Gaillac. It has an extent of 2100 square miles, and a population of nearly 296,000, of whom above 40,000 are Protestants.

Tarn and Garonne, a department in the south of France, formed, so lately as 1808, of portions of the departments of the Lot and Upper Garonne. It lies to the west of the department of the Tarn. Its surface is a plain, traversed by three chains of hills, the highest of which is said not to exceed 1200 feet. Its principal rivers are the Tarn and Garonne. The soil is in general fruitful, and the climate mild, but the labors of the husbandman are frequently exposed to hazard from hail storms. Its products are wheat, barley, maize, hemp, flax, vines, chesnuts, and several fruits of a southern climate, as almonds and figs. The pastures are of limited extent. The domestic animals are mules, asses, horses; poultry is particularly abundant. The culture of silk is on a limited scale. This department is divided into three arrondissements, viz. Montauban (the capital), Moissac, and Castel Sarrazin. It has an extent of 1500 square miles, and a population of 240,000, of whom above 30,000 are Protestants.

TAR'NISH, *v. a.* & *v. n.* Fr. *ternir*. To sully; soil; dull: to lose brightness.

Let him pray for resolution, that he may discover nothing that may discredit the cause, *tarnish* the glory, and weaken the example of the suffering.
Collier.

If a fine object should *tarnish* by having a great many see it, or the musick should run mostly into one man's ears, these satisfactions would be made inclosure. *Id. of Envy.*

Low waves the rooted forest, vexed, and shed
What of its *tarnished* honours yet remain.
Thomson.

TARNOW, a circle of Austrian Galicia, lying along the river Dunajee, and bounded on the north by the Vistula. Its area is 1300 square

miles, and its population 205,600. It is in general a level country, with the exception of some hills in the south.

TARPAWLING, *n. s.* From tar. Hempen cloth smeared with tar.

Some the galled ropes with dauby marling bind,
Or searcloth masts with strong *tarpawling* coats.
Dryden.

Was any thing wanting to the extravagance of this age, but the making a living *tarpawlin* and a swabber the hero of a tragedy? *Dennis.*

TARPEIA, a vestal virgin who betrayed the citadel of Rome to the Sabines; for which, by a voluntary mistake, they rewarded her with death. See ROME.

TARPEIAN ROCK, in Roman antiquity, a steep rock in Rome; whence, by the law of the XII. tables, those guilty of certain crimes were precipitated. It took its name from Tarpeia, who was burnt near it.

TARPEIUS MONS, the Tarpeian Hill, on which stood the Tarpeian Rock. See last article. It was eighty feet perpendicular in height. It was also called Capitolinus, from the Capitol being built on it.

TARQUIN I., king of Rome, succeeded Ancus Martius, A. A. C. 615. See ROME.

TARQUIN II., surnamed the Proud, a tyrant and usurper. See ROME.

TARQUINIA, the daughter of Tarquin I. and the wife of Servius Tullius. After the murder of her husband (see ROME), she buried his body, and died of grief the night following. Others say that she was poisoned by the parricide Tullia.

TARQUINIENSES, the ancient inhabitants of Tarquinii. They endeavoured to restore Tarquin II. See ROME.

TARQUINII, an ancient city of Etruria, built by Tarchon, an ally of Æneas. Lucumo the Corinthian was educated in it, took his surname Tarquinius from it; and after he became king of Rome, by the name of Tarquin I., made it a Roman colony.—Strabo 5. It is now called Tarchina.

TARQUINIUS (Lucius, Collatinus), one of the two first consuls of Rome, the husband of Lucretia and colleague of Brutus. See COLLATINUS and ROME.

TARQUITUS, a son of Faunus and Dryope, who assisted Turnus against Æneas, and was killed by the latter.—Virg. Æn. x. v. 550.

TARRACINA, or Anxur, an ancient city of the Volsci, between Rome and Naples (see ANXUR); now called Terracina.

TARRACO, in ancient geography, a city of Hispania Tarraconensis, of which it was the capital, founded by the Phœnicians; and planted with a Roman colony by the two Scipiones Africani, and seated on the coast of the Mediterranean. It is now called Tarragona.

TARRACONENSIS HISPANIA, an ancient Roman province of Spain, called also Hispania Citra, or Citerior, in respect of its situation as to Rome. It was bounded on the north by the Pyrenees and the Cantabrian Sea, now the Bay of Biscay; on the east by the Mediterranean; south by Lusitania, and Hispania Bœtica; and west by the Atlantic Ocean. It was famous for its wines. Tarraco was the capital. It comprehended Catalonia and some adjacent districts. See CATALONIA.

TARRAGONA, a sea-port of Catalonia, Spain, near the mouth of the Francoli. It is a place of great antiquity, built on a hill, and surrounded by walls with turrets, erected either by the Moors, or by the Christians of the middle ages. It was occupied by the British in the beginning of the eighteenth century, with an intention of rendering it a naval station, but on the acquisition of Gibraltar, in 1704, the design was abandoned. Tarragona contains 7500 inhabitants, is the see of a bishop, and has a large and elegant cathedral, built in the Gothic style. It was under the Romans the chief town of the province of Tarraconensis.

TARRANTIUS (Lucius), an ancient Roman mathematician and philosopher, who was contemporary with Cicero, and was one of his friends. He has been styled the Prince of Astrologers. He made two famous horoscopes, the one of Romulus, the other of Rome.

TARRAS, or TERRAS, a volcanic earth used as a cement, and which does not differ much in its principles from pouzzolana; but is much more compact, hard, porous, and spongy. It is generally of a whitish-yellow color, and contains more heterogeneous particles, as spar, quartz, schorl, &c., and something more of a calcareous earth. It effervesces with acids, is magnetic, and fusible per se. When pulverised it serves as a cement, like pouzzolana. It is found in Germany and Sweden.

TAR'RIANCE, *n. s.* From tarry. Stay; delay; perhaps sojourn. Obsolete.

Dispatch me hence;
Come, answer not; but do it presently,
I am impatient of my *tarriance.* *Shakspeare.*

TAR'RIER, *n. s.* Or terrier, from Fr. *terre*, the earth. A sort of small dog, that hunts the fox or otter out of his hole.

The fox is earthed; but I shall send my two *tarriers* after him. *Dryden.*

TAR'RY, *v. n.* & *v. a.* Fr. *targir.* To stay; to continue in a place; delay; wait: wait for.

Tarry ye here for us until we come again.
Exodus xxiv. 14.

Thou art my deliverer, make no *tarrying*, O God!
Psalms.

Who hath woe and redness of eyes? they that *tarry* long at the wine. *Proverbs* xxiii. 30.

I will go drink with you, but I cannot *tarry* dinner. *Shakspeare.*

Tarry I here, I but attend on death;
But fly I hence, I fly away from life. *Id.*

I yet am tender, young, and full of fear,
And dare not die, but fain would *tarry* here.
Dryden.

TAR'SEL, *n. s.* Teut. *tarzel.* A kind of hawk.

Hist! Romeo, hist! O for a falc'ner's voice,
To lure this *tarsel* gentle back again! *Shakspeare.*

A falc'ner Henry is, when Emma hawks;
With her of *tarsels* and of lures he talks. *Prior.*

TAR'SUS, *n. s.* Fr. *tarse*; Gr. ταρσος. In anatomy, the space betwixt the lower end of the focil bones of the leg, and the beginning of the five long bones that are joined with, and bear up, the toes.

An obscure motion, where the conjunction is called synanthrosis; as in joining the *tarsus* to the metatarsus. *Wiseman.*

TARSUS, a city of Asia Minor, the ancient capital of Cilicia. It possesses very high antiquity, and is said by Arrian and Strabo to have been founded by Sardanapalus on the same day with Anchiale; others are of opinion that it was a Grecian colony, founded by Triplolemus. It was much favored by Augustus and Adrian, and rose to such celebrity as to rival Athens, Antioch, and Alexandria, in wealth and grandeur, as well as in literature and science. It was also adorned with a number of magnificent temples, a gymnasium, and a theatre. It has, however, been subject to many vicissitudes, and retains scarcely a vestige of its former magnificence.

The city is situated in a fertile plain, on the right bank of the Cydnus; the houses, intersected by gardens and orchards, seldom exceed one story in height, are flat-roofed, and mostly constructed of hewn stone. There is a castle, said to be built by Bajazet; and portions of a wall, probably the remains of that erected by Haroun al Raschid. On an eminence to the south-west are the ruins of a spacious edifice, which may very probably have been the gymnasium; and, about 200 yards farther to the west, an ancient gateway. The city contains two public baths, several mosques, and caravanserai, and a small ancient church. The land in the neighbourhood is exceedingly fertile. The port is about seven or eight miles from the town. Population 25,000 to 30,000.

TART, *adj.* } Saxon ȝeapȝ; Belgic
TART'LY, *adj.* } *taertig*; Gr. τερεω. Sour;
TART'NESS, *n. s.* } acid; acidulated; sharp; keen; severe: the adverb and noun substantive corresponding.

Why so *tart* a favour
To trumpet such good tidings? *Shakspeare.*

How *tartly* that gentleman looks!
—He is of a very melancholy disposition. *Id.*

They cannot be too sweet for the king's *tartness.* *Id.*

Figures, with divers coloured earths, under the windows of the house on that side near which the garden stands, be but toys; you may see as good sights in *tarts.* *Bacon's Essays.*

When his humours grew *tart*, as being now in the lees of favour, they brake forth into certain sudden recesses. *Wotton.*

Of these sweets put in three gallons, more or less, into an hogshead, as the *tartness* of your cider requires. *Mortimer.*

TARTAGLIA (Nicholas), a celebrated Italian mathematician, born at Brescia, where he became a famous teacher of the mathematical sciences. He published several works which are esteemed. His chief tract is on number and measure, entitled Trattat di Numeri et Misure, 1556, folio. e died about 1558.

TARTAK, an idol of the Avites. See SAMARITANS.

TARTAN, or TARTAN CLOTH, a kind of cloth, made generally of woollen, sometimes of linen, and often of silk, of various colors; as blue, red, green, white, black, and yellow, &c., running in parallel lines and crossing each other; and thus forming various colored squares, parallelograms and parallelopipeds. This dress is much worn by the Scottish Highlanders. The tartan dress is said to have been derived from the ancient Gauls or Celtæ; the Galli non-braccati. The tartan is made into plaids, coats, and philibegs. The most elegant form of this dress is when the coat is made of that kind of tartan in which the red stripes chiefly prevail; the vest entirely white; the philibeg, drawers, or trowsers, of that in which the green or blue chiefly predominates; and the plaid, with either the green or blue predominant, but differing from that of the philibeg. See PHILIBEG.

TARTAN PLAID. See PLAID.

TARTANE, *n s.* Fr. *tartane;* Ital. *tartana.* A vessel used in the Mediterranean, with one mast and a three-cornered sail.

I set out from Marseilles to Genoa in a *tartane*, and arrived late at a small French port called Cassis. *Addison.*

TARTANE, in sea language, a small coasting vessel navigated in the Mediterranean Sea, and having only one mast and a bowsprit, the principal sail, which is extremely large, being extended by a lateen yard. When tartanes put up a square sail it is called a sail of fortune.

TARTAR, *n. s.* Lat. *tartarus.* Hell. A word used by the old poets. Now obsolete.

With this the damned ghosts he governeth,
And furies rules, and *tartare* tempereth. *Spenser.*

He's in *tartar* limbo worse than hell;
A devil in an everlasting garment hath him,
One worse hard heart is buttoned up with steel. *Shakspeare.*

His throne mixed with *tartarean* sulphur. *Milton.*

The spirit of God downward purged
The black *tartareous* cold infernal dregs,
Adverse to life. *Id.*

TARTAR, *n. s.* Fr. *tartre.* The concretion of wine casks; wine lees; see below.

The fermented juice of grapes is partly turned into liquid drops or lees, and partly into that crust or dry feculency that is commonly called *tartar*; and this *tartar* may by the fire be divided into five differing substances, four of which are not acid, and the other not so manifestly acid as the *tartar* itself. *Boyle.*

In fruits, the *tartareous* parts of the sap are thrown upon the fibres designed for the stone, and the oily upon the seed within it. *Grew's Cosmology.*

TARTAR is deposited on the sides of casks during the fermentation of wine; it forms a lining more or less thick, which is scraped off. This is called crude tartar, and is sold in Languedoc from ten to fifteen livres the quintal. All wines do not afford the same quantity of tartar. Neumann remarked that the Hungarian wines left only a thin stratum; that the wines of France afforded more; and that the Rhenish wines afforded the purest and the greatest quantity.

Tartar is distinguished from its color into red and white: the first is afforded by red wine, and is purified from an abundant extractive principle, by processes which are executed at Montpellier and at Venice.

The following is the process used at Montpellier:—The tartar is dissolved in water, and suffered to crystallize by cooling. The crystals are then boiled in another vessel, with the addition of five or six pounds of the white argilla-

ceous earth of Murviel to each quintal of the salt. After this boiling with the earth, a very white salt is obtained by evaporation, which is known by the name of cream of tartar, or the acidulous tartrate of potash.

M. des Maretz has informed us that the process used at Venice consists, 1. In drying the tartar in iron boilers; 2. Pounding it, and dissolving it in hot water, which, by cooling, affords purer crystals; 3. Redissolving these crystals in water, and clarifying the solution by whites of eggs and ashes. The process of Montpellier is preferable to that of Venice. The addition of the ashes introduces a foreign salt, which alters the purity of the product.

TARTAR, in mythology. See HELL and TARTARUS.

TARTAR, CHALYBEATED. This is prepared by boiling three parts of the supertartrate of potash and two of iron-filings in forty-six parts of water, till the tartar appears to be dissolved. The liquor is then filtered, and crystals are deposited on cooling, more of which are obtained by continuing the evaporation.

TARTAR, CREAM OF, the proper name of the purified supertartrate of potash.

TARTAR, CRUDE, the supertartrate of potash in its natural state, before it has been purified.

TARTAR, EMETIC, the tartrate of potash and antimony. See ANTIMONY.

TARTAR OF THE TEETH, the popular name for the concretion that so frequently incrusts the teeth, and which consists apparently of phosphate of lime.

TARTAR, PHENOMENA AND PROPERTIES OF. See CHEMISTRY.

TARTAR, REGENERATED, acetate of potash.

TARTAR, SALT OF, the subcarbonate of potash.

TARTAR, SECRET FOLIATED EARTH OF, acetate of potash.

TARTAR, SOLUBLE, neutral tartrate of potash.

TARTAR, VITRIOLATED, sulphate of potash.

TARTARIC ACID. The casks in which some kinds of wine are kept become incrusted with a hard substance, tinged with the coloring matter of the wine, and otherwise impure, which has long been known by the name of argal, or tartar, and distinguished into red and white according to its color. This being purified by solution, filtration, and crystallisation, was termed cream, or crystals of tartar. It was afterwards discovered that it consisted of a peculiar acid combined with potash; and the supposition that it was formed during the fermentation of the wine was disproved by Boerhaave, Neumann, and others, who showed that it existed ready formed in the juice of the grape. It has likewise been found in other fruits, particularly before they are too ripe; and in the tamarind, sumac, balm, carduus benedictus, and the roots of restharrow, germander, and sage. The separation of tartaric acid from this acidulous salt, is the first discovery of Scheele that is known. He saturated the superfluous acid, by adding chalk to a solution of the supertartrate in boiling water as long as any effervescence ensued, and expelled the acid from the precipitated tartrate of lime by means of the sulphuric. Or four parts of tartar may be boiled in twenty or twenty-four of water, and one part of sulphuric acid added gradually. By continuing the boiling, the sulphate of potash will fall down. When the liquor is reduced to one-half, it is to be filtered; and, if any more sulphate be deposited by continuing the boiling, the filtering must be repeated. When no more is thrown down, the liquor is to be evaporated to the consistence of a syrup; and thus crystals of tartaric acid, equal to half the weight of the tartar employed, will be obtained.

The tartaric acid may be procured in needly or laminated crystals, by evaporating a solution of it. Its taste is very acid and agreeable, so that it may supply the place of lemon juice. It is very soluble in water. Burnt in an open fire it leaves a coaly residuum; in close vessels it gives out carbonic acid and carburetted hydrogen gas. By distilling nitric acid off the crystals, they may be converted into oxalic acid, and the nitric acid passes to the state of nitrous.

To extract the whole acid from tartar, M. Thenard recommends, after saturating the redundant acid with chalk, to add muriate of lime to the supernatant neutral tartrate, by which means it is completely decomposed. The insoluble tartrate of lime, being washed with abundance of water, is then to be treated with three-fifths of its weight of strong sulphuric acid, diluted previously with five parts of water. But Fourcroy's process, as improved by Vauquelin, seems still better. Tartar is treated with quicklime and boiling water in the proportion, by the theory of equivalents, of 100 of tartar to thirty of dry lime, or forty of the slaked. A caustic magma is obtained, which must be evaporated to dryness, and gently heated. On digesting this in water, a solution of caustic potash is obtained, while tartrate of lime remains; from which the acid may be separated by the equivalent quantity of oil of vitriol.

According to Berzelius, tartaric acid is a compound of 3·807 hydrogen + 35·980 carbon + 60·213 oxygen = 100; to which result he shows that of M. Gay Lussac and Thenard to correspond, when allowance is made for a certain portion of water, which they had omitted to estimate. The analysis of tartrate of lead gives 8·384 for the acid prime equivalent; and it may be made up of—

3 hydrogen .	= 0·375	4·48
4 carbon .	= 3·000	35·82
5 oxygen .	= 5·000	59·70
	8·375	100·00

The crystallised acid is a compound of 8·375 acid + 1·125 water = 9·5; or in 100 parts 88·15 acid + 11·85 water.

The *tartrates*, in their decomposition by fire, comport themselves like all the other vegetable salts, except that those with excess of acid yield the smell of caromel when heated, and afford a certain quantity of the pyrotartaric acid. All the soluble neutral tartrates form, with tartaric acid, bitartrates of sparing solubility; while all the insoluble tartrates may be dissolved in an excess of their acid. Hence, by pouring gradually an

excess of acid into barytes, strontites, and lime-waters, the precipitates formed at first cannot fail to disappear; while those obtained by an excess of the same acid, added to concentrated solutions of potash, soda, or ammonia, and the neutral tartrates of these bases as well as of magnesia and copper, must be permanent. The first are always flocculent; the second always crystalline; that of copper alone is in a greenish-white powder. It likewise follows, that the greater number of acids ought to disturb the solutions of the alkaline neutral tartrates, because they transform these salts into bitartrates; and on the contrary they ought to affect the solution of the neutral insoluble tartrates, which indeed always happens, unless the acid cannot dissolve the base of the tartrate. The order of apparent affinities of tartaric acid are, lime, barytes, strontites, potash, soda, ammonia, and magnesia.

The tartrates of potash, soda, and ammonia, are not only susceptible of combining together, but also with the other tartrates, so as to form double or triple salts. We may thus easily conceive why the tartrates of potash, soda, and ammonia, do not disturb the solutions of iron and manganese; and on the other hand disturb the solutions of the salts of barytes, strontites, lime and lead. In the first case, double salts are formed, however small a quantity of tartrate shall have been employed; in the second no double salt is formed unless the tartrate be added in very great excess.

The tartrates of lime and barytes are white, pulverulent, and insoluble.

Tartrate of strontian, formed by the double decomposition of muriate of strontian and tartrate of potash, according to Vauquelin, is soluble, crystallisable, and consists of 52·88 strontian, and 47·12 acid. That of magnesia forms a gelatinous or gummy mass.

Tartrate of potash, the tartarized kali of the London college, and vegetable salt of some, formerly called soluble tartar, because much more so than the supertartrate, crystallises in oblong squares, bevelled at the extremities. It has a bitterish taste, and is decomposed by heat, as its solution is even by standing some time. It is used as a mild purgative.

The supertartrate of potash, already mentioned at the beginning of this article, is much used as a cooling and gently opening medicine, as well as in several chemical and pharmaceutical preparations. Dissolved in water, with the addition of a little sugar, and a slice or two of lemon-peel, it forms an agreeable cooling drink by the name of imperial: and if an infusion of green balm be used, instead of water, it makes one of the pleasantest liquors of the kind with which we are acquainted. Mixed with an equal weight of nitre, and projected into a red-hot crucible, it detonates, and forms the white flux; treated in the same way with half its weight of nitre, it forms the black flux; and simply mixed with nitre, in various proportions, it is called raw flux. It is likewise used in dyeing, in hat-making, in gilding, and in other arts.

The blanching of the crude tartar is aided by boiling its solution with one-twentieth of pipe-clay.

According to the analysis of Berzelius, it consists of 70·45 acid + 24·8 potash + 4·75 water = 100; or—

2 primes	acid	=	16·75	70·30
1	potash	=	5·95	24·95
1	water	=	1·125	4·75
			23·825	100·00

sixty parts of water dissolve four of bitartrate at a boiling heat; and only one at 60° Fahrenheit. It is quite insoluble in alcohol. It becomes very soluble in water, by adding to it one-fifth of its weight of borax; or even by the addition of boracic acid. It appears by Berzelius that neutral tartrate of potash, dried in the sun, differs from the bitartrate, in containing no water of crystallization. He states it to be compounds of 58·69 acid + 41·31 potash = 100; which afford 155·7 tartrate of lead. Now, 8·375 : 5·95 : : 58·5 : 41·5; which are the equivalent proportions.

On considering the great solvent property of cream of tartar, and that it is even capable of dissolving various oxides, which are insoluble in tartaric acid, as the protoxide of antimony, M. Gay Lussac has recommended it as a useful agent in chemical analysis. He thinks that in many cases it acts the part of a single acid. According to this view, tartar emetic would be a compound of the cream-tarter acid, and protoxide of antimony. Cream of tartar generally contains from three to five per cent. of tartrate of lime, which are in a great measure separated when three parts of tartar are boiled with one of borax for a few minutes in a sufficient quantity of water. The soluble cream of tartar which is obtained by this process is deliquescent; it dissolves in its own weight of boiling water, at 54·5°, and in half its weight of boiling water. Its solution is very imperfectly decomposed by the sulphuric, nitric, and muriatic acids. Four parts of tartar and one of boracic acid form a permanent saline compound, very soluble in water. Alum also increases the solubility of tartar.

By saturating the superfluous acid in this supertartrate with soda, a triple salt is formed, which crystallises in larger regular prisms of eight nearly equal sides, of a bitter taste, efflorescent, and soluble in about five parts of water. It consists, according to Vauquelin, of fifty-four parts tartrate of potash, and forty-six tartrate of soda; and was once in much repute as a purgative by the name of Rochelle salt, or sel de Seignette.

The tartrate of soda is much less soluble than this triple salt, and crystallises in slender needles or thin plates.

The tartrate of ammonia is a very soluble bitter salt, and crystallizes easily. Its solution is spontaneously decomposable. This too forms, with tartrate of potash, a triple salt, the solution of which yields, by cooling, fine pyramidal or prismatic efflorescent crystals. Though both the neutral salts that compose it are bitter, this is not, but has a cooling taste. See Salt.

TARTARINE. The name given by Kirwan to the vegetable alkali, or potash.

TARTARUM. See Materia Medica.

TARTARUS, in the mythology, the infernal regions, or the hell of the ancient Greeks, Romans, and Egyptians; which consisted of two divisions, the one called Elysium, for the reception of the virtuous; the other Tartarus, for that of the wicked. See ELYSIUM and HELL. Tartarus was surrounded with a brazen wall, and its entrance was continually hidden from the sight by a cloud of darkness three times more gloomy than the obscurest night. Hesiod says (Theog. 720) it was a prison, at a greater distance from the earth than the earth is from the heavens. Virgil says (Æn. vi.) it was surrounded by three impenetrable walls, and by the impetuous burning streams of the river Phlegethon. The entrance was by a large lofty tower, whose gates were supported by columns of adamant, which neither gods nor men could open. In Tartarus, he adds, were punished all who had been disobedient to parents, traitors, adulterers, barbarous conquerors, who undertook unjust and cruel wars, faithless ministers, &c. It was the place where Tantalus, Ixion, Sisyphus, the Danaides, and other heinous offenders were punished (Ovid. Met. iv. fab. 13, Hom. Odys. xi.); and was frequented by the Furies, the Harpies, and other monsters of the heathen mythology.

TARTARY, a name applied very indefinitely to an extensive region of central Asia, and interposing between Asiatic Russia on the north, and the great empires of Persia, Hindostan, and China, on the south. The Tartar race was known and celebrated in antiquity under the name of Scythians, a people who are described under the same warlike, rude, and pastoral features which now distinguish the tenants of these regions. The simplicity of their manners, their ignorance of money and of luxury, and their hospitality, caused them to be quoted with admiration by the Greek sages: at the same time, the records of history bear ample testimony to the calamities which their inroads inflicted. Even under the Assyrian dynasty, they are represented as having overwhelmed and held the sceptre of Western Asia for twenty-eight years. If we may believe Herodotus, Cyrus, after having subdued the rest of Asia, found the termination of his life in his conflict with Tomyris, queen of this race. Darius, his successor, with difficulty escaped the same fate, and Alexander was little more fortunate; for, though he compelled the Scythians to cross the Jaxartes, he in vain attempted to pursue them beyond it.

At these earlier periods, although the Scythian tribes frequently laid waste the southern empires, they were unable to effect any permanent conquest or settlement. It was during the decline of the Roman empire that these tribes began permanently to forsake their own plains, in search of more fertile regions, and the first of these ravagers, whose terror and fame reached the frontier of Italy, were the Huns, the ancestors of the modern race of Mongols. The deformity of their aspect, and the ferocity of their manners, rendered their name more terrible than that of any of the German barbarians, and under Attila, characterised as 'the scourge of God, and the destroyer of nations,' they materially hastened the downfall of the empire. On the eastern frontier, another Tartar race took no less active a part. The Turks or Toorks, inhabiting extensive tracts of what is now called Chinese and Independent Tartary, poured down in large bodies upon the Persian empire, where they established a dynasty, under the name of Seljukian; and ultimately established themselves at Constantinople. In the twelfth century Tartary became the seat of the most formidable and extensive empire that perhaps has ever been established. Zingis, originally an obscure chief, having succeeded in uniting under his standard all the neighbouring tribes, successively conquered China, Persia, and all Central Asia, from the Black Sea to the Eastern Ocean. His successors added Russia, and overran Poland, with part of Germany. For some time the greatest panic prevailed in Europe. But in the course of a few reigns this vast empire was split into parts. The lead was now taken by the populous countries on the Oxus and the Jaxartes, where Timur established a sway, which, though less extended than that of Zingis, was superior in the value and importance of its regions. Timur conquered all Persia, broke the power of the Turks in Asia Minor, and established in India a dynasty, which continued to reign, and to form the most splendid court of Asia, till the close of the last century. China has also always been subject to Tartar dynasties.

Tartary may now be considered as divided into Chinese and Independent Tartary. The latter, since the time of Timur, has been occupied, and the ancient inhabitants either exterminated or expelled by the Uzbecks, a people of the widely extended race of Turk or Toork, but whose original seat is not precisely ascertained. It has the country of Bulkh (part of Cabul) and Korassim on the south; the Caspian on the west; and Asiatic Russia on the north. The Uzbecks, like other Turks, are celebrated in the east for their beauty, the reputation of which, however, arises chiefly from its contrast to the hideous forms of the Mongols, Calmucs, and other Tartar tribes. They have broad foreheads, high cheek bones, thin beards, and small eyes: their complexion is clear and ruddy, their hair generally black. The political constitution is a complete and pure despotism, the will of the sovereign being the only law. This circumstance depends probably upon the military habits formed by conquest; and according to which, and to the forms and customs of a camp, the whole government is administered. In Bokhara the men are divided, like troops, into parties or masses of ten each, who have a boiler, a tent, and a camel in common. The authority of the sovereign is also strengthened by the Mahometan religion, which is here professed in its utmost rigor. The Koran is implicitly assumed as the guide, not only in faith and doctrine, but in civil government and domestic life. The king, now reigning at Bokhara, was raised to the throne by the ostentatious profession of poverty, and of all those observances which establish the character of a Mussulman saint. Even in his present elevation, he spends part of every day in teaching the Mahometan religion, and of every night in watching and prayer. The revenue is col-

lected exactly in the proportions prescribed in the Koran; and one-tenth of it is expended in alms.

All the habitations of the Uzbecks consist of a species of moveable tent called onool, composed of a lattice of thin lath, covered with black felt. From twenty to fifty of these compose a species of moveable village or camp. Many of them now, however, reside in towns. Horsemanship is their favorite pursuit, and their horses are considered, next to the Arabian, as the best in Asia. An immense exportation formerly took place to India. In this trade, horses are still purchased in the markets of Bokhara or Bulkh, where they cost from £5 to £100, and are fattened on the way in the rich pastures of Cabul. Horse flesh, and koumiss, or fermented mares' milk, are considered as the greatest of luxuries here; in regard to which last even the Mahometan law is obliged somewhat to relax its rigor. Horses are so numerous that there is scarcely a man so poor as to walk; even beggars travel on horseback, or at least on camels or asses. As might be expected in a people with these habits, the Uzbecks produce numerous bodies of light cavalry, and excel in predatory warfare. Their arms are a long and heavy lance, swords, and a shield; but many have long knives and daggers. They charge in a body, with shouts, which are described as terrific. In battle they are drawn up in three lines, so that, even after being repulsed, they return twice to the charge. Their laws of war are most barbarous, giving no quarter except to infidels, whom the Koran allows them to sell as slaves; while the faithful, who cannot thus be subjected, have the honor of being killed on the spot. Yet, compared with many other Asiatics, they are sincere and honest, and murder scarcely ever occurs. Foreign merchants are also protected and encouraged, notwithstanding the national bigotry.

Bokhara may be considered as the most important of the kingdoms into which Independent Tartary is now divided. This territory includes the finest part of the country on the banks of the Oxus, and, though not very extensive, maintains an army of 80,000 or 100,000 cavalry. The city of Bokhara contains upwards of 100,000 inhabitants, with very extensive establishments for the cultivation of learning: and Samarcand, though declined from its ancient splendor, contains many fine buildings, and exhibits the same beauty of climate and situation for which it was anciently celebrated. The present possessor has paid much attention to it. On the Jaxartes, the bey of Koukan or Ferganna, possesses an extensive, fertile, and highly populous kingdom. The cities of Koukan, Khojund, and Murghelan, are said in populousness and beauty of situation to surpass any other in Central Asia. The population generally retains its pastoral and migratory habits, more particularly as we proceed northwards among the Kirghises. The country on the Upper Oxus, and that between the Aral and the Caspian, consists almost entirely of a vast sandy desert, tenanted by roving tribes of Uzbecks and Turcomans, who subsist partly by pasturage, and partly by plunder. Even here, however, are a few richer tracts, on which towns are built.

Chinese Tartary.—The tracts of Central Asia, over which the Chinese empire holds a nominal sway, include the whole territory contained between Hindostan and Asiatic Russia, and from the Eastern Ocean to the mountain boundary of Independent Tartary; a space comprising about 70° of longitude, and 20° of latitude. The southern and mountainous part of this vast tract passes under the name of Thibet. The western part of what is usually called Chinese Tartary is among the regions of the globe with regard to which our information is most imperfect. The great emporium of this region is Yarcund, situated to the south, and forming the rendezvous of the merchants from India, Cabul, and Independent Tartary. Proceeding eastward, the principal kingdoms are Koten or Khoten, and Hami or Chamil. The former is represented as very flourishing, containing numerous fortified cities, and excelling both in agriculture and manufactures. It is particularly celebrated for a species of beautifully variegated marble, which bears a high price in China. Hami is also described as a wealthy region, inhabited by a dissolute people. In this part of Asia are mentioned Acsu, Cialis, Ciarcian, Lop, and Peym: but one of its most distinguishing features is the great desert of Shamo or Cohi, which extends from west to east through nearly its whole extent. It extends in this direction nearly 2000 miles, and cannot be crossed without almost insuperable difficulties. Yet its position is such as to make it impossible to avoid it, on going from Cashgar to China. The caravans therefore coast its northern border, till they come to Lop, where they cross from north to south, and proceed to China along the south border.

Tartary, to the west and north-west of China, consists entirely of naked plains, particular portions only of which afford pasture and water, and traversed by wandering tribes. All of them own the supremacy of the Chinese empire, though it is necessary to secure their allegiance by giving pensions to chiefs. At the same time these wandering tribes claim the right of making war upon each other, though, when these contests rise to an alarming height, a Chinese force is employed to suppress them. All these people are devoted to Shamanism, or the religion of the Lamas; and in each distinguished place there is a sovereign priest, who claims the privilege of immortality and pre-existence.

The eastern extremity of Tartary, bordering on the Pacific, consists of the country of the Mantchoo Tartars, which, in consequence of having given a dynasty to China, forms now a province of that empire. It is still a favorite hunting residence of the emperors. The country consists generally of lofty mountains, covered with immense forests. No grain except oats can be raised; and, though the latitude be only that of the south of France, the climate resembles that of Norway. The most valued production is ginseng, a medicinal plant which grows on the declivity of wooded mountains, or on the rocky banks of deep rivers. The root is the part used in physic, and the value of it is enhanced by its age. In China it is highly esteemed. The persons who collect it carry with them neither horses,

baggage, tent, nor even a bed. They have merely a bag of dried millet, and lodge at night under the shelter of trees, or in temporary huts. Their greatest danger is from wild beasts, with which every part of the country is infested. The Mantchoo Tartars in person resemble the Mongols, except that they are fairer. They have adopted, only to a very limited extent, the religion of Fo or Boodh, but have an ancient religion of their own, and a language peculiar to themselves. Their country is traversed by the river Amour or Saghalien, which, in the upper part of its course, forms the boundary of the Chinese and Russian empires. Besides these tribes, who inhabit the region properly called Tartary, a great part of the southern provinces of Asiatic Russia have a Tartar population, among these may particularly be distinguished the Kalmucs and Baschkirs.

TARTINI (Joseph), a celebrated Italian musician, born at Pisano, in Istria, in 1692. He became so capital a performer on the violin, that he was appointed master of the band in the famous church of St. Anthony. He published several valuable tracts on music; and is styled by Dr. Burney, the Admirable. He died 1770.

TARTRATE. A neutral compound of tartaric acid with a base.

TARUFFI (Emilius), an eminent Italian painter, born at Brescia, in 1632. His landscapes and historical pieces were much admired, as well as his choice of scenery. He died in 1694.

TARVISIUM, an ancient town of Italy, now Treviso.

TARUNTIUS (Spurina, Lucius), a celebrated mathematician, who flourished about A. A. C. 61. Cic. ad div. ii. c. 47.

TARUSATES, an ancient people of Gaul, who inhabited the country now called Tursan. Cæs. de Bel. Gal. iii. 23.

TARUSCUM, an ancient town of Gaul.

TASK, *n. s.* & *v. a.* } Fr. *tasche*; Ital. *tassa*; Lat. *taxo*. Something imposed by another to be done; employment: 'to take to task' is to reprove; reprimand: to task, to impose a burden or business upon another: the noun-substantives that follow corresponding.
TASK'ER, *n. s.*
TASKMASTER.

Forth he goes,
Like to a harvestman, that's *tasked* to mow,
Or all, or lose his hire. *Shakspeare. Coriolanus.*

I have drunk but one cup to night, and that was craftily qualified too; and behold what innovation it makes here. I am unfortunate in the infirmity, and dare not *task* my weakness with any more. *Id. Othello.*

All is, if I have grace to use it so,
As ever in my great *taskmaster's* eye. *Milton.*

Relieves me from my *task* of servile toil
Daily in the common prison else enjoined me. *Id.*

Divert thy thoughts at home;
There *task* thy maids, and exercise the loom. *Dryden.*

Hear, ye sullen powers below;
Hear, ye *taskers* of the dead. *Id. and Lee.*

A holy man *took* a soldier *to task* upon the subject of his profession. *L'Estrange.*

The service of sin is perfect slavery; and he who will pay obedience to the commands of it, shall find it an unreasonable *taskmaster*, and an unmeasurable exactor. *South.*

He discovered some remains of his nature when he met with a football, for which Sir Roger took him to *task*. *Addison.*

His mental powers were equal to greater *tasks*. *Atterbury.*

No happier *task* these faded eyes pursue,
To read and weep is all they now can do. *Pope.*

TAS'SEL, *n. s.* Fr. *tasse*; Swed. *tass*; low Lat. *tasselus*. An ornamental bunch of silk or glittering substances.

Their heads are tricked with *tassels* and flowers. *Sandys.*

Then took the squire an horn of bugle small,
Which hung adown his side in twisted gold
And *tassels* gay. *Spenser.*

Early, ere the odorous breath of morn
Awakes the slumbering leaves, or *tasselled* horn
Shakes the high thicket, haste I all about. *Milton.*

TASSIE (James), modeller, born near Glasgow, of obscure parents, began his life as a country stone mason. Going to Glasgow, he acquired a knowledge of drawing in the academy instituted by the Fowlises; while, at the same time, he was obliged to labor at stone cutting for his support. Resorting to Dublin for employment, he became known to Dr. Quin, who was amusing himself with trying to imitate the precious stones in colored pastes, and take impressions of the engravings that were on them. Dr. Quin soon discovered Tassie to be one in whom he could place perfect confidence. He was endowed with fine taste; modest, unassuming, patient, and possessed the highest integrity. The doctor committed his laboratory and experiments to his care. The associates were fully successful; and found themselves able to imitate all the gems, and take accurate impressions of the engravings. The doctor, when the discovery was completed, encouraged Mr. Tassie to repair to London, and to devote himself to the preparation and sale of those pastes as his profession. In 1766 he arrived in the capital; and until his death, in 1799, he continued acquiring eminence and wealth. In addition to this elegant art, he practised the modelling of portraits in wax, which he afterwards moulded and cast in paste.

TASSISUDON, or TADISSOO JEUNG, a city of Northern Hindostan, the capital of the province of Bootan, and residence of the Deb Rajah, stands in a highly cultivated valley, about three miles in length, by one in breadth; intersected by the Tehintchieu River. On the surrounding mountains are timber trees, intermixed with fir and pine, and a great variety of shrubs. The climate generally is described as remarkably salubrious.

The castle or palace of Tassisudon is situated near the centre of the valley, and is a quadrangular building of stone. The walls are thirty feet high, pierced below with very small windows, apparently more for the purpose of admitting air than light. The citadel is very lofty, consisting of seven stories, each from fifteen to twenty feet high. From the centre rises a square piece of masonry, which supports a canopy of copper richly gilt, supposed to be immediately over the idol Maha Moonee. The Deb Rajah of Bootan dwells in the citadel, on the fourth story from the ground.

Near to the city are a long line of sheds, where the workmen are employed in forging brazen gods, and various other ornaments of their religious edifices. There is here also a considerable manufacture of paper, made from the deah bark, which grows in great abundance near to Tassisudon. It is very strong, and capable of being woven, when gilt, into the texture of silks and satins.

TASSO (Bernard) an illustrious Italian lawyer, descended of the ancient and noble family of Torreggiani. He was author of several ingenious compositions in verse and prose. He was sent to accompany the prince of Salerno upon a deputation from Naples, to the emperor Charles V., to remonstrate against the erection of an Inquisition there. He was afterwards employed by William Gonzago, duke of Mantua, as his principal secretary, who at last promoted him to be governor of Ostiglia, upon the Po; where he died in 1585. He was father to the celebrated Torquato.

Tasso (Torquato), a justly celebrated Italian poet, born at Sorrento in Naples, in the year 1549, the son of Bernard, by Portia di Rossi, a lady of an illustrious family of Naples. At nine he and his father were condemned to death for treason, but escaped; and three years after they went from Rome to Mantua: Tasso had then completed his knowledge of the learned languages. He was soon after sent to the university of Padua; and, in his eighteenth year, published his Rinaldo. He next went to Bologna, by the invitation of the city and college; but soon returned to Padua at the request of Scipio Gonzago, who had been elected prince of the academy then established by the name of the Ætheroi, of which Tasso was made a member. Here he formed the plan of his Jerusalem Delivered. Being pressed by the duke, and his brother cardinal Lewis, to reside with them at Ferrara, he consented, and the duke gave him an apartment in his palace, where he lived in affluence, and prosecuted his work; which he dedicated to the duke. When he was about twenty-seven, he published a pastoral comedy called Aminta. In his thirtieth year, he finished his Jerusalem, and, the whole being reprinted and published together, its success was astonishing, and it was immediately translated into Latin, French, Spanish, and even the oriental languages. But it was Tasso's fate to become wretched as soon as he gained the summit of reputation. Soon after his Jerusalem was published, he lost his father; his Jerusalem was attacked by invidious critics; and the perfidy of a friend drew upon him greater misfortunes. In consequence of a rencontre, in which he behaved very bravely, the duke put him in prison, under pretence of securing him from any future attacks. But Tasso within a year escaped, and retired to Turin, where he was recommended to the duke of Savoy; but Tasso, fearing that the duke of Ferrara would require him to be delivered up, set out for Rome: there he was visited by princes, cardinals, prelates, and all the learned in the city. But, being impatient of exile, he made his peace with the duke, who gave him fresh marks of his esteem. But Tasso, having made some attempts on the duke's sister, princess Leonora, whom he had celebrated in his verses, the duke caused him to be confined in the hospital of St. Anne, as a person deranged. Tasso applied to the duke, by every friend he had, to release him, but without effect; for Tasso was certainly disordered in his mind. At last, after he had been a prisoner seven years, Vincent Gonzago, prince of Mantua, came to Ferrara, during the festivals, procured his liberty, and took him to Mantua, he being then in the forty-second year of his age. At Mantua he lived about a year in great favor with the prince, but he became weary of a state of dependence, and therefore resolved to go to Naples, and endeavour to recover his mother's jointure, which had been seized by her relations when he went into exile. Finding his law-suit not likely to be soon determined, he went from Naples to Rome, where he continued about a year in high favor with pope Sixtus V., and then went to Florence, at the invitation of Ferdinand, grand duke of Tuscany. Having spent another year at Florence, he returned to Naples, and published his Jerusalem Delivered. Soon after this Sixtus V. died, and was succeeded by Clement VII.; and his nephews, Cynthio and Peter Aldrobandini, were created cardinals. Cynthio, who was a patron of learning, prevailed with him to leave Naples, and live with him in Rome. He returned again to Naples, but came back to Rome, in order to be crowned with laurels in the capital. While they were waiting for fair weather, Cynthio fell sick; and, before he recovered, Tasso was taken ill, and died on the fifteenth day, aged fifty-one. His poems had acquired him an immortal reputation. His works were printed together at Florence in 1724, in 6 vols. folio, with the criticisms. His Aminta and Gierusalemme Liberata have been translated into English.

TASSONI (Alexander), an Italian poet, born at Modena, in 1565. He was a member of the academy of Umeristi; and, among other works, published Secchia Rapita, or the Rape of the Bucket: which was the first model of a Mock Heroic poem in the Italian language. He died in 1635.

TASTE, *v.a.*, *v.n.*, & Tast'able, *adj.* [*n. s.* Tast'ed, Tast'er, *n. s.* Taste'ful, *adj.* Taste'less, Taste'lessness, *n. s.* Fr. *taster*, to try; Ital. *tastare;* Teut. *tasten*; barb. Lat. *tasto*. To perceive, distinguish, or try, by the palate; have perception of food; relish: hence to eat a small quantity; to relish mentally; obtain pleasure from: as a verb neuter to try by the mouth; to eat; have a smack; be tinctured; enjoy in a small degree: as a noun substantive the act of tasting; gust; perception; sensibility; a crude portion or specimen; intellectual relish or discernment; an essay; trial: the adjectives correspond with the above terms: a taster is one who takes the first portion of food: tastlessnesss, insipidity; want of relish or perception.

Manna was like coriander seed, white; and the *taste* of it was like wafers made with honey.

Exodus xvi. 31.

The ruler of the feast *tasted* the water made wine. *John* ii.

He should *taste* death for every man. *Heb.* ii. 9.

The *tasting* of death touched the righteous also, and there was a destruction of the multitude in the wilderness. *Wisdom.*

Seeing they pretend no quarrel at other psalms which are in like manner appointed to be daily ready, why do these so much offend and displease their *tastes?* *Hooker.*

Roscetes was seldom permitted to eat any other meat but such as the prince before *tasted* of. *Knolles.*

I have almost forgot the *taste* of fears:
The time has been, my senses would have cooled
To hear a night shriek. *Shakspeare. Macbeth.*

Cowards die many times before their deaths,
The valiant never *taste* of death but once. *Shakspeare.*

I hope, for my brother's justification, he wrote this as an essay or *taste* of my virtue. *Id.*

When kine feed upon wild garlick, their milk *tasteth* of it. *Bacon.*

Bees delight more in one flower than another and therefore have *taste.* *Id. Natural History.*

Coleworts prosper exceedingly, and are better *tasted,* if watered with salt water. *Id.*

They thought 't not safe to resolve, till they had *taste* of the people's inclination. *Id. Henry VII.*

The body's life with meats and air is fed,
Therefore the soul doth use the tasting power
In veins, which, through the tongue and palate spread,
Distinguish ever relish sweet and sour. *Davies.*

So shalt thou be despised, fair maid,
When by the sated lover *tasted;*
What first he did with tears invade,
Shall afterwards with scorn be wasted. *Carew.*

Fair hope! our earlier heaven! by thee
Young time is *taster* to eternity. *Crashaw.*

Musick of sighs thou shalt not hear,
Nor drink one lover's *tasteful* tear. *Cowley.*

Bold deed to *taste* it, under ban to touch. *Milton.*

Delicacies of *taste,* sight, smell. *Id.*

Best of fruits, whose *taste* gave elocution. *Id.*

Sion's songs to all true *tastes* excelling,
Where God is praised aright. *Id.*

Of nature's bounty men forbore to *taste,*
And the best portion of the earth lay waste. *Waller.*

The tardy plants in our cold orchards placed,
Reserve their fruit for the next age's *taste.* *Id.*

By depurating chemical oils, and reducing them to an elementary simplicity, they could never be made *tasteless.* *Boyle.*

Their distilled oils are fluid, volatile and *tasteable.* *Id.*

Besides the prayers mentioned, I shall give only a *taste* of some few recommended to devout persons in the manuals and offices. *Stillingfleet.*

Thou and I marching before our troops,
May *taste* fate to them, mow them out a passage. *Dryden.*

This fiery game your active youth maintained,
Not yet by years extinguished, though restrained;
You season still with sports your serious hours,
For age but *tastes* of pleasures, youth devours. *Id.*

Says the fly, Are not all places open to me?
Am not I the *taster* to princes in all their entertainments. *L'Estrange.*

Though there be a great variety of *tastes.* yet, as in smells, they have only some few general names. *Locke.*

If by his manner of writing a critick is heavy and *tasteless,* I throw aside his criticisms. *Addison's Spectator.*

As he had no *taste* of true glory, we see him equipped like an Hercules, with a club and a lion's skin. *Addison.*

The understanding cannot, by its natural light, discover spiritual truths; and the corruption of our will and affections renders them *tasteless* and insipid to us. *Rogers's Sermons.*

Your way of life, in my *taste,* will be the best. *Pope.*

Not *tasteful* herbs that in these gardens rise,
Which the kind soil with milky sap supplies,
Can move. *Id.*

Scholars, when good sense describing,
Call it *tasting* and imbibing. *Swift.*

How ill a *taste* for wit and sense prevails in the world! *Id.*

Pleasure results from a sense to discern, and a *taste* to be affected with, beauty. *Seed's Sermons.*

Apicius, here, the *taster* of the town,
Feeds twice a-week, to settle their renown. *Young.*

However contradictory it may be in geometry, it is true in *taste,* that many little things will not make a great one. *Reynolds.*

Taste is a certain sensation, or class of sensations, excited in the mind by certain bodies, which are called sapid, applied to the tongue and palate, and moistened with the saliva. This is the original and proper meaning of the word taste (see Metaphysics); but, as the qualities of bodies which produce these sensations are unknown, they have in all languages got the names of the sensations themselves, by that figure of speech which substitutes the cause for the effect. Hence we talk of the taste of sugar, wormwood, honey, vinegar, &c.; and say that the one is sweet and the other sour, &c. Tastes have been divided into simple and compound; and philosophers have to very little purpose endeavoured to ascertain the number of each species. See Phil. Trans. No. 280, 299; and Abercromb. Nov. Med. Clavis.

Taste is likewise used in a figurative sense to denote that faculty of the mind by which we perceive and enjoy whatever is beautiful or sublime in the works of nature or of art. Like the taste of the palate, this faculty relishes some things, is disgusted with others, and to many is indifferent; and from these obvious analogies between it and the external sense it has obtained its name. It has likewise been called an internal sense, and by Dr. Hutchinson a reflex sense; whilst others have considered it, not as a distinct faculty or sense, but as the joint exertion of perception and judgment in some cases, and as a play of the imagination in others.

Tasteless Earth (agust erde), the name given by professor Trommsdorff to a new simple earth, which he discovered in the Saxon beryl. It is distinguished, he says, from other earths by being white, and totally insoluble in water. In a fresh state, when moistened with water, it is somewhat ductile. In the fire it becomes transparent, and very hard, so as to scratch glass, but remains insipid and insoluble in water. The burnt earth dissolves very easily in acids, and produces with them peculiar salts, which are entirely devoid of taste; and hence he gave it the name of tasteless earth. Fixed alkalies do not dissolve this earth, either in the dry or in the wet way; and it is equally insoluble with

the carbonic acid and with caustic ammonia. It has a greater affinity to the oxalic than to the other acids.

TATA, or Dotis, a large town of Western Hungary, situated on a height in the midst of marshes, sixty-four miles E. S. E. of Presburg. It contains 8600 inhabitants, and is divided into two parts called Dotis and Tovaros. The inhabitants carry on a number of employments on a small scale, such as the manufacture of woollens, sawing of timber, and, finally, the preparing of whetstones for sale and export. They are descended from a mixed race of Magyars, Sclavonians, German settlers, and Jews. In religion the Catholic predominates, and here are a Catholic gymnasium and monastery, conducted by the Piarists.

TATARBASAR, or Tatar Bazargik, a considerable inland town of European Turkey, in Bulgaria, near the Marizza; the ancient Hebrus. It is situated on the great road from Constantinople to Belgrade, and is little visited by travellers; but is said to contain several mosques, baths, and other good buildings, with about 10,000 inhabitants. Fourteen miles N. N. W. of Philippopoli.

TATE (Nahum), a poet, born at Dublin, where he received his education, in 1652. He was made poet laureat to king William III. upon the death of Shadwell, and held that place until the reign of George I., whose first birthday ode he wrote, with unusual spirit. He died in the mint in 1716. He wrote nine dramatic performances, a great number of poems, and a version of the psalms in conjunction with Dr. Nicholas Brady.

TATIAN, a writer of the primitive church, in the second century, born in Assyria, and trained up n the heathen religion and learning. He become Christian and disciple of Justin Martyr, whom he attended to Rome; and, while Justin lived, continued orthodox; but after his death made a schism, and founded a new sect, condemning marriage, enjoining abstinence from wine and animal food, and suffering only water to be used in the holy mysteries; whence his followers were called Encratitæ and Hydroparastatæ. None of his works are extant but his piece against the Gentiles, entitled his Oration to the Greeks.

TATIENSES, a name given by Romulus to a tribe of the Roman people, in honor of his colleague king Tatius, to whom part of them had been subjects. They lived on the mounts Capitolinus and Quirinalis.

TATIUS (Titus), king of the Sabines and Romans. See Rome and Sabines.

Tatius (Achilles), a native of Alexandria, was the author of a book on the sphere. There is also attributed to him a Greek romance on the lives of Leucippe and Clitophon, of which Salmasius has given a beautiful edition in Greek and Latin, with notes. Suidas says that Tatius was a Pagan, but afterwards became a Christian, and a bishop. Photius mentions him in his Bibliotheca.

TATTA, a large district of Hindostan, in Sinde, comprehending the whole Delta of the Indus, calculated at 150 miles in length, by fifty in breadth. Being intersected by rivers, travelling takes place mostly by water. The country is in general sandy and barren, and many parts of it only fit for pasturing camels or goats; but it also produces a quantity of rice and salt, and the rivers abound with fish. This district has for nearly forty years belonged to the Ameers of Sinde. Its principal town is Tatta, and its chief port Corachie. In the beginning of the eighth century this province was invaded by the Arabs, and may be considered as having been subject to the Mahometans from that period. It was taken possession of by the emperor Akbar in 1590, and acknowledged the Mogul authority till the dissolution of that empire. Its former capital was Brahminabad, which is said to have been enclosed by a brick wall, having 1400 round towers or bastions.

Tatta, an ancient city, capital of the abovementioned district, is situated on the banks of the Indus, about 130 miles from the sea. The town stands in a fertile valley, formed by a range of low hills, which, during the freshes of the river, is inundated; a circumstance which often gives the city the appearance of an island. Some of the houses are of brick and mortar, but the greater number are of mud and timber. The old English factory, purchased in 1751, is still reckoned the best house in the town. The circumference of the modern town is four miles, and is supposed to contain 15,000 inhabitants. It was formerly famous for its commerce and manufactures; but its greatness is much diminished. On a hill, about a mile from the town, is an immense number of Mahometan tombs, in good preservation. The stone mausoleum of Mirza Isa is uncommonly magnificent and well executed; and supported by many columns: the interior is covered with inscriptions formed of different colored stones. The modern city of Tatta was founded by Jam Mundel, the 14th of the Someah dynasty, A. D. 1485, and was plundered by the Portuguese in 1555. Dr. Robertson was of opinion that Tatta was the Pattala of the Greeks.

TATTER, *v. a. & n. s.* } Sax. tozæpan. To
Tatterdemal'ion. *n. s.* } tear; rend; make ragged: a rag; a fragment: tatterdemalion seems a word formed in the caprice of ridicule.

Through *tattered* cloaths small vices do appear:
Robes and furred gowns hide all.
Shakspeare. King Lear.

This fable holds, from him that sits upon the throne, to the poor devil that has scarce a *tatter*.
L'Estrange.

As a poor fellow was trudging in a bitter cold morning with never a rag, a spark that was warm clad called to this *tatterdemalion*, how he could endure this weather? *Id.*

Where waved the *tattered* ensigns of Ragfair,
A yawning ruin hangs. *Pope.*

Little tyrants raged,
Tore from cold wintry limbs the *tattered* weed.
Thomson.

Here Satan vanished—He had fresh commands,
And knew his pupil was in able hands;
And now, the treasure found, and matron's store,
Sought other objects than the *tattered* poor. *Harte.*

TATTERSHALL, a market-town and parish in Gartree hundred, Lincolnshire, on the river

Bain, eight miles S. S. W. from Horncastle, and 128 north of London. The church is a handsome building formerly collegiate in the form of a cross; some of the windows still contain some good paintings on glass. The castle was demolished during the civil war. The Bain is navigable for barges to the Witham. Market on Friday. Fairs, May 11th, and September 25th. It is a curacy.

TATTLE, *v. n.* & *n. s.* } Belg. *tateren;* Goth.
TAT'TLER, *n. s.* } *tatala.* To prate; talk idly; use many words with little meaning: idle talk: an idle talker.

He stands on terms of honourable mind,
Ne will be carried with every common wind
Of court's inconstant mutability,
Ne after every *tattling* fable fly. *Spenser.*

The one is too like an image, and says nothing; and the other too like my lady's eldest son, evermore *tattling.* *Shakspeare.*

Going from house to house, *tattlers,* busy bodies, which are the canker and rust of idleness, as idleness is the rust of time, are reproved by the apostle. *Taylor.*

Excuse it by the *tattling* quality of age, which is always narrative. *Dryden.*

The world is forward enough to *tattle* of them. *Locke.*

The French language is extremely proper to *tattle* in; it is made up of so much repetition and compliment. *Addison.*

They asked her how she liked the play?
Then told the *tattle* of the day. *Swift's Miscellany.*

A young academick shall dwell upon trade and politicks in a dictatorial stile, while at the same time persons well skilled in those different subjects hear the impertinent *tattle* with a just contempt. *Watt's on the Mind.*

TATTOO', *n. s.* Fr. *tapotez tous.* The beat of drum by which soldiers are warned to their quarters.

All those whose hearts are loose and low,
Start if they hear but the *tatto.* *Prior.*

TATTOOING or TATTOWING, an operation in use among the islanders in the South Sea for marking their bodies with figures of various kinds which they consider as ornamental. It is performed by puncturing the skin and rubbing a black color into the wounds. See OTAHEITE.

TAVAI POENAMMOO, an island in the South Pacific Ocean, being the most southerly of the two which form New Zealand, and separated from the northern island by a channel called Cook's Straits, discovered by captain (then lieutenant) Cook, who sailed round them both in the year 1769. It is about 500 miles in length from south-west to north-east, and from 55 to 140 broad. See ZEALAND, NEW.

TAVARONE (Lazarus), a celebrated Italian painter of history and portraits, born at Genoa in 1556. He was a disciple of Luke Cangiagio, and succeeded him as painter to the king of Spain. He died in 1631.

TAUBMAN (Frederick), a learned German critic born in Franconia, about 1565. He became professor of poetry and belles lettres at Wirtemberg. He published Commentaries on Virgil and Plautus. He died in 1633.

TAVERNIER (John Baptist), a famous French traveller, born at Paris in 1605. In the course of forty years he travelled six times to Turkey, Persia, and the East Indies; and visited all the countries in Europe, travelling mostly on foot. His Travels have been often printed. He died on his journey, at Moscow, in 1609.

TAV'ERN, *n. s.* } Fr. *taverne;* Lat. *taberna.*
TAV'ERNER, } A house where wine is
TAV'ERNKEEPER, } sold, and drinkers are en-
TAV'ERNMAN. } tertained: the other names mean the person who keeps a tavern.

Enquire at London, 'mong the *taverns* there
For there they say he daily doth frequent,
With unrestrained loose companions.
Shakspeare. Richard II.

After local names, the most in number have been derived from occupations; as tailor, archer, *taverner.* *Camden.*

To reform the vices of this town, all *taverns* and alehouses should be obliged to dismiss their company by twelve at night, and no woman suffered to enter any *tavern* or alehouse. *Swift.*

TAVISTOCK, a borough and market-town in Tavistock hundred, Devonshire, near the river Tavy, fourteen miles north from Plymouth, and 206 west by south of London. The manufacture principally occupying the inhabitants is that of serges. This town is well built, but the streets are narrow, and indifferently paved. The church is large and handsome. It is one of the stannary towns. The ruins of its benedictine abbey are still observeable. It sends two members to parliament, the right of election being in the freeholders, inhabitants of the borough; number of voters about 110; the returning officer is the portreeve. Here is a chalybeate mineral water. Market on Saturday. Fairs, January 17th, May 6th, September 9th, October 10th, and December 11th. It is a vicarage. Patron, the duke of Bedford.

TAUNT, *v. a.* & *n. s.* } Fr. *tanser.*—Skinner.
TAUNT'INGLY, *adv.* } Mr. Thomson observes that taunt, in sea language, signifies too high or lofty (contracted from too haught). To reproach; insult; revile; treat with insolence: the reproach used; insult; scoff: the adverb corresponding.

When I had at my pleasure *taunted* her,
She in mild terms begged my patience. *Shakspeare.*

With scoffs and scorns, and contumelious *taunts,*
In open market-place produced they me,
To be a publick spectacle. *Id. Henry VI.*

It *tauntingly* replied
To the' discontented members, the' mutinous parts,
That envied his receipt. *Id. Coriolanus.*

The bitterness and stings of *taunting* jealousy,
Vexatious days, and jarring joyless nights,
Have driven him forth. *Rowe's Jane Shore.*

Julian thought it more effectual to persecute the Christians by *taunts* and ironies than by tortures. *Government of the Tongue.*

He, by vile hands to common use debased,
Shall send them flowing round his drunken feast,
With sacrilegious *taunt* and impious jest. *Prior.*

TAUNTON, a market-town and borough of Somerset, is situated on the river Tone; and, in point of size, buildings, and general respectability, may vie with many cities. It extends nearly a mile from east to west, and consists of four principal streets, with various minor ones. The streets are wide and airy; the houses very well built, and most of them have gardens be-

hind. Within the last twenty years the town has undergone many alterations and improvements, in most of which, views of utility have been judiciously combined with embellishment. The vale of Taunton, or Taunton Dean, is proverbial for its fertile soil and temperate climate. The public buildings are the market-house, town-hall, free grammar school, and the parish churches, St. Mary Magdalen's and St. James's. St. Mary's is an elegant and splendid building, situated near the centre of the town, built in the Gothic style of architecture; whence it has been supposed to have been founded by Henry VII., as were several other churches in Somersetshire. It is extremely spacious and beautiful, and at one end here is a lofty tower of magnificent workmanship. It contains thirteen windows, adorned with a variety of curious ornaments. The height of the whole is 153 feet; and from the balustrades at the bottom of the pinnacles there is an extensive view of the adjacent country. The roof is extremely curious, and is supported by twenty-four pillars in four rows, which divide the whole into five aisles and a chancel. In the centre stands the desk and pulpit, beautifully adorned with carved work. In the middle aisle, over the pillars, are twelve niches, supposed to have been occupied with the images of the apostles. There are no less than forty-four windows in this church, some of which still retain traces of the ancient painting. The church of St. James is a plain ancient building, which seems to have been erected in the thirteenth century. Besides the parish churches, there are several dissenting meeting-houses in the town. Paul's meeting-house is perhaps the oldest. The Baptist chapel is a large, expensive, and handsome building, fifty-four feet in length, and forty-nine in breadth; the roof is supported by two strong and curious pillars of the Corinthian order. The pulpit and staircase are enriched with elegant carved work; and the fronts of the galleries and pews are of Flemish oak. The Octagon chapel, erected by the Rev. Mr. Wesley, in 1778, is a neat building in Middle Street, St. James's. The Wesleyan Methodists have another chapel in Upper High Street, built by Mr. James Lackington, the late bookseller, Finsbury Square, London. The Baptists have also another chapel in Silver Street, which is a small neat structure. The Quaker meeting-house is a neat building, kept extremely clean, and the Catholics have a respectable chapel in the Crescent. The market-house stands in the centre of the town, and is a handsome and commodious building: in the lower part is the town-hall, and a coffee-room furnished with newspapers, &c. On the first floor there is an elegant assembly-room, fifty-feet long, and thirty wide, in which hang two superb chandeliers, presented to the inhabitants by the late colonel Coxe. In the upper floor is a handsome room, supplied with a billiard-table. On each side of this house is a large wing or arcade, for the accommodation of those who attend the markets with poultry, butter, and other articles of provisions. The corn-market is held in one of the arcades. In front is a spacious area, on which are erected moveable stalls, placed in rows, for the use of the butchers. This area is enclosed by posts and chains. In the middle of it, to the north, is a noble pavement of broad stones, 216 feet in length, and eighteen broad, which is called the Parade.

The free grammar-school was founded in the reign of Henry VII., by Fox, bishop of Winchester, and liberally endowed, about the year 1553, by William Walbee. The charitable institutions in Taunton consist likewise of several alms-houses, two work-houses, and an hospital or infirmary. Taunton hospital is an oblong building, situate in East Reach, and was erected by subscription in 1811, to commemorate the jubilee kept in honor of his late majesty's having attained the fiftieth year of his reign. The building (erected about fifty years ago for the purpose of an hospital) has been converted into a convent, and is now inhabited by nuns of the order of St. Bridget, who came into England during the revolution in France. Part of the castle of Taunton remains. It was originally built by Ina, king of the West Saxons. The principal part of the castle, as formerly laid out, was the great hall, which is 119 feet and a half long, by thirty feet and a half broad, and twenty feet five inches high. It is now the place in which the Lent assizes, the county sessions, and the courts of the bishops of Winchester, are held. The assize-hall, and some other parts of this building, were repaired, and elegantly fitted up, in the end of the last century, by Sir Benjamin Hammet, member for the borough.

On the north side of the town stands the Priory farm, near to which there was once a priory of black canons, which was founded by William Gifford, bishop of Winchester, in the reign of Henry I. Besides this, there were several chapels and chantries in Taunton, all of which were dependent on the mother church, in the convent dedicated to St. Peter and St. Paul. Taunton carries on some manufactures, and a considerable trade to Bridgewater by means of the Tone. It was for a long period the principal seat of the manufacture of coarse woollen goods, such as serges, corduroys, sagathies, druggets, shalloons, &c., a manufacture which flourished here soon after its introduction into England. For many years, however, it has been on the decline; and the inhabitants are at present occupied in a great measure in the silk trade. Large quantities of malt liquor are sent from this town to Bristol. Taunton is a borough by prescription, its rights being confirmed by charter at a very early period. In the reign of Charles II. it was deprived of its charter on account of its adherence to the parliament: but he restored its privileges about seventeen years after. About 1792 the corporate body was dissolved, and the charter lost, on account of the number of members having been allowed to decrease below a majority of the whole. In the adjoining village of Wilton there is a bridewell, built and maintained by the county, for the confinement of criminals only, debtors being sent to the county jail at Ilchester. Taunton sends two members to parliament, who are elected by such of the inhabitants residing within the borough as do not receive alms, and are potwallers or potwallopers, that is, every inhabitant who dresses his own victuals. The

number of voters is about 500. The legal returning officers of this borough are the bailiffs, elected at the annual court leet, as was decided by a committee of the house of commons on the 3d of May 1803. Numerous Roman coins have been found in this neighbourhood, and it is certain that it was a place of some note in the time of the Saxons, from the circumstance of king Ina building his castle here. Markets on Wednesday and Saturday, which are very considerable. Thirty-one miles north-east of Exeter, and 140 west by south of London. Population 8534.

Taunton, a post-town and capital of Bristol county, Massachusetts, on the river Taunton, twenty-one miles east of Providence, twenty-four north of Bristol, twenty-seven north by west of New Bedford, and thirty-two and a half south of Boston. It is a pleasant and handsome town, containing a court house, a jail, town house, bank, academy, printing office, paper mill, three rolling and slitting mills, two cotton manufactories, and five houses of public worship, two for Congregationalists, two for Baptists, and one for Friends. Large quantities of bricks are made in this neighbourhood

TAURÆ, in zoology (from Lat. taurus a bull, literally a female bull, differing from vacca, a cow), the name given by the Romans to that hermaphrodite kind of ox which is neither bull nor cow, and which British farmers call a freemartin. See Hermaphrodite.

TAURANIA, a town of Italy, in the country of the Bruttii.—Lempriere.

TAURANTES, an ancient people of Armenia, who dwelt between Artaxata and Tigranocerta. —Tacit. Ann. 14, c. 24.

TAURI, an ancient nation of European Sarmatia, who inhabited Taurica Chersonesus, and sacrificed all strangers to Diana. The statue of this goddess, which they believe to have fallen down from heaven, was carried off to Sparta by Iphigenia and Orestes. See these articles. —Herodot. iv. c. 99. Eurip. Iphig. &c.

TAURIC (from Taurica), of or belonging to, or produced in Taurida, or Taurica Chersonesus. The term is chiefly applied to animals, natives of that country; particularly the Tauric goats, from the skins of which the celebrated Morocco leather is manufactured at Karasubazar, a town in Taurica.

Tauric Goat's Leather, or Morocco Leather, is the staple of an ancient manufacture, in Karasubazar, where they make large quantities from the skins of the numerous flocks of Tauric goats. They begin the process by cleaning the skins in the following manner:—After having steeped some raw hides in cold water for twenty-four hours, to free them from blood and other impurities, the fleshy parts are scraped off with proper instruments. They are next macerated for ten days in cold lime water, to loosen the hair, which is likewise scraped off as clean as possible. For fifteen days they lie in clean cold water, and then are worked under foot in a succession of clean water; the last being impregnated with dog's dung to loosen the hair still more, when they receive a second scraping, and are drained of their humidity; which finishes the cleaning process. They now proceed to what they call feeding the skins, by steeping them four days in a cold infusion of wheat bran; then in a decoction of honey and water, twenty-eight pounds to five pails, cooled down to the temperature of new milk; out of which they are put under press into a vessel with holes at the bottom to let the liquor escape. They are lastly steeped four days in a light solution of salt and water, one pound to five pails; this finishes the preparation, and the leather is now ready to receive the dye. A strong decoction of artemisia annua, or southern-wood, in the proportion of four pounds to ten pails of water, seems to be the basis of all the different colors that they give to Morocco in Taurica, Astracan, and the other cities formerly belonging to the Tartar empire, where the secret has remained till now. When a red color is intended, a pound of cochineal in powder is gradually stirred into ten pails of fine yellow decoction of artemisia, and boiled up in it for half an hour, with five or six drachms of alum, and poured on the leather in a proper vessel. They are next worked under feet in an infusion of oak leaves in warm water, till they become supple and soft; when they are finally rinsed in cold water, then rubbed over with olive-oil and calendered with wooden rollers; which finishes the manufacture. The yellow Morocco is dyed with the decoction of artemisia alone; only stronger; twenty pounds of it to fifteen pails, being the proportion when used without other admixture; but two pounds of alum in fine powder are gradually added, by half a table spoonful at a time; and with this each skin is twice stained before the last operation of oiling and calendering. It is proper to remark that there is a little difference in the preparation of the skins for receiving the pure yellow dye described above, as neither honey nor salt are used; but, instead of them, the hides are steeped for two days in an infusion of oak-leaves; and immediately after being taken out of the infusion of bran wherein they must have lain four days, and then be worked under foot for a few hours of these four days, next rinsed in cold water, and placed one above another on poles, to drain off the water and make them ready for staining.

TAURICA, in the mythology, a surname of Diana, because she was worshipped by the inhabitants of Taurica Chersonesus.

Taurica Chersonesus, in ancient geography a large peninsula of Europe, at the south west end of the Palus Mœotis, joined to Scythia by an isthmus, and bounded by the Cimmerian Bosphorus, the Euxine Sea, and the Palus Mœotis. The inhabitants were called Tauri, and were very savage. Strabo, iv. Plin. iv. 12. Its modern name, till lately, was Crimea, or Crim Tartary. See Tartar and Tartary. The inland country was anciently possessed by the Scythians, who extended themselves on the north beyond the Perekop, west to the Dnieper, and east as far as the Don. The west and south coasts were inhabited by some Greek colonies, of which the town of Chersonesus became the most powerful. The east side on the Don and the opposite country, or the tract from the Don along the sea of Azoph to the Black Sea and Mount Caucasus, was under the kings of the

Bosphoric Greeks, so called from the strait of Bosphorus. The Scythians proving troublesome neighbours to the Greeks, they asked the assistance of Mithridates VII. king of Pontus, who drove the Scythians out of the peninsula, and formed the kingdom of Bosphorus, which comprehended the whole peninsula, and the country facing it on the east towards Mount Caucasus. In the reign of Dioclesian, the Sarmatæ were in sole possession of this kingdom, except that the Goths had seized a part of it, on the west side of the peninsula, and the whole tract lying north of it, along the Don. The peninsula afterwards fell under the emperors of the east, though partly shared with the Huns; who were succeeded by the Cozars, and these by the Polawzers. About the end of the twelfth century, the Genoese, having made themselves masters of the Euxine or Black Sea, with all its harbours, settled also in the Crimea. In the thirteenth century the Tartars expelled the Polawzers out of the Crimea; but the strength of the Genoese ports and castles baffled their undisciplined fury; and held out till 1471, when the Turks reduced the whole Crimea and placed a khan over it. In 1698 the Russians made an attempt on the Crimea, but took only Perekop. In 1736 they were more successful under count Munich, who again took Perekop, and opened a passage into the Crimea, though garrisoned by 100,000 men in a great number of strong towers. In 1737, 1738, and 1739, the Russians renewed their invasion with such success, tha they ravaged one-half of the Crimea, while the Tartars ravaged the other; and vast numbers of the people perished by famine. The khan, however, continued after this to govern the greater part of it; and assumed the title of Khan of Lesser Tartary, though he was only a vassal of the Ottoman Porte, till 1774, when he was declared independent. But in 1783, from the farther successes of the Russians, under Catherine II., he abdicated his government, and ceded the whole country to Russia.

Taurica Chersonesus, in modern geography, is the ancient name restored to the Crimea, by the late empress of Russia, Catherine II., after her complete conquest of the whole country. It is also called Taurida, Tauris, and Russian Tartary, and simply Taurica. In the Russian language it is called Taurichesskaia.

TAURICOR'NOUS, *adj.* Lat. *taurus* and *cornu.* Having horns like a bull.

Their descriptions must be relative, or the *taurico*rnous picture of the one the same with the other.
Browne.

TAURIDA, a province of European Russia, which lies between long. 31° 36′ and 40° 24′ E., and between lat. 44° 32′ and 47° 50′ N.; has a superficial extent of 35,000 square miles; but the inhabitants are so thinly scattered that their number does not exceed 260,000, making hardly seventy-four to the square mile. It contains some fertile tracts, particularly in the Crimea, but has also immense steppes, many of them almost entirely unproductive, and all deficient in water, though others are covered with the finest grass. The summer is mild, but the winter, though short, is very severe. Without any particular insalubrity of climate, a species of scurvy, common in this country, is more prevalent here than in other parts of the south of Russia. In the peninsula a regular system of agriculture is carried on; but, throughout the rest, little is to be found except wandering tribes. The principal products have been described under the head of Crimea. The inhabitants consist of a mixture of Tartars of three or four different tribes, Cossacs of two or three, Russians, Jews, gypsies, and foreign colonists, chiefly of German descent. The province is divided into six circles, besides the isle of Taman, and the land of the Czernomorski Cossacs.

Taurida. This is also the name of a range of mountains, which sweep along the whole coast of the Crimea from east to west. They are apparently distinct from the great chains of Europe and Asia; the highest, the Tschatyrdag, is about 6800 feet above the Euxine. They are composed of sand, lime-stone, and marl-slate. In the Isle of Taman, at the eastern extremity of the peninsula, is a volcano in this line of mountains, which broke out for the first time in 1804. These mountains divide the Crimea into two parts, remarkable for difference of climate; the northern, by much the larger, being neither pleasant nor healthy, while the southern, which may be said to resemble in its degree of heat, and in its vegetable products, the most favored parts of Asia Minor.

TAURINI, the ancient inhabitants of

TAURINUM, a town of Gallia Cisalpina; (Sil. Ital. iii. 646, Plin. iii. 17), now called Turin.

TAURIS, a city of Persia, which at different periods has been the capital of the empire. Sir William Jones and other writers conceive it to be the ancient Ecbatana. D'Anville, however, imagines it to be Gaza, or Ganzaca, where Cyrus deposited the treasures of Crœsus. It was a favorite city of Haroun el Raschid; and, according to Persian tradition, was founded by Zobeida, one of his wives. It was probably to him that it was indebted for that extraordinary magnitude and splendor which it once exhibited. In the time of Chardin, it was reckoned to contain upwards of 500,000 inhabitants, and carried on an extensive trade with Russia, Tartary, and India; and, for the accommodation of strangers, there were 300 spacious caravanseras. The manufacture of silk, particularly of turbans, was very extensive. Tauris, however, has suffered in a more than ordinary degree under those revolutions which have laid waste all the modern cities of Persia. Situated near the frontier, it has alternately been the object of contest to Turks, Tartars, and Persians, and has been taken and sacked eight different times. It has suffered still more by earthquakes. The last, in 1724, is supposed to have destroyed 100,000 inhabitants. At present Tauris does not contain more than 30,000 people, and is, on the whole, one of the most wretched cities in Persia. The wall that surrounds it is decayed; and, while the ruins of the ancient city cover a great extent of ground, they exhibit nothing but a confused heap of old mud walls. Long. 46° 37′ E., lat. 38° 10′ N.

TAUROMENIUM, or Taurominium, an ancient town of Sicily, between Messana and

Catana; built by the Zancleans, Sicilians, and Hybleans, by order of Timoleon, in the age of Dionysius II. tyrant of Syracuse. The hills adjacent were famous for their grapes and wines; and for the extent and beauty of their prospects. Diodor. It was built on the site of Naxus, and is now called Taormina. See NAXUS, and TAORMINA.

TAUROMINIUS, a river near Tauromínium.

TAURUS, in astronomy, one of the twelve signs of the zodiac.

TAURUS, the name which Europeans give to a lofty chain of mountains, situated in the eastern part of Asia Minor, where it borders on Syria, called by the Turks Gebel Kurin. They approach so near to the Mediterranean as in some places to leave only narrow passes, the most celebrated of which is that of Issus, where the battle was fought between Darius and Alexander. These mountains are in many places very rugged, and covered with vast pine forests. They are traversed in summer by Turcoman shepherds, who in winter descend and take up their residence in towns.

TAUSENAU. See DAUSENAU.

TAUTOL'OGY, *n. s.* Fr. *tautologie;* Gr. ταυτολογία; ταῦτο and λόγος. Repetition of the same words, or of the same sense in different words.

All science is not *tautology;* the last ages have shewn us, what antiquity never saw, in a dream. *Glanville's Scepsis.*

Saint Andre's feet ne'er kept more equal time,
Not even the feet of thy own Psyche's rhime;
Though they in numbers as in sense excel,
So just, so like *tautology,* they fell. *Dryden.*

Every paper addressed to our beautiful incendiaries hath been filled with different considerations, that enemies may not accuse me of *tautology.* *Addison's Freeholder.*

TAW, *n. s.* Perhaps from Sax. ταρian, to whiten. A marble to play with.

Trembling I 've seen thee
Mix with the children as they played at *taw;*
Nor fear the marbles as they bounding flew,
Marbles to them, but rolling rocks to you. *Swift.*

TAW'DRY, *adj.* From. St. Audry, St. Awdrey, or St. Etheldred, as the things bought at St. Etheldred's fair.—Henshaw and Skinner. Meanly showy; fine without grace; showy without elegance. It is used both of persons and things.

Bind your fillets fast,
And gird in your waste,
For more fineness, with a *tawdrie* lace. *Spenser's Pastorals.*

Not the smallest beck,
But with white pebbles makes her *tawdries* for her neck. *Drayton.*

He has a kind of coxcomb upon his crown, and a few *tawdry* feathers. *L'Estrange.*

Old Romulus, and father Mars, look down!
Your herdsman primitive, your homely clown,
Is turned a beau in a loose *tawdry* gown. *Dryden's Juvenal.*

He rails from morning to night at essenced fops and *tawdry* courtiers. *Addison's Spectator.*

A clumsy beau makes his ungracefulness appear the more ungraceful by his *tawdriness* of dress. *Clarissa.*

TAWEETAWEE. A cluster of islands, nearly sixty in number, in the eastern seas, forming part of the Sooloo Archipelago. Some are of considerable extent, others high, some low, and not a few mere rocks. The chain of islands to the south-east of Taweetawee are all low, with an infinite number of shoals between them, which abound with fish, and are the site of a pearl fishery. The island of Taweetawee has plenty of excellent waters, but very few inhabitants; the names of many of these small islands in the Malay language are so indecent that they do not admit of being translated.

TAWING. See TANNING.

TAW'NY, *adj.* Fr. *tané, tanné.* Yellow; tan-colored; like things tanned.

This child of fancy, that armado hight,
For interim to our studies shall relate,
In high born words, the worth of many a knight
From *tawny* Spain, lost in the world's debate. *Shakspeare.*

Eurus his body must be drawn the colour of the *tawny* Moor, upon his head a red sun. *Peacham.*

The *tawny* lion pawing to get free. *Milton.*

Whilst they make the river Senaga to bound the Moors, so that on the south side they are black, on the other only *tawny,* they seem not to derive it from the sun. *Browne.*

Where 's the worth that sets this people up
Above your own Numidia's *tawny* sons? *Addison's Cato.*

TAX, *n. s.* & *v. a.* } Fr. *taxer;* Belg. *taxe,*
TAXA'TION, *n. s.* } Lat. *taxo;* Welsh *tásg.* An
TAX'ER } impost or tribute imposed; an excise; a tallage; charge; censure: to impose a tribute or charge; to censure: taxation is the act of doing so; impost: taxer, he who taxes.

Jehoiakim gave the silver and gold to Pharaoh, but he *taxed* the land to give the money.
2 *Kings,* xxiii. 35.

The subjects could taste no sweeter fruits of having a king, than grievous *taxations* to some vain purposes; laws made rather to find faults than to prevent faults. *Sidney.*

I bring no overture of war, no *taxation* of homage; my words are as full of peace as matter. *Shakspeare. Twelfth Night.*

How many hath he killed? I promised to eat all of his killing.—Niece, you *tax* signior Benedick too much; but he'll be meet with you. *Shakspeare.*

I am not justly to be *taxed* with any presumption for meddling with matters wherein I have no dealing. *Raleigh.*

These rumours begot scandal against the king, taxing him for a great *taxer* of his people. *Bacon's Henry VII.*

They cannot *tax* others' omissions towards them without a tacit reproach of their own. *Decay of Piety.*

He could not without grief of heart, and without some *tax* upon himself and his ministers for the not executing the laws, look upon the bold licence of some pamphlets. *Clarendon.*

Tax not divine disposal: wisest men
Have erred, and by bad women been deceived. *Milton.*

Men's virtues I have commended as freely as I have *taxed* their crimes. *Dryden.*

If he *taxes* both of long delay,
My guilt is less, who sooner came away. *Id.*

With wars and *taxes* others waste their own,
And houses burn, and household gods deface,
To drink in bowls which glittering gems enchase *Id.*

This salutation cannot be *tared* with flattery, since it was directed to a prince, of whom it had been happy for Rome if he had never been born, or if he had never died. *Addison.*

The *tax* upon tillage was two shillings in the pound in arable land, and four in plantations: this *tax* was often levied in kind upon corn, and called decumæ or tithes. *Arbuthnot.*

Various news I heard,
Of old mismanagements, *taxations* new;
All neither wholly false nor wholly true. *Pope.*

TAXATIO ECCLESIASTICA. The valuation of ecclesiastical benefices made through every diocese in England, on occasion of pope Innocent IV. granting to king Henry III. the tenth of all spirituals for three years, was first made by Walter, bishop of Norwich, delegated by the pope to this office in 38 Hen. III. This taxation is sometimes called Pope Innocent's Valor, and Taxatio Norwicensis.

In 1288 pope Nicholas IV. granted the tenths to king Edward I. for six years, towards defraying the expense of an expedition to the Holy Land; and, that they might be collected to their full value, a taxation by the king's precept was begun in that year (1288), and finished as to the province of Canterbury in 1291, and as to that of York in the following year; the whole being under the direction of John, bishop of Winton, and Oliver bishop of Lincoln. A third taxation, entitled Nova Taxatio, as to some part of the province of York, was made A. D. 1318 (11 Ed. II.) by virtue of a royal mandate directed to the bishop of Carlisle, chiefly on account of the invasion of the Scots, by which the clergy of those border countries were rendered unable to pay the former tax.

The taxation of pope Nicholas is important, because all the taxes, as well to our kings as to the popes, were regulated by it, until the survey made in the twenty-sixth year of Henry VIII.; and because the statutes of colleges which were founded before the Reformation are also interpreted by this criterion, according to which their benefices under a certain value were exempted from the restriction in the statute 21 Hen. VIII. c. 13 concerning pluralities. Various detached parts of this record had been published in county histories; but the whole was for the first time given to the public in 1802, under the direction of the commissioners on the public records, from two MSS. in the king's remembrancer's office, exchequer, collated with a Cottonian MS. of much greater antiquity in the British museum, Tiberius C. X. which has unfortunately suffered some damage from the fire which happened to the Cottonian library whilst lodged at Westminster. By a strange carelessness in the introductory note to the volume, published under such high authority, mention is made of pope Innocent XXII. instead of pope Innocent IV.

A new Valor Beneficiorum was instituted in 26 Hen. VIII., when the first-fruits and tenths of every ecclesiastical promotion were annexed to the revenue of the crown, by stat. 26 Hen. VIII. c. 3. To ascertain their value, ecclesiastical surveys were taken by virtue of commissions in the king's name issuing under the great seal, 26 Hen. VIII.; and these surveys, preserved in the first-fruits office, are admitted as evidence of the amount at that period, although they are generally considered as estimating the value much too low. These surveys are commonly called 'The King's Books,' according to which the value of livings is ascertained in case of pluralities. In like manner, and upon the same principle, surveys of the possessions of religious houses, previous to the dissolution of monasteries, are received in evidence, Kellington, vicar, v. Trinity Coll. Camb.; 1 Wils. 170; and these surveys are held admissible, although the commissions under which they were taken are not now to be found. See 1 Wils. 170; 2 Gwill. 542.

TAXES. A tax in England differs from what is commonly called a subsidy, in this, that it is always certain as it is set down in the exchequer book, and levied in general of every town, and not particularly of every man, &c. See Rastall's Abridgment, title Taxes. A tax may now be defined to be a general aid, subsidy, or supply, granted by the commons in parliament assembled, and confirmed by act of parliament; constituting the king's extraordinary revenue, and paid yearly towards the expenses of government. 1 Comm. c. 8.

Under title King V. 4 the taxes are stated, from Blackstone, as part of the king's extraordinary revenue, as applicable to the purposes of government: they may, however, more properly be considered as the national revenue applicable to public purposes. For their nature and account see GREAT BRITAIN.

TAXILA, in ancient geography, an extensive country of India, between the Indus and the Hydaspes.

TAXILES, or TAXILUS, a king of Taxila, called also Omphis in the age of Alexander. He submitted to the conqueror, who rewarded him liberally. See MACEDON.

TAXIMAQUILUS, a king in the south part of Britain, contemporary with Julius Cæsar. Cæs. de Bel. Gal. c. 22.

TAXIS, in ancient architecture, the ordonance; the disposition. Ash.

TAXUS, the yew tree, in botany, a genus of plants belonging to the class of diœcia, and order of monodelphia; and in the natural system ranging under the fifty-first order, coniferæ. The male calyx is triphyllous, gemmaceous, and imbricated: there is no corolla; the stamina are numerous; the antheræ peltated and octofid. The female calyx resembles the male; there is no corolla nor style, and only one seed with a calycle resembling a berry very entire. There are five species:—1. T. baccata, the common yew tree, is a native of Britain, France, Switzerland, &c., and of North America. It is distinguished from the other species by linear leaves which grow very close, and by the receptacles of the male flowers being subglobose. The wood is reddish, full of veins, and flexible, very hard and smooth, and almost incorruptible. Its hardness renders it very proper for turners and cabinet makers. It produces berries which are red, mucilaginous, and have a sweet mawkish taste. They are often eaten by birds, and are therefore not poisonous: but it is a common opinion that the leaves are poisonous to cattle, and many facts

are mentioned of horses and cows having died by eating them.. But others deny this. 2. T. Capensis, a native of the Cape of Good Hope, is mentioned by Mr. Sonnerat. 3. T. macrophylla is described by Sir Charles Thunberg, in his Flora Japonica, as a native of Japan. 4. T. nucifera, the nut bearing yew, is the only other species mentioned by Linnæus.

5. T. verticillata, another species growing in Japan, is described by Sir Charles Thunberg.

TAY, called by the Romans Tavus or Taus, a river in Scotland; which is said to contribute a greater quantity of water to the ocean than any river in Great Britain. It rises in Breadalbane, on the frontiers of Lorn; and, having augmented its stream by several small rills, spreads itself into a lake called Loch Dochart; out of which having run but a little space, it expands again. Leaving this second lake, it rolls some miles with a considerable body of water, and then diffuses itself into the spacious Loch Tay, which is sixteen miles long. Almost as soon as it issues from this lake, which it does under a handsome bridge, it receives the river Lyon; and, pursuing a course due east, it receives ten miles farther on the Tummel, which conveys the united rivulets of Athol into its channel. Bending them to the south for six miles, it reaches Dunkeld; where an elegant bridge was built in 1806. Declining still to the south-east with a winding course, for above twelve miles, the Tay receives the Isla, and a large supply of waters from the county of Angus; and, then running south-west for eight miles more, is joined in that space by several rivers, the most considerable of which is the Almond. Turning then to the south-east, this copious river rolls past Perth, the capital of the county. The Tay, continuing still a south-east course, receives a few miles below Perth the river Earne. Swelled by the waters of this last river, the Tay, running next directly east, enlarges itself till it becomes about three miles broad; but contracts again before the town of Dundee; soon after which it opens into the German Ocean. At the entrance of the frith there are sands both on the north and south side: the former styled Goa, the latter Aberlay and Drumlan: and before these, in the very mouth of the frith, those which are called the Cross Sands. At Buttonness, which is the northern promontory, there are two light houses. The space between the north and the south sands may be nearly a mile, with about three fathoms water; but, being within the frith, it grows deeper, and in the road of Dundee is full six fathoms. The frith of Tay is not indeed so large or so commodious as that of Forth, but from Buttonness to Perth it is not less than forty miles; and the whole may be without any great impropriety styled a harbour, which has Fife on one side, and the shires of Perth and Angus on the other.

TAY, a river of Ireland, in Waterford, which runs into the sea; seven miles W.N.W. of Dungarvon Bay.

TAY, FRITH OF, an arm of the sea, at the mouth of the Tay, which divides the county of Fife from those of Perth and Forfar.

TAY, LOCH. a lake of Perthshire, through which the river Tay runs, sixteen miles long, and in many parts above one broad. The banks of this lake are finely shaded with trees; and it has an island, on which are the ruins of a priory built by Alexander I.

TAYGETA, or TAYGETE, in the mythology, a daughter of Atlas and Pleione, and mother of Lacedæmon by Jupiter. She became one of the Pleiades.

TAYGETUS, a mountain of Laconia, west of the Eurotas. It hung over Lacedæmon, and a part of it once fell down and destroyed the suburbs. The Spartan women celebrated the Bacchanalia upon it.

TAYLOR (Dr. Jeremy), was the son of a barber at Cambridge, where he was educated. He became divinity lecturer of St. Paul's in London; and was, by the interest of archbishop Laud, elected fellow of All Soul's College, Cambridge, in 1636. In 1638 he became chaplain to the archbishop, who made him rector of Uppingham in Rutlandshire. In 1642 he was chaplain to the king; and a frequent preacher before him at Oxford. He afterwards attended his army as chaplain. Upon the declining of his cause, he retired into Wales, where he officiated as minister, and kept a school. Having spent several years there, he lost three sons of great hopes in three months. This made him leave the country, and go to London, where he officiated in a private congregation of loyalists. At length Edward lord Conway carried him over into Ireland, and settled him at Portmore. Upon the Restoration he returned to England; soon after he was advanced to the bishopric of Down and Connor in Ireland. He was likewise made a privy-counsellor and vice-chancellor of the university of Dublin; which he held till his death. He died of a fever at Lisnegarvy in 1667. He was the author of several works on divinity.

TAYLOR (Dr. Brook) was born at Edmonton, August 18th, 1685. He was the son of John Taylor, esq., of Bifron's House in Kent, by Olivia, daughter of Sir Nicholas Tempest, of Durham, bart. His grandfather, Nathaniel Taylor, was one of those puritans whom 'Cromwell appointed by letter, June 14th, 1653, to represent Bedford in parliament.' In 1701 he was entered a Fellow Commoner of St. John's College, Cambridge. In 1708 he wrote his treatise On the Centre of Oscillation, in the Philosophical Transactions. In 1709 he took his degree of A. B. In 1712 he was chosen F. R. S. In 1712 he presented to the Royal Society three papers:—1. On the Ascent of Water between two Glass Planes; 2. On the Centre of Oscillation; and, 3. On the Motion of a Stretched String. In 1713 he presented a paper on Music. In 1714 he was elected secretary: same year he took at Cambridge his degree of LL. D., and sent to Sir Hans Sloane, An Account of some Curious Experiments relative to Magnetism; which was printed in the Transactions. In 1715 he published in Latin his Methodus Incrementorum; also a curious essay, preserved in the Philosophical Transactions, entitled An Account of an Experiment for the Discovery of the Laws of Magnetic Attraction; likewise a treatise On

the Principles of Linear Perspective. In the same year he conducted a controversial correspondence with the count Raymond de Montmort, on the Tenets of Malebranche; which occasioned his being particularly noticed in the eulogium pronounced by the French academy, on that eminent metaphysician. The new philosophy of Newton engaged the attention of mathematicians and philosophers both at home and abroad. In 1716 he went to Paris, where his society was very much courted. In 1717 he returned to London, and wrote three treatises, which were published in the Philosophical Transactions, vol. xxx. His intense application having impaired his health, he went to Aix-la-Chapelle, and resigned his secretaryship in 1718. After his return, in 1719, he applied to subjects of a very different kind, such as A Treatise on the Jewish Sacrifices, and a Dissertation on the Lawfulness of Eating Blood. He also revised his treatise on Linear Perspective. Drawing continued also to be his favorite amusement to his last hour. In 1721 he published his last paper in the Philosophical Transactions, entitled An Experiment to ascertain the Proportion of Expansion of Liquor in the Thermometer, with regard to the degree of Heat. In 1721 he also married Miss Bridges of Wallington in Surrey. She died in 1725, and he united himself to Miss Sawbridge of Olantigh, in Kent. In 1729, on the death of his father, he succeeded to the family estate of Bifrons. In 1730 he lost his wife in child bed. In the interval between 1721 and 1730 he wrote a Treatise of Logarithms. The essay entitled Contemplatio Philosophica, published by Sir William Young in 1793, appears to have been written about this time. Having survived his second wife little more than a year, Dr. Brook Taylor died of a decline, aged forty, December 29th, 1731. He was a finished Christian, gentleman, and scholar.

Taylor (Dr. John), a learned dissenting minister, born in Lancashire. He settled first at Kirkstead in Lincolnshire, where he preached to a small congregation, and taught a grammar-school for nearly twenty years. Afterwards he removed to Norwich, where he preached many years, until he went to superintend the academy at Warrington, in Lancashire. He died in 1761; and, among several other performances, was the author of a Hebrew and English Concordance, 2 vols. folio.

Taylor (Jane), an accomplished female writer, born September 23d, 1783, in London, where her father, a respectable artist, then resided. Being also a dissenting minister, Mr. Taylor accepted, in 1792, an invitation from a congregation at Colchester to officiate as their pastor, and carried his daughters thither with him, continuing to superintend their education, and teaching them his own art as an engraver. It was in the intervals between these pursuits that Miss Taylor began to commit the effusions of her genius to writing; and, a visit to London in 1802 introducing her to the society of some young females of congenial disposition and talent, she, as well as her sister, was induced to join them in contributing to the Minor's Pocket Book, a small publication, in which her first work, the Beggar Boy, appeared in 1804. The success of this little poem encouraged her to proceed, and from this period till 1813 she continued to publish occasionally miscellaneous pieces in verse, of which the principal are entitled Original Poems for Infant Minds, in 2 vols.; Rhymes for the Nursery, in 1 vol.; and some verses in The Associate Minstrels, a publication written in conjunction with the ladies already alluded to, and Mr. Josiah Conder. In the winter of the last mentioned year she commenced a prose composition of higher pretension, which appeared in 1815 under the name of Display, and met with much success. Her last and principal work consists of Essays in Rhyme on Morals and Manners. The latter part of her life was passed in occasional excursions from Ongar, in which place her family had resided since the year 1810. After some months of lingering debility, in which however the vigor of her mind appears to have remained to the last, this amiable and intellectual female expired of a pulmonary complaint in the month of April 1823.

Taylor Bird. See Motacilla.

TAYRA, in zoology. See Mustela.

TCHANG Te, a city of China, of the first rank, in Ho-nan, the most northern in the province. A fish resembling a crocodile is said to be known here, the fat of which, when kindled, cannot be put out. It has also a mountain so steep and inaccessible that in time of war the citizens retire to it, and bid defiance to their foes. It comprehends one city of the second class, and six of the third in its district; and is 255 miles S. S. W. of Peking. Long. 131° 44′ E. Ferro, lat. 36° 6′ N.

TCHANG-TCHA, a city of China of the first rank, on the Heng River, in Hou-quang. A great festival is celebrated here in the fifth month throughout the empire. The mandarin who governed this city, being much esteemed and beloved by the people for his probity, happening to be drowned in the river, they instituted this festival to his honor. It includes certain fights upon the water, as if they intended to search for the mandarin. The festival was at first peculiar to this city, but came afterwards to be observed throughout the empire. 742 miles S. of Peking.

TCHANG-TCHEOU, a city of China of the first rank, in Fo-kien, the most southerly in the province. It stands on a river, and carries on a considerable trade. The neighbouring mountains abound with the finest crystal. 950 miles south of Peking.

Tchang-tcheou, a city of China of the first rank, in Kiang-nan. It is two leagues in circumference, situated on the great canal, and has a very extensive trade. The population has been estimated at 200,000 souls. 525 miles S. S. E. of Peking.

TCHANG-TE, a city of the first rank in China, in Hou-quang. It stands on a river near the great lake Tong-ting. 717 miles S. S. W. of Peking.

TCHAOU-KING, a city of China of the first rank, in Quang-tong. It is reckoned the best built city in the province, and is the residence of the tsong-tsi, or governor. The port is very spacious, placed at the confluence of three rivers, one of which communicates with Canton. 1062 miles S. S. W. of Peking.

TCHE-KIANG, a province of China, bounded on the north and north-west by Kiang-nan, on the east by the sea, on the south by Fo-kien, and on the south-west by Kiangsee; about 200 miles in length from north to south, and from 120 to 180 broad. This was formerly the residence of some of the emperors, and is one of the most considerable provinces in the empire, on account of its maritime situation. The air is pure and healthful, the plains watered by a number of rivers and canals, and it abounds with springs and lakes. The natives are mild and polite to strangers, but extremely superstitious. A prodigious quantity of silk-worms are bred in this province. The principal branch of trade, therefore, consists in silk stuffs, an immense quantity of which is sent to every part of China, Japan, the Philippines, and Europe. A complete suit of silk may be bought here as cheap, we are told, as one of the coarsest woollen cloth in France. Excellent hams are also brought from this province; and the tallow-tree grows here. In Tche-kiang there are reckoned to be eleven cities of the first class, seventy-two of the third, and eighteen fortresses, which in Europe would be accounted large cities. According to Sir George Staunton the number of inhabitants is 21,000,000.

TCHEOU-CHEN, an island of China, sixty miles from Ning-po, where the British embassy first landed.

TCHEOU-KONG, a celebrated Chinese astronomer, who flourished above 1000 years before the Christian era, and is said to have invented the mariner's compass. He erected a tower in the city of Ho-nan, for an observatory; and there is still to be seen in it an instrument which he made and used for finding the shadow at noon, and determining the latitude.

TCHING-KIANG, a city of China of the first rank, in Kiang-nan, on the south side of the Yang-tse. This city is not above a league in circumference; but it is one of the most considerable for its situation and commerce, and the key of the empire towards the sea. The walls are above thirty feet in height in several places, and the streets and suburbs are paved with marble. 470 miles S. S. E. of Peking.

TCHING-TCHEOU, a city of China of the first rank, in Hou-quang. It is situated on an angle made by two rivers, and the country is watered by a great number of brooks, and yields plenty of quicksilver, lapis lazuli, and green stones for painting. There are also mines of silver and gold. The district of this city contains one of the second order, and nine of the third. 65 miles S. S. W. of Peking.

TCHING-TEOU, a town of Corea, thirty miles S. S. W. of Kang-tcheou.

TCHING-TING, a large city of China of the first rank, in Pe-che-lee. It is about four miles in circumference, and its jurisdiction is very extensive, and comprehends thirty-two towns, five of which are of the second, and twenty-seven of the third class.

TCHING-TOU, a city of China of the first rank, in Se-chuen. This was formerly the residence of the emperors, and one of the largest and most beautiful in China; but in 1646 it was almost entirely destroyed by the Tartars. Its temples, bridges, and the ruins of ancient palaces, are still, however, objects of great admiration. 810 miles south-west of Pekin.

TCHONG-KING, a very flourishing city of China of the first rank, in Se-chuen. It is indebted for its trade to its situation at the confluence of two remarkable rivers; one of which, called Kin-cha-kiang, or Golden-sand, receives in its course all the streams from the mountains which rise in the neighbouring confines of Tartary. The other is Ta-kiang, which has its source beyond the boundaries of China, and is called also Yang-tse-kiang. Tchong-king is built upon a mountain, and rises in the form of an amphitheatre. The air is wholesome and temperate; and the city is celebrated for its fish, and a particular kind of trunks made with canes, interwoven like basket work. It has in its district three cities of the second class, and eleven of the third. It is 150 miles west of Pekin.

TCI-NAN, or TSI-NAN, a populous city of China of the first rank, in Shan-tung, situated south of the river Tsing-ho, or Tsi. This city is much respected by the Chinese on account of its having been formerly the residence of a long series of kings, whose tombs, rising on the neighbouring mountains, crown a delightful prospect. It is 235 miles south of Pekin.

TEA, *n. s.* French *thé*; Chinese *theh*. A well-known Chinese plant. See below.

The muses' friend, *tea*, does our fancy aid,
Repress those vapours which the head invade.
Waller.

One has a design of keeping an open *tea* table.
Addison.

He swept down a dozen *tea* dishes. *Spectator.*

Green leaves of *tea* contain a narcotick juice, which exudes by roasting; this is performed with great care before it is exposed to sale.
Arbuthnot on Aliments.

A living *tea* pot stands, one arm held out,
One bent; the handle this, and that the spout.
Pope.

The mistress of the *tea* shop may give half an ounce. *Swift.*

When you sweep, never stay to pick up *tea* spoons.
Id.

TEA. The tea plant, which is an evergreen, grows to the height of five or six feet: Le Compte says ten or twelve. The leaves, which are the only valuable part of it, are about an inch and a half long, narrow, indented, and tapering to a point like those of the sweet briar, and of a dark green color. The root is like that of the peach tree, and its flowers resemble those of the white wild rose. The stem spreads into many irregular branches. The wood is hard, of a whitish green color, and the bark is of a greenish color, with a bitter, nauseous, and astringent taste. The fruit is small, and contains several round blackish seeds, about the bigness of a bean or large pea.

The tea plant delights in valleys, is frequent on the sloping sides of mountains and the banks of rivers, where it enjoys a southern exposure. It flourishes in the north latitudes of Pekin, as well as round Canton, but attains the greatest perfection in the mild temperate regions of Nankin. It is said only to be found between 30° and 45° lat. N. In Japan it is planted round the

borders of fields, without regard to the soil; but, as it is an important article of commerce with the Chinese, whole fields are covered with it, and it is by them cultivated with care. It is propagated by seeds; from six to twelve are put into a hole about five inches deep, at certain distances from each other. The reason why so many seeds are sown in the same hole is said to be, that only a fifth part vegetate. Being thus sown they grow without any other care.

The leaves are not fit for being plucked till the shrub be of three years' growth. In seven years it rises to a man's height; but, as it then bears but few leaves, it is cut down to the stem, and this produces a new crop of fresh shoots the following summer, every one of which bears nearly as many leaves as a whole shrub. Sometimes the plants are not cut down till they are ten years old. We are informed by Kœmpfer that there are three seasons in which the leaves are collected in the isles of Japan, from which the leaves derive different degrees of perfection. The first gathering commences at the end of February or beginning of March. The tea is then small, tender, and unfolded, and not above three or four days old: these are called ficki tsiaa, or tea in powder, because it is pulverised; it is also called imperial tea, being generally reserved for the court and people of rank; and sometimes also it is named bloom tea. It is sold in China for 1*s*. 8*d*. or 2*s*. per pound. The laborers employed in collecting it do not pull the leaves by handsful, but pluck them one by one, and take every precaution that they should not break them. However long and tedious this labor may appear, they gather from four to ten or fifteen pounds a day. The second crop is gathered about the end of March or beginning of April. At this season part of their leaves have attained their full growth, and the rest are not above half their size. This difference does not, however, prevent them from being all gathered indiscriminately. They are afterwards picked and assorted into different parcels, according to their age and size. The youngest, which are carefully separated from the rest, are often sold for leaves of the first crop, or for imperial tea. Tea gathered at this season is called too-tsiaa, or Chinese tea, because the people of Japan infuse it and drink it after the Chinese manner. The third crop is gathered in the end of May or in June. The leaves are then very numerous and thick, and have acquired their full growth. This kind of tea, which is called Ben-tsiaa, is the coarsest of all. Some of the Japanese collect their tea only at two seasons of the year, which correspond to those already mentioned; others confine themselves to one general gathering of their crop in June; but they always form afterwards different assortments of their leaves. The finest and most celebrated tea of Japan is that which grows near Ud-si, a village near Meaco on the coast. In the district of this village is a delightful mountain of the same name, the climate of which is said to be extremely favorable to the culture of tea; it is therefore enclosed by a hedge, and surrounded with wide ditches, which prevent all access to it. The tea shrubs that grow on this mountain are planted in regular order, and are divided by avenues and alleys. The care of this place is entrusted to people who guard the leaves from dust and defend them from the inclemency of the weather. The laborers who are appointed to collect the tea abstain from every kind of gross food for some weeks before they begin, that their breath and perspiration may not in the least injure the leaves. They gather them with the most scrupulous nicety, and never touch them but with very fine gloves. When this choice tea has undergone the process necessary for its preparation, it is escorted by the superintendent of the mountain and a strong guard to the emperor's court, and reserved for the use of the imperial family.

When the tea leaves have been collected, they are exposed to the steam of boiling water; after which they are put upon plates of copper, and held over the fire until they become dry and shrivelled, and appear such as we have them in Europe. Kœmpfer says, tea is prepared in the same manner in the isles of Japan. The people of Japan and China generally keep their tea a year before using it, because, when fresh and newly gathered, it possesses a narcotic quality which hurts the brain. Imperial tea is generally preserved in porcelain vases, or in leaden or tin canisters covered with fine mats made of bamboo. Common tea is kept in narrow-mouthed earthen pots; and coarse tea, the flavor of which is not so easily injured, is packed up in baskets of straw.

The Chinese pour boiling water over their tea, and leave it to infuse, as we do in Europe; but they drink it without any mixture, and even without sugar. The people of Japan reduce theirs to a fine powder, which they dilute with warm water until it has acquired the consistence of thin soup.

Tea was introduced into Europe in 1610 by the Dutch East India Company. It is generally said that it was first imported from Holland to England in 1666 by the lords Arlington and Ossory, who brought it into fashion among people of quality. But it was used in Coffee-houses before this period, as appears from an act of parliament made in 1660; in which a duty of 8*d*. was laid on every gallon of the infusion sold in these places. In 1666 it was sold in London for 60*s*. per pound, though it did not cost more than 2*s*. 6*d*. or 3*s*. 6*d*, at Batavia. It continued at this price till 1707. In 1715 green tea began to be used; and, as great quantities were then imported, the price was lessened, and the practice of drinking tea descended to the lower ranks. In 1720 the French began to send it to us by a clandestine commerce. Since that period the demand has been increasing yearly, and it has become almost a necessary of life in several parts of Europe, and among the lowest as well as the highest ranks.

Many attempts have been made to introduce this valuable plant into Europe; but, from want of proper precautions, most of these attempts have miscarried. The seeds, being of an oily nature, are apt to grow rancid during a long voyage, unless proper care is taken to preserve them. The finest tea-plant known in England was raised in Kew gardens; but the first that ever

flourished in Europe was one belonging to the duke of Northumberland at Sion. The plants which are cultivated in the gardens near London thrive well in the green-house during winter, and some stand that season in the open air. Linnæus, who obtained this shrub in its growing state, contrived to preserve it in the open air in the northern latitude of Sweden. France has also procured some plants. There can be no doubt but they would succeed in many countries of Europe, if proper care were paid to their cultivation till they became innured to the climate.

In this country, teas are generally divided into three kinds of green, and five of bohea: The former are, 1. Imperial or bloom tea, with a large loose leaf, light green color, and a faint delicate smell. 2. Hyson, so called from the merchant who first imported it; the leaves of which are closely curled and small, of a green color, verging to a blue: And 3. Singlo tea, from the name of the place where it is cultivated. The boheas are, 1. Souchong, which imparts a yellow green color by infusion. 2. Camho, so called from the place where it is made: a fragrant tea, with a violet smell; its infusion pale. 3. Congo, which has a larger leaf than the following, and its infusion somewhat deeper, resembling common bohea in the color of the leaf. 4. Pekoe tea is known by the appearance of small white flowers mixed with it. 5. Common bohea, whose leaves are of one color. There are other varieties, particularly a kind of green tea, done up in roundish balls, called gunpowder tea.

Dr. Lettsom thinks it most probable that there is only one species of tea, and that the difference between the green and bohea teas depends on the nature of the soil, culture, age, and the manner of drying the leaves. He adds that it has even been observed that a green tea tree, planted in the bohea tea country, will produce bohea, and on the contrary; and that on his examining several hundred flowers, brought both from the bohea and green tea countries, their botanical characters have always appeared uniform. We are principally indebted to Kæmpfer, Le Compte, and Du Halde, for an authentic history of the culture of this exotic shrub, and the manner of preparing or curing its leaves.

The particulars of greatest importance that have been recited have lately been judiciously collected, and the subject further illustrated by additional observations of this writer.

The present consumption of tea in this country is immense, both among the rich and poor. Dr. Lettsom tells us that he has been informed, that at least 3,000,000 lbs. are allowed for the annual home consumption, not including the incredible quantity smuggled into the kingdom; and that the East India Company have generally in their warehouses a supply for three years. In the appendix to Sir George Staunton's Account of lord Macartney's Embassy to China, we have also several statements relating to the tea trade. The average of teas exported from China to Europe in foreign ships, for nine years, viz. from March 1772 to 1780, the average of the number of ships being twelve, was 13,198,201 lbs.; in English ships, at the average of nine, 5,639,939 lbs.: the total average of ships is twenty-one, and of exported tea 18,838,140 lbs. The annual consumption of tea by foreigners in Europe is estimated at 5,500,000 lbs.; and the consumption of Great Britain and her dependencies is at least 13,338,140 lbs., which, at 700,000 lbs. per ship, would employ thirty-eight large ships constantly in the China trade, instead of eighteen ships, as above, most of which were small, one fleet going out when another is coming home. The above is exclusive of private trade teas, brought legally and illegally into Europe. It is said, upon the authority of confidential information, that the English ships have often smuggled from 1000 to 3000 chests of tea each; and also that the foreign captains bring a large quantity of tea, which they either smuggle at sea, or throw into the sea, the punishment being severe. The loss to the public on 1000 chests of hyson tea smuggled is above £20,000.

The properties of tea, medicinally considered, are strangely controverted: the eastern nations are at least as much possessed with an idea of their extraordinary virtues as the Europeans, but it is, perhaps, because imagination bears as great a sway there as here. The reason why the gout and stone are unknown in China is ascribed to the use of this plant.

Tea, on the one hand, has been extolled as the greatest of all medicines: moderately and properly taken, it certainly acts as a gentle astringent and corroborative: it strengthens the stomach and bowels, and is good against nauseas, indigestions, and diarrhœas. It acts also as a diuretic and diaphoretic. The immoderate use of it, however, has been very prejudicial to many, who have been thereby thrown into the diabetes. In Europe, also, infusions of tea leaves have been extravagantly condemned by some, and commended by others. From the contradictory opinions, even of medical writers, on this subject, the natural inference seems to be that they possess neither noxious nor beneficial powers, in any very considerable degree. They seem, when moderately used, to be for the most part innocent; in some cases they seem to be salutary; in some they are apparently prejudicial. They dilute thick juices, and quench thirst more apparently, and pass off by the natural emunctories more freely, than more watery fluids: they refresh the spirits in heaviness and sleepiness, and seem to counteract the operation of inebriating liquors. From their manifest astringency, they have been supposed to strengthen and brace up the solids; but this effect experience does not countenance, as it is in disorders, and in constitutions in which corroborants are more serviceable, that the immoderate use of tea is peculiarly hurtful, in cold indolent habits, cachexies, chlorosis, dropsies, and debilities of the nervous system. Lewis's Materia Medica.

Dr. Lettsom has particularly enquired into the medical effects of tea; and, having observed that infusions of bohea and green tea contribute to preserve sweet some small pieces of beef immersed in them, he infers that they possess an antiseptic power, when applied to the dead animal fibre, and, from their striking a purple color

with salt of iron, he deduces their astringent quality.

From other experiments he concludes that the activity of tea chiefly resides in its fragrant and volatile parts; and that if the use of it be beneficial or injurious to any particular constitution, it becomes so principally by means of this odorous fragrant principle. He apprehends that it is the safest course to use the infusion of the more ordinary kinds of this plant, which abound less with this fragrant principle. Or the tea may be boiled a few minutes, in order to dissipate this volatile part, which stands charged as the cause of those nervous affections that are said to be produced, or aggravated, by the use of this liquor. By this process may likewise be extracted more copiously the more fixed, bitter, and stomachic parts of this vegetable. Our author seems to be thoroughly persuaded of the occasionally noxious effects of this volatile principle, in the finer teas especially, and recommends this last mentioned mode of making tea, or the substitution of the extract instead of the leaves; by the use of which the nervous relaxing effects, which follow the drinking of tea in the usual manner, would be in a great measure avoided. This extract has been imported hither from China, in the form of small cakes, not exceeding a quarter of an ounce each in weight, ten grains of which might suffice one person for breakfast; but it might easily be made here by simple decoction and evaporation, by those who experience the noxious qualities of the volatile principles of this plant. It may be farther observed that the effect of drinking large quantities of any warm aqueous liquor would be to enter speedily into the course of circulation, and pass off as speedily by urine or perspiration, or the increase of some of the secretions.

Its effects on the solid parts of the constitution would be relaxing, and thereby enfeebling. If this warm aqueous fluid were taken in considerable quantities, its effects would be proportionable, and still greater if it were substituted instead of nutriment. The infusion of tea, however, has these two peculiarities. It is not only possessed of a sedative quality, but also of a considerable astringency; by which the relaxing power, ascribed to a mere aqueous fluid, is in some measure corrected on this account. It is, perhaps, less injurious than many other infusions of herbs, which, besides a very slight aromatic flavor, have very little, if any, stypticity, to prevent their relaxing debilitating effects. So far, therefore, tea, if not too fine, if not drank too hot, nor in too great quantities, is perhaps preferable to any other known vegetable infusion. And if we take into consideration, likewise, its known enlivening energy, our attachment to it will appear to be owing to its superiority in taste and effects to most other vegetables. See Dr. Lettsom's Natural History of the Tea Tree, with Observations on the Medical Qualities of Tea, and Effects of Tea Drinking, 4to., 1772.

The following results of experiments on tea, by Mr. Brande, have been published by him in his Journal:—

One hundred parts of Tea.		Soluble in Water.	Soluble in Alcohol.	Precipit. with Jelly.	Inert Residue.
Green Hyson	14*s.* per lb.	41	44	31	56
Ditto	12*s.*	34	43	29	57
Ditto	10*s*	36	43	26	57
Ditto	8*s.*	36	42	25	58
Ditto . . .	7*s.*	31	41	24	59
Black Souchong	12*s.*	35	36	28	64
Ditto	10*s.*	34	37	28	63
Ditto	8*s.*	37	35	28	63
Ditto	7*s*	36	35	24	64
Ditto	6*s.*	35	31	23	65

Tea Tree of New Zealand, a species of myrtle, of which an infusion was drunk by Captain Cooke's people in their voyages round the world. Its leaves were finely aromatic, astringent, and had a particular pleasant flavor at the first infusion; but this went off at the next filling up of the tea-pot, and a great degree of bitterness was then extracted; for which reason it was never suffered to be twice infused. In a fine soil in thick forests this tree grows to a considerable size; sometimes thirty or forty feet in height, and one foot in diameter. On a hilly and dry exposure it degenerates into a shrub of five or six inches; but its usual size is about eight or ten feet high, and three inches in diameter. In this case its stem is irregular and unequal, dividing very soon into branches, which rise at acute angles, and only bear leaves and flowers at top. The flowers are white, and very ornamental to the whole plant. Mr. White, in his Journal of a Voyage to New South Wales, mentions a shrub which he calls a tea-tree, merely from its being used by the convicts as a succedaneum for tea; for he had not seen the flower, nor did he know to what genus it belonged. It is a creeping kind of a vine, running to a great extent along the ground: the stork slender; the leaf not so large as the common bay leaf; the taste sweet, exactly like the liquorice root of the shops.

TEACH, *v. a.* & *v. n.*
Teach'able, *adj.*
Teach'ableness, *n. s.*
Teach'er.
} *Pret.* and *part. pass.* taught, sometimes teached, which is now obsolete. Saxon tæcan. To instruct; inform: correlative to learn: dictate; impress on the mind; show; tell: to

perform the office of instructor: the adjective and noun substantives corresponding.

Moses wrote this song, and *taught* it.
Deut. xxxi. 22.

The Lord will *teach* us of his ways, and we will walk in his paths. *Isaiah*, ii. 3.

All thy children shall be *taught* of the Lord.
Id. liv. 13.

In vain they worship me, *teaching* for doctrines the commandments of men. *Matt.* xv. 9.

Huswives are *teached*, instead of a clocke,
How winter night passeth by crowing of cocke.
Tusser.

Nature is no sufficient *teacher* what we should do that may attain unto life everlasting. *Hooker.*

I am too sudden bold.
To *teach* a *teacher* ill beseemeth me. *Shakspeare.*

I have laboured,
And with no little study, that my *teaching*,
And the strong course of my authority,
Might go one way. *Id.*

For the choice of a governor more sufficient, the *teachers* in all the churches assembled themselves.
Raleigh.

Our lecture men, and some others, whom precise people stile powerful *teachers*, do seldom honour it.
White.

'Tis sufficient that matters of faith and religion be propounded in such a way as to render them highly credible, so as an honest and *teachable* man may willingly and safely assent to them, and according to the rules of prudence be justified in so doing.
Wilkins.

Teach us by what means to shun
The' inclement seasons. *Milton.*

Wolves shall succeed for *teachers*. *Id.*

I went into the temple, there to hear
The *teachers* of our law, and to propose
What might improve my knowledge or their own.
Id.

How hast thou satisfied me, *taught* to live.
Id.

These were notions born with us; such as we were taught without the help of a *teacher*.
South's Sermons.

If some men *teach* wicked things, it must be that others should practise them. *Id.*

Dissenting *teachers* are under no incapacity of accepting civil and military employments. *Swift.*

We ought to bring our minds free, unbiassed, and *teachable*, to learn our religion from the word of God.
Watts.

And O! that, humble as my lot,
And scorned as is my strain,
These truths, though known, too much forgot,
I may not *teach in* vain. *Cowper.*

TEAD, or TEDE, *n. s.* Lat. *tæda.* A torch; a flambeau. Not in use.

A bushy *tead* a groom did light,
And sacred lamp in secret chamber hide. *Spenser.*

Hymen is awake,
And long since ready from his mask to move,
With his bright *tead* that flames with many a flake.
Id.

TEAGUE, a name of contempt used for an Irishman.

TEAK WOOD. See TECTONA.

TEAL, *n. s.* Belg. *teelingh.* A wild fowl.

Some serve for food to us, and some but to feed themselves; amongst the first sort we reckon the dipchick, coots, *teal*, wigeon.
Carew's Survey of Cornwall.

TEAM, *n. s.* Sax. tȳme, a yoke; Lat. *temo*, the team of a carriage. A number of horses or oxen drawing at once the same carriage.

Thee a ploughman all unweeting found,
As he his toilsome *team* that way did guide,
And brought thee up in ploughman's state to bide.
Spenser.

I am in love; but a *team* of horses shall not pluck that from me, nor who 'tis I love. *Shakspeare.*

Making such difference betwixt wake and sleep,
As is the difference betwixt day and night,
The hour before the heavenly harnessed *team*
Begins his golden progress in the east.
Id. Henry IV.

After the declining sun
Had changed the shadows, and their task was done,
Home with their weary *team* they took their way.
Roscommon.

He heaved with more than human force to move
A weighty stone, the labour of a *team*. *Dryden.*

Like a long *team* of snowy swans on high,
Which clap their wings and cleave the liquid sky.
Id.

In stiff clays they may plow one acre of wheat with a *team* of horse. *Mortimer's Husbandry.*

TEANUM, two ancient towns of Italy, 1. In Campania, on the Appian road, on the east bank of the Liris, called also Sidicinium, to distinguish it from 2. Another town in the west of Apulia, on the coast of the Adriatic.—Cic. Cluent 9, 69. Plin. 31 c. 2.

TEAR, *v. a.* & *v. n.* *Pret.* tore, anciently tare; *part. pass.* torn. Sax. tæran; Swed. *tara.* To pull in pieces; lacerate; rend; separate by violent pulling; break; shatter; pull or drive violently: to fume; rave with passion: bluster.

The one went out from me; and I said, Surely he is *torn* in pieces, and saw I him not since.
Gen. xliv. 28.

Neither shall men *tear* themselves for them in mourning, to comfort them for the dead. *Jer.* xvi. 7.

Come, feeling night!
And with thy bloody and invisible hand
Cancel and *tear* to pieces that great bond
Which keeps me pale. *Shakspeare. Macbeth.*

Old men with dust deformed their hoary hair
The women beat their breasts, their cheeks they *tare*.
Shakspeare.

In the midst a *tearing* groan did break
The name of Antony. *Id. Antony and Cleopatra.*

Solyman
Rhodes and Buda from the Christians *tore*. *Waller.*

As storms the skies, and torrents *tear* the ground,
Thus raged the prince, and scattered death around.
Dryden.

He roared, he beat his breast, he *tore* his hair.
Id.

All men transported into outrages for small trivial matters, fall under the inuendo of this bull, that ran *tearing* mad for the pinching of a mouse. *L'Estrange.*

Is it not as much reason to say that God destroys fatherly authority, when he suffers one in possession of it to have his government *torn* in pieces, and shared by his subjects? *Locke.*

The hand of fate
Has *torn* thee from me, and I must forget thee.
Addison.

Blush rather that you are a slave to passion,
Which, like a whirlwind, *tears* up all your virtues,
And gives you not the leisure to consider.
A. Philips.

John *tore* off lord Strutt's servants' clothes: now and then they came home naked.
Arbuthnot's History of John Bull.

Ambassadors sent from Carthage were like to be *torn* to pieces by the populace. *Arbuthnot.*

TEAR, *n. s., v. a.,* & *v. n.* } Saxon, tear; Dan. *taare.* The water which
TEAR'FALLING, *adj.*
TEAR'FUL

strong passion or emotion forces from the eyes; any moisture trickling in drops: the adjectives correspond.

I am in
So far in blood, that sin will pluck on sin:
Tearfalling pity dwells not in this eye. *Shakspeare.*
She comes, and I'll prepare
My *tear*-stained eyes to see her miseries. *Id.*
The pretty vaulting sea refused to drown me,
Knowing that thou wouldst have me drowned on shore
With *tears* as salt as sea, through thy unkindness. *Id.*
Is't meet that he
Should leave the helm, and, like a fearful lad,
With *tearful* eyes add water to the sea? *Id.*
Cromwell, I did not think to shed a *tear*
In all my miseries; but thou hast forced me.
Let's dry our eyes. *Id. Henry VIII.*

Tears are the effects of compression of the moisture of the brain upon dilatation of the spirits. *Bacon's Natural History.*

She silently a gentle *tear* let fall. *Milton.*
Let Araby extol her happy coast,
Her fragrant flowers, her trees with precious *tears,*
Her second harvests. *Dryden.*
This clears the cloudy front of wrinkled care,
And dries the *tearful* sluices of despair:
Charmed with that virtuous draught, the exalted mind
All sense of woe delivers to the wind. *Pope's Odyssey.*
The losses, the crosses,
That active man engage!
The fears all, the *tears* all,
Of dim declining age! *Burns.*
He dared not raise to his that deep blue eye,
Which downcast drooped in *tearless* agony. *Byron.*

TEARS. For an accurate analysis of this fluid we are indebted to Messrs. Fourcroy and Vauquelin. It is transparent and colorless like water; has scarcely any smell, but its taste is always perceptibly salt. Its specific gravity is somewhat greater than that of distilled water. It gives to paper stained with the juice of the petals of mallows or violets a permanently green color, and therefore contains a fixed alkali. It unites with water, whether cold or hot, in all proportions. Alkalies unite with it readily, and render it more fluid. The mineral acids produce no apparent change upon it. Exposed to the air, this liquid gradually evaporates and becomes thicker. When nearly reduced to a state of dryness, a number of cubic crystals form in the midst of a kind of mucilage. These crystals possess the properties of muriate of soda; but they tinge vegetable blues green, and therefore contain an excess of soda. The mucilaginous matter acquires a yellowish color as it dries.

Tears are composed of the following ingredients:—1. Water; 2. Mucus; 3. Muriate of soda; 4. Soda; 5. Phosphate of lime; 6. Phosphate of soda. The saline parts amount only to about 0·01 of the whole, or probably not so much.

TEARUS, a river of ancient Thrace, rising in the same rock from thirty-eight different sources, some of which were hot, and others cold. Darius raised a column on its banks when he marched against the Scythians.—Plin. iv. c. 11.

TEARY, or TEHREE, a town of Hindostan, province of Allahabad, capital of a chief under the British protection, whose territories are situated on the north-west boundary of Bundelcund. Although compelled to pay tribute for a long period to the Mahrattas, he was never dispossessed of his lands, and during the war, in 1809, the rajah requested to be enrolled among the number of the British allies, and was of considerable utility. His revenue is estimated at about £50,000 per annum.

TEASE, *v. a.* } Sax. tæran. To comb or
TEAS'ER, *n. s.* } unravel wool or flax: scratch cloth in order to level the nap: hence torment or vex impertinently: the noun substantive corresponding.

Not by the force of carnal reasons,
But indefatigable *teasing.* *Hudibras.*

My friends always *tease* me about him, because he has no estate. *Spectator.*

After having been present in public debates he was *teased* by his mother to inform her of what had passed. *Addison.*

We system-makers can sustain
The thesis, which you grant was plain;
And with remarks and comments *tease* ye,
In case the thing before was easy. *Prior.*

A fly buzzing at his ear makes him deaf to the best advice. If you would have him come to himself, you must take off his little *teaser,* which holds his reason at bay. *Collier.*

Thus always *teasing* others, always *teased,*
His only pleasure is—to be displeased. *Cowper.*

TEA'SEL, *n. s.* Sax. tærl. A plant

The species are three: one is called carduus fullonum, and is of singular use in raising the nap upon woollen cloth. *Miller.*

TEAT, *n. s.* Sax. tit; Belg. *tette;* Welsh. *teth.* The dug of a beast; anciently the pap of a woman.

And in the myddil of seuene golden candlestickis oon lyk to the sone of man clothed with a long garnement, and gird at the *tetis* with a goldun girdil. *Wiclif. Apoc.* i.

Even at thy *teat* thou hadst thy tyranny. *Shakspeare.*

Snows cause a fruitful year, watering the earth better than rain; for the earth sucks it as out of the *teat.* *Bacon.*

When we perceive that bats have *teats,* we infer that they suckle their younglings with milk. *Browne's Vulgar Errours.*

It more pleased my sense,
Than smell of sweetest fennel, or the *teats*
Of ewe or goat dropping with milk at even. *Milton.*

Infants sleep, and are seldom awake but when hunger calls for the *teat.* *Locke.*

The goat, how bright amidst her fellow stars,
Kind Amalthea, reached her *teat* distent
With milk, thy early food. *Prior.*

An' tent them duly, e'en an' morn,
Wi' *teats* o' hay, an' rips o' corn. *Burns.*

TEATE, TEATEA, or TEGEATE, an ancient town of Italy in Latium.—Sil. Ital. 8 v. 522.

TEA-TREA, a moveable board, with a raised border, generally pierced, made of metal, maho-

gany, or other wood, for holding the tea apparatus.

TECHES, a mountain of Pontus, from the top of which Xenophon and his 10,000 Greeks first saw the sea.—Xenophon 4.

TECHMESSA, the daughter of Teuthras, king of Phrygia, who was carried captive by Ajax, and became mother of his son Erysaces by him. She afterwards prevented him from killing himself; which forms the subject of a scene in one of Sophocles's tragedies.

TECH'NICAL, *adj.* Fr. *technique*; Gr. τεχνικὸς. Belonging to arts; not in common or popular use.

In *technical* words, or terms of art, they refrain not from calling the same substance sometimes the sulphur, and sometimes the mercury of a body. *Locke.*

Technical expresses somewhat relating to arts and sciences. It is also particularly applied to a kind of verses wherein are contained the rules or precepts of any art, thus digested to help the memory to retain them.

TE'CHY, *adj.* Ital. *testactico.* Peevish; fretful; irritable; froward. Obsolete.

I cannot come to Cressid but by Pandar,
And he is as *techy* to be wooed to wooe,
As she is stubborn-chaste against all sute.
Shakspeare.

When it did taste the wormwood on the nipple, and felt it bitter, pretty fool, to see it *techy*, and fall out with the dug! *Id. Romeo and Juliet.*

TECMON, an ancient town of Epirus. Livy.

TECRIT, A town of Irak Arabi, in Mosul, on the western bank of the Tigris. It is thought to be the Birtha or Vitra of the ancients, and was a considerable town in 1393, when it was taken by Timur. It contains now only 500 or 600 houses, with two coffee-houses; but the ruins are extensive. Long. 42° 37′ E., lat. 34° 37′ N.

TECTAMUS, the son of Dorus, grandson of Helen, and great grandson of Deucalion. He went to Crete at the head of a body of Ætolians and Pelasgi; was made king of Crete, and married a daughter of king Cretheus, by whom he had a son named Asterius.

TECTONA, in botany, a genus of plants belonging to the class of pentandria and order of monogynia. The stigma is dentate; the fruit a dry spongy plum within an inflated calyx; and the nucleus is trilocular. There is only one species, viz. T. grandis, Indian oak, or teak wood, which is a native of India.

TECTOSAGÆ, or Tectosages, an ancient nation of Gallia Narbonensis, so named because, sagis tegerentur, they were protected by sorcerers. They were among those Gauls who pillaged Rome under Brennus (see Rome), and afterwards attempted to plunder the temple of Apollo at Delphi. On their return home they were attacked by a pestilence; and to stop it were ordered to throw into the river all the plunder. Some of them went into Germany and settled in the Hercynian forest; another colony passed into Asia and conquered Phrygia, Cappadocia, and Paphlagonia. Cæs. de Bel. Gal. vi. 23. Strabo 4; Liv. 38, c. 16.

TECULET, a town of Africa, in the empire of Morocco, situate near the coast of the Atlantic, on the edge of a mountain: In 1514 this town was sacked by the Portuguese. It has been since re-peopled: fifteen miles east of Mogodor, and ninety-nine north-west of Morocco.

TED, *v. a.* Sax. teaban, to prepare. To lay grass newly mown in rows.

The smell of grain or *tedded* grass, or kine,
Or dairy, each rural sight, each rural sound.
Milton.

Prudent his fallen heaps
Collecting, cherished with the tepid wreaths
Of *tedded* grass, and the sun's mellowing beams,
Rivalled with artful heats. *Philips.*

Hay-makers following the mowers, and casting it abroad they call *tedding.* *Mortimer's Husbandry.*

TEDANIUS, a river of Liburnia. Plin. 3.

TED'DER, or Tether, *n. s.* Belg. *tudder*; Erse *teigher.* A rope with which a horse is tied in the field: any thing by which one is restrained.

We live joyfully, going abroad with our *tedder.*
Bacon.

We shall have them against the wall; we know the length of their *tedder*; they cannot run far from us. *Child.*

TE DEUM, *n. s.* Lat. *te Deum.* An hymn of the church, so called from the two first words of the Latin.

The choir,
With all the choicest musick of the kingdom,
Together sung *Te Deum.* *Shakspeare. Henry VIII.*

Te Deum was sung at Saint Paul's after the victory. *Bacon.*

Te Deum is sung in the Romish church with great pomp and solemnity upon the gaining of a victory or other happy event; and is believed to be the composition of St. Ambrose bishop of Milan.

TE'DIOUS, *adj.* } Fr. *tedieux*; Lat. *tædium.* Wearisome by continuance; troublesome; irksome.
Te'diously, *adv.*
Te'diousness, *n. s.*

That I be not further *tedious* unto thee, hear us of thy clemency a few words. *Acts* xxiv. 4.

They unto whom we shall seem *tedious* are in nowise injured by us, because it is in their own hands to spare that labour, which they are not willing to endure. *Hooker.*

In vain we labour to persuade them that any thing can take away the *tediousness* of prayer, except it be brought to the same measure and force which themselves assign. *Id.*

Since brevity's the soul of wit,
And *tediousness* the limbs and outward flourishes,
I will be brief. *Shakspeare. Hamlet.*

She distastes them all within a while;
And in the sweetest finds a *tediousness.* *Davies.*

More than kisses, letters mingle souls,
For thus friends absent speak: this ease controuls
The *tediousness* of my life. *Donne.*

Chief mastery to dissect
With long and *tedious* havock fabled knights.
Milton.

The one intense, the other still remiss,
Cannot well suit with either, but soon prove
Tedious alike. *Id*

Pity only on fresh objects stays,
But with the *tedious* sight of woes decays. *Dryden.*

But then the road was smooth and fair to see,
With such insensible declivity,
That what men thought a *tedious* course to run,
Was finished in the hour it first begun. *Harte.*

TEDZEN, a considerable river of Korassan, in Persia, the largest, next to the Oxus, in this part of Asia. It is supposed by Mr. Kinneir to rise near Serukhs; and, after a course from east to west, falls into the gulf of Balkan.

TEEM. To pour. A low word imagined by Skinner to come from Dan. *tommen*, to draw out; to pour. The Scots retain it; as, teem that water out; hence Swift took this word.

Teem out the remainder of the ale into the tankard, and fill the glass with small beer.
Swift's Directions to the Butler.

TEEM, *v. n.* & *v. a.* } Sax. team, offspring.
TEEMLESS, *adj.* } To bring young; be full, or, as it were, pregnant; bring forth; produce: teemless, unfruitful.

What's the newest grief?
—Each minute *teems* a new one.
Shakspeare. Macbeth.

Common mother, thou
Whose womb unmeasurable, and infinite breast,
Teems and feeds all. *Id. Timon of Athens.*

The earth obeyed; and strait
Opening her fertile womb, *teemed* at a birth
Innumerous living creatures.
Milton's Paradise Lost.

When the rising spring adorns the mead,
Teeming buds and cheerful greens appear. *Dryden.*

Such wars, such waste, such fiery tracks of dearth,
Their zeal has left, and such a *teemless* earth. *Id.*

There are fundamental truths, the basis upon which a great many others rest: these are teeming truths, rich in store, with which they furnish the mind, and, like the lights of heaven, give light and evidence to other things. *Locke.*

We live in a nation where there is scarce a single head that does not *teem* with politicks. *Addison.*

The deluge wrought such a change that the earth did not then *teem* forth its increase, as formerly, of its own accord, but required culture.
Woodward's Natural History.

TEEN, *n. s.* Sax. tinan, to kindle; Flem. *tenen* is to vex; Sax. teonan, injuries. Sorrow; grief. Not in use.

Fry not in heartless grief and doleful *teen*.
Spenser.

My heart bleeds
To think of the *teene* that I have turned you to.
Shakspeare.

TEEMBOO, a city of central Africa, the capital of Foota Jallo, the principal kingdom of the Foulahs. It contains about 7000 inhabitants, who manufacture narrow cloths, iron, silver, wood, and leather. The houses are neatly and conveniently built, at a little distance from each other. 160 miles east of Sierra Leone.

TEES, a considerable river of England, arising in the mountains of Westmoreland, and taking an easterly direction, it divides the North Riding of Yorkshire from the county of Durham in its whole extent. It passes Barnard Castle, Staindrop, Darlington, Yarm, and Stockton, and falls into the German Ocean, in a wide estuary called the Teesmouth, on the south of Hartlepool.

TEESDALE Forest, a township of England, in Durham, eleven miles north by west of Barnard castle. Population 998.

TEESEE, a large unwalled town of central Africa, in the kingdom of Kasson. The Mandingo inhabitants are remarked by Park for their want of delicacy as to articles of diet, eating without difficulty rats, moles, and snakes: yet no woman must eat an egg. It is thirty miles north-west of Koonickary.

TEETH, the bones placed in the jaws for chewing food that it may be the more easily digested in the stomach. For the anatomical structure of these see Anatomy and Zootomy. The diseases to which they are liable, with the most successful remedies, are fully detailed under Medicine and Surgery. Quacks and mountebanks use various washes for teeth, the sudden effects of which, in cleaning and whitening the teeth, surprise and please people, but the effects are very pernicious. All the strong acid spirits will do this. One of the best mixtures is the following:—Take plantane-water an ounce, honey of roses two drachms, muriatic acid ten drops; mix the whole, and rub the teeth with a piece of linen rag dipped in this every day till they are whitened. The mouth ought to be well washed with cold water after the use of this or any other acid liquor; and indeed the best of all washes is cold water with or without a little salt; the constant use of this will keep them clean and white, and prevent them from aching.

In early infancy Nature designs us for the softest aliment, so that the gums alone are then sufficient for manducation; but as we advance in life, and require a different food, she wisely provides us with teeth, the hardest and whitest of our bones, and, at full maturity, usually amounting to thirty-two in both jaws; viz. sixteen above, and as many below. Their number varies indeed in different subjects: but it is seldom seen to exceed thirty-two, and it will very rarely be found to be less than twenty-eight.

Each tooth has its *body*, or that part which appears above the gums; and its fangs or root, which is fixed into the socket. The boundary between these two, close to the edge of the gum, where there is usually a small circular depression, is called the neck of the tooth. The teeth of each jaw are commonly divided into three classes; but all are of similar general structure. That is, every tooth is composed of its cortex or enamel, and its internal bony substances. The enamel, or, as it is sometimes called, the vitreous part of the tooth, is a very hard and compact substance, of a white color, and peculiar to the teeth. It is found only upon the body of the tooth, covering the outside of the bony or internal substance. When broken it appears fibrous or striated; and all the striæ are directed from the circumference to the centre of the tooth. This enamel is thickest on the grinding surface, and on the cutting edges or points of the teeth, becoming gradually thinner as it approaches the neck, where it terminates insensibly. Some writers have described it as being vascular, but it is certain that no injection will ever reach this substance; that it receives no tinge from madder; and that it affords no appearance of a circulation of fluids. The bony part of a tooth resembles other bones in its structure, but is much harder than the most compact part of bones in general. It composes the inner part of the body and neck, and the whole of the root of the tooth. This part of a tooth, when completely formed, does not, like the other bones, receive a tinge

from madder, nor do the minutest injections penetrate into its substance, although many writers have asserted the contrary. Mr. Hunter has been therefore induced to deny its being vascular. But we find that a tooth recently drawn, and transplanted into another socket, becomes as firmly fixed after a certain time, and preserves the same color as the rest of the set; whereas a tooth that has been long drawn before it is transplanted will never become fixed. Mr. Hunter, indeed, is aware of this objection, and refers the success of the transplantation, in the first instance, to the living principle possessed by the tooth, and which he thinks may exist independent of a circulation. But, however applicable such a doctrine may be to zoophytes, it is suspected that it will not hold good in man, and others of the more perfect animals: and there does not appear to be any doubt but that, in the case of a transplanted tooth, there is a real union by vessels. 2dly, The swellings of the fangs of a tooth, which in many instances are known to be the effects of disease, and which are analogous to the swelling of other bones, are a clear proof of a similarity of structure, especially as we find them invested with a periosteum. 3dly, It is a curious fact, though as yet perhaps not generally known, that, in cases of phthisis pulmonalis, the teeth become of a milky whiteness, and in some degree transparent. Does not this prove them to have absorbents? Each tooth has an inner cavity, which, commencing by a small opening at the point of the fang, becomes larger, and terminates in the body of the tooth. This cavity is supplied with blood vessels, and nerves, which pass through the small hole in the root. In old people this hole sometimes closes, and the tooth becomes then insensible. The teeth are also invested with periosteum from their fangs to a little beyond their bony sockets, where it is attached to the gums. This membrane seems to be common to the tooth which it encloses, and to the sockets which it lines. The teeth are likewise secured in their sockets by a red substance called the gums, which every where covers the alveolar processes, and has as many perforations as there are teeth. The gums are exceedingly vascular, and have something like cartilaginous hardness and elasticity, but do not seem to have much sensibility. The gums of infants, which perform the offices of teeth, have a hard ridge extending through their whole length; but in old people, who have lost their teeth, this ridge is wanting. The three classes into which the teeth are commonly divided are incisores, canini, and molares, or grinders.

The incisores are the four teeth in the forepart of each jaw; they derive their name from their use in dividing and cutting the food in the manner of a wedge, and have each of them two surfaces, which meet in a sharp edge. Of these surfaces, the anterior one is convex, and the posterior one somewhat concave. In the upper jaw they are usually broader and thicker, especially the two middle ones, than those of the under jaw, over which they generally fall by being placed a little obliquely.

The canini, or cuspidati, are the longest of all the teeth, deriving their name from their resemblance to a dog's tusk. There is one of these teeth on each side of the incisores, so that there are two in each jaw. They are the longest of all the teeth. Their fangs differ from that of the incisores only in being much larger, and their shape may be easily described to be that of an incisor with its edge worn off, so as to end in a narrow point instead of a thin edge. The canini not being calculated for dividing like the incisores, or for grinding, seem to be intended for laying hold of substances. Mr. Hunter remarks, of these teeth, that we may trace in them a similarity of shape, situation, and use, from the most imperfect carnivorous animal, which we believe to be the human species, to the lion, which is the most perfectly carnivorous.

The molares, or grinders, of which there are ten in each jaw, are so called, because from their size and figure they are calculated for grinding the food. The canini and incisores have only one fang, but the three last grinders in the under jaw have constantly two fangs, and the same teeth in the upper jaw three fangs. Sometimes these fangs are divided into two points near their base, and each of these points has, perhaps, been sometimes considered as a distinct fang. The grinders likewise differ from each other in their appearance. The first two on each side, which Mr. Hunter appears to have distinguished very properly by the name of bicuspides, seem to be of a middle nature between the incisores and grinders; they have in general only one root, and the body of the tooth terminates in two points, of which the anterior one is the highest, so that the tooth has in some measure the appearance of one of the canini. The two grinders beyond these, on each side, are much larger. Their body forms almost a square with rounded angles; and their grinding surface has commonly five points or protuberances, two of which are on the inner, and three on the outer part of the tooth. The last grinder is shorter and smaller than the rest, and, from its coming through the gums later than the rest, and sometimes not appearing till late in life, is called dens sapientiæ. The variation in the number of teeth usually depends on these dentes sapientiæ.

The alveolar process, which begins to be formed at a very early period, appears about the fourth month of pregnancy only as a shallow longitudinal groove, divided by slight ridges into a number of intermediate depressions, which are to be the future alveoli or sockets. These depressions are at first filled with small pulpy substances, included in a vascular membrane; and these pulpy substances are the rudiments of the teeth. As these advance in their growth, the alveolar processes become gradually more completely formed. The surface of the pulp first begins to harden, the ossification proceeding from one or more points, according to the kind of tooth that is to be formed. Thus, in the incisores and canini, it begins from one point; in the bicuspides from two points, corresponding with the future shape of those teeth; and in the molares from four or five points. As the ossification advances, the whole of the pulp is gradually covered with bone, excepting its under surface, and then the fang begins to be formed

Soon after the formation of this bony part, the tooth begins to be incrusted with its enamel; but, in what manner this is deposited, we are as yet unable to explain.—Perhaps the vascular membrane, which encloses the pulp, may serve to secrete it. It gradually crystallises upon the surface of the bony part, and continues to increase in thickness, especially at the points and basis of the tooth, till some time before the tooth begins to pass through the gum; and, when this happens, the enamel seems to be as hard as it is afterwards, so that the air does not appear to have the least effect in hardening it, as has been sometimes supposed.—While the enamel is thus forming, the lower part of the pulp is gradually lengthened out and ossified, so as to form the fang. In those teeth which are to have more than one fang, the ossification begins from different parts of the pulp at one and the same time. In this manner are formed the incisores, the canini, and two molares on each side, making in the whole twenty teeth, in both jaws, which are sufficient for the purposes of manducation early in life. As the fangs of the teeth are formed, their upper part is gradually pushed upwards, till at length, about the seventh, eighth, or ninth month after birth, the incisores, which are the first formed, begin to pass through the gum. The first that appears is generally in the lower jaw. The canini and molares, not being formed so soon as the incisores, do not appear till about the twentieth or twenty-fourth month. Sometimes one of the canini, but more frequently one of the molares, appears first.

The danger to which children are exposed during *dentition* arises from the pressure of the teeth in the gum, so as to irritate it, and excite pain and inflammation. The effect of this irritation is that the gum wastes, and becomes gradually thinner at this part, till at length the tooth protrudes. In such cases therefore we may, with great propriety, assist nature by cutting the gum. These twenty teeth are called temporary or milk teeth, because they are all shed between the age of seven and fourteen, and are supplied by others of a firmer texture, with large fangs, which remain till they become affected by disease, or fall out in old age, and are therefore called the permanent or adult teeth. The rudiments of these adult teeth begin to be formed at different periods. The pulp of the first adult incisor, and of the first adult grinder, may be perceived in a fœtus of seven or eight months, and the ossification begins in them about six months after birth. Soon after birth the second incisor, and canine tooth on each side, begin to be formed. About the fifth or sixth year the first bicuspis, and about the seventh the second bicuspis begins to ossify. These bicuspides are destined to replace the temporary grinders. All these permanent teeth are formed in a distinct set of alveoli; so that it is not by the growing of one tooth under another in the same socket, that the uppermost tooth is gradually pushed out, as is commonly imagined; but the temporary teeth, and those which are to succeed them, being placed in separate alveoli, the upper sockets gradually disappear, as the under ones increase in size, till at length the teeth they contain, having no longer any support, consequently fal out. But, besides these twenty teeth, which succeed the temporary ones, there are twelve others to be added to make up the number thirty-two. These twelve are three grinders on each side in both jaws; and, in order to make room for this addition, we find the jaws grow as the teeth grow, so that they appear as completely filled with twenty teeth as they are afterwards with thirty-two. Hence in children the face is flatter and rounder than in adults. The first adult grinder usually passes through the gum about the twelfth year; the second, which begins to be formed in the sixth or seventh year, cuts the gum about the seventeenth or eighteenth; and the third, or dens sapientiæ, which begins to be formed about the twelfth year, passes through the gum between the age of twenty and thirty. The dentes sapientiæ have, in some instances, been cut at the age of forty, fifty, sixty, and even eighty years; and it sometimes happens that they do not appear at all. Sometimes likewise it happens that a third set of teeth appear about the age of sixty or seventy. Diemerbroek tells us that he himself, at the age of fifty-six, had a fresh canine tooth in the place of one he had lost several years before; M. du Fay saw two incisores and two canini cut the gum in a man aged eighty-four; Mr. Hunter has seen two fore teeth shoot up in the lower jaw of a very old person; and an account was lately published of a man who had a complete set of teeth at the age of sixty. Other instances of the same kind are to be met with in authors. The circumstance is curious, and from the time of life at which it takes place, and the return of the catamenia, which sometimes happens to women at the same age, it has been very ingeniously supposed, that there is some effort in nature to renew the body at that period.

Teeth of various sorts of machines, as of mill wheels, &c. These are often called cogs by the workmen; and by working in the pinions, rounds, or trundles, the wheels are made to turn one another. Mr. Emerson (in his Mechanics, prop. 25) treats of the theory of teeth, and shows that they ought to have the figure of epicycloids for properly working in one another.

TEFF, in botany, a kind of grain sown all over Abyssinia, from which is made the bread commonly used throughout the country. Mr. Bruce says it is herbaceous; and that from a number of weak leaves surrounding the root proceeds a stalk of about twenty-eight inches in length, not perfectly straight, smooth, but jointed or knotted at particular distances. This stalk is not much thicker than that of a carnation or july-flower. About five inches from the top a head is formed of a number of smaller branches, upon which it carries the fruit and flowers; the latter of which are small, of a crimson color, and scarcely perceptible by the naked eye but from the opposition of that color. The pistil is divided into two, seemingly attached to the germ of the fruit, and has at each end small capillaments forming a brush. The stamina are three; two on the lower side of the pistil, and one on the upper. These are each of them crowned with two oval stigmata, at first green but after-

wards crimson. The fruit is formed in a capsula, consisting of two conical hollow leaves, which, when closed, seem to compose a small conical pod pointed at the top. The fruit or seed is oblong, and is not so large as the head of the smallest pin; yet it is very prolific, and produces these seeds in such abundance as to yield a very great quantity of meal. Of this teff-bread the natives make a liquor. When well toasted it is broken into small pieces, which are put into a large jar and have warm water poured upon them. It is then set by the fire, and often stirred for several days, the mouth of the jar being closely covered. After being allowed to settle for three or four days it acquires a sourish taste, and is what they call bouza, or the common beer of the country. The bouza in Atbara is made in the same manner, only, instead of teff, cakes of barley-meal are employed. Both are very bad liquors, but the worst is that made of barley.

TEFLIS, or Tiflis, a city of Asia, and capital of the kingdom of Georgia, was visited in 1817 by Sir R. Kerr Porter, who describes it as situated on the sublime banks of the Kur, at the extremity of a defile formed by two bold ranges of mountains.

This city was founded in 1063, by the Tzar Liewvang, who wished to derive personal benefit from certain warm springs in its neighbourhood, and built hovels for the convenience of the occupiers of a small fortress, which stood on an adjacent height. The remains of this ancient bulwark are still to be seen on a hill to the south of the town, at some distance from the station of the modern citadel, of Turkish origin. The position of the old work completely commanded the road along the western bank of the Kur. The streets are, without exception, narrow, and intolerably filthy in wet weather, and dusty in dry; but, since it has come under the dominion of Russia, this inconvenience has been in some degree remedied. The governor had ordered the streets to be paved, and the work was already begun when Sir R. Kerr Porter visited the city; other improvements were also going forward. Teflis has been long celebrated for its baths. Population about 15,000.

TEGEA, an ancient town of Peloponnesus, where Orestes' gigantic bones were found. It was famous for its temples to Apollo, Pan, Ceres, Proserpine, and Venus.

TEGEATES, a son of Lycaon, the founder of Tegea.

TEG'UMENT, *n. s.* Lat. *tegumentum.* Cover; the outward part. A word seldom used but in anatomy or physicks.

Clip and trim those tender strings in the fashion of beard, or other hairy *teguments.*
Browne's Vulgar Errours.

In the nutmeg another *tegument* is the mace between the green pericarpium and the hard shell.
Ray on the Creation.

Proceed by section, dividing the skin and separating the *teguments.* *Wiseman's Surgery.*

TEHAMA, a belt of sand, which stretches along the eastern shore of the Red Sea, to the mountains of the interior. It is of varying but considerable breadth, and is probably augmented by the blowing of the moving sands, which appear to have encroached upon the limit of the sea. It is almost entirely barren, and bears every mark of having been anciently a part of the bed of the sea.

TEHRAUN, a large city of Persia, which, during the two last reigns, has been the capital of the empire. Its situation is striking, having to the south the ruins of the immense ancient city of Rey or Rae; to the north and east the lofty mountain ranges of Elburz and Demavend, and to the west a plain enriched with cultivation and villages. The modern city is about four miles in circumference, surrounded by a strong wall, flanked by innumerable towers, and a broad dry ditch, with a glacis. After being destroyed by the Afghauns at the beginning of this century, it was rebuilt by Kurreen Khan, and enlarged by Agn Mahommed, who made it the seat of government. It has been still farther enlarged and adorned by his successor.

TEH-HE, *v. n.* A cant word made from the sound. To laugh with a loud and more insolent kind of cachinnation; to titter.

They laughed and *teh-he'd* with derision,
To see them take your deposition. *Hudibras.*

TEHUACAN, a town in the intendency of Mexico, and one of the most frequented ancient sanctuaries of the Mexicans. It has four principal churches, besides convents. The streets, houses, and squares are handsome. Long. 97° 14′ 30″ W., lat. 18° 30′ N.

TEHUANTEPEC, Teguantepeque, or Tecoantepeque, a sea-port of Mexico, in the intendency of Oaxaca, in the bottom of the creek formed by the ocean, between the small villages of San Francisco, San Dionisio, and Santa Maria de la Mar. This port, impeded by a dangerous bar, may become of consequence, when navigation in general, and especially when the transport of the indigo of Guatimala, shall become more frequent by the Rio Guasacuallo. It is about 196 miles south-east of Mexico.

Tehuantepec, a large open gulf in the front of the above city, from which it takes its name.

TEIGNMOUTH, East, a sea-port, township, and chapelry, in the parish of Dawlish, hundred of Exminster, Devon, near the mouth of the Teign, fifteen miles south of Exeter, and 187 west by south of London. The church or chapel is near the beach, and a venerable pile of Saxon architecture. This place has been much improved of late years, and is now become a place of fashionable resort for sea-bathing. The public rooms are in a neat brick building. The bathing machines are commodious, and here are two good inns. It has a considerable commerce in the export of pipe-clay to Bristol, Liverpool, &c. It also employs a great number of vessels in the Newfoundland fisheries.

Teignmouth, West, is divided from the above by the rivulet Tame. The old church was taken down in 1821, and a handsome octagonal edifice erected in its stead. This church is a curacy under Bishop's-Teignton, as that of East Teignmouth is under that of Dawlish, the incumbents of these parishes nominating the minister who serves the churches alternately. The theatre is a handsome new structure. The market-place has been lately built, and is very commodious

Across the Teign lies the delightful little village of Shaldon, containing several new lodging-houses. Market on Saturday. Fair September 29th. It is a member of the port of Exeter.

TEIL-TREE, *n. s.* Lat. *tilia.* The same with LINDEN or LIME TREE: which see.

A *teiltree* and an oak have their substance in them when they cast their leaves. *Isaiah* vi. 13.

TEIL TREE, in botany. See TILIA.

TEINT, *n. s.* Fr. *teinte.* Color; touch of the pencil.

Glazed colours have a vivacity which can never be imitated by the most brilliant colours, because the different *teints* are simply laid on, each in its place, one after another. *Dryden.*

TEINTS and SEMITEINTS, in painting, denote the several colors used in a picture, considered as more or less high, bright, deep, thin, or weakened and diminished, &c., to give the proper relievo, softness, or distance, &c., of the several objects.

TEJUCO, a district of Brasil, of which the town of Tejuco is the capital, around which it extends sixteen leagues from north to south, and about eight from east to west.

TEJUCOS, BAY OF, on the coast of Brasil, in South America, some miles to the north of the island of St. Catharine's. It is from two to three leagues across, and extends the same distance inland, being well sheltered, and affording good anchorage, and fine situations for loading timber. 'Along the beach of this bay,' observes Mr. Mawe, 'I found the shell of the murex genus, which produces that beautiful crimson dye so valued by the ancients. It is here called purpura, and, to my great surprise, its use is in some degree known to the natives, one of whom showed me some cotton fringe, dyed with an extract of it, though ill prepared. The shell is about the size of the common whelk, and contains a fish, on whose body appears a vesicle, full of a pale yellow, viscid, purulent substance, which constitutes the dye. The mode of extracting it, is to break the shell carefully with a hammer, so as not to crush the fish, and then let out the liquor in the vesicle with a lancet or other sharp instrument. I, for greater convenience, used a pen, and immediately wrote my initials, &c., on a handkerchief; the marks in half an hour after were of a dirty green color, and, on being exposed to the air a few hours longer, changed to a most rich crimson. The quantity produced by each animal is very small, but quite sufficient for such an experiment. The best time for making it is when the animal is in an incipient state of putrescency. I have not a doubt that if a sufficient quantity of them were taken, and the dyeing matter, when extracted, were liquified in a small degree with gum-water, a valuable article of commerce might be produced; at least the trial is worth making. The liquid is a perfect substantive dye, and of course resists the action of alkalies.' Lat. 26° 56′ S.

TELAMON, a celebrated Grecian hero, the son of Æacus and Endeis, brother of Peleus and Phocus, and father of Teucer and Ajax. Having accidentally killed his brother Phocus he fled from Megara, his birth-place; and arriving at Salamis married Glauce, the daughter of king Cychreus, whom he succeeded. He was one of the Argonauts, and accompanied Hercules when he took Troy, who gave him the princess Hesione to wife.

TELAMONE, a town of Naples, the chief port of the Presidii, ten miles north of Orbitello. It is famous for the victories obtained by the Romans under the consuls C. A. Regulus and Æmilius Lepidus over the Gauls.

TE'LARY, *adj.* Lat. *tela,* a web. Spinning webs.

The pictures of *telary* spiders, and their position in the web, is commonly made lateral, and regarding the horizon; although we shall commonly find it downward, and their heads respecting the centre. *Browne's Vulgar Errours.*

TELCHINES, an ancient people of Rhodes, originally from Crete. They were the inventors of many useful arts, whence the poets fabled that they could change themselves into whatever shapes they pleased. Diod.

TELCHINIA, a territory of Crete, whence the Telchines emigrated to Rhodes.

TELCHIS, the son of Europus, and grandson of Ægialeus, one of the first kings of Peloponnesus.

TELEGONUS, a son of Ulysses, by Circe, born in Æea. He went to Ithaca to seek his father, but being shipwrecked on the coast he got into a quarrel with the people after landing, and killed his father in the squabble without knowing him, to his great grief upon the discovery. He afterwards founded Tusculum in Italy, and left a daughter, named Mamilia, from whom the Roman family of Mamilii claimed their name and descent.

TELEGRAPH (from τηλε, far off, and γραφω, to write), the name very properly given to an instrument by means of which information may be almost instantaneously conveyed to a considerable distance.

The telegraph, though it has been generally known and used by the moderns only for a few years, is perhaps not entirely a modern invention. There is reason to believe that amongst the Greeks there was some sort of telegraph in use. The burning of Troy is said to have been known in Greece very soon after it happened, and before any person had returned thence. But we have no certainty of this. The Chinese, when they send couriers on the great canal, or when any great man travels there, make signals by fire from one day's journey to another to have every thing prepared; and most of the barbarous nations used formerly to give the alarm of war by fires lighted on the hills or rising grounds. Polybius calls the different instruments used by the ancients for communicating information πυρσειαι, pyrsiæ, because the signals were always made by fire. At first they communicated information of events merely by torches; but this method was of little use, because it was necessary before hand to fix the meaning of every particular signal. Æneas, a contemporary of Aristotle, who wrote a treatise on the duties of a general, endeavoured to correct those imperfections, but by no means succeeded. His method was defective, because it could not convey any other intelligence except what was written

on the sticks, and even that not exactly. With regard to all unforeseen events it was quite useless. A method was invented by Cleoxenus, or Democlitus, and very much improved by Polybius, as he himself informs us. This was by the letters of the Greek alphabet divided into five parts. But neither this nor any other method mentioned by the ancients seems ever to have been brought into general use.

The most ingenious of the moderns had not thought of such a machine as a telegraph till 1663, when the marquis of Worcester, in his Century of Inventions, affirmed that he had discovered 'a method by which, at a window, as far as eye can discover black from white, a man may hold discourse with his correspondent, without noise made or notice taken; being according to occasion given, or means afforded ex re nata, and no need of provision before hand; though much better if foreseen, and course taken by mutual consent of parties.' This could be done only by means of a telegraph, which in the next sentence is declared to have been rendered so perfect that by means of it the correspondence could be carried on 'by night as well as by day, though as dark as pitch is black.'

The first idea of a telegraph upon the modern construction, was suggested by Dr. Hooke towards the end of the last century. He gave the complete description of such a machine, as appears by the following extract, from a paper of his, read before the Royal Society on the 21st of May, 1684: 'I proposed,' says he, 'some years since, a method of discoursing at a distance, not by sound but by sight: I say that it is possible to convey intelligence from any one high and eminent place, to any other that is in sight of it, though thirty or forty miles distant, in as short a time almost as a man can write what he would have sent; and as suddenly to receive an answer, as he that receives it has a mind to return it, or can write it down on paper. Nay, by the help of three, four, or more eminent places visible to each other, lying in a straight line, 'tis possible to convey intelligence almost in a moment, to twice, or thrice, or more times that distance, with as great a certainty as by writing. For the performance of this, we must be beholden to a late invention, which we do not find any of the ancients knew; that is, the eye must be assisted with telescopes, that whatever characters are exposed at one station, may be made plain and distinguishable at the other. First: for the stations, if they be far distant, it will be necessary that they should be high, and lie exposed to the sky; that there be no higher hill or part of the earth beyond them, that may hinder the distinctness of the characters, which are to appear dark against the sky, beyond them appearing white, by which means also the vapors near the ground will be passed over and avoided. Next, in choosing these stations, care must be taken, as near as may be, that there be no hill that interposes between them, that is almost high enough to touch the visible ray, because in such cases the refraction of the air of that hill will be very apt to disturb the clear appearance of the object. The stations being found convenient, the next thing to be considered is, what telescopes will be necessary for each station. One of these telescopes must be fixed at each extreme station, and two of them in each intermediate station; so that a man for each glass, sitting and looking through them, may plainly discover what is done in the next adjoining station, and with his pen write down on a paper the characters there exposed, in their due order; so that there ought to be two persons at each extreme station, and three at each intermediate one, that intelligence may be conveyed backwards and forwards at the same time. Next there must be certain times agreed on, when the correspondents are to expect it; or else there must be set at the top of a pole, in the morning, the hour appointed by either of the correspondents for acting that day.

'Next there must be convenient apparatus of characters, consisting of at least as many distinct characters as there are necessary letters in the alphabet (to be made use of as is expressed in plate TELEGRAPH, fig. 1). And these must be either day characters or night characters. If they are to be made use of in the day-time, they may all be made of deals, and of a size convenient for the several distances, any one of which characters may signify any one letter of the alphabet, and the whole alphabet may be varied 10,000 ways, so that none but the two extreme correspondents shall be able to discover the information conveyed. If the characters are for the night, then they may be made with links, or lights disposed in a certain order, which may be covered or uncovered, according to the method agreed on. There will be also requisite several other characters, which may for expedition express a whole sentence, such as 'I am ready to communicate;' 'I am ready to observe.' I could instance a hundred ways of facilitating the method of performing the design with the more dexterity and quickness, and with little change, but that I think will be needless at present, since, whensoever such a way of correspondence shall be put in practice, those and many more than I can think of at present will of themselves occur, so that I do not in the least doubt but that with a little practice all things may be made so convenient, that the same character may be seen at Paris, within a minute after it hath been exposed in London; and that the characters may be exposed so quick after one another, that a composer shall not much exceed the exposer in swiftness, and this not only at the distance of one station, but of 100; for supposing all things ready at all of those several stations for observing and exposing as fast as the second observer doth read the characters of the first exposer, the second exposer will display them to the observer of the third station, whose exposer will likewise display them for the fourth observer, as fast as his observer doth name them to him or write them down. There may be many objections brought against this way of communication, because it has not yet been put in practice, but hardly any that may not be easily answered and obviated.'

Dr. Hooke thus illustrates his invention: let A B C (fig. 2) represent three very long masts or poles erected, E the top piece that joins them together, D a screen, behind which all the deal-board characters hang upon certain rods or lines, and may, by the help of small lines connected

TELEGRAPH.

Fig. 11.

Fig. 10.

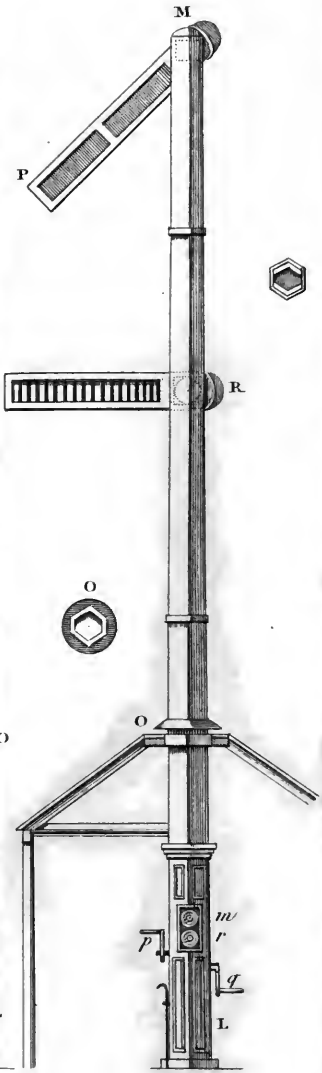


Fig. 9.

Fig. 12.

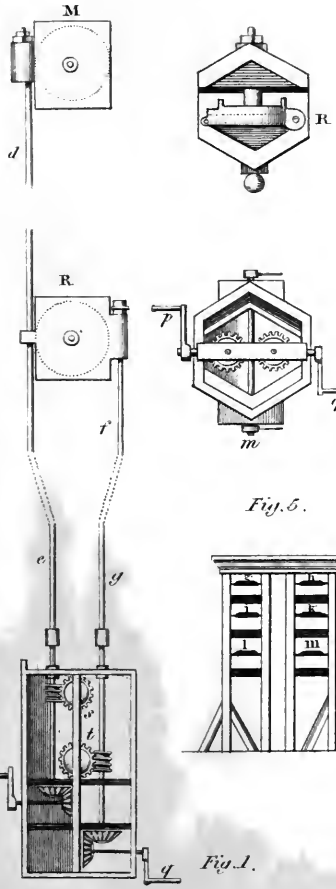


Fig. 5.

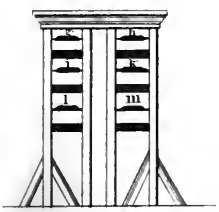


Fig. 1.

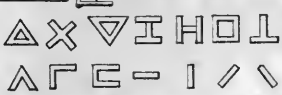


Fig. 2.

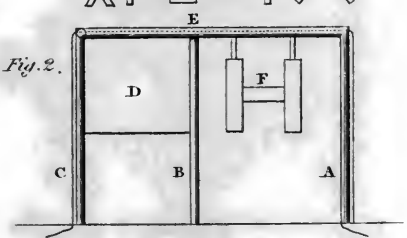


Fig. 3.

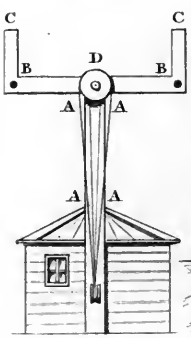


Fig. 4.

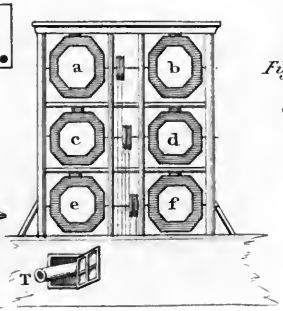


Fig. 8.

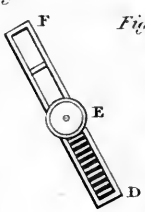
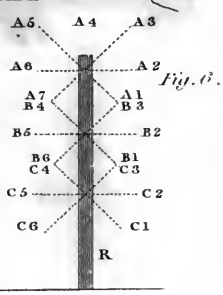


Fig. 7.

Fig. 6.



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J. Shury sculp.

with each of them, be exposed at T, or drawn back at D, as occasion shall require.

After this M. Amontons, a French academician, born in 1663, prepared a telegraph. His method was this:—Let there be people placed in several stations, at such a distance from one another that by the help of a telescope a man in one station may see a signal made in the next before him; he must immediately make the same signal that it may be seen by persons in the station next after him, who are to communicate it to those in the following station, and so on. Amontons tried this method in a small tract of land before several persons of the highest rank at the court of France.

It was not till the French revolution that the telegraph was applied to useful purposes. M. Chappe invented the telegraph first used by the French about the end of 1793, on principles nearly similar to those of Amontons. The manner of using this telegraph was as follows:—At the first station, which was on the roof of the palace of the Louvre at Paris, M. Chappe, the inventor, received in writing, from the committee of public safety, the words to be sent to Lisle, near which the French army then was. An upright post was erected on the Louvre, at the top of which were two transverse arms, moveable in all directions by a single piece of mechanism, and with inconceivable rapidity. He invented a number of positions for these arms which stood as signs for the letters of the alphabet; and these, for the greater celerity and simplicity, he reduced in number as much as possible. The intermediate operators were only instructed generally in sixteen signals; which were so distinct, so marked, so different the one from the other, that they were easily remembered. The construction of the machine was such that each signal was uniformly given in precisely the same manner at all times. M. Chappe having received at the Louvre the sentence to be conveyed, gave a known signal to the second station, which was Mont Martre, to prepare. At each station there was a watch tower, where telescopes were fixed, and the person on watch gave the signal of preparation which he had received, and this communicated successively through all the line, which brought them all into a state of readiness. The person at Mont Martre then received, letter by letter, the sentence from the Louvre, which he repeated with his own machine; and this was again repeated from the next height, with inconceivable rapidity, to the final station at Lisle. The first description of the telegraph was brought from Paris to Frankfort on the Maine by a ci-devant member of the parliament of Bordeaux, who had seen that which was erected on the mountains of Belville.

Dr. Hutton has thus described his telegraph:—Let A A be a beam or mast of wood placed upright on a rising ground (fig. 3), which is about fifteen or sixteen feet high. B B is a beam or balance moving upon the centre A A. This balance-beam may be placed vertically or horizontally, or any how inclined, by means of strong cords, which are fixed to the wheel D, on the edge of which is a double groove to receive the two cords. This balance is about eleven or twelve feet long and nine inches broad, having at the ends two pieces of wood, C, C, which likewise turn upon angles by means of four other cords that pass through the axis of the main balance, otherwise the balance would derange the cords; the pieces C are each about three feet long, and may be placed either to the right or left, straight or square, with the balance-beam. By means of these three the combination of movement is very extensive, remarkably simple, and easy to perform. Below is a small wooden hut, in which a person is employed to observe the movements of the machine. In the mountain nearest to this another person is to repeat these movements, and a third to write them down. The time taken up for each movement is twenty seconds; of which the motion alone is four seconds, the other sixteen the machine is stationary. Two working models of this instrument were executed at Frankfort, and sent by Mr. W. Playfair to the duke of York; and hence the plan and alphabet of the machine came to England. Various experiments were in consequence tried upon telegraphs in this country; and one was soon after set up by government in a chain of stations from the admiralty, London, to the sea coast. It consisted of six octagon boards, each of which was poised upon an axis in a frame in such a manner that it could be either placed vertically, so as to appear with its full size to the observer at the nearest station, as in fig. 4, or become invisible to him by being placed horizontally, as in fig. 5, so that the narrow edge alone would be exposed. Fig. 4 is a representation of this telegraph, with the parts all shut, and the machine ready to work. T, in the officer's cabin, is the telescope pointed to the next station. Fig. 3 is a representation of the machine not at work, and with the ports all open. The opening of the first port (fig. 4) expresses *a*, the second *b*, the third *c*, the fourth *d*, the fifth *e*, and the sixth *f*, &c. Six boards make thirty-six changes by the most plain and simple mode of working, and they will make many more if more were necessary.

Several other improvements have been proposed; but none, perhaps, of the telegraphs hitherto offered to the public exceeds the following either in simplicity, cheapness, or facility in working, and it might, with a few trifling additions, be made exceedingly distinct. It is thus described in the Repertory of Arts, vol. i. p. 382. For a nocturnal telegraph let there be four large patent reflectors, lying on the same plane, parallel to the horizon, placed on the top of an observatory. Let each of these reflectors be capable, by means of two winches, either of elevation or depression to a certain degree. By elevating or depressing one or two of the reflectors, eighteen very distinct arrangements may be produced, each reflector, after every arrangement, being restored to its place, as the following scheme will explain:—

A	B	D	E	F	G
o ooo	o o oo	o oo o	o ooo	ooo o	o oo o
I	**K**	**L**	**M**	**N**	**O**
oo o o	ooo o	oo oo	o o o o	o o oo	oo oo
P	**R**	**S**	**T**	**U**	**Y**
o o o o	oo o o	oo o o	o oo o	o o oo	o oo o

For the sake of example the above arrangements are made to answer to the most necessary letters of the alphabet; but alterations may be made at will, and a greater number of changes produced without any addition to the reflectors. In the first observatory there need only be a set of single reflectors; but in the others each reflector should be double, so as to face both the preceding and subsequent observatory; and each observatory should be furnished with two telescopes. The proper diameter of the reflectors, and their distance from each other, will be ascertained by experience. To convert this machine into a diurnal telegraph nothing is necessary but to insert, in the place of the reflectors, gilt balls, or any other conspicuous bodies.

In 1806 a new set of telegraphs was established on the whole extent of the coast of the French empire, of which the following description is given by captain C. W. Pasley, in the Philosophical Magazine. See figs. 6 and 7. Every telegraph consists of an upright post R, to which are attached three arms, A, B, and C, exactly similar to each other, and each moving upon its own distinct spindle or axis. The axis of one of these arms, A, is near the head of the post R; and the distance between the centres of motion of either of the two uppermost arms, and the centre of the one immediately below it, is rather less than double the length of one arm. The highest of the three arms A, can exhibit seven distinct positions, as is shown by the dotted lines A 1, A 2, A 3, &c.; but the other two arms B and C can only exhibit six positions each, because they are hidden by the post when in a vertical position. The total number of combinations, or of distinct signals, which can be made by this telegraph, will constantly be 391; but as the arm A, when in the vertical position A 4, may appear to be part of the post R, it is not safe to employ that position, and this will reduce the number of signals to 342. As only three bodies are employed in this telegraph, it appears very superior to the admiralty telegraphs used in England, which, by the combination of double that number of bodies, can only make sixty-three distinct signals. Captain Pasley observes, that the mechanism of the French telegraphs just described, must be either imperfect, or the men employed in working them must have been very unskilful, for the signals were made and repeated in an aukward manner, with what seemed to him much unnecessary loss of time. But these defects, it will be evident, detract nothing from its merit as an invention. In regard to the mechanical construction, he could only observe that the arms, which were painted black, and appeared solid at a distance, were made in the fashion of a Venetian blind, in order, it may be presumed, to diminish the action of the wind in bad weather. Each arm had a counterpoise of thin materials painted white, which, unless the observer be very near the telegraph, becomes invisible.

Fig. 6 shows the telegraph in a state of rest, the dotted lines marking the several positions in which the arms can be exhibited. Fig 7 is a specimen of the telegraph at work. Fig. 8 shows the construction of one of the arms on a larger scale, D E being the part which is fashioned like a Venetian blind, and E F the counterpoise.

Sir Home Popham's telegraph.—The original telegraphs at the admiralty, with the six boards, have been lately taken down, and a new kind substituted. It is on the same principle with the French, being an upright mast with two indicators, which move upon centres one above the other, in the manner of the last described. The mast is made to turn round on its vertical axis, so as to present its arm successively to all quarters, when required. The mechanism, which is the invention of Sir Home Popham, is the best that has ever been contrived, the movements being very simple, and effected by iron spindles and endless screws, so that the indices below are certain to accompany the indicators exactly in their movements, and place them precisely in their required positions, which cannot be done by the old machinery with cords, because they are liable to expand and contract by wet or dry weather. The machinery for this set of telegraphs was constructed in the most substantial manner by Maudslay in 1816. See figs. 9, 10, and 11. L M is a tall mast of an hexagonal form, framed up from six fir planks put together at the angles, and bound by iron hoops at different places, so as to be hollow within. The lower end L terminates in a pivot, and the mast is retained in a vertical position by a circular collar at O, which embraces it, and is supported in the roof of the building. The two arms P M and Q R are moveable upon centres, one at the top of the mast and the other half way down. When the arms are placed in a vertical position, they shut up within the hollow of the mast, so as to be entirely concealed; and for this purpose two of the six sides are cut away at the upper part, so as to leave an opening through the mast of sufficient width to admit the two arms to work in it. To communicate motion to the arms, a small toothed wheel is fixed upon each arm at the centre of motion, and close to the side of the arm. The teeth of these wheels are actuated by endless screws or worms, formed on the upper ends of the long spindles *d e* and *f g*, which descend down to the bottom of the hollow mast, and have small bevelled wheels upon them, which are actuated by wheels of similar size, fixed on the ends of short horizontal spindles, which have handles *p*, *q*, applied at the extremi-

ties. See fig. 12. By turning these handles, motion is given to the vertical spindles *d* and *f*; and, by means of the endless screws upon the upper ends of them, the wheels at M and R, on the centres of the arms, are turned round, and the arms are put into any required position. But, in order that the people below may at all times know exactly what positions the arms stand in, two dials, *m* and *r*, are formed on the lower part of the mast, the upper one *m* being for the upper arm M, and the other *r* for the lower arm R; and each dial has an index or hand, which turns round with a motion exactly corresponding to the motion of the arms. For producing this motion, the axle of each hand or index has a small toothed wheel *s* or *t* (fig. 11) fixed upon it in the middle; and an endless screw is formed upon the upright spindle to work in the teeth of the wheel. The wheels upon the centre of the arms, and those upon the axes of the indices, have the same number of teeth; and, as every turn of the spindles and screws will move the wheels round one tooth, the angular motion of the arms P M and Q R, and the hands *m* and *r*, will in all cases be the same. The dials are each divided into eight, corresponding with the eight positions in which the arms are to be exhibited; viz. pointing vertically; 1st, upwards; and 2dly, downwards: pointing horizontally; 3dly, to the right; and 4thly, to the left: pointing upwards at an inclination of 45°; 5thly, to the right; and 6thly, to the left: pointing downwards at an inclination of 45°; 7thly, to the right; and 8thly, to the left. But of these eight positions, only the four last are made use of to represent characters; because, in the two vertical positions, the pointers enter within the mast, and cannot therefore be seen whether they are pointing upwards or downwards: the horizontal positions of the arms are reserved for the necessary signals of preparation, &c. Each arm, then, has four positions, in which it will express different signals; and these positions are all made with the pointer, at an inclination of 45° from the horizontal line.

These signals either express the letters of the alphabet, or the numeral characters, according to previous arrangement, which must be made known by exhibiting a preparatory signal, before the communication is begun. The signal to prepare for receiving letters is the lower arm extended horizontally to the right; and, for the numerals, both arms are extended horizontally to the left.

The upper pointer P M used by itself, at an elevation of 45°, denotes,

A, or 1, when pointing upwards to the left.
B, or 2, when pointing downwards to the left.
C, or 3, when pointing upwards to the right.
D, or 4, when pointing downwards to the right.

The lower pointer Q R used by itself, at an elevation of 45°, denotes,

E, or 5, when pointing upwards to the left.
F, or 6, when pointing downwards to the left.
G, or 7, when pointing upwards to the right.
H, or 8, when pointing downwards to the right.

It is easy to conceive that, by repeating all these positions with both arms exhibited together instead of one singly, various combinations may be made, which are sufficient to express all the remaining letters, and some other necessary signals. The dial for each arm is double; that is, a dial is fixed at each side of the mast, and the axles of the indices or hands proceed quite through the mast, so as to have a hand at each end. These dials are not numbered exactly similar to each other, but are reversed; and the two indices on the opposite ends of the same axle, though they point in one direction, do not indicate the same numbers on the two dials; because each dial is adapted to indicate the meaning which the different positions of the arms will have, when the telegraph is viewed on that side to which the dial faces. For, when a signal is made, that arm which projects from the right-hand side, if the telegraph is examined on one side, will project on the left hand when the telegraph is viewed on the other side. It was stated before that the telegraph can be turned round, so as to present its arms to any direction. This is done by the pivot L, at the lower hand; but, to hold it fast in the desired direction, a circular iron plate is placed on the floor, with holes in it; and a bolt W is fitted into two eyes, which are fixed to the axle of the mast. The point of this bolt drops into any of the holes in the plate, and thus holds the mast firm; but if the bolt is lifted up, to draw its point out of the holes, it can be turned round. The arms are made with boards, like Venetian blinds; and each has a piece of cast-iron at the opposite end, to counterpoise the weight and make the arm move freely into all positions.

TELEMACHUS, the son of Ulysses and Penelope, was in the cradle when his father went with the rest of the Greeks to the Trojan war. When a child he fell into the sea, but was brought ashore by a dolphin. At the end of that war Telemachus went to seek his father; and as the place of his residence, and the cause of his long absence, were unknown, he visited the courts of Menelaus and Nestor to obtain information, accompanied by Minerva in the form of Mentor. He afterwards returned to Ithaca, where the suitors of Penelope had conspired to murder him, but he avoided their snares; and by means of Minerva he discovered his father, who had arrived in the island two days before him, and was then in the house of Eumæus. With this faithful servant and Ulysses, Telemachus consulted how to deliver his mother from the importunities of her suitors, and it was effected with great success. After his father's death he went to the island of Ææa, where he married Cassiphone the daughter of Circe, by whom he had a son called Latinus. He some time after had the misfortune to kill his mother-in-law Circe, and fled to Italy where he founded Clusium. From these stories, collected from Homer and the other poets, the celebrated Fenelon archbishop of Cambray composed his well known Adventures of Telemachus; which, though not in verse, is justly esteemed a poem.

TELEPHASSA, the wife of Agenor, and mother of Cadmus, Phœnix, Cilix, and Europa. She died in Thrace, seeking her daughter Europa.

TELEPHIUM, true orpine, in botany, a ge-

nus of plants belonging to the class of pentandria, and order of trigynia; and in the natural system ranging under the fifty-fourth order, miscellaneæ. The calyx is pentaphyllous; there are five petals, which are inserted into the receptacle; the capsule is unilocular and trivalvular. There are two species: 1. T. imperati; and 2. T. oppositifolia.

TELEPHUS, a son of Hercules by Auge, the daughter of Aleus. He was exposed as soon as born on mount Parthenis, but was preserved by a she goat and her shepherd. Auge, to avoid her father's rage, fled to Teuthras king of Mysia, and was by him adopted as his daughter. Mean time Telephus grew up, and on consulting the oracle as to his parentage, was advised to go to Mysia. Teuthras, being harassed by the depredations of Idas the son of Aphareus, offered his daughter Auge, and the succession to his crown, to any man who would repel Idas. Telephus undertook the task, and at the head of the Mysian troops conquered Idas, and claimed his reward. But, as he was just going to marry Auge, a monstrous serpent interrupted the ceremony; upon which, Auge imploring the aid of Hercules, the god appeared and told her that Telephus was her own son. After this Telephus became king of Mysia, married a daughter of Priam king of Troy, and assisted him in his war against the Greeks, a party of whom he defeated; but was mortally wounded by Achilles, who, however, was ordered by the oracle to cure him with the same spear that had wounded him. This Achilles did by the rust of the spear; and Telephus, in gratitude, joined the Greeks against the Trojans. —Paus. 8, c. 48; Diod. 4, &c.

TEL'ESCOPE, *n. s.* } Fr. *telescope*; Gr. τηλος
TELESCOP'IC, or } and σκοπεω. A long
TELESCOP'ICAL, *adj.* } glass by which distant objects are viewed: belonging to a telescope; seeing at a distance.

The *telescope* discovers to us distant wonders in the heavens, and shews the milky way, and the bright cloudy spots, in a very dark sky, to be a collection of little stars. *Watts.*

Where Science points her *telescopic* eye,
Familiar with the wonders of the sky.
Cowper.

TELESCOPE is derived from the Greek, τηλε, far off, and σκοπειν, to look at. This name is commonly appropriated to the larger sizes of the instrument, while the smaller are called perspective glasses, spy glasses, or opera glasses. A particular kind, which is thought to be much brighter than the rest, is called a night glass.

To what has been said on the invention of this most noble instrument, in the article OPTICS, we may add the following:—Mr. Leonard Digges, a gentleman of the seventeenth century, of great and various knowledge, asserts in his Stratoticos, and in another work, that his father, a military gentleman, had an instrument which he used in the field, by which he could bring distant objects near, and could know a man at the distance of three miles. He says, that when his father was at home he had often looked through it, and could distinguish the waving of the trees on the opposite side of the Severn. Mr. Digges resided near Bristol. Francis Fontana, in his Celestial Observations, published at Naples in 1646, says, that he was assured by a Mr. Hardy, advocate of the parliament of Paris, a person of great learning and undoubted integrity, that on the death of his father there was found among his things an old tube, by which distant objects were distinctly seen; and that it was of a date long prior to the telescope lately invented, and had been kept by him as a secret. From the table and scheme which Sirturus has given us of the tools or dishes in which the spectacle-makers fashioned their glasses, that they had convex lenses formed to spheres of twenty-four inches diameter, and of eleven inferior sizes. He has given us a scheme of a set which he measured belonging to a spectacle-maker of the name of Rogette, at Corunna, in Spain; who, he says, had tools of the same sizes for concave glasses. It also appears that it was a general practice to use a convex and concave glass together. If any person should put together a twenty-four inch convex and a twelve inch concave (wrought on both sides) at the distance of six inches, he would have distinct vision, and the object would appear of double size. Concaves of six inches were not uncommon; and one such combined with the convex of twenty-four, at the distance of nine inches, would have distinct vision, and objects would be quadrupled in diameter. When such a thing occurred, it was natural to keep it as a curiosity, although the rationale of its operation was not understood. It is plain that Galileo's first telescope was of this kind, made up of such spectacle glasses as he could procure; for it magnified only three times in diameter; a thing easily procured by such glasses as he could find with every spectacle-maker. And he could not but observe, in his trials of their glasses, that the deeper concaves and flatter convexes he employed, he produced the greater amplification; and then he would find himself obliged to provide a tool not used by the spectacle-makers, viz. either a much flatter tool for a convex surface, or a much smaller sphere for a concave. His next telescope magnified but five times. But he groped his way with such spectacle-glasses as he could get, till he at last made tools for very flat object-glasses and very deep eye-glasses, and produced a telescope which magnified about twenty-five times. Sirturus saw it, and took the measures of it. He afterwards saw a scheme of it which Galileo had sent to a German prince at Inspruck, who had it drawn (that is, the circles for the tools) on a table on his gallery. The object-glass was a plano-convex, a portion of a sphere, of twenty-four inches diameter; the eye-glass was a double concave of two inches diameter; the focal distances were therefore twenty-four inches and one inch nearly. This must have been a very lucky operation, for Sirturus says, it was the best telescope he had seen; and we know that it requires the very best work to produce this magnifying power with such small spheres. Telescopes continued to be made in this way for many years; and Galileo never made them of any other form. Kepler published his Dioptrics in 1611; in which he tells us all that he or others had discovered of the law of refraction, viz. that in very small obliquities of

incidence, the angle of refraction was nearly one-third of the angle of incidence. This was indeed enough to have pointed out, with sufficient exactness, the construction of every optical instrument that we are even now possessed of; for this proportionality of the angles of incidence and refraction is assumed in the construction of the optical figure for all of them; and the deviation from it is still considered as the refinement of the art, and was not brought to any rule till fifty years after by Huyghens, and called by him aberration. Yet even the sagacious Kepler seems not to have seen the advantage of any other construction of the telescope; he just seems to acknowledge the possibility of it; and we are surprised to see writers giving him as the author of the astronomical telescope, or even as hinting at its construction. It is true, in the last proposition, he shows how a telescope may be made apparently with a convex eye-glass; but this is only a frivolous fancy; for the eye-glass is directed to be made convex externally, and a very deep concave on the inside; so that it is, in fact, a meniscus with the concavity prevalent. In the eighty-sixth proposition he indeed shows that it is possible so to place a convex glass behind another convex glass, that an eye shall see objects distinct, magnified, and inverted; and he speaks very sagaciously on the subject. After having said that an eye placed behind the point of union of the first glass, will see an object inverted, he shows that a small part only will be seen; and then he shows that a convex glass, duly proportioned and properly placed, will show more of it. But in showing this, he speaks in a way which shows evidently that he had formed no distinct notions of the manner in which this effect would be produced, only saying vaguely that the convergency of the second glass would counteract the divergency beyond the focus of the first. Had he conceived the matter with any tolerable distinctness, after seeing the great advantage of taking in a field greater in almost any proportion, he would have eagerly catched at the thought, and enlarged on the immense improvement. Had he but drawn one figure of the progress of the rays through two convex glasses, the whole would have been open to his view. This step, so easy and so important, was reserved for Scheiner, as has been observed under Optics; and the construction of this author, together with that of Jansen, are the models on which all refracting telescopes are now constructed; and in all that relates to their magnifying power, brightness, and field of vision, they may be constructed on Kepler's principle, that the angles of refraction are in a certain given proportion to the angles of incidence. But after Huyghens had applied his elegant geometry to the discovery of Snellius, viz. the proportionality, not of the angles, but of the sines, and had ascertained the aberrations from the foci of infinitely slender pencils, the reasons were clearly pointed out why there were such narrow limits naturally affixed to the performance of optical instruments, in consequence of the indistinctness of vision which resulted from constructions where the magnifying power, the quantity of light, or the field of vision, were extended beyond certain moderate bounds. The theory of aberrations, which that most excellent geometer established, has enabled us to diminish this indistinctness arising from all these causes; and this diminution is the sole aim of all the different constructions which have been contrived since the days of Galileo and Scheiner.

The general aim, in the construction of a telescope, is to form, by means of mirrors or lenses, an image of the distant object, as large, as bright, and as extensive as is possible, consistently with distinctness; and then to view the image with a magnifying glass in any convenient manner. This gives us an arrangement of our subject. We shall first show the principles of construction of the object-glass or mirror, so as that it shall form an image of the distant object with these qualities; and then show how to construct the magnifying glass or eye-piece, so as to preserve them unimpaired. This indistinctness, which we wish to avoid, arises from two causes; the spherical figures of the refracting and reflecting surfaces, and the different refrangibility of the differently colored rays of light. The first may be called the spherical, and the second the chromatic indistinctness; and the deviations from the foci, determined by the elementary theorem, may be called the spherical and the chromatic aberrations. The limits of our work will not permit us to give any more of the doctrine of aberrations than is absolutely necessary for the construction of achromatic telescopes; and we refer the reader for a general view of the whole to Euler's Dioptrics, and other works of that kind. Dr. Smith has given as much as was necessary for the comparison of the merits of different glasses of similar construction, and in a very plain and elegant manner. His improvement of the fundamental theorem of that most elegant geometer Huyghens is as follows:—

I. In Reflection. Let A V B (fig. 1, plate I., Telescope) be a concave spherical mirror, of which C is the centre, V the vertex, C V the axis, and F the focus of an infinitely slender pencil of parallel rays passing through the centre. Let the ray a A, parallel to the axis, be reflected in A G, crossing the central ray C V in f. Let A P be the sine of the semi-aperture A V, A D its tangent, and C D its secant. The aberration F f from the principal focus of central rays is equal to $\frac{1}{2}$ of the excess V D of the secant above the radius, or very near equal to $\frac{1}{4}$ of V P, the versed sine of the semi-aperture. For, because A D is perpendicular to C A, the points C, A, D, are in a circle, of which C D is the diameter; and because A f is equal to C f, by reason of the equality of the angles f A C, f C A, and C A a, f is the centre of the circle through C, A, D, and f D is $= \frac{1}{2}$ C D. But F C is $= \frac{1}{2}$ C V; therefore F f is $\frac{1}{2}$ of V D. But because D V : V P $=$ D C : V C, and D C is very little greater than V C when the aperture A B is moderate, D V is very little greater than V P, and F f is very nearly equal to $\frac{1}{2}$ of V P. Cor. 1. The longitudinal aberration is $= \frac{A V^2}{4 C N^2}$; for P V is very nearly $= \frac{A V^2}{2 C V}$. Cor. 2. The lateral aberration F G is $= \frac{A V^3}{2 C V^2}$. For F G : F f $=$ A P : P f $=$

A V : ½ C V nearly, and therefore $FG = \frac{AV^3}{4CV} \times \frac{2}{CV} = \frac{AV^3}{2CV^2}$. II. In Refractions. Let A B V (fig. 2 or 3) be a spherical surface separating two refracting substances, C the centre, V the vertex, A V the semi-aperture, A P its sine, P V its versed sine, and F the focus of parallel rays infinitely near to the axis. Let the extreme ray a A, parallel to the axis, be refracted into A G, crossing C F in f, which is therefore the focus of extreme parallel rays. The rectangle of the sine of incidence, by the difference of the sines of incidence and refraction, is to the square of the sine of refraction as the versed sine of the semi-aperture is to the longitudinal aberration of the extreme rays. Call the sine of incidence i, the sine of refraction r, and their difference d. Join C A, and about the centre f describe the arch A D. The angle A C V is equal to the angle of incidence, and C A f is the angle of refraction. Then, since the sine of incidence is to the sine of refraction as V F to C F, or as A f to C f, that is, as D f to C f, we have

$$CF : FV = Cf : fD$$

by conversion $CF : CV = Cf : CD$

altern. conver. $CF - Cf : CV - CD = CF : CV$

or . . . $Ff : VD = CF : CV = r : d$.

Now, $PV = \frac{AP^2}{CP + CV}, = \frac{AP^2}{2CV}$ nearly, and $PD = \frac{AP^2}{fP + fV}, = \frac{AP^2}{2fV}$ nearly, $= \frac{AP^2}{2FV}$ nearly. Therefore $PV : PD = FV : CV$, and $DV : PV = CF : FV$ nearly.

We had above $Ff : VD = r : d$;

and now . $VD : PV = CF : FV, = r : i$;

therefore . $Ff : PV = r^2 : di$,

and $Ff = \frac{r^2}{di} \times PV$. Q. E. D. The aberration will be different according as the refraction is made towards or from the perdendicular; that is, according as r is less or greater than i. They are in the ratio of $\frac{r^2}{di}$ to $\frac{i^2}{dr}$, or of r^3 to i^3. The aberration therefore is always much diminished when the refraction is made from a rare into a dense medium. The proportion of the sines for air and glass is nearly that of 3 to 2. When the light is refracted into the glass, the aberration is nearly ⅓ of P V; and, when the light passes out of glass into air, it is about ⅔ of P V. Cor. 1. $Ff = \frac{r^2}{di} \times \frac{AP^2}{2CV}$ nearly, and it is also $= \frac{r^2}{d^2} \times \frac{AP^2}{2FV}$, because $PV = \frac{AP^2}{2CV}$ nearly, and $i : d = FV : CV$. Cor. 2. Because $f P PA = Ff : FG$

or $FV : AV = Ff : FG$ nearly,

we have F G, the lateral aberration, $= Ff \times \frac{AV}{FV}, = \frac{r^2}{d^2} \times \frac{AV^3}{2FV^3} = \frac{r^2}{i^2} \times \frac{AV^3}{2CV^2}$. Cor. 3. Because the angle F A f is proportional to $\frac{FG}{FV}$ very nearly, we have the angular aberration F A f $= \frac{r^2}{d^2} \times \frac{AV^3}{2FV^3} = \frac{r}{i^2} \times \frac{AV^3}{2CV^3}$. In general, the longitudinal aberrations from the focus of central parallel rays are as the squares of the apertures directly, and as the focal distances inversely; and the lateral aberrations are as the cubes of the apertures directly, and the squares of the focal distances inversely; and the angular aberrations are as the cubes of the aperture directly, and the cubes of the focal distances inversely. To simplify the investigation, some small errors are admitted. P V and P D are not in the exact proportion that we assumed them, nor is D f equal to F V. But in tne small apertures which suffice for optical instruments, these errors may be disregarded. This spherical aberration produces an indistinctness of vision in the same manner as the chromatic aberration does; viz. by spreading out every mathematical point of the object into a little spot in its picture; which spots, by mixing with each other, confuse the whole. We must now determine the diameter of the circle of diffusion. Let a ray β a (fig. 4) be refracted on the other side of the axis into a H ϕ, cutting A f G in H, and draw the perpendicular E H. Call A V a, a V a, V f (or V F, or V ϕ, which in this comparison may be taken as equal) $= f$; $Ff = b$, and $f E = \phi x$. $AV^2 : aV^2 = Ff : F\phi$ (already demonstrated) and $F\phi = \frac{a^2}{a^2} b$, and

$Ff - F\phi$ (or $f\phi$) $= b - \frac{a^2}{a^2} b, = \frac{a^2 b - a^2 b}{a^2}. = \frac{b}{a^2} \times a^2 - a^2, = \frac{b}{a^2} \times \overline{a} + \overline{a} \times \overline{a - a}$. Also

$Pf : PA = fE : EH$ or $f : a = x : \frac{ax}{f} = EH$.

And $P\pi : P\phi = EH : E\phi$ or $a : f = \frac{ax}{f} : \frac{ax}{a}$, $= E\phi$. Therefore $f\phi = \frac{ax}{a} + x, = \frac{\overline{a + a}\, x}{a}$, $= \frac{x}{a} \times \overline{a + a}$. Therefore $\frac{x}{a} \times \overline{a} + \overline{a} = \frac{b}{a^2} \times \overline{a} + \overline{a} \times \overline{a - a}$, and $\frac{x}{a} = \frac{b}{a^2} \times \overline{a - a}$, and $x = \frac{b}{a^2} \times a\,(a - a)$. Therefore x is greatest when $a \times \overline{a - a}$ is greatest; that is when $a = \frac{1}{2} a$. Therefore E H is greatest when P π is equal to the half of A P. When this is the case we have at the same time $\frac{b}{a^2} \times a\,(a - a) = \frac{b}{a^2} \times \frac{1}{4} a^2$, and $x = \frac{1}{4} b$, or $EH = \frac{1}{4} FG$. That is, the diameter of the circle of aberration, through which the whole of the refracted light must pass, is one-fourth of the diameter of the circle of aberration at the focus of parallel central rays. In the chromatic aberration it was one-half; so that in this respect the spherical aberration does not create so great confusion as the chromatic. We are now able to compare them, since we have now the measure of both the circles of aberration. It has not been found possible to give more than four inches of aperture to an object glass of 100 feet focal distance, so as to preserve sufficient distinctness. If we compute the diameter of the circle E H, corresponding to this aperture, we shall find it not much to exceed $\frac{1}{120000}$ of an inch. If we restrict the circle of chromatic dispersion to $\frac{1}{250}$ of the aperture, which is hardly the fifth

part of the whole dispersion in it, it is $\frac{1}{62\frac{1}{2}}$ of an inch, and is about 1900 times greater than the other. The circle of the spherical aberration of a plano-convex lens, with the plane side next the distant object, is equal to the circle of chromatic dispersion when the semi-aperture is about 15°: for we saw formerly that E H is one-fourth of F G, and that F G is $=\frac{r^2}{i^2}\frac{AP^8}{2AC^2}$, and therefore $EG=\frac{r^2}{i^2}\times\frac{AP^3}{8AC^2}$. This being made $=\frac{AP}{55}$, gives us $AP=\sqrt{\frac{8\,i^2\,AC^2}{55\,r^2}}$, which is nearly $\frac{AC}{4}$, and corresponds to an aperture of 30° diameter, if r be to i as 3 to 2. Sir Isaac Newton was therefore well entitled to say that it was quite needless to attempt figures which should have less aberration than spherical ones, while the confusion produced by the chromatic dispersion remained uncorrected. Since the indistinctness is as the squares of the diameters of the circles of aberration, the disproportion is quite beyond our imagination, even when Newton has made such a liberal allowance to the chromatic dispersion. But it must be acknowledged that he has not attended to the distribution of the light in the circle of spherical aberration, and has hastily supposed it to be like the distribution of the colored light, indefinitely rare in the margin and denser in the centre. We are indebted to abbé Boscovich for the elegant determination of this distribution, which we have given in the article Optics. From this it appears that the light in the margin of the circle of spherical aberration, instead of being incomparably rarer than in the spaces between it and the centre, is incomparably denser. The indistinctness, therefore, produced by the intersection of these luminous circumferences is vastly great, and increases the whole indistinctness exceedingly. By a gross calculation it appears to be increased at least 500 times. The proportional indistinctness therefore, instead of being 1900^2 to 1, is only $\frac{1900^2}{500}$, or nearly 7220 to 1; a proportion still sufficiently great to warrant Newton's preference of the reflecting telescope of his invention. And we may now observe that the reflecting telescope has even a great advantage over a refracting one of the same focal distance with respect to its spherical aberration: for we have seen (Cor. 2.) that the lateral aberration is $\frac{r^2}{i^2}\frac{AV^3}{2CV^2}$. This for a plano-convex glass is nearly $\frac{9}{4}\frac{AV^3}{2CV^2}$. And the diameter of the circle of aberration is one-fourth of this, or $\frac{9}{16}\times\frac{AV^3}{2CV^2}$. In like manner the lateral aberration of a convave mirror is $\frac{AV^3}{2CV^2}$; and the diameter of the circle of dispersion is $\frac{AV^3}{8CV^2}$; and therefore, if the surfaces were portions of the same sphere, the diameter of the circle of aberration of refracted rays would be to that of the circle of aberration of reflected rays as $\frac{9}{16}$ to $\frac{1}{4}$, or as nine to four. But when the refracting and reflecting surfaces, in the position here considered, have the same focal distance, the radius of the refracting surface is four times that of the reflecting surface. The proportion of the diameters of the circles of spherical aberration is that of 9×4^2 to 4, or of 144 to 4, or 36 to 1. The distinctness, therefore, of the reflector is 36×36, or 1296 times greater than that of a plano-convex lens (placed with the plane side next the distant object), of the same breadth and focal distance, and will therefore admit of a much greater magnifying power. This comparison is indeed made in circumstances most favorable to the reflector, because this is the very worst position of a plano-convex lens. But we have not as yet learned the aberration in any other position. In another position the refraction and consequent aberration of both surfaces are complicated. Before we proceed to the consideration of this very difficult subject, we may deduce from what has been already demonstrated, several general rules and maxims, in the construction of telescopes, which will explain (to such readers as do not wish to enter more deeply into the subject) and justify the proportion which long practice of the best artists has sanctioned. Indistinctness proceeds from the commixture of the circles of aberration on the retina of the eye. For any one sensible point of the retina, being the centre of a circle of aberration, will at once be affected by the admixture of the rays of as many different pencils of light as there are sensible points in the area of that circle, and will convey to the mind a mixed sensation of as many visible points of the object. This number will be as the area of the circle of aberrations, whatever be the size of a sensible point of the retina. Now, in vision with telescopes, the diameter of the circle of aberration on the retina is as the apparent magnitude of the diameter of the corresponding circle in the focus of the eye-glass; that is, as the angle subtended by this diameter at the centre of the eye-glass; that is, as the diameter itself directly, and as the focal distance of the eye glass inversely. And the area of that circle on the retina is as the area of the circle in the focus of the eye-glass directly, and as the square of the focal distance of the eye-glass inversely. And this is the measure of the apparent indistinctness. Cor. In all sorts of telescopes, and also in compound microscopes, an object is seen equally distinct when the focal distance of the eye-glasses are proportional to the diameters of the circles of aberration in the focus of the object glass. Here we do not consider the trifling alteration which well-constructed eye-glasses may add to the indistinctness of the first image. In refracting telescopes, the apparent indistinctness is as the area of the object-glass directly, and as the square of the focal distance of the eye-glass inversely. For it has been shown that the area of the circle of dispersion is as the area of the object-glass, and that the spherical aberration is insignificant when compared with this. Therefore, to make reflecting telescopes equally distinct, the diameter

of the object-glass must be proportional to the focal distance of the eye-glass. But, in reflecting telescopes, the indistinctness is as the sixth power of the aperture of the object-glass directly, and as the fourth power of the focal distance of the object-glass, and square of the focal distance of the eye-glass, inversely. This is evident from the dimensions of the circle of aberration, which was found proportional to $\frac{AV^3}{CV^2}$. Therefore, to have them equally distinct, the cubes of the apertures must be proportional to the squares of the focal distance multiplied by the focal distance of the eye-glass. By these rules, and a standard telescope of approved goodness, an artist can always proportion the parts of any instrument he wishes to construct. Mr. Huyghens made one, of which the object-glass had thirty-feet focal distance and three inches diameter. The eye-glass had 3·3 inches focal distance. And its performance was found superior to any which he had seen: nor did this appear owing to any chance goodness of the object-glass, because he found others equally good which were constructed on similar proportions. This has therefore been adopted as a standard. We should now proceed to the most difficult part of our subject, the compound aberrations of different surfaces. But our limits will not permit us to enlarge on this deep subject. We must therefore refer to what we have said upon it under the article Optics. We may also recommend to the curious reader Clairault's Dissertations, in the Memoirs of the Academy of Paris, 1756, &c.; those of Boscovich in the Memoirs of the Academy of Bologna, and in his five volumes of Opuscula, published at Bassano in 1785, and those of D'Alembert and Euler. The only treatise in our language is the translation of a very imperfect work by Schærter. In what follows, we shall, however, give a general view of it.

Estimate of the dispersive power of the refracting telescope.—The separation of the red, violet, and intervening rays, is called *dispersion;* and, although this arises merely from a difference of the refractive power in respect of the different rays, it is convenient to distinguish this particular modification of the refractive power by a name, and we call it the *dispersive power* of the refracting substance. It is susceptible of degrees; for a piece of flint-glass will refract the light, so that, when the sine of refraction of the red ray is 77, the sine of the refraction of the violet ray is nearly 78½; or if the sine of refraction of the red ray, measured on a particular scale, is 1·54, the sine of refraction of the violet ray is 1·57. The dispersion of this substance, being measured by the difference of the extreme sines of refraction, is greater than the dispersion of the other glass, in the proportion of three to two. But this alone is not a sufficient measure of the absolute dispersive power of a substance. Although the ratio of 1·54 to 1·56 remains constant, whatever the real magnitude of the refractions of common glass may be; and though we therefore say that its dispersive power is constant, we know that, by increasing the incidence and the refractions, the absolute dispersion is also increased. Another substance shows the same properties, and in a particular case may produce the same dispersion; yet it has not, for this sole reason, the same dispersive power. If indeed the incidence and the refraction of the mean ray be also the same, the dispersive power cannot be said to differ; but, if the incidence and the refraction of the mean ray be less, the dispersive power must be considered as greater, though the actual dispersion be the same; because, if we increase the incidence till it becomes equal to that in the common glass, the dispersion will now be increased. The proper way of conceiving the dispersion, therefore, is to consider it as a portion of the whole refraction; and, if we find a substance making the same dispersion with half the general refraction, we must say that the dispersive quality is double; because, by making the refraction equal, the dispersion will really be double. If therefore we take m as a symbol of the separation of the extreme rays from the middle ray, $\frac{m}{m-1}$ is the natural measure of the dispersive power. We shall express this in the Leibnitzian notation thus, $\frac{dm}{m-1}$, that we may avoid the indistinctness which the Newtonian notation would occasion when m is changed for m' or m''. It is not unusual for optical writers to take the whole separation of the red and violet rays for the measure of the dispersive power, and to compare this with the refracting power, with respect to one of the extreme rays. But it is surely better to consider the mean refraction as the measure of the refracting power; and the deviation of either of the extremes from this mean is a proper enough measure of the dispersion, being always half of it. It is attended with this convenience, that, being introduced into our computations as a quantity infinitely small, and treated as such for the ease of computation, while it is really a quantity of sensible magnitude; the errors arising from this supposition are diminished greatly by taking one-half of the deviation and comparing it with the mean refraction. This method has, however, this inconvenience, that it does not exhibit at once the refractive power in all substances respecting any particular color of light; for it is not the ray of any particular color that suffers the mean refraction. In common glass it is the ray which is in the confines of the yellow and blue; in flint glass it is nearly the middle blue ray: and in other substances it is a different ray. These circumstances appear plainly in the different proportions of the colors of the prismatic spectrum exhibited by different substances. This is a great bar to the perfection of achromatic instruments.

Method of constructing an achromatic lens.—The way in which an achromatic lens is constructed is, to make use of a contrary refraction of a second lens to destroy the dispersion or spherical aberration of the first. The first purpose will be answered if $\frac{dm}{n}$ be equal to $\frac{dm'}{n'}$. For, in order that the different colored rays may be collected into one point by two lenses, it is only necessary that $\frac{1}{f}$, the reci-

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Fig. 1.

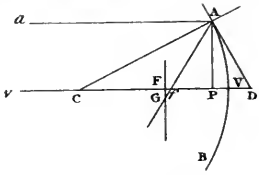


Fig. 2.

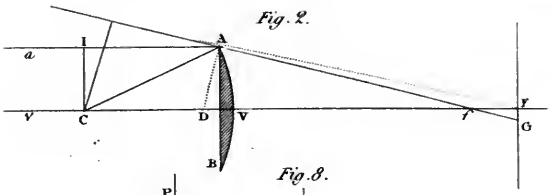
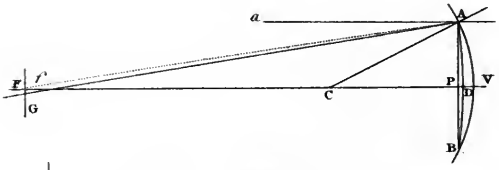


Fig. 3.



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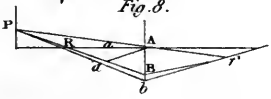

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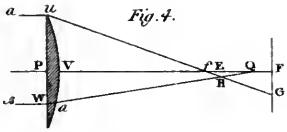

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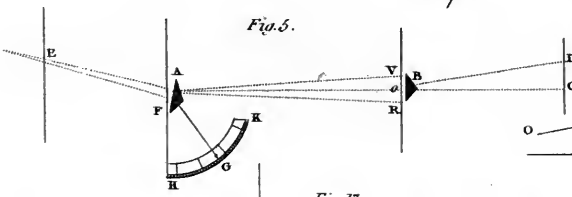

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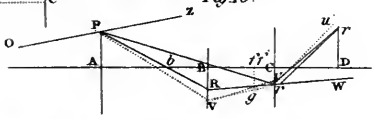

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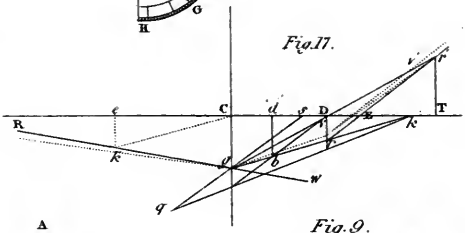

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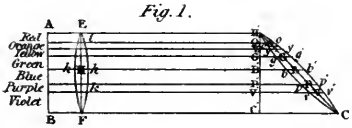
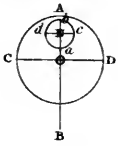


Figs. 10 & 11.



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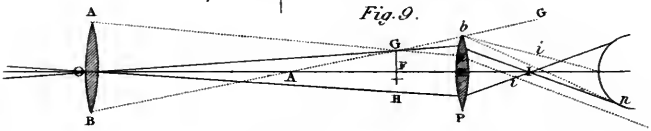
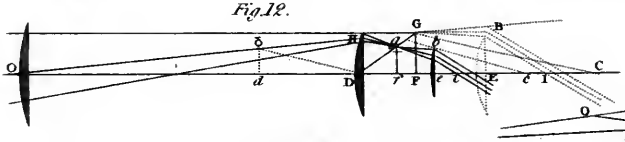


Fig. 12.



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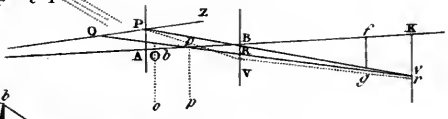

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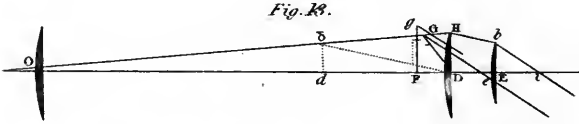

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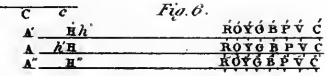

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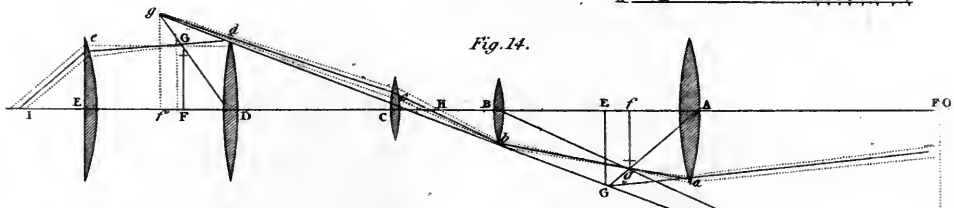

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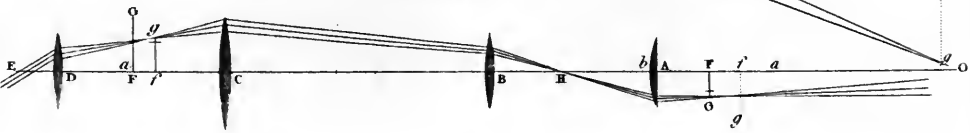

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Fig.3.

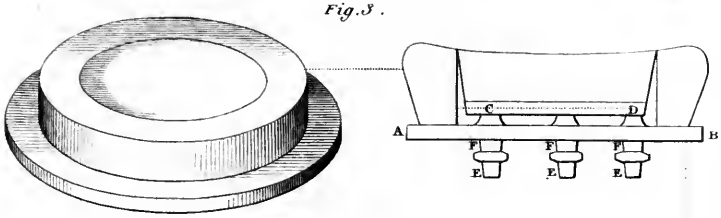


Fig.4.

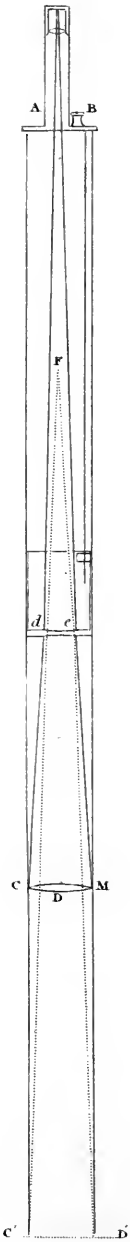
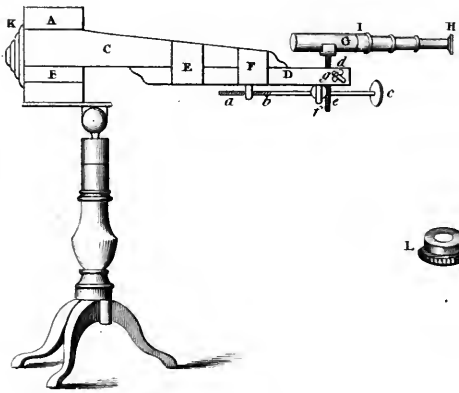
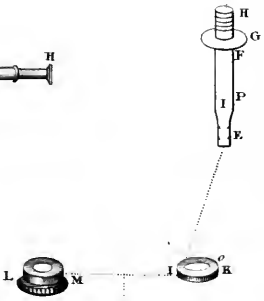


Fig.1.





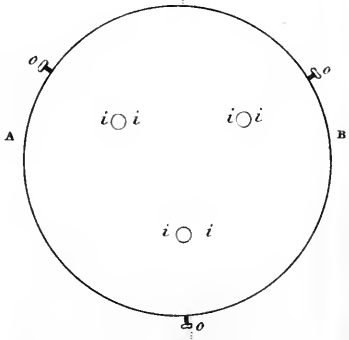
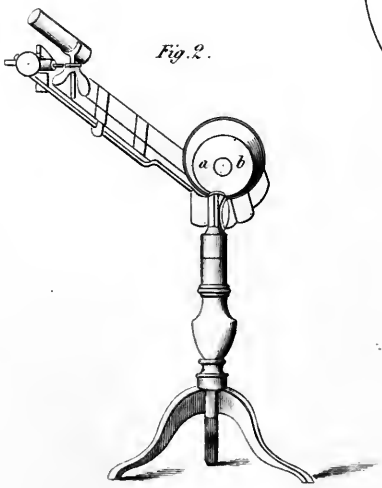
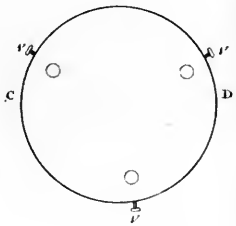


Fig.2.





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J. Shury sculp.

procal of the focal distance of rays refracted by both, may be the same for the extreme and mean rays, that is, that $\frac{m + d\,m - 1}{n} + \frac{m' + d\,m' - 1}{n'} + \frac{1}{r}$ be of the same value with $\frac{m-1}{n} + \frac{m'-1}{n'} + \frac{1}{r}$; which must happen if $\frac{d\,m}{n} + \frac{d\,m'}{n'}$ be $= 0$, or $\frac{d\,m}{n} = -\frac{d\,m'}{n'}$. This may be seen in another way, more comprehensible by such as are not versant in these discussions. In order that the extreme colors, which are separated by the first lens, may be rendered parallel by the second; we have shown already that n and n' are proportional to the radii of the equivalent isosceles lenses, being the halves of these radii. They are therefore (in these small refractions) inversely proportional to the angles formed by the surfaces at the edges of the lenses; n' may therefore be taken for the angle of the first lens, and n for that of the second. Now the small refraction by a prism, whose angle (also small) is n', is $\overline{m - 1} \times n'$. The dispersive power being now substituted for the refractive power, we have for this refraction of the prism $d\,m \times n'$. This must be destroyed by the opposite refraction of the other prism $d\,m' \times n$. Therefore $d\,m \times n' = d\,m' \times n$, or $\frac{d\,m}{n} = -\frac{d\,m'}{n}$. In like manner, this effect will be produced by three lenses if $\frac{d\,m}{n} + \frac{d\,m'}{n'} + \frac{d\,m'}{n'}$ be $= 0$, &c. Lastly, the errors arising from the spherical figure, which we expressed by $-R^2\,(q + q')$ will be corrected if $q + q'$ be $= 0$.

Method of constructing a double achromatic object-glass.—Here we have to determine four radii, a, b, a', and b'. Make $n = 1$. This greatly simplifies the calculus, by exterminating it from all the denominators. This gives for the equation $\frac{d\,m}{n} + \frac{d\,m'}{n'} = 0$, the equation $d\,m + \frac{d\,m'}{n'} = 0$, or $d\,m = -\frac{d\,m}{n'}$, and $\frac{1}{n'} = -\frac{d\,m}{d\,m'}, = -u$. Also we have r', the focal distance of the light incident on the second lens, the same with the principal focal distance p of the first lens (neglecting the interval, if any). Now $\frac{1}{p} = \frac{m-1}{n}$, which in the present case is $= m - 1$. Also $\frac{1}{p'}$ is $= -u\,(m - 1)$, and $\frac{1}{P} = m - 1 - u\,(m' - 1) = u'$. Make these substitutions in the values of $\frac{q}{m-1}$ and $\frac{q'}{m'-1}$, and we obtain the following equation: $c\,m^2 - \frac{c\,(2\,m + 1)}{a} + \frac{c\,(m + 2)}{m\,a^2} - u^3\,m'^2 - \frac{u^2(2m' + 1)}{a} - \frac{u\,(m' + 2)}{m'\,a'\,2} + u^2\,(3\,m' + 1)\,(m -) + \frac{4u\,(m' + 1)\,(m - 1)}{m'\,a'} - \frac{u(3m' + 2)(m - 1)}{m'} = 0$. Arrange these terms in order, according as they are factors of $\frac{1}{a^2}$, $\frac{1}{a}$, $\frac{1}{a'^2}$, $\frac{1}{a'}$, or independent quantities. It puts on this form: $\frac{c\,(m + 2)}{m} \times \frac{1}{a^2} - c'\,(2\,m + 1) \times \frac{1}{a} - \frac{u\,(m' + 2)}{m'} \times \frac{1}{a'^2} - \left(u^2\,(2\,m' + 1) - \frac{4\,u\,(m' + 1)\,(m - 1)}{m'}\right) \times \frac{1}{a'} + c\,m^2 + u^2\,(3\,m' + 1)\,(m - 1) - u^3\,m'^2 - \frac{u\,(3\,m' + 2)\,(m - 1)^2}{m'} = 0$. Let A be the coefficient of $\frac{1}{a^2}$, B that of $\frac{1}{a}$, C that of $\frac{1}{a'^2}$, D that of $\frac{1}{a'}$, and E the sum of the independent quantity: that is, let A be $= \frac{c\,(m + 2)}{m}$, B $= c\,(2\,m + 1)$, C $= \frac{u\,(m' + 2)}{m}$, D $= u^2\,(2\,m' + 2) - \frac{4\,u\,(m' + 1)\,(m - 1)}{m}$, and E $= c\,m^2 + u2(3\,m' + 1)\,(m - 1) - u^3\,m'\,2 - \frac{u\,(3\,m' + 2)\,(m - 1)^2}{m'}$. Our final equation becomes $\frac{A}{a^2} - \frac{B}{a} - \frac{C}{a'^2} - \frac{D}{a'} + E = 0$. The coefficients of this equation and the independent quantity are all known, from our knowledge of m, m' $d\,m$, $d\,m'$; and we are to find the values of a and a', and from them and $n = 1$ to find the values of b and b'. But it is evidently an indeterminate equation, because there are two unknown quantities; so that there may be an infinity of solutions. It must be rendered determinate by means of some other conditions to which it may be subjected. These conditions must depend on some other circumstance which may direct our choice. One circumstance occurs which we think of very great consequence. In the passage of light from one substance to another, there is always a considerable portion reflected from the posterior surface of the first and from the anterior surface of the last; and this reflection is more copious in proportion to the refraction. This loss of light will therefore be diminished by making the internal surfaces of the lenses to coincide; that is, by making $b = d$. This will be attended with another advantage. If we put between the glasses a substance of nearly the same refracting power, we shall not only completely prevent this loss of light, but we shall greatly diminish the errors which arise from an imperfect polish of the surfaces. We have tried this, and find the effect very surprising. The lens, being polished immediately after the figure has been given it, and while it was almost impervious to light by reason of its roughness, which was still sensible to the naked eye, performed as well as when finished in the finest manner. This condition, by taking away one refraction, obliges us to increase those which remain, and therefore increases the spherical aberrations. And since our formulæ do not fully remove those (by reason of the small quantities neglected in the process), it is uncertain whether this condition be the most eligible. We have, however, no direct argument to the contrary. By

comparing this object-glass with the former, we may remark, that diminishing a a little increases b, and in this respect improves the lens. It indeed has diminished b', but this being already considerable no inconvenience attends this diminution. But we learn, at the same time, that the advantage must be very small; for we cannot diminish a much more, without making it as small as the smallest radius of the object-glass. This proportion is therefore very near the maximum, or best possible; and we know that in such cases, even considerable changes in the radii will make but small changes in the result: for these reasons we are disposed to give a strong preference to the first construction, on account of the other advantages which we showed to attend it. As another example, we may take a case which is very nearly the general practice of the London artists. The radius of curvature for the anterior surface of the convex crown glass is five-sixths of the radius of the posterior surface, so that $h = \frac{5}{6}$. This, being introduced into the determinate equation, gives

$$a = 0{\cdot}2938 \qquad a' = -0{\cdot}3449$$
$$b = -0{\cdot}3526 \qquad b = 1{\cdot}1474$$

Method of constructing a triple achromatic object-glass.—It is plain that there are more conditions to be assumed before we can render this a determinate problem, and that the investigation must be more intricate. At the same time, it must give us a much greater variety of constructions, in consequence of our having more conditions necessary for giving the equation this determinate form. Our limits will not allow us to give a full account of all that may be done in this method. We shall therefore content ourselves with giving one case which will sufficiently point out the method of proceeding. We shall then give the results in some other eligible cases, as rules to artists by which they may construct such glasses. Let the first and second glasses be of equal curvatures on both sides; the first being a double convex of crown-glass, and the second a double concave of flint-glass. Still making n the unit of our calculus, we have in the first place $a = -b, = -a', = b'$. Therefore $\frac{1}{a'} - \frac{1}{b'} = -\left(\frac{1}{a} - \frac{1}{b}\right)$, or $\frac{1}{n'} = -\frac{1}{n} = -1$. Therefore the equation $\frac{dm}{n} + \frac{dm'}{n'} + \frac{dm''}{n''} = 0$ becomes $u - 1 + \frac{u}{n''} = 0$, or $\frac{1}{n} = \frac{1}{u} - 1$. Let us call this value u'. We have $\frac{1}{p} = m - 1$; $\frac{1}{p'} = -(m' - 1)$; $\frac{1}{p''} = u'(m - 1)$; $\frac{1}{P} = \frac{1}{p} + \frac{1}{p'} + \frac{1}{p''} = m - m' + u'(m - 1)$. And, if we make $m' - m = C'$, we shall have $\frac{1}{P} = -C, + u'(m - 1)$. Also $\frac{1}{p'} = m - 1$; $\frac{1}{p''} = m - 1 - (m' - 1)$, $= m - m', = -C'$. The equality of the two curvatures of each lens gives $\frac{1}{a} = \frac{1}{2c}$. Therefore $\frac{1}{a} = -\frac{1}{b}, = -\frac{1}{a'}, = \frac{1}{b'}, = \frac{1}{2}$; and $\frac{1}{b''} = \frac{1}{a''} - \frac{1}{n''}, = \frac{1}{a''}u'$. Substituting these values in the equation, we obtain the three formulæ:

1. $\quad - c m^2 - \frac{1}{2} c (2m + 1) + \frac{c(m + 2)}{4m}$.

2. $-m' 2 + \frac{1}{2}(2m' + 1) - \frac{m' + 2}{4m'} + (3m' + 1)(m - 1) - \frac{2(m' + 1)(m - 1)}{m'} - \frac{(3m' + 2)(m - 1)^2}{m'}$.

3. $c u' 3 m^2 - \frac{c u'^2 (2m + 1)}{a''} + \frac{c u'(m + 2)}{m a''^2} - c c' u'^2 (3m + 1) + \frac{4 c c' u'(m + 1)}{m a''} + \frac{c c'^2 u'(3m + 2)}{m} = 0$.

Now arrange these quantities according as they are coefficients of $\frac{1}{a''^2}$ and of $\frac{1}{a''}$, or independent quantities. Let the coefficient of $\frac{1}{a^2}$ be A, that of $\frac{1}{a''}$ be B, and the independent quantity be C; we have $A = \frac{c u'(m+2)}{m}$, $B = c u'^2 (2m+1) - \frac{4 c c' u'(m + 1)}{m}$, and $C = c m^2 + \frac{c(m + 2)}{4m} + \frac{1}{2}(2m' + 1) + (3m + 1)(m - 1) + c u'^3 m^2 + \frac{c c'^2 u'(3m + 2)}{m} - \frac{1}{2} c (2m + 1) - m'^2 - \frac{m' + 2}{4m} - \frac{2(m' + 1)(m - 1)}{m'} - \frac{(3m' + 2)(m - 1)^2}{m'} - c c' u'^2 (3m + 1)$. Our equation now becomes $\frac{A}{a''^2} - \frac{B}{a''} + C = 0$. This reduced to numbers, by computing the values of the coefficients, is $\frac{1{\cdot}312}{a''^2} - \frac{1{\cdot}207}{a''} - 0{\cdot}3257 = 0$. This, divided by 1·312, gives $s = -0{\cdot}92$; and $t = -0{\cdot}2482$; $-\frac{1}{4}s = 0{\cdot}46$; $\frac{1}{4}s^2 = 0{\cdot}2116$; and $\sqrt{\frac{1}{4}s^2 - t} = \pm 0{\cdot}6781$. And, finally, $\frac{1}{a''} = 0{\cdot}46 \pm 0{\cdot}6781$. This has two roots, viz. 0·2181 and $-1{\cdot}1381$. The last would give a very small radius, and is therefore rejected. Now, proceeding with this value of $\frac{1}{a''}$ and the $\frac{1}{n''}$, we get the other radius b'', and then, by means of u', we get the other radius which is common to the four surfaces. Then, by $\frac{1}{P} = \frac{1}{p''} - c'$, we get the value of P. The radii being all on the scale of which n is the unit, they must be divided by P to obtain their value on the scale which has P for its unit. They will give us

$$a = -b, = -a', = b', = 0{\cdot}530$$
$$a'' = 1{\cdot}215$$
$$b'' = -0{\cdot}3046$$
$$P = 1{\cdot}$$

Upon the whole, an amateur has little chance of succeeding in these attempts. The diversity of glasses, and the uncertainty of the workman's producing the very curvatures which he intends, is so great, that the object-glass turns out different from his expectation. The artist who makes great numbers acquires a pretty certain guess at the remaining error; and, having many lenses, intended to be of one form, but unavoidably differing a little from it, he tries several of them with the other two, and, finding one better than the rest, he makes use of it to complete the set. The great difficulty in the construction is to find the exact proportion of the dispersive powers of the crown and flint glass. The crown is pretty constant; but there are hardly two pots of flint glass which have the same dispersive power. Even if constant, it is difficult to measure it accurately; and an error in this greatly affects the instrument, because the focal distances of the lenses must be nearly as their dispersive powers. The best method of examining this is as follows: The sun's light, or that of a brilliant lamp, passed through a small hole in a board, and fell on another board pierced also with a small hole. Behind this was placed a fine prism A fig. 5, which formed, a spectrum R O V on a screen pierced with a small hole. Behind this was placed a prism B of the substance under examination. The ray which was refracted by it fell on the wall at D, and the distance of its illumination from that point to C, on which an unrefracted ray would have fallen, was carefully measured. This showed the refraction of that color. Then, in order that we might be certain that we always compared the refraction of the same precise color by the different prisms placed at B, we marked the precise position of the prism A when the ray of a particular color fell on the prism B. This was done by an index A G attached to A, and turning with it, when we caused the different colors of the spectrum formed by A to fall on B. Having examined one prism B with respect to all the colors in the spectrum formed by A, we put another B in its place. Then bringing A to all its former positions successively, by means of a graduated arch H G K, we were certain that when the index was at the same division of the arch, it was the very ray which had been made to pass through the first prism B in a former experiment. We did not solicitously endeavour to find the very extreme red and violet rays; because, although we did not learn the whole dispersions of the two prisms, we learned their proportions, which is the circumstance wanted in the construction of achromatic glasses. It is in vain to attempt this by measuring the spectrums themselves; for we cannot be certain of selecting the very same colors for the comparison, because they succeeded in an insensible gradation. We have hitherto proceeded on the supposition that when, by means of contrary refractions, we have united the extreme red and violet rays, we have also united all the others. But this is quite gratuitous. Sir Isaac Newton would, however, have made the same supposition; for he imagined that the different colors divided the spectrum formed by all substances in the proportions of a musical canon. This is a mistake. When a spectrum is formed by a prism of crown glass, and another of precisely the same length is formed by the side of it by prism of flint glass, the cosine between the green and blue will be found precisely in the middle of the first spectrum, but in the second it will be considerably nearer to the red extremity. In short, different substances do not disperse the colors in the same proportion. The effect of this irrationality (so to call it) of dispersion, will appear plainly. Let A, fig. 6, represent a spot of white solar light falling perpendicularly on a wall. Suppose a prism of common glass placed behind the hole through which the light is admitted, with its refracting angle facing the left hand. It will refract the beam of light to the right, and will at the same time disperse this heterogeneous light into its component rays, carrying the extreme red ray from A to R, the extreme orange from A to O, the extreme yellow from A to Y, &c., and will form the usual prismatic spectrum R O Y G B P V C. If the whole length R C be divided into 1000 parts, we shall have (when the whole refraction A R is small) R O very nearly 125, R Y = 200, R G = 333, R B = 500, R P = 667, R V = 778, and R C = 1000; this being the proportion observed in the differences of the sines of refraction by Sir Isaac Newton. Dr. Blair has found that certain fluids, particularly such as contain the muriatic acid, when formed into a prism, will refract the light from H″ (in the lower line) so as to form a spectrum R″ C′ equal to R C, and as far removed from A″ as R C is from A, but having the colors more dilated toward R″, and more constipated toward C, than is observed in R C; so that the ray which was carried by the prism of common glass to the middle point B″ considerably nearer to C″. Let us now suppose that instead of a white spot at A, we have a prismatic spectrum A B fig. 7, and that the prism of common glass is applied as before, immediately behind the prism which forms the spectrum A B. We know that this will be refracted sidewise, and will make a spectrum R O Y G B P C, inclined to the plane of refraction in an angle of 45°; so that drawing the perpendicular R C′ we have R C′ = CC. We also know that the prism of flint glass would refract the spectrum formed by the first prism on E H F, in such a manner that the red ray will go to R, the violet to C, and the intermediate rays to points *o, y, g, b, p, v*, so situated that O′*o* is = R′ O′ of the other figure: Y *y* is = R′ Y′, &c. These points must therefore lie in a curve R *o y g b p v* C, which is convex toward the axis R′ C′. In like manner we may be assured that Dr. Blair's fluid will form a spectrum R *o′ y′ g′ b′ p′ v′* C, concave towards R′C. This is a very good method for discovering whether a medium disperses the light in the same proportion with the prism which is employed for forming the first spectrum A B or E F. It disperses in the same or in a different proportion, according as the oblique spectrum is straight or crooked; and the exact proportion corresponding to each color is had by measuring the ordinates of the curves R *b* C or R *b′* C. Having formed the oblique spectrum R B C by a prism of common glass

an equal prism of the same glass, placed in a contrary position, will bring back all the rays from the spectrum R B C to the spectrum A B, laying each color on its former place. In like manner, having formed the oblique spectrum R *b* C by a prism of flint-glass, we know that another prism of flint-glass, placed in the opposite direction, will bring all the rays back to the spectrum E H F. But having formed the oblique spectrum R B C by a prism in common glass, if we place the flint-glass prism in the contrary position, it will bring the color R back to E, and the color C to F; but it will not bring the color B to H, but to a point *h*, such that B *h* is equal to *b* H, and *b* B to *h* H. In like manner, the other colors will not be brought back to the straight line E H F, but to a curve E *h* F, forming a crooked spectrum. In like manner the fluids discovered by Dr. Blair when employed to bring back the oblique spectrum R B C, formed by common glass, will bring its extremities back to E and F, and form the crooked spectrum E *h'* F lying beyond E H F. This experiment evidently gives us another method for examining the proportionality of the dispersion of different substances. Having by common glass brought back the oblique spectrum formed by common glass to its natural place A B, suppose the original spectrum at A B to contract gradually (as Newton has made it to do by means of a lens), it is plain that the oblique spectrum will also contract, and so will the second spectrum at A B; and it will at last coalesce into a white spot. The effect will be equivalent to a gradual compression of the whole figure, by which the parallel lines A R and B C gradually approach, and at last unite. In like manner when the oblique spectrum formed by flint-glass is brought back to E H F by a flint-glass prism, and the figure compressed in the same gradual manner, all the colors will coalesce into a white spot. But when flint-glass is employed to bring back the oblique spectrum formed by common glass, it forms the crooked spectrum E *h* F. Now let the figure be compressed. The curve E *h* F will be doubled down on the line H *h*, and there will be formed a compound spectrum H *h*, quite unlike the common spectrum, being purple or claret colored at H by the mixture of the extreme red and violet, and green edged with blue at *h* by the mixture of the green and blue. The fluid prisms would in like manner form a spectrum of the same kind on the other side of H. This is precisely what is observed in achromatic object-glasses made of crown glass and flint; for the reflection from A to R corresponds to the refraction of the convex crown-glass; and the contrary refraction from R to E corresponds to the contrary refraction of the concave flint-glass, which still leaves a part of the first refraction, producing a convergence to the axis of the telescope. It is found to give a purple or wine-colored focus, and within this a green one, and between these an imperfect white. Dr. Blair found that, when the eye-glass was drawn out beyond its proper distance, a star was surrounded by a green fringe, by the green end of the spectrum, which crossed each other within the focus; and, when the eye-glass was too near the object-glass, the star had a wine-colored fringe. The green rays were ultimately most refracted. Dr. Blair very properly calls these spectrums H *h* and H *h* secondary spectrums, and seems to think that he is the first who has taken notice of them. But Mr. Clairault was too accurate a mathematician, and too careful an observer, not to be aware of a circumstance which was of primary consequence to the whole enquiry. He could not but observe that the success rested on this very particular, and that the proportionality of dispersion was indispensably necessary. This subject was touched on by Clairault; and fully discussed by Boscovich, first in his Dissertations, published at Vienna in 1759; then in the Comment. Bononiensis; and, lastly, in his Opuscula, 1785. Dr. Blair read an ingenious Dissertation on Achromatic Glasses to the Royal Society of Edinburgh in 1793. Boscovich shows how to unite the two extremes with the most outstanding color of the secondary spectrum, by means of a third substance. When we have done this, the aberration occasioned by the secondary spectrums must be prodigiously diminished; for it is evidently equivalent to the union of the points H and *h* of our figure. Whatever cause produces this, must diminish the curvature of the arches E *h* and *h* F; but, even if these curvatures were not diminished, their greatest ordinates cannot exceed one-fourth of H *h*; and we may say, without hesitation, that, by uniting the mean or most outstanding ray with the two extremes, the remaining dispersion will be as much less than the uncorrected color of Dolland's achromatic glass, as this is less than four times the dispersion of a common object-glass. It must therefore be altogether insensible. Boscovich asserts, that it is not possible to unite more than two colors by the opposite refraction of two substances, which do not disperse the light in the same proportions. Dr. Blair makes light of this assertion, as he finds it made in general terms in the extract made by Priestly from Boscovich in his Essay on the History of Optics; but, had he read this author in his own dissertations, he would have seen that he was perfectly right. Dr. Blair, however, hit on a very ingenious and effectual method of producing this union of three colors. In the same way as we correct the dispersion of a concave lens of crown-glass by the opposite dispersion of a concave lens of flint-glass, we may correct the secondary dispersion of an achromatic convex lens by the opposite secondary dispersion of an achromatic concave lens. But this union does not contradict the assertion of Boscovich, because it is necessarily produced by means of three refracting substances. The most essential service which the public has received from Dr. Blair is the discovery of fluid mediums of a dispersive power. By composing the lenses of such substances we are at once freed from the irregularities, in the refraction and dispersion of flint glass, which the chemists have not been able to free it from. In whatever way this glass is made, it consists of parts which differ both in refractive and dispersive power; and when taken up from the pot these parts mix in threads,

which may be disseminated through the mass in any degree of fineness. But they still retain their properties; and, when a piece of flint glass has been formed into a lens, the eye, placed in its focus, sees the whole surface occupied by glistening threads or broader veins running across it. Great rewards have been offered for removing this defect, but hitherto to no purpose. We would propose the following method:—Let the glass be reduced to powder, and then melted with a great proportion of alkaline salt, so as to make a liquor silicum. When precipitated from this by an acid, it must be in a state of very uniform composition. If again melted into glass we should hope that it would be free from this defect; if not, the case seems to be desperate. But by using a fluid medium Dr. Blair was free from all this embarassment; and he acquired another immense advantage, that of adjusting at pleasure both the refractive and dispersive powers of his lenses. In solid lenses we do not know whether we have taken the curvatures suited to the refractions till our glass is finished; and, if we have mistaken the proportions, all our labor is lost. But when fluids are used it is enough that we know nearly the refractions. We suit our focal distances to these, and then select our curvatures, so as to remove the aberration of figure, preserving the focal distances. Thus, by properly tempering the fluid mediums, we bring the lens to agree precisely with the theory, perfectly achromatic and the aberration of figures as much corrected as is possible. Dr. Blair examined the refractive and dispersive powers of a great variety of substances, and found great varieties in their actions on the different colors. This was indeed to be expected. There is no doubt now among naturalists about the mechanical connexion of the phenomena of nature; and all agree that the chemical actions of the particles of matter are perfectly like in kind to the action of gravitating bodies; that all these phenomena are the effects of forces like those which we call attractions and repulsions, and which we observe in magnets and electrified bodies; that light is refracted by forces of the same kind, but differing chiefly in the small extent of their sphere of activity. One who views things in this way will expect that as the actions of the same acid for the different alkalies are different in degree, and as the different acids have also different actions on the same alkali, in like manner different substances differ in their general refractive powers, and also in the proportion of their action on the different colors. Nothing is more unlikely, therefore, than the proportional dispersion of the different colors by different substances. Common glass disperses the rays in such a manner that the ray which is in the cosine of the green and blue occupies the middle of the prismatic spectrum; but in glasses, and many other substances which are more dispersive, this ray is nearer to the ruddy extremity of the spectrum. While, therefore, the straight line R C′, fig. 7, terminates the ordinates O o′, Y Y,′ G g′, &c., which represent the dispersion of common glass, the ordinates which express the dispersions of these substances are terminated by a curve passing through R and C′, but lying below the line R C′. When, therefore, parallel heterogeneous light is made to converge to the axis of a convex lens of common glass, as happens at F in fig. 5, C, the light is dispersed, and the violet rays have a shorter focal distance. If we now apply a concave lens of greater dispersive power, the red and violet rays are brought to one focus F′; but the green rays, not being so much refracted away from F, are left behind at ϕ, and have now a shorter focal distance. But Dr. Blair afterwards found that this was not the case with the muriatic acid, and some solutions in it. He found that the ray which common glass caused to occupy the middle of the spectrum was much nearer to the blue extremity when refracted by these fluids. Therefore a concave lens formed of such fluids which united the red and violet rays in F′ refracted the green rays to *f*. Having observed this, it was an obvious conjecture that a mixture of some of these fluids might produce a medium, whose action on the intermediate rays should have the same proportion that is observed in common glass; or that two of them might be found which formed spectra similarly divided, and yet differing sufficiently in dispersive power to enable us to destroy the dispersion by contrary refractions, without destroying the whole refraction. Dr. Blair accordingly found a mixture of solutions of ammoniacal and mercurial salts, and also some other substances which produced dispersions proportional to that of glass, with respect to the different colors. We have examined one of his telescopes: the focal distance of the object-glass did not exceed seventeen inches, and the aperture was fully three inches and a half. We viewed some single and double stars and some common objects with this telescope, and found that in magnifying power, brightness, and distinctness, it was manifestly superior to one of Mr. Dollond's of forty-two inches focal length. It also gave us an opportunity of admiring the dexterity of the London artists, who could work the glasses with such accuracy. We had most distinct vision of a star when using an erecting eye-piece, which made this telescope magnify more than 100 times; and we found the field of vision as uniformly distinct as with Dollond's forty-two inch telescope magnifying forty-six times. The intelligent reader must admire the nice figuring and centering of the very deep eye-glasses which are necessary for this amplification.

Methods of constructing and correcting the eye-glasses.—The proper construction of an eye-piece is not less essential than that of the object-glass. But our limits will not allow us to treat this subject in the same detail, having already extended this article to a great length. Our readers will find abundant information in Dr. Smith's Optics concerning the eye-glasses, chiefly deduced from Huyghens's fine theory of aberration. At the same time we must again pay Mr. Dollond the merited compliment of saying, that he was the first who made any scientific application of this theory to the compound eye-piece for erecting the object. His eye-pieces of five and six glasses are very ingenious reduplications of Huyghens's eye-piece of two glasses, and would probably have superseded all others had not his

discovery of achromatic object-glasses caused opticians to consider the chromatic dispersion with more attention, and pointed out methods of correcting it in the eye-piece without any compound eye-glasses. They have found that this may be more conveniently done with four eye-glasses, without sensibly diminishing the advantages which Huyghens showed to be the result from employing many small refractions instead of a lesser number of great ones. As this is a very curious subject, we shall endeavour to make our readers fully acquainted with it, and content ourselves with merely mentioning the principles of the other rules for constructing an eye-piece. If A B, fig. 8, plate I, be a lens, R a radiant point of focus of incident rays, and a the focus of parallel rays coming from the opposite side; then, 1. Draw the perpendicular $a\,a'$ to the axis, meeting the incident ray in a', and a' A to the centre of the lens. The refracted ray B F is parallel to a' A; for R a' : a' A (= R a : a A) = R B : B F (= R A : A F), which is the focal theorem. 2. An oblique pencil B P b, proceeding from any point P which is not in the axis, is collected to the point f, where the refracted ray B F cuts the line P A f drawn from P through the centre of the lens; for P a' : a' A = P B : B f, which is also the focal theorem.

The principle of the common astronomical telescope may now be exhibited. See fig. 9. The beam of parallel rays, inclining to the axis, is made to converge to a point G, where it forms an image of the lowest point of a very distant object. These rays, decussating from G, fall on the eye-glass; the ray from the lowest point B of the object-glass falls on the eye-glass at b; and the ray from A falls on a; and the ray from the centre O falls on o. These rays are rendered parallel, or nearly so, by refraction through the eye-glass, and take the direction $b\,i'$, o I, $a\,i$. If the eye be placed so that this pencil of parallel rays may enter it, they converge to a point of the retina, and give distinct vision of the lowest point of the object. It appears inverted, because the rays by which we see its lowest point come in the direction which in simple vision is connected with the upper point of an object. They come from above, and therefore are thought to proceed from above. We see the point as if situated in the direction I o. In like manner the eye placed at I sees the upper point of the object in the direction I P, and its middle in the direction I E. The proper place for the eye is I: if brought much nearer the glass, or removed much farther from it, some, or the whole, of this extreme pencil of rays will not enter the pupil. It is therefore of importance to determine this point. Because the eye requires parallel rays for distinct vision, it is plain that F must be the principal focus of the eye-glass. Therefore, by the common focal theorem, O F : O E = O E : O I or O F : F E = O E : E I. The magnifying power being measured by the magnitude of the visual angle, compared with the magnitude of the visual angle with the naked eye, we have $\frac{o\,I\,p}{o\,O\,p}$, or $\frac{o\,I\,E}{o\,O\,F}$, for the measure of the magnifying power. This is very nearly $= \frac{O\,E}{E\,I}$, or $\frac{O\,F}{F\,I}$. As the line O E, joining the centres of the lenses, and perpendicular to their surfaces, is called the axis of the telescope, so the ray O G is called the axis of the oblique pencil, being really the axis of the cone of light which has the object-glass for its base. This ray is through its whole course the axis of the oblique pencil; and, when its course is determined, the amplification, the field of vision, the apertures of the glasses, are all determined. For this purpose we have only to consider the centre of the object-glass as a radical point, and trace the process of a ray from this point through the other glasses; this will be the axis of some oblique pencil. It is evident, therefore, that the field of vision depends on the breadth of the eye-glass. Should we increase this, the extreme pencil will pass through I, because O and I are still the conjugate foci of the eye-glass. On the other hand the angle resolved on for the extent of field of vision gives the breadth of the eye-glass. For all optical instruments there must be two optical figures considered. The first shows the progress of a pencil of rays coming from one point of the object. The various focuses of this pencil show the places of the different images, real or virtual. Such a figure is formed by the three rays A G a i', O G o I, B G b i. The second shows the progress of the axis of the different pencils proceeding through the centre of the object-glass. The focuses of this pencil of axes show the places where an image of the object-glass is formed; and this pencil determines the field of vision, the apertures of the lenses, and the application or magnifying power. The three rays O G o I, O F E I, O H P I, form this figure. See also fig. 14, where the progress of both sets of pencils is more diversified. The perfection of a telescope is to represent an object in its proper shape, distinctly magnified, with a great field of vision, and sufficiently bright. But there are limits to all these qualities; and an increase of one of them, for the most part, diminishes the rest. The brightness depends on the aperture of the object-glass, and will increase in the same proportion, because $i\,i'$ will always be to A B in the proportion of E F to F O, till the diameter of the emergent pencil is equal to that of the pupil of the eye. Increasing the object-glass any more, can send no more light into the eye. But we cannot make the emergent pencil nearly so large as this when the telescope magnifies much; for the great aperture of the object-glass produces an indistinct image at G F, and its indistinctness is magnified by the eye-glass. A great field of vision is incompatible with the true shape of the object; for since the angles of the marginal parts are enlarged by the aberration of the eye-glass, the marginal parts themselves will appear enlarged, or the object appear distorted. Thus a chess board, viewed through a reading glass, appears drawn out at the corners, and the straight lines are all changed into curves. The circumstance which most peremptorily limits the extent of field is the necessary distinctness. If the vision be indistinct, it is useless, and no other quality can compensate this defect. The distortion is very inconsiderable in much larger angles of vision than we can admit, and it is unworthy of the attention paid to it by optical writers. They

have been induced to take notice of it, because the means of correcting it, in a considerable degree, are attainable, and afford an opportunity of exhibiting their knowledge; whereas the indistinctness which accompanies a large field is a subject of most difficult discussion, and has hitherto baffled all their efforts to express by any intelligent or manageable formulæ. This subject must, however, be considered. The image at GF, fig. 9, of a very moderate object, is not a plain surface perpendicular to the axis of the telescope, but is nearly spherical, having O for its centre. If a number of pencils of parallel rays crossing each other in I fall on the eye-glass, they will form a picture on the opposite side, in the focus F. But this picture will by no means be flat, nor nearly so, but very concave towards E. Its exact form is of most difficult investigation. The elements of it are given by Dr. Barrow. Therefore it is impossible that the picture formed by the object-glass can be seen distinctly in all its parts by the eye-glass. Even if it were flat, the points G and H, fig. 9, are too far from the eye-glass when the middle F is at the proper distance for distinct vision. When, therefore, the telescope is so adjusted that we have distinct vision of the middle of the field, in order to see the margin distinctly we must push in the eye-glass; and, having so done, the middle of the field becomes indistinct. When the field of vision exceeds 12° or 15°, it is not possible by any contrivance to make it tolerably distinct all over; and we must turn the telescope successively to the different parts of the field that we may see them agreeably. The cause of this indistinctness is the shortness of the lateral foci of lateral and oblique pencils refracted by the eye-glass. But the determination is not complete, and relates only to those rays which are in a plane passing through the axis of the lens. But the oblique pencil *b* G *a*, fig. 9, by which an eye placed at I sees the point G of the image, is a cone of light having a circular base on the eye-glass, of which circle *a b* is one of the diameters. There is a diameter perpendicular to this, which, in this figure, is represented by the point *a*. Figs. 10 and 11, represents the base of the cone as seen by an eye placed in the axis of the telescope, with the object-glass as appearing behind it. The point *b* is formed by a ray which comes from the lowest point B of the object-glass, and the point *a* is illuminated by a ray from A. The point *c* at the right hand of the circular base of this cone of light came from the point C on the left side of the object glass; and the light comes to *d* from D. Now the laws of optics demonstrate that the rays which come through the points *c* and *d* are more convergent after refraction than the rays which come through *a* and *b*. The analogies, therefore, which ascertain the foci of rays lying in planes passing through the axis do not determine the foci of the others. Of this we may be sensible by looking through a lens to a figure on which are drawn concentric circles crossed by radii. When the telescope is so adjusted that we see distinctly the extremity of one of the radii, we shall not see distinctly the circumference which crosses the extremity with equal distinctness, and vice versâ. This difference, however, between the foci of the rays which come through *a* and *b*, and those which come through *c* and *d*, is not considerable in the fields of vision which are otherwise admissible. But the same difference of foci obtains also with respect to the dispersion of light, and is more remarkable. Both d'Alembert and Euler have attempted to introduce it into their formulæ; but they have made them useless for any practical purpose by their inextricable complication. This must serve as a general indication of the difficulties which occur in the construction of telescopes, even although the object-glass were perfect, forming an image without the smallest confusion or distortion. There is yet another difficulty. The rays of the pencil *a* G *b*, fig. 9, when refracted through the eye-glass, are also separated into their component colors. The edge of the lens must evidently perform the office of a prism, and the white ray G *b* will be so dispersed that, if *b i* be the path of its red ray, the violet ray, which makes another part of it, will take such a course *b n* that the angle *i' b n* will be nearly one-twenty-seventh of G *b i'*. The ray G *a*, passing through a part of the lens whose surfaces are less inclined to each other, will be less refracted, and will be less dispersed in the same proportion very nearly; therefore the two violet rays will be very nearly parallel when the two red rays are rendered parallel. Hence it must happen that the object will appear bordered with colored fringes. A black line, seen near the margin on a white ground, will have a ruddy and orange border on the outside, and a blue border within; and this contusion is altogether independent on the object-glass, and is so much the greater as the visual angle *b* I E is greater. Such are the difficulties; they would be insurmountable were it not that some of them are so connected that, to a certain extent, the diminution of one is accompanied by a diminution of the other. The point G is very nearly in the caustic formed by a beam of light consisting of rays parallel to I *o*, and occupying the whole surface of the eye-glass, because the pencil of rays which are collected at G is very small. Any thing therefore that diminishes the mutual inclination of the adjoining rays puts their concourse farther off. Now this is precisely what we want; for the point G of the image formed by the object-glass is already beyond the focus of the oblique slender pencil of parallel rays *i a* and *i' b*; and therefore, if we could make this focus go a little farther from *a* and *b*, we shall bring it nearer to G, and obtain more distinct vision of this point of the object. Now let it be recollected that, in moderate refractions through prisms, two rays which are inclined to each other in a small angle are, after refraction, inclined to each other in the same angle; therefore, if we can diminish the aberration of the ray *a i* or *o* I, or *b i'*, we diminish their mutual inclination, and consequently the mutual inclination of the rays G *a*, G *o*, G *b'*, and therefore lengthen the focus, and get more distinct vision of the point G. Therefore we at once correct the distortion and the indistinctness; and this is the aim of Mr. Huyghens's great principle of dividing the refractions. The general method is as follows:—Let *o* be the object-glass

(fig. 12) and E the eye-glass of a telescope, and F their common focus, and F G the image formed by the object-glass. The proportion of their focal distances is supposed to be such as gives as great a magnifying power as the perfection of the object-glass will admit. Let B I be the axis of the emergent pencil. It is known by focal theorem that G E is parallel to B I; therefore B G E is the whole refraction or deflection of the ray O H B from its former direction. Let us diminish the aberrations by dividing this into two parts by means of two glasses D and *e*, so as to make the ultimate angle of vision *b i e* equal to B I E, and thus retain the same magnifying power and visible field. Let us divide it into the parts B G C and C G E. From G draw any line G D to the axis towards O; and draw the perpendicular D H, cutting O G in H; draw H *c* parallel to G C, cutting G D in *g*; draw *g f* perpendicular to the axis, and *g e* parallel to G E; draw *e b* perpendicular to the axis; draw D δ parallel to G C, and δ *d* perpendicular to the axis. Then if there be placed at D a lens whose focal distance is D *d*, and another at *e* whose focal distance is *e f*, the thing is done. The ray O H will be refracted into H *b*, and this into *b i* parallel to B I. The demonstration of this construction is so evident, by means of the common focal theorem, that we need not repeat it. We have the same magnifying power, and the same field of vision; we have less aberration, and therefore less distortion and indistinctness; and this is brought about by a lens H D of a smaller aperture and a greater focal distance than B E. Consequently, if we are contented with the distinctness of the margin of the field with a single eye-glass, we may greatly increase the field of vision; for if we increase D H to the size of E B we shall have a greater field, and much greater distinctness in the margin; because H D is of a longer focal distance, and will bear a greater aperture, preserving the same distinctness at the edge. On this account the glass H D is commonly called the field-glass. It must be observed here, however, that although the distortion of the object is lessened, there is a real distortion produced in the image *f g*. But this, when magnified by the glass *e*, is smaller than the distortion produced by the glass E, of greater aperture and shorter focus, on the undistorted image G F. But, because there is a distortion in the second image *f g*, this construction cannot be used for the telescopes of astronomical quadrants, and other graduated instruments, because then equal divisions of the micrometer would not correspond to equal angles. But the same construction will answer in this case, by taking the point D on that side of F which is remote from O (fig. 13). This is the form now employed in the telescopes of all graduated instruments. The great refractions which take place on the eye-glasses occasion very considerable dispersions, and disturb the vision by fringing every thing with colors. To remedy this, achromatic eye-glasses may be employed, constructed by the rules already delivered. This construction, however, is incomparably more intricate than that of object-glasses; for the equations must involve the distance of the radiant point, and be more complicated; and this complication is immensely increased on account of the great obliquity of the pencils. Fortunately the Huyghenian construction of an eye-piece enables us to correct this dispersion to a great degree of exactness. By it we may free the eye-glasses from the greatest part of the effect of dispersion. We may do it entirely by pushing the eye-glass a little nearer to the field-glass. This will render the violet rays a little divergent from the red, so as to produce a perfect picture from the bottom of the eye. But by doing so we have hurt the distinctness of the whole picture. We remedy this by drawing both glasses out a little, and the telescope is made perfect.

Presuming that the reader is now pretty familiar with the different circumstances which must be considered in the construction of an eye-piece, we proceed to consider those which must be employed to erect the object. This may be done by placing the lens which receives the light from the object-glass in such a manner that a second image (inverted with respect to the first) may be formed beyond it, and this may be viewed by an eye-glass. But, besides many other defects, it tinges the object prodigiously with color. But the common day telescope, invented by F. Rheita, has, in this respect, greatly the advantage of the above. This telescope may be improved by substituting for the eye-glass *i k* (fig. 7) the Huyghenian double eye-glass, or field-glass and eye-glass, figs. 12 and 13; and the first of these may be improved and rendered achromatic. This will require the two glasses *a f* and *g h* to be increased from their present dimensions to the size of a field-glass, suited to the magnifying power of the telescope, supposing it an astronomical telescope. Thus we shall have a telescope of four eye-glasses. The first three will be of a considerable focal distance, and two of them will have a common focus. But this is considerably different from the eye-piece of four glasses which are now used, and are far better. We are indebted for them to Mr. Dollond, who was a mathematician as well as an artist, and in the course of his research discovered resources which had not been thought of. He had not then discovered the achromatic object-glass, and was busy in improving the eye-glasses by diminishing their spherical aberration. His first thought was to make the Huyghenian addition at both the images of the day telescope. This suggested to him the following eye-piece of five glasses. Fig. 14 represents this eye-piece, but there is not room for the object-glass at its proper distance. A pencil of rays coming from the upper point of the object is made to converge (by the object-glass) to G, where it would form a picture of that part of the object. But it is intercepted by the lens A *a*, and its axis is bent towards the axis of the telescope in the direction *a b*. At the same time the rays which converged to G converge to *g*, and there is formed an inverted picture of the object at *g f*. The axis of the pencil is again refracted at *b*, crosses the axis of the telescope in H, is refracted again at *c*, at *d*, and at *e*, and at last crosses the axis in I. The rays of this pencil, diverging from *g*, are made less diverging, and proceed as if they came from

g', in the line B g g'. The lens c C causes them to converge to g', in the line G″ C g'. The lens d D makes them converge still more to G″, and there they form an erect picture G″ F″; diverging from G″, they are rendered parallel by the refraction at e. At H the rays are nearly parallel. Had the glass B b been a little farther from A, they would have been accurately so, and the object-glass, with the glasses A and B, would have formed an astronomical telescope with the Huyghenian eye-piece. The glasses C, D, and E, are intended merely for bending the rays back again till they again cross the axis in I. The glass C tends chiefly to diminish the great angle B H b; and then the two glasses D and E are another Huyghenian eye-piece. The art in this construction lies in the proper adjustment of the glasses, so as to divide the whole bending of the pencil pretty equally among them, and to form the last image in the focus of the eye-glass, and at a proper distance from the other glass. Bringing B nearer to A would bend the pencil more to the axis. Placing C farther from B would do the same thing; but this would be accompanied with more aberration, because the rays would fall at a greater distance from the centres of the lenses. The greatest bending is made at the field-glass D; and we imagine that the telescope would be improved, and more distinct at the edges of the field, by employing another glass of great focal distance between C and D. There is an image formed at H of the object-glasses, and the whole light passes through a small circle in this place. It is usual to put a plate here pierced with a hole which has the diameter of this image. A second image of the object-glass is formed at I, and indeed wherever the pencils cross the axis. A lens placed at H makes no change in any of the angles, nor in the magnifying power, and affects only the place where the images are formed. And, on the other hand, a lens placed at f, or F″, where a real image is formed, makes no change in the places of the images, but affects the mutual inclination of the pencils. This affords a resource to the artist, by which he may combine properties which seem incompatible. The aperture of A determines the visible field and all the other apertures. We must avoid forming a real image, such as f g, or F″ G″, on or very near any glass. For we cannot see this image, without seeing along with it every particle of dust and every scratch on the glass. We see them as making part of the object when the image is exactly on the glass, and we see them confusedly, and so as to confuse the object, when the image is near it. For, when the image is on or very near any glass, the pencil of light occupies a very small part of its surface, and a particle of dust intercepts a great proportion of it. This construction will not do for the telescope of graduated instruments, because the micrometer cannot be applied to the second image f g, on account of its being a little distorted. Also the interposition of the glass C makes it difficult to correct the dispersion. By proper reasoning from the correction in the Huyghenian eye-piece, we are led to the best construction of one with three glasses. Let P A (fig. 15) be the glass which first receives the light proceeding from the image formed by the object-glass, and let O P be the axis of the extreme pencil. This is refracted into P R, which is again refracted into R r by the next lens B r. Let b be the focus of parallel rays of the second lens. Draw P B r. We know that A b : b B = P B : B r, and that rays of one kind diverging from P will be collected at r. But if P R, P V, be a red and a violet ray, the violet ray will be more refracted at V, and will cross the red ray in some intermediate point g of the line R r. If therefore the first image had been formed precisely on the lens P A, we should have a second image at f g free from all colored fringes. If the refractions at P and R are equal (as in the common day telescope), the dispersion at V must be equal to that at P, or the angle v V r = V P R. But we have ultimately R P V : R r V = B C : A B (= B b : A b by the focal theorem); therefore g V r : g r V (or g r : g V, or C f : f B) = B b : A b, and A B : A b = R r : R g. This shows the advantage of the common day telescope. In this A B = 2 A b, and therefore f is the place of the last image which is free from colored fringes. But this image will not be seen free from colored fringes through the eye-glass C r, if f be its focus; for had g r, g v, been both red rays, they would have been parallel after refraction; but g v, being a violet ray, will be more refracted. It will not indeed be so much deflected from parallelism as the violet ray, which naturally accompanies the red ray to r, because it falls nearer the centre. By computation its dispersion is diminished about one-seventh. That g v may be made parallel to g r, after refraction, the refraction at r must be such that the dispersion corresponding to it may be of a proper magnitude. Let the dispersion at g be to the dispersion produced by the refraction at r (which is required for producing the intended magnifying power) as 1 to 9. Make 9 : 1 = f f' : f'' C = f C : C D, and draw the perpendicular D r' meeting the refracted r r' in r'. Then we know, by the common focal theorem, that if f'' be the focus of the lens C r, red rays diverging from g will be united in r'. But the violet ray g v will be refracted into v v' parallel to r r'. For the angle v r' r : v g r = (ultimately) f C : C D = 9 : 1. Therefore the angle v r' r is equal to the dispersion produced at r, and therefore equal to r' v v', and v v' is parallel to r r'. But by this we have destroyed the distinct vision of the image formed at f g, because it is no longer at the focus of the eye-glass. But distinct vision will be restored by pushing the glasses nearer to the object-glass. This makes the rays of each particular pencil more divergent after refraction through A, but scarcely makes any change in the directions of the pencils themselves. Thus the image comes to the focus f'', and makes no sensible change in the dispersions. In the common day telescope, the first image is formed in the anterior focus of the first eye-glass, and the second image is at the anterior focus of the last eye-glass. If we change this last for one of half the focal distance, and push in the eye-piece till the image formed by the object-glass is half way between the first eye-glass and its focus, the last image will be formed at the focus of the new

eye-glass, and the eye-piece will be achromatic. This is easily seen by making the usual computations by the focal theorem. But the visible field is diminished, because we cannot give the same aperture as before to the new eye-glass; but we can substitute for it two eye-glasses, like the former, placed close together. This will have the same focal distance with the new one, and will allow the same aperture that we had before. On these principles may be demonstrated the correction of color in eye-pieces with three glasses of the following construction. Let the glasses A and B be placed so that the posterior focus of the first nearly coincides with the anterior focus of the second, or rather so that the anterior focus of B may be at the place where the image of the object-glass is formed, by which situation the aperture necessary for transmitting the whole light will be the smallest possible. Place the third, C, at a distance from the second, which exceeds the sum of their focal distances by a space which is a third proportional to the distance of the first and second, and the focal distance of the second. The distance of the first eye-glass from the object-glass must be equal to the product of the focal distance of the first and second divided by their sum. Let O o, A a, B b, C c, the focal distances of the glasses, be O, a, b, c. Then make $AB = a + b$ nearly; $BC = b + c + \frac{b^2}{b + c}$; $OA = \frac{bc}{b + c}$. The amplification or magnifying power will be $= \frac{ob}{ac}$; the equivalent eye-glass $= \frac{ac}{b}$; and the field of vision $= 3438' \times \frac{\text{Aperture of A}}{\text{foc. dist. ob. gl.}}$. These eye-pieces will admit the use of a micrometer at the place of the first image, because it has no distortion.

Mr. Dollond was anxious to combine this achromatism of the eye-pieces with the advantages which he had found in the eye-pieces with five glasses. This eye-piece of three glasses necessarily has a very great refraction at the glass B, where the pencil which has come from the other side of the axis must be rendered again convergent, or at least parallel to it. This occasions considerable aberrations. This may be avoided by giving part of this refraction to a glass put between the first and second, in the same way as he has done by the glass B put between A and C in his five glass eye-piece. But this deranges the whole process. His ingenuity, however, surmounted this difficulty, and he made eye-pieces of four glasses, which seem as perfect as can be desired. If we make the rays of different colors unite on the surface of the field-glass, the thing will be done, because the dispersion from this point of union will then unite with the dispersion produced by this glass alone; and this increased dispersion may be corrected by the last eye-glass in the way already shown. Therefore let A, B (fig. 16, plate I.), be the stations which we have fixed on for the first and second eye-glasses, in order to give a proper portion of the whole refraction to the second glass. Let b be the anterior focus of B. Draw P B r through the centre of B. Make A b : b B = A B : B K. Draw the perpendicular K r, meeting the refracted ray in r. By the focal theorem, red rays diverging from P will converge to r; but the violet ray P V, being more refracted, will cross R r in some point g. Drawing the perpendicular $f g$, we get f for the proper place of the field-glass. Let the refracted ray R r, produced backwards, meet the ray O P coming from the centre of the object-glass in O. Let the angle of dispersion R P V be called p, and the angle of dispersion at V, that is r V v, be v, and the angle V r R be r. It is evident that $OR : OP = p : v$, because the dispersions are proportional to the sines of the refractions, which, in this case, are very nearly as the refractions themselves. Let $\frac{OP}{OR}$ $\left(\text{or } \frac{op}{pB} \text{ or } \frac{pB}{bB}\right)$ be made $= m$. Then $v = mp$; also $p : r = BK : AB = bB : Ab$, and $r = p \cdot \frac{Ab}{bB}$, or, making $\frac{Ab}{Bb} = n$, $r = np$; therefore $v : r = m : n, = \frac{pB}{bB} : \frac{Ab}{Bb}, = pB : Ab$. The angle R g V $= g$ V r + $g r$ V $= p \cdot \overline{m + n}$; and R g V : R r v = R r : R g, or $m + n : n = R r : R g$, and $R g = R r \frac{n}{m + n}$. But R r is ultimately $= BK = AB \frac{bB}{Ab} = \frac{AB}{n}$. Therefore $R g = \frac{AB}{n} \times \frac{n}{m + n} = \frac{AB}{m + n}$, and $Bf = \frac{AB}{m + n}$. This value of B f is evidently $= bB \times \frac{AB}{pB + Ab}$. Now b B being a constant quantity, while the glass B is the same, the place of union varies with $\frac{AB}{pB + Ab}$. If we remove B a little farther from A, we increase AB, and p B, and A b, each by the same quantity. This evidently diminishes B f. On the other hand, bringing B nearer to A increases B f. If we keep the distance between the glasses the same, but increase the focal distance b B, we augment B f, because this change augments the numerator and diminishes the denominator of the fraction $\frac{bB \times AB}{pB + Ab}$. Thus we can unite the colors at what distance we please, and consequently in the place of the intended field-glass, from which they will diverge with an increased dispersion, viz. with the dispersion competent to the refraction produced there, and the dispersion $p \times \overline{m + n}$ conjoined. It only remains to determine the proper focal distances of the field-glass and eye-glass, and the place of the eye-glass, so that this dispersion may be finally corrected. This is an indeterminate problem, admitting of an infinity of solutions. We shall limit it by an equal division of the two remaining refractions, which are necessary to produce the intended magnifying power. This construction has the advantage of diminishing the aberration. Thus we know the two refractions, and the dispersion competent to each; it being nearly one-twenty-seventh of the refraction.

Call this q. The whole dispersion at the field-glass consists of q, and of the angle K g V of fig. 16 which we also know to be $= p \times m + n$. Call their sum s. Let fig. 17 represent this addition to the eye-piece. C g is the field-glass coming in the place of $f g$ of fig. 19, and R g w is the red ray coming from the glass B R. Draw g s parallel to the intended emergent pencil from the eye-glass; that is, making the angle C s g with the axis correspond to the intended magnifying power. Bisect this angle by the line g K. Make $s\,g : g\,q = s : q$, and draw q K, cutting C g in t. Draw $t\,\delta$ D, cutting $g\,k$ in δ, and the axis in D. Draw $\delta\,d$ and D r perpendicular to the axis. Then a lens placed in D, having the focal distance D d, will destroy the dispersion at the lens $g\,c$, which refracts the ray $g\,w$ into $g\,r$. Let $g\,v$ be the violet ray, making the angle $v\,g\,r = s$. By the common optical theorem, $g\,r$ will be refracted into $r\,r'$ parallel to δ D. Draw g D r' red rays $g\,r\,g\,v$, will be united in r'. But the violet ray $g\,v$ will be more refracted, and will take the path $v\,v'$, making the angle of dispersion $r'\,v\,v' = q$, very nearly, because the dispersion at v does not sensibly differ from that at r. Now, in the small angles of refraction which obtain in optical instruments, the angles $r\,r'\,v$, $r\,g\,v$, are very nearly as $g\,r$ and $r\,r'$, or as g D and D r', or as C D and D T; which, by the focal theorem, are as C d and d D; that is, $\mathrm{D}\,d : d\,c = r\,g\,v : r\,r'\,v$. But $\mathrm{D}\,d : d\,\mathrm{C} = \mathrm{D}\,\delta : \delta\,t, = s\,g : g\,q = s : q$. But $r\,g\,v = s$; therefore $r\,r'\,v = q, = r'\,v\,v'$, and $v\,v'$ is parallel to $r\,r'$, and the whole dispersion at g is corrected by the lens D r. The focal distance C c of C g is had by drawing C κ parallel to K g, meeting R g in κ, and drawing $\kappa\,c$ perpendicular to the axis. It is easy to see that this elegant construction is not limited to the equality of the refractions $w\,g\,r$, K $r\,r'$. In whatever proportion the whole refraction $w\,g\,s$ is divided, we always can tell the proportion of the dispersions which the two refractions occasion at g and r, and can therefore find the values of s and q. Indeed this solution includes the problem above stated. In it some quantities and ratios are assumed as equal which are not strictly so, in the same manner as in all the elementary optical theorems. The parallelism, however, of $v\,v'$ and $r\,r'$ may be made accurate, by pushing the lens D r nearer to C g, or retiring it from it. We may also, by pushing it still nearer, induce a small divergency of the violet ray, so as to produce accurate vision in the eye, and may thus make the vision through a telescope more perfect than with the naked eye, where dispersion is by no means avoided. It would therefore be an improvement to have the eye-glass in a sliding tube for adjustment. Bring the telescope to distinct vision; and, if any color be visible about the edges of the field, shift the eye-glass till this color is removed. The vision may now become indistinct; but this is corrected by shifting the place of the whole eye-piece. In examining the progress of a red and a violet ray through many eye-pieces of Dollond's and Ramsden's best telescopes, in all of them the colors are united on or very near the field-glass. We meet with many made by other artists, where a considerable degree of color remains, sometimes in the natural order, and often in the contrary order. This must happen in the hands of mere imitators, ignorant of principle.

Fig. 18 represents the eye-piece of a very fine spy-glass by Mr. Ramsden: the focal length of its object-glass is eight inches and a half, with $1\frac{1}{10}$th of aperture, 2° 05′ of visible field, and 15·4 magnifying power. The distances and focal lengths are of their proper dimensions, but the apertures are half larger, that the progress of a lateral pencil might be more distinctly drawn. The dimensions are as follow: foc. lengths $\mathrm{A}\,a = 0{\cdot}775$ $\mathrm{B}\,b = 1{\cdot}025$ $\mathrm{C}\,c = 1{\cdot}01$ $\mathrm{D}\,d = 0{\cdot}79$ distances. $\mathrm{A\,B} = 1{\cdot}18$ $\mathrm{B\,C} = 1{\cdot}83$ $\mathrm{C\,D} = 1{\cdot}05$. It is perfectly achromatic, and the colors are united, not precisely at the lens C g, but about one-twentieth of an inch nearer the eye-glass. This combination of glasses may be used as a microscope; for if, instead of the image formed by the object-glass at F G, we substitute a small object, illuminated from behind, as in compound microscopes; and if we draw the eye-piece a very small way from this object, the pencils of parallel rays emergent from the eye-glass D will become convergent to very distant points, and will there form an inverted and enlarged picture of the object, which may be viewed by a Huyghenian eye-piece; and we may thus get high magnifying powers without using very deep glasses. The eye-piece, of which we have given the dimensions, in this way might be made to magnify 180 times with very great distinctness. When used as the magnifier of a solar microscope, it surpasses every thing we have seen. The picture formed by a solar microscope is generally very indistinct; but with this magnifier it seemed perfectly sharp. The only thing which remains to be considered in the theory of refracting telescopes is the forms of the different lenses. Hitherto we have had no occasion to consider any thing but their focal distances; but their aberration depends greatly on the adjustment of their forms to their situations. When the conjugate focuses of a lens are determined by the service which it is to perform, there is a certain form or proportion between the curvatures of their anterior and posterior surfaces, which will make their aberrations the smallest possible. We obtain this formula for a, the radius of curvature for the anterior surface of a lens. $\frac{1}{a} = \frac{2m^2+m}{2m+4} + \frac{4m+4}{2(m\quad)r}$, where m is the ratio of the sine of incidence of the sine of refraction, and r is the distance of the focus of incident rays, positive or negative, according as they converge or diverge, all meeting $r\,r'$ and join $v\,r'$. By the focal theorem two measured on a scale of which the unit is n, $=$ half of the radius of the equivalent isosceles lens. It will be sufficiently exact for our purpose to suppose $m = \frac{3}{2}$, though it is more nearly $\frac{31}{20}$. In this case $\frac{1}{a} = \frac{b}{7} + \frac{10}{7r'} = \frac{42r+70}{49r}$. Therefore $a = \frac{49r}{42r+70}$. And $\frac{1}{b} = \frac{1}{a} - 1, = \frac{1-a}{a}$. For example, let it be required to give the radii of

curvature in inches for the eye-glass $b\,e$, fig. 12, which we shall suppose of one inch and a half focal distance, and that $e\,c$ ($= r$) is $3\frac{3}{4}$th inches. The radius of curvature for the equivalent isosceles lens is 1·5, and its half is 0·75. Therefore $r = \frac{3\frac{3}{4}}{0{\cdot}75}, = 5$, and our formulæ is $a = \frac{49 \times 5}{42 \times 5 + 70}, = \frac{245}{280}, = 0{\cdot}875$; and $\frac{1}{b} = \frac{1 - a}{a}, = \frac{0{\cdot}125}{0{\cdot}875}$, and $b = \frac{0{\cdot}875}{0{\cdot}125}, = 7$. These values are parts of a scale, of which the unit is 0·75 inches. Therefore

a, in inches, $= 0{\cdot}875 \times 0{\cdot}75, = 0{\cdot}65525$
b, in inches, $= 7 \times 0{\cdot}75. \quad = 5{\cdot}25.$

And here we must observe that the posterior surface is concave; for b is a positive quantity, because $1 - a$ is a positive quantity as well as a; therefore the centre of sphericity of both surfaces lies beyond the lens. And this determination is nearly the same with the usual practice, which commonly makes this lens a plane convex with its flat side next the eye; and there will not be much difference in the performance of these two lenses; for in all cases of maxima and minima, even a pretty considerable change of the best dimensions does not make a sensible change in the result. The same consideration leads to a rule which is very simple, and sufficiently exact for ordinary situations. This is to make the curvature such, that the incident and emergent pencils may be nearly equally inclined to the surfaces of the lens. Thus, in the eye-piece with five glasses, A and B should be most convex on their anterior sides; C should be most convex on the posterior side; D should be nearly isosceles; and E nearly plano-convex. But this is not so easy as it appears at first sight. The lenses of an eye-piece have not only to bend the several pencils of light to and from the axis of the telescope; they have also to form images on the axis of these pencils. These offices frequently require opposite forms. Thus the glass A, of fig. 18, should be most convex on the side next the object, that it may produce little distortion of the pencils. But it should be most convex next the eye, that it may produce distinct vision of the image F G, which is very near it. This image should have its concavity turned towards A, whereas it is towards the object-glass. We must therefore endeavour to make the vertical image $f\,g$ flatter, or even convex. This requires a glass very flat before and convex behind. For similar reasons the object-glass of a microscope and the simple eye-glass of an astronomical telescope should be formed the same way. This is a subject of most difficult discussion, and requires a theory which few of our readers would relish; nor do our limits afford room for it. The artists are obliged to grope their way. The proper method of experiment would be, to make eye-pieces of large dimensions, with extravagant apertures to increase the aberrations, and to provide for each station A, B, C, and D, a number of lenses of the same focal distance, but of different forms; and we would advise making the trial in the way of a solar microscope, and to have two eye-pieces on trial at once. Their pictures can be formed on the same screen, and accurately compared; whereas it is difficult to keep in remembrance the performance of one eye-piece, and compare it with another. We have now treated the theory of refracting telescopes with considerable minuteness. We cannot add any thing to what Dr. Smith has delivered on the theory of reflecting telescopes. There appears to be the same possibility of correcting the aberration of the great speculum by the contrary aberration of a convex small speculum, that we have practised in the compound object-glass of an achromatic refracting telescope. But this cannot be, unless we make the radius of the convex speculum exceedingly large, which destroys the magnifying power and the brightness. This therefore must be given up. Indeed their performance, when well executed, does already surpass all imagination. Dr. Herschel has found great advantages in what he calls the front view, not using a plane mirror to throw the pencils to one side. But this cannot be practised in any but telescopes so large that the loss of light, occasioned by the interposition of the observer's head, may be disregarded. Nothing remains but to describe the mechanism of some of the best.

We may commence with the reflecting telescope. This was an important improvement on the long and unwieldy refractors, which were in use among astronomers towards the close of the seventeenth century. With a Newtonian reflector, only six feet long, celestial objects may be viewed with as high a magnifying power, and with equal distinctness, as with a common refracting telescope of 120 feet in length. By means of these instruments, the late Dr. Herschel made those brilliant discoveries which have extended our views of the solar system, and of the grandeur of the universe, and which have rendered his name immortal in the annals of astronomy. It was not a little singular, however, that more than half a century elapsed, after the construction of this instrument was suggested by Gregory and Newton, before any reflecting telescope of a size calculated for celestial observation was actually constructed. In the year 1663 Mr. James Gregory of Aberdeen published his account of the construction of that form of the reflecting telescope which bears his name, in a treatise entitled Optica promota; and in the year 1672 Sir Isaac Newton constructed two small reflecting telescopes, about six inches in length, of a form somewhat different from that proposed by Gregory, which he presented to the Royal Society: but we hear no more about the construction of reflectors, till the year 1723, when Mr. Hadley published, in No. 376 of the Philosophical Transactions, an account of a large Newtonian reflector, which he had just then constructed, and which left no room to fear that this invention would remain any longer in obscurity. The large speculum of this instrument was sixty-two inches and five-eights focal distance, and five inches and a half diameter, was furnished with magnifying powers of from 190 to 230 times, and equalled in performance the famous aërial telescope of Huyghens of 123 feet in length. Since this period the reflecting telescope has been in

general use among astromoners in most countries of Europe, and has received numerous improvements, under the direction of Short, Mudge, Edwards, and Herschel, the last of whom constructed reflectors of seven, ten, twenty, and even forty feet in focal length, which far surpassed in brightness and magnifying power all the instruments of this description which had previously been attempted.

Plate II. fig. 1 exhibits a general representation of an improved instrument by Mr. Dick. A B is the short tube which holds the speculum; C D the arm which carries the eye-tubes, which consist of two distinct pieces of mahogany; the part D being capable of sliding along the under side of C, through the brass sockets E, F. To the under part of the socket F is attached a brass nut, with a female screw, in which the male screw *a b* acts, by applying the hand to the knob *c*, which serves for adjusting the instrument to distinct vision. G is the brass tube which receives the eye-pieces. It is supported by a strong brass wire *d e*, which passes through a nut connected with another strong wire, which passes through the arm D. By means of the nut *f*, this tube may be elevated or depressed, and firmly fixed in its proper position; and, by the nut *g*, it may be brought nearer to, or farther from, the arm D. By the same apparatus, it is also rendered capable of being moved either in a vertical or a horizontal direction: but, when it is once adjusted to its proper position, it must be firmly fixed, and requires no farther attention. The eye-piece represented in this figure is the one used for terrestrial objects, which consists of the tubes belonging to a small achromatic telescope. When an astronomical eye-piece is used, the length of the instrument extends only to the point I. In looking through this telescope, the right eye is applied at the point H, and the observer's head is understood to be uncovered. For those who use only the left eye, the arm would require to be placed on the opposite side of the tube, or the tube along with the arm be made to turn round 180°.

Fig. 2 represents a front or rather an oblique view of the instrument, in which the position of the speculum may be seen. All the specula fitted up by Mr. D. in this form, having been originally intended for Gregorian reflectors, had holes in their centres. The eye-piece was, therefore, directed to a point nearly equidistant from the hole to the exterior edge of the speculum, that is, to the point *a*. In one of these instruments fitted up with a four feet speculum, the line of vision is directed to the point *b*, on the opposite side of the speculum; but, in this case, the eye-tube is removed farther from the arm than in the former case. The hole in the centre of the speculum is obviously a defect in this construction of a reflecting telescope, as it prevents us from obtaining the full advantage of the rays which fall near the centre of the mirror; yet the performance of the instruments, even with this disadvantage, is superior to what we should previously have been led to expect.

The principal nicety, in the construction of this instrument, consists in the adjustment and proper direction of the eye-tube. There is only one position in which vision will be perfectly distinct. It must neither be too high nor too low,—it must be fixed at a certain distance from the arm, and must be directed to a certain point of the speculum. This position must be ultimately determined by experiment, when viewing terrestrial objects. A person unacquainted with this construction of the telescope, would, perhaps, find it difficult, in the first instance, to make this adjustment; but, were it at any time deranged, through accident or otherwise, the adjustment may be made a-new in the course of five or six minutes.

In pointing this telescope to the object intended to be viewed, the eye is applied at K (fig. 1), and looking along the arm, towards the eye-piece, till it nearly coincide with the object, it will, in most cases, be readily found. In this way a person may easily point this instrument to Jupiter or Saturn, or to any of the other planets visible to the naked eye, even when a power of 170 or 180 times is applied. When high magnifying powers, however, are used, it is expedient to fix, on the upper part of the short tube in which the speculum rests, a finder, such as that which is used in Newtonian telescopes. When the moon is the object intended to be viewed, she may be instantly found by moving the instrument till her reflected image be seen from the eye-end of the telescope on the face of the mirror.

Mr. D. has fitted up five or six instruments of the above description, with specula of eight, sixteen, twenty-seven, thirty-five and forty-nine inches focal distance. One of these having a speculum eight inches focus, and two inches diameter, with a terrestrial eye-piece, magnifying about twenty-four times, forms an excellent parlour telescope, for viewing land objects, and exhibits them in a brilliant and novel aspect. When compared with a small Gregorian, of the same size and magnifying power, the quantity of light upon the object appears nearly doubled, and the image is equally distinct. It represents objects in their natural colors, without that dingy and yellowish tinge which appears when looking through a Gregorian. Another of these instruments, having a speculum of 27 inches focal distance, and an astronomical eye-piece, producing a magnifying power of about 100 times, serves as an excellent astronomical telescope. By this instrument the belts and satellites of Jupiter, the ring of Saturn, and the mountains and cavities of the moon, may be contemplated with great ease and distinctness. With a magnifying power of forty times, terrestrial objects appear extremely bright and well defined. Another of these instruments is about four feet long. The speculum which belongs to it is a very old one: when it came into Mr. D's possession it was so completely tarnished as scarcely to reflect a ray of light. After it was cleaned it appeared to be scarcely half-polished, and its surface was variegated with yellowish stains. Were it fitted up upon the Gregorian plan, it would, observes Mr. Dick, be of very little use, unless when a very small magnifying power was applied. Yet, in its present form, it bears with great distinctness a magnifying power of 170 times, and is su-

perior in its performance to a four feet achromatic refractor, with a similar magnifying power. It exhibits very distinct and interesting views of the diversities of shade, and of the mountains, vales, caverns, and other inequalities of the moon's surface. The smallest instrument I have fitted up on this plan is one whose speculum is only five inches and a half focal distance, and one inch and three-quarters in diameter. With a magnifying power of about fifteen times, it shows land objects with great distinctness and brilliancy. But Mr. D. would deem it inexpedient to fit up any instrument of this description with specula of a shorter focal distance than ten or twelve inches.

The following are some of the properties and advantages peculiar to this construction of the reflecting telescope.

1. It is extremely simple, and may be fitted up at a comparatively small expense. Instead of large and expensive brass tubes, such as are used in the Gregorian and Newtonian construction, little more is required than a short mahogany tube, two or three inches long, to serve as a socket for the speculum, with an arm about the focal length of the mirror. The expense of small specula, either plain or concave, is saved, together with the numerous screws, springs, &c., for centring the two specula, and placing the small mirror parallel to the large one. The only adjustment requisite in this construction is that of the eye-tube to the speculum; and, by means of the simple apparatus already described, it can be effected in the course of a few minutes. Almost the whole expense of the instrument consists in the price of the speculum and the eye-pieces. The expense of fitting up the four feet speculum, alluded to above, including mahogany tube and arm, brass sockets, screws, eye-tube, brass joint, and a cast iron stand, painted and varnished, did not amount to £1 7*s*. A Gregorian of the same size would have required a brass tube at least four feet and a half in length, which would cost four or five guineas, besides the apparatus connected with the small speculum, and the additional expense connected with the fitting up of the joint and stand requisite for supporting and steadying so unwieldy an instrument. While the one instrument would require two persons to carry it from one room to another, and would occupy a considerable portion of an ordinary apartment, the other can be moved, with the utmost ease, to any moderate distance, and the space it occupies is very small.

2. It is more convenient for viewing celestial objects at a high altitude than any other telescope. When we look through a Gregorian reflector, or an achromatic telescope of four or five feet in length, at an object elevated 50° or 60° above the horizon, the body requires to be placed in an uneasy and distorted position, and the eye is somewhat strained, while the observation is continued. But, when observing similar objects by the aërial reflector, we can either stand perfectly erect, or sit on a chair, with the same ease as we sit at a desk when reading a book or writing a letter. In this way, the surface of the moon, or of any of the planets, may be contemplated for an hour or two, without the least weariness or fatigue. A delineation of the lunar surface may be taken by this instrument, with more ease and accuracy than with any other telescope, as the observer can sketch the outline of the object by one eye, on a tablet placed a little below the eye-piece, while the other eye is looking at the object. For the purpose of accommodating the instrument to a sitting or a standing posture, I caused a small table to be constructed, capable of being elevated or depressed at pleasure, on which the stand of the telescope is placed. When the telescope is four or five feet long, and the object at a very high elevation, the instrument may be placed on the floor of the apartment, and the observer will stand in an erect position.

3. This instrument is considerably shorter than a Gregorian telescope, whose large mirror is of the same focal length. When an astronomical eye-piece is used, the whole length of the instrument is nothing more than the focal length of the speculum. But a Gregorian, whose large speculum is four feet focus, will exceed five feet in length, including the eye-piece.

4. The aërial reflector far excels the Gregorian in brightness. The want of light in Gregorians is owing to the second reflection from the small mirror; for it has been fully proved, by experiment, that, about the one-half of the rays of light which fall upon a reflecting surface is lost by a second reflection. The image of the object may also be presumed to be more correct, as it is not liable to any distortion by being reflected from another speculum.

5. There is less tremor in these telescopes than in Gregorian reflectors. One cause among others of the tremors which affect Gregorians is the formation of a second image at a great distance from the first, besides that which arises from the elastic tremor of the small speculum, when carried by an arm supported only at one end. But as the image formed by the speculum, in the aërial telescope, is viewed directly, without being exposed to any subsequent reflection, it is not so liable to the tremors which are so frequently experienced in other reflecting telescopes. Notwithstanding the length of the arm, of the four feet telescope above-mentioned, a celestial object appears remarkably steady, when passing across the field of view, especially when it is at a moderate degree of altitude; and it is easily kept in the field by a gentle motion applied to the arm of the instrument.

The specula used in the instruments to which we have alluded above, were far from being good, being of a yellowish color, and some of them scarcely half polished. They had likewise large holes in their centre, as they were originally intended for Gregorian telescopes. Were they fitted up in the Gregorian form, they would be of little use, unless with small degrees of magnifying power. Yet, with all these imperfections, they exhibit the object with more brightness and accuracy than the generality of reflectors; and therefore observes Mr. D. have no doubt that, were instruments of this construction fitted up with specula of the best figure and polish, they would equal if not surpass, in brilliancy and distinctness, the general run of achromatic telescopes.

We have now to notice one of the greatest improvements that has been made in the reflecting telescope since the commencement of the present century. It is an instrument constructed by lord Oxmantown, a young nobleman of high mathematical attainments. It may be best described in his own words:—

'The following considerations,' observes his lordship, 'induced me to make the experiments on the specula of reflecting telescopes which I am about to describe. The reflecting telescope would be almost a perfect instrument, could we devise means of freeing it from spherical aberration; it would then retain merely the defects necessarily arising from imperfections in the workmanship, and perhaps some others of a much more trifling nature, such as those derived from the inflection of light. The refractor, however, is not only affected by the spherical aberration in common with the reflector, but also by the different refrangibility of the rays of light. Both of these defects may indeed be in a great degree corrected by giving curves of proper radii to the lenses which compose the object-glass. The spherical aberration may by this be almost entirely obliterated; but a considerable portion of the chromatic aberration still remains, owing to the irrationality of the spectra formed by the different kinds of glass, of which the object-glass is necessarily composed, the different colored rays not being refracted by each in the same proportion. The refractors until lately were limited to a very small scale, owing to the impossibility of procuring suitable glass of large dimensions; and although a new process has lately been discovered on the continent, which has considerably extended the limits of their construction, still I believe that large pieces of glass, of a tolerably homogeneous nature, are procured with great difficulty; and there seems to be but little prospect of our being able, with the present state of our knowledge, to construct efficient refractors, at least with glass lenses of apertures at all approaching the late Sir W. Herschel's reflectors. I have been thus minute in stating my reasons for making the following experiments, as many practical men whom I have spoken to, seem to think that since Fraunhofer's discoveries, the refractor has entirely superseded the reflector, and that all attempts to improve the latter instrument are useless.

'Two modes have been hitherto adopted for diminishing the spherical aberration in reflectors, the one by rubbing down the outer surface of the speculum from the edge to the centre, so as to make its figure approach to that of a paraboloid, the other by increasing the focal length in proportion to the aperture. It is certainly extremely probable that a very skilful workman, who has devoted the greater part of his life to the construction of reflectors, may succeed in some instances, particularly when the instrument is what is technically termed a *dumpy*, in forming a surface approaching to the paraboloid, which will perform better than one which is truly spherical; but when we consider the extreme accuracy necessary, and that a true surface can only be obtained by the process of polishing, when two motions are combined, the one in some degree at right angles to the other, and that a spherical surface is the only surface which can be formed by these two motions, it will be evident that when we attempt the parabolic form we abandon an essential requisite to the formation of an accurate surface. It is scarcely worth while remarking, that, in every attempt to improve a speculum of an accurate spherical figure, I have invariably rendered it worse; these attempts were not on very dumpy instruments. The other method of diminishing the spherical aberration, by increasing the focal length in proportion to the aperture, is certainly unexceptionable; but it will be immediately evident that it has its limits, and that instruments become unwieldy after they exceed a certain length. I will now immediately proceed to describe one of the instruments I have constructed, with a view of diminishing the spherical aberration without introducing either of these defects:—

'In fig. 3, plate II., A B is a brass plate turned true on both sides by means of a slide apparatus, which at the same time renders its sides parallel. The dimensions are seven inches by five-eighths thick. C D is another brass plate, made true by the same means, half an inch thick. The two plates were then screwed together in a temporary manner, their centres coinciding; three holes were then bored through them one-fourth of an inch in diameter, accurately perpendicular to their surfaces. The two plates were then unscrewed, and the holes in the plate C D were carefully tapped with a tap, having one-sixtieth of an inch interval between its threads. Three cast steel spindles were then accurately turned, the shank E F being made to fit the holes of the plate A B, and the screw G H nicely to fit the holes in the plate C D. It is almost needless to observe that the flanches, and indeed every part of the spindles, must be very carefully turned. The three cast steel spindles were then put through the holes in the plate A B, till their flanches rested on it. They were secured there by washers I, K, put on the shanks of the spindles at the back of the plate, and the washers were retained in their places by milled nuts L, M. To prevent the washers from shaking as the steel spindles were turned backwards and forwards, which would loosen the milled nuts, each washer was provided with a screw on its side O, which enters the groove P in the shank, and keeps it steady. The plate C D was then laid upon the three screws G H of the spindles, which were then gradually turned round in succession by a key fitting their other ends till the plate C D reached within about one-eighth of an inch of their flanches. To prevent the spindles from shaking either in the plate A B, or C D, lateral holes were drilled reaching the principal holes *o, o, o, v, v, v*. These were stuffed with small bits of leather, which were kept constantly pressed against the spindles by small screws. This precaution is essential. Besides, screws were inserted at the back of the plate through the holes marked *i, i, i*, which were screwed against the plate C D, to prevent the possibility

of its shaking in the slightest degree during the operation of grinding and polishing the speculum.

'The mechanism being now complete, a speculum was cast one inch thick. This was secured to the plate C D by three small screwed wires cast into it, by a groove in the plate C D, and by a cement composed of resin, wax, and sulphate of lime. A ring of speculum metal was also cast one inch and a half thick, which was secured to the plate A B in a similar manner, leaving a very minute interval between it and the piece of speculum metal it surrounded. The whole together formed a speculum of six inches aperture, and two feet focal length, which was ground and polished in the common way, till by repeated trials it was found to be of a good spherical figure. The small screws *i, i, i,* were then drawn back, the speculum placed in the tube, and the spindles turned round a certain number of times, by which the centre part of the speculum was made to approach nearer the plate A B, by a quantity ascertained in a manner I shall presently point out. The two images were then made to coincide, and the image was then found to be apparently as distinct as either image had been when separate. It is necessary to observe that, in order to effect the adjustment properly, each image must be brought to the same degree of brightness, which can be accomplished by shades on the mouth of the telescope, and that no higher power should be used than each metal, when separately employed, can bear with distinctness.

'I rather think that instruments of this construction will pretty frequently require adjustment; however, this is easily effected in the space of two or three minutes. The first I attempted consisted of a solid metal surrounded by two rings. Owing to a defect in the mechanism it required very frequent adjustments, the smallest shock displacing the images. The one I have described is almost entirely free from this defect, remaining in perfect adjustment even after very violent shocks. I have a speculum like the first I made, consisting of three parts, which is almost ready for grinding; and I expect it will turn out well. I have not yet perceived any ill effects from expansion and contraction, which was the difficulty I most apprehended. Whether they will become perceptible in instruments of higher powers, or whether, if perceived, means may or may not be devised of obviating them, can only be ascertained by future trials. On my return from parliament, if other avocations do not interfere, I propose to construct a speculum in three parts of eighteen inches aperture and twelve feet focal length;—this will be giving the experiment a fair trial on a large scale. It may perhaps be as well to observe that I do not think the principle of subdividing the aberration can be applied with advantage to small instruments. The object to be gained by it is a diminution of the focal length with a given aperture and power, and this is by no means desirable in small instruments, as it forces us to make use of deep eye-glasses, which are on many accounts objectionable.

'To compute the respective lengths of the curves composing a compound speculum, such as has been described, so that the aberration of the whole speculum may be equally divided between them.

'Let E, fig. 3, be the centre of the surface. Let a ray proceed from Q and intersect the axis in V. Let q be the geometrical focus of rays proceeding from the point Q.

Let q represent	E Q,	Let q' represent	E v
q'	E q,	θ	R E A
f	E F,	v	ver sin θ

Then considering q' a function of ver. sin θ, v being of course $= 0$ in each coefficient, we have

$$q' = q' + \left(\frac{d\,q'}{d\,v}\right) v + \frac{1}{1\cdot 2}\left(\frac{d^2\,q'}{d\,v^2}\right) v^2 + \&c.$$

which by proper substitutions becomes

$$q' = \frac{q.f}{q+f} + \frac{q^2 f v}{(q+f)^2} + \frac{q^3 f v^2}{(q+f)^3} + \&c.$$

The aberration being $q'-q'$ is evidently represented by this series without its first term, which, expressed geometrically, amounts to

$$\frac{\mathrm{Q\,E}^2}{\mathrm{Q\,F}^2}\cdot\frac{\mathrm{A\,N}}{2} + \frac{\mathrm{Q\,E}^3}{\mathrm{Q\,F}^3}\cdot\frac{\mathrm{A\,N}^2}{4\,\mathrm{E\,F}} + \&c.$$

which, when the rays are parallel, becomes

$$\frac{\mathrm{A\,N}}{2} + \frac{\mathrm{A\,N}^2}{4\,\mathrm{E\,F}}\ \&c.$$

'It is evident that the first term of this series will afford a sufficiently near approximation for compound specula; if we therefore represent the ver. sines of the arcs D O, D P, D Q, fig. 3, by A N, A N,′ A N,″ the problem becomes, Given A N = A N′ — A N = A N″ — A N,′ the length of the arc D Q and its radius, to find the lengths of the arcs D O and D P.

'*Example.*—Let a be the arc D Q = 3 inches, r its radius = 48 inches, x the seconds in a, then $x = 206265\,\frac{a}{r} = 206265\frac{1}{16} = 12891''$, which in degrees amounts to 3° 35′ whose v. s. = ·0019550.

$\frac{1}{3}$ of which = ·0006516, corresponding to arc, 2° 4′ = 7440″ = 1·77 inches.

$\frac{2}{3}$ of which = ·0013034′ corresponding to arc 2° 54′ 30″ = 10470 = 2·44 inches.

Arc D O = 1·77 inches, and D P = 2·44 inches.

'It is evident that the arc P O must be drawn back, a quantity equal to D′C′ = $\frac{1}{2}$ D C, and D O must be drawn back 2 D′ C′ = D C.'

We have in the article Optics fully explained the principle of a reflecting specula mirror for telescopes, and it may now be advisable to furnish our readers with some important particulars in the art of annealing this part of the instrument. It is from the pen of Dr. M'Culloch, and was published in the Journal of Science for June, 1828. Dr. M'Culloch commences his paper by the following observations:—

'It is much more than twenty years since I spent some time in constructing specula for reflecting telescopes; nor, till very recently, had I any reason to conjecture that in any part of the process, which it was my lot, like that of others, to labor through for myself, I was possessed of

knowledge which was not equally known to every one who had attended to this subject, much more to the makers of such telescopes. Having lately, however, had an opportunity of conversing with Mr. Ramage about his processes, I believe that there is one point at least which has been misunderstood, and, consequently, often mismanaged; the result being the production, by accident, of good metals, perhaps one good metal only, among many failures, when, if I am right, those may be produced with comparative certainty, and possibly in such hands as those of Mr. Ramage himself with absolute precision. It may perhaps, indeed, be considered that it is wrong here to suppose that because this excellent constructor has overlooked a necessary portion of his process, others should be supposed to have done the same; but, as I have no means of ascertaining what are the knowledge and practice of the different makers, I must even hazard the chance of here attempting to teach any one what he knew before; while I must still trust that some may hereafter derive, from my experience, precautions by which they will be saved considerable disappointment and some expense. Such is the apology for this paper, should it prove superfluous to any one; while I cannot help considering the subject as of some importance, as, not merely the color of the metal, but, as I think, its durability, and its power of giving a clear image, depend much on the nature of the management in that part of the process to which I allude.

'I am not aware that it is necessary to say any thing respecting the proportions of the two metals in the alloy; though I would caution makers of specula respecting the purity of the tin and copper, being convinced by some trials that the presence of arsenic is apt to lead, in time, to the tarnishing of the surface. I must equally presume that every one is acquainted with the temperature required for the separate metals before mixing, with the necessary flux, the method of pouring in the alloy, the position of the mould, and so forth; though with respect to the best form of the metal itself, that is as to relative thickness in its several parts, I must confess that I have never yet been able to satisfy myself: such are the complicated difficulties, entangled between the cooling and annealing first, and the optical consequences afterwards depending on changes of temperature, and on weight or flexure, that beset any calculations on this subject; while it is probable that they are really irreconcileable, or that there is no one form which will be the best, as concerns the original nature of the metal and its action when completed.

'To pass from these points, therefore, the object to which I am desirous of especially calling the attention of those who may be interested in this question, is the process of annealing the metal after casting, since it is in this, as far as I have found, that the chief disappointments take place; and in consequence of a species of mismanagement which attention will be able to prevent when once the principle has been explained. Here it is at least that I did fail myself, until I contrived to examine and discover the cause; and here it is that Mr. Ramage has found the same difficulties, and made the same failures—not likely, I trust, to happen often again, though, in a process so delicate, certainty must not always be expected.

'I need scarcely say that if this alloy were suffered to cool rapidly it would break, or might break, and that it requires to be cooled slowly in the mould, or annealed; this being true, particularly of the larger metals, as there is not so much hazard with respect to small ones. The process itself is simple and easy: it would scarcely, indeed, be necessary to describe it were it not for its frequently injurious consequences; and it consists commonly in covering the metal in the mould with hot ashes or cinders, and thus retaining it, often for a considerable time and at a high temperature.

'To state now what those failures are, before enquiring into the cause,---I must first remark, that the fracture of speculum metal ought to be that which mineralogists term flat conchoidal, or resembling that of gun-flint; and the surface of the fracture ought to be lucid and smooth, or like that of glass, utterly free of granulation or roughness of any kind, and as polished in reality as it can afterwards be rendered on the tool. Without this, it is in vain to expect the greatest light which a speculum is capable of giving, nor the purest color; and without this, also, it will be found that the surface will be apt to fail after long use, or in consequence of frequent exposure to the atmosphere and vacillations of temperature. A speculum metal, therefore, which does not thus come out at the annealing, ought to be rejected; it is not worth the subsequent labor.

'It is true, that, as far as four inches diameter, a very moderate degree of care will generally insure success; the difficulty occurs in the larger ones, and increases rapidly with their increase of size. And the failure consists in the reverse of what I have just stated. The fracture becomes granular or rough, and is at the same time dull as might be anticipated; while the degree of this fault varies with the extent of the mismanagement; which is a mismanagement in the annealing alone, as I shall presently show, while the nature of the metals used, or something in the flux, or in the casting, is often accused for faults depending on a much simpler cause.

'Nor is it only that the metal is dull from the nature of the fractured surface, or that this is a mere deception which the polishing will remove. So far from that, the absolute color of the alloy itself is imperfect or bad; it has no longer that clear silver whiteness which will take what is technically called a black polish, but is gray and sometimes of different tones, often so gray and so dark as to be palpably unfit for its purpose, though often, in the least imperfect instances, retained and finished for use, with the production assuredly of some disappointment even at first, and of somewhat more, I have fully ascertained, after long use, as I shall presently explain.

'In such cases of extreme failure, as the blame is generally laid on the metals of the alloy, the fault remains uncorrected; and if others have found the same difficulties as I at first encountered myself, and as Mr. Ramage had always

done when I inspected his processes, they will be well pleased to know where the error lies; though it must still depend on a nicety of attention which it is impossible to describe to find the remedy.

'Could the speculum be suddenly or quickly cooled after casting, it would be always perfect; the evil is the result of slow cooling—of that very process which is necessary, or thought necessary, to secure its integrity; and the slower the cooling the greater the evil or the failure. Or, by rapid cooling, the texture and the color are the most perfect which can be obtained from this alloy; while it is possible, by a proceeding as highly reverse as possible, to render it absolutely useless, and utterly unlike to what is desired; and even while the most rigid analysis shows that the bad metal and the good are precisely the same after having been cast, if we should not be satisfied as to this, from having produced by those different treatments a perfectly good and an extremely bad metal out of the same pots at the same time.

'There ought now to be no difficulty in seeing what the efficient cause of this evil is. It is the crystallisation of the alloy, permitted or encouraged by the application of too high a heat in the annealing, and by continuing that heat too long. Nor is fluidity necessary to this process; it occurs after the metal is consolidated, as I have amply proved; since it is even easy to bring a metal to this state by annealing, after having been thoroughly well cast and annealed, and after having been tried by fracture. Nor is it a fact to excite any surprise, since it belongs to a wide train of analogies on which my experiments, long since ready to be made public, amount perhaps to thousands.

'We can now, therefore, trace the cause of all those variations of defect, which occur in this case, between the best and the worst specimens; as it will be found that the degree of crystallisation on which depend the faults, is always proportioned to the extent to which the annealing process has been carried; or on the duration and the intensity of the heat applied to the metal after consolidation. The reason of this, also, is apparent; but I need not, in this merely practical notice, enter into a subject which I have treated fully in a paper of another nature.

'But, to convince observers that this is the real cause of the defect of such metals, it is always easy to dissect the crystallisation, if I may use such a term, by means of an acid, and thus to see how the defect goes hand in hand with the crystallisation, while the variety of texture in speculum metals thus discovered will also be found very considerable, and often, I may add, very unexpected; since, among other singular varieties not easily described, I have found even examples of what mineralogists call the spheroidal concretionary structure.

'But, if I dare not here dwell on the properly theoretical part of this subject, I must suggest one circumstance or change, which, under high or extreme degrees of annealing, seems to occur, and which is probably the real cause of the defect as to color, since it is not so easy to suppose that mere texture could produce a gray tint, such as is often found in these defective metals. I call it a suggestion, because, while engaged in these investigations, I was never able to discover any method of analysis by which the fact, if it be one, could be ascertained.

'The suggestion is simply this,—that under the complete liberty of crystallisation permitted by high and long-continued heat, an alloy is formed different from that which was intended; or that a certain definite combination takes place between the tin and copper, so as to produce a mixture which is possibly that of two alloys, or else is such as to set a portion of one or other of the metals free, though of course under a state of mixture which is unassignably minute. It is plain that this is at best a probable state of things, while I need not say how difficult the proof must be at present. It is probable, for this reason: there is a crystallised metal or alloy, crystallisation takes place only in simple bodies or definite compounds, and it would be very singular if the proportion of twenty-five copper and twelve tin, which was my compound, should be that definite compound, while as other proportions are used by Mr. Ramage, such an occurence cannot, plainly, happen in both cases. And, in defect of analysis, it has often seemed to me, on the trial by acids, that there was more than one substance in the defective and crystallised speculum, distinguishable by the manner in which the acid acted on the surface. It might not be very difficult to approximate to this point to a greater nicety by the application of different acids, and by a subsequent examination of the proportions of tin and copper dissolved; but what I neglected to do, when I had the power, my state of health has long prevented me from following up.

'It seems unneccessary to add more on this part of the subject in a paper so merely practical; and if I ought now to show how the annealing ought to be carried on, so as to avoid the evil in question, I find it very difficult to give such directions as will enable any one to do as I have done in these cases with success. And, indeed, it can scarcely be necessary; since the general principle, and the cause of the evil having been once explained, it will be easy for the speculum-maker to apply what, after all, must be a matter of trial, and which must also vary with each magnitude of speculum. I could not describe a temperature for which there is no measure, nor lay down a period of time which must depend partly on that temperature, and partly on the size of the metal, and partly also, I may add, on its form and thickness, and even on the temperature of the atmosphere. But if each maker must feel his way for himself, and for each size that he may cast, let him always remember that the speculum metal is rather a mixture than a true alloy, and that it has a tendency to separate as to crystallise, when under liberty, by heat; that the best and most brilliant metal is that which cools most suddenly, or which is soonest deprived of the power of crystallising, and therefore that his object must be to cool his speculum as rapidly as it can possibly be cooled without breaking. And, as to the practical method of annealing, I may add that I think the ordinary

mode bad, inasmuch as it is difficult to regulate. Whether my own method may prove better in other hands or not it is not for me to pronounce, but it was to use sand for that purpose. In this case the mass of sand was placed over a horizontal iron-plate flue, so as to be at a high red-heat in one place and to cool gradually at another; and while the speculum was placed in the hottest part after casting, it was slowly moved to the cooler parts till the desired end was obtained.

'I have but one other suggestion to offer as to the effects which have seemed to me to follow from polishing for use, specula, of which the texture had been thus crystallised. Whether there should be two alloys, or an alloy and a metal, or not, or whether the whole result is mechanical, depending on the intersected surface of this confused crystallisation, it is certain that a polished surface of this nature is irregular in its action on light, and that good images are scarcely attainable, from optical causes that will be sufficiently obvious, to say nothing of an absolute loss of light produced by this cause And I have further reason to believe from numerous experiments, which it would be impossible as improper to detail here, that such crystallised specula undergo further changes of their crystalline texture from the ordinary vacillations of temperature to which the uncrystallised ones are either less subject, or from which they are exempt; the consequence being a slow deterioration, as may easily be imagined without further explanation. To this cause, indeed, we must, I believe, trace some of the deteriorations of specula which do not depend on tarnish or corrosion, though I must also add, in concluding, that the crystallised specula are more easily tarnished than others, probably from the irregular action of moisture on them, or, possibly, because the definite compound and its associate thus intermixed, one or other, or both, offer less resistance to the air than that mixture of tin and copper which constitutes a good speculum.'

We may now furnish our readers with some particulars of the powerful achromatic telescope, constructed by M. Lerebours. On this subject we may best quote the opinions of Messrs. Herschel, South, and Amici.

'The diameter,' says Mr. South, 'of the object-glass of the achromatic telescope, constructed by M. Lerebours, now in the Royal Observatory of Paris, is rather better than 9·2 inches English, uncovered by the cell, but of which 8·4 inches only are in actual use. Its focal length is eleven feet.

'The magnifying powers with which I used it, on the night of the 15th of March last, are 136, 153, 224, 240, 420, and 560. With all, except 560 (which, by some forgetfulness, was not applied), Venus was extremely well defined during a dark night; of course, Jupiter and Saturn were well shown. The two stars of Castor, of γ Leonis, of ζ Orionis, were exhibited with 240, 420, and 560, as round as possible, ω Leonis presented by its side a light blue star with 420, which could not be overlooked by the most careless observer, and with 560 both stars were admirably defined.

'I need not inform you that a telescope, having an object-glass of the diameter above-mentioned, which, with these powers, will neatly define the limb of the planet Venus, and will give to the discs of the double stars here named images absolutely round, deserves to be well spoken of. Indeed, I have no hesitation in saying that this telescope is the best achromatic I ever pointed to the heavens; nor will I withhold my regret, or even the mortification I feel in asserting, that England, when I visited it in May last, could not produce an achromatic any thing like it. The stand upon which it is mounted is not provided with any means of giving to the telescope equatorial motion.

'Whilst, however, I say thus much, I am far from entertaining the sentiments of Mr. Fraunhofer, as to the decided superiority of refractors over reflectors, nor can I accompany Mr. Struve in his idea, that the Dorpat telescope 'may perhaps rank with the most celebrated of all reflecting telescopes, namely, Herschel's.' It is true, I have not had the enviable qualification of having seen the former; still I think the Paris telescope furnishes me with data upon which to form something like a rational conjecture.

'Its object-glass actually in use is in proportion to Mr. Struve's (if all of it be effective), as seventy to ninety-two nearly, a difference not very hard to be allowed for.

'I have seen the nebulæ in Orion; the planets Jupiter and Saturn, with the Paris telescope; and with their appearances in Mr. Herschel's twenty feet reflector, I am perfectly familiar, and the comparison is many times in favor of the latter.

'The power of the twenty feet reflector at Slough is well authenticated; and if the indefatigable astronomer of Dorpat will turn his probably matchless achromatic upon some of the faint nebulæ in the constellation Virgo, or upon some others, not easily resolvable into stars, he will soon satisfy himself, that his ideas of its space penetrating power are much overrated.

'The star ζ Bootis was seen 'close double' by Mr. Pond at Lisbon, perhaps twenty years ago, and, as I believe, with a Newtonian reflector of six inches aperture, and the circumstances mentioned in a letter written by him to Dr. Wollaston. The instrument with which I first observed it, in 1810, 'close double,' was a reflector of the worst possible construction, viz. a Gregorian reflector of six inches aperture, and thirty inches focal length, but a very perfect instrument, made for me by Mr. Watson in the year 1809, and which is now in the possession of my friend Mr. Perkins.'

After speaking of the merits of the telescope of M. Lerebours, Mr. Herschel proceeds as follows:—

'My object, in writing this, is to obviate an erroneous impression that may arise in the minds of those who read Mr. Fraunhofer's Memoir, as to the great inferiority of reflecting telescopes in point of optical power to achromatics in general, and more especially to those constructed with such delicacy as his own doubtless are. Those who have witnessed the performance of M. Amici's beautiful Newtonian reflector will not

readily admit this inferiority, but will feel disposed to wish that some attempt might be made to accomodate such admirable instruments to the more exact purposes of astronomy, an object which appears to have been too easily lost sight of.

'Mr. Fraunhofer's expressions, when speaking of the loss of light by metallic reflection, are, I think, too strong. He observes that 'the most perfect metallic mirror reflects only a small part of the incident light, and that the greater part is absorbed;' and that, in consequence, the intensity of the light entering the eye of the observer is always very small.' A metallic mirror, however, reflects 0·673 of the incident light, or more than two-thirds, and absorbs less than one-third of the whole. M. Fraunhofer appears rather to have in view the Newtonian construction, where two metallic mirrors are used, and where the whole effective quantity of light is only 0·452 of the incident rays. No one who has been half blinded by the entrance of Sirius, or of α Lyræ, into one of my father's twenty feet reflectors, will say that the intensity of its light is small, nor, to take a less extreme case, will any one who uses one of M. Amici's Newtonian reflectors of twelve inches aperture (a perfectly convenient and manageable size, and of which he has constructed several), be disposed to complain of its want of light. The ordinary reflector used by my father, in his reviews of the heavens, was a Newtonian, seven feet focus, and barely six inches in aperture; and consequently equal, cœteris paribus, to an achromatic of $4\frac{1}{4}$ (4·254) English, or 3·999 Paris inches, and therefore by no means proper to be put in competition with M. Fraunhofer's chef d'œuvres of seven and nine inches; yet it will be recollected that with this telescope, and with a magnifying power of 460, ω Leonis was discovered to be double, and distinctly separated, and its angle of position measured.

'In order to demonstrate the superiority of refracting over reflecting telescopes, M. Fraunhofer has selected the star ζ Bootis, which my father has described as a double star of the sixth class (No 104), in his second catalogue of double stars, but without mentioning the division of the large star into two, as a double star of the first class. It might, however, be very easily overlooked in a review in indifferent weather. It is, at least, as difficult to resolve as η Coronœ, more so than σ, either of which, with any telescope, be its goodness what it may, requires a favorable atmosphere for its separation. From this omission, however, Mr. Fraunhofer concludes that the power of the telescope was insufficient to resolve it, and must, therefore, have been inferior to that of an achromatic in the hands of Mr. Bessel, with which it was recognised by that eminent astronomer as double. It will be seen, in reference to the memoir on Double Stars by Mr. South and myself, that this star had been long since ascertained to be double, not only by Mr. Bessel, but by Messrs. Struve, Pond, and South, and, what is more to the present purpose, by Sir. W. Herschel himself. It was only by oversight that we omitted to refer, in that work, to his account of it, which is published in his paper On the Places of 145 new Double Stars, in the first volume of the Transactions of the Astronomical Society, p. 178, and read in June 1821.

'In large reflectors, in which only one metallic mirror is used, the disadvantage, in point of light, under which they labor, in comparison with refractors, is, however, much less formidable. A reflector of eighteen inches aperture would be equivalent to an achromatic of fifteen and a half, and one of forty-eight inches to an achromatic of forty-one and a half in aperture: a size we cannot suppose (from any thing we have yet seen) that it is possible the latter should ever attain. Reflectors of eighteen or twenty inches are perfectly manageable, and, I apprehend, quite within the power of any good artist to execute, and (if intended only for use, and not at all for show) at no very ruinous expense. That which I habitually use, of the former dimension, is my own workmanship; and, though inferior in distinctness to the exquisite one used by my father in his sweeps, is by no means an instrument to be despised. Indeed, from the experience I have had of these telescopes, I am satisfied of their applicability, even to the more exact purposes of astronomy, and that great improvements in their construction and mechanism remain to be made.

'Having succeeded in observing the eclipses of Jupiter's satellites in the day time, and in measuring the diameters with one of his Newtonian reflectors, professor Amici was desirous of ascertaining the dimensions of an achromatic telescope, capable of showing these phenomena with the same distinctness.

'With this view,' says he, 'I took a Newtonian telescope of my own making, having a focal distance of thirty inches, and an aperture of thirty-six lines, and I compared with it an achromatic telescope of the same length, having an English object-glass of two lenses, two inches and a half diameter. In applying to these instruments two equal eye-glasses, and directing them to the same object, I saw this object with most brightness through the achromatic telescope. In order to be certain of this fact, I constructed a parallelopiped, three inches long, by placing, in opposite directions, two prisms, one of colorless, and the other of obscure glass, such as those which are employed for observing the sun. This apparatus furnished a regular gradation of transparency; by placing it between the eye of the eye-glass, I could easily find the opacity necessary for intercepting entirely the light of the object which I looked at alternately with each instrument. In order to avoid all calculation, I diminished by diaphragms the aperture of the brightest telescope, till the light of the object was extinguished in the two apparatuses at the same division of the parallelopiped. After several trials I found that, in order that the refractor and the reflector should have the same brightness, the first must have an aperture of twenty-seven lines, and the second of thirty-six. I am of opinion, indeed, that this ratio of 3 to 4 ought to be the same for telescopes of all dimensions, as we cannot take into account the slight loss of light arising from the great thickness of the two glasses in these telescopes.

'In order, then, to see the satellites as bright as I have seen them, we require an achromatic

telescope of eight inches and a half in diameter, and having a focal distance such that the instrument may magnify 400 times. The great object-glass, therefore, of seven inches and a half aperture at Naples, will show the satellites less distinctly than mine, while the nine inch object-glass at Dorpat will show them more distinctly.

'The result obtained by Sir W. Herschel does not differ from the above. By the method of Bouguer he found that the diameters of a double achromatic, and of a Newtonian reflector, must be as 7 to 10, in order to produce the same brightness with the same magnifying power, or as 5 to 6, if the small Newtonian mirror is not used. Hence, in order that an achromatic telescope may equal his forty feet reflector, its object-glass must be forty English inches in diameter.

'If reflecting telescopes, for which I have a partiality, have, in general, the advantage over refractors, with respect to the distinctness of the images, magnifying power, and smaller focal distance, they must always yield to the latter on account of the smaller apertures which these require, the facility with which they may be applied to different instruments, and the immutability of the substance of their lenses, which render comparable observations made at distant epochs, and partly for the convenience of using them, arising from this, that the object-glass preserves always the well centered position which the artist has given it. This last quality is so much valued, by some observers, that they do not hesitate to prefer a moderate achromatic telescope to a good Newtonian one.'

We shall now present, in a small table, the relative performances of achromatic telescopes, with double object-glasses, and Newtonian reflectors, according to Sir. W. Herschel, Mr. Herschel, and Professor Amici.

	Ratio of diameters when the performance is equal. Achromatic.		Reflector.	
1. When the reflectors have a small mirror	7	to	10	Sir W. Herschel.
2. When the small mirror is not used	$8\frac{1}{3}$	to	10	Sir W. Herschel.
3. When the reflectors have a small mirror	$7\frac{1}{10}$	to	10	Mr. Herschel.
4. When the reflector has a small mirror	$7\frac{1}{2}$	to	10	Prof. Amici.

Professor Barlow has suggested a new fluid telescope which is deserving of attention. He employs sulphuret of carbon for a correcting medium as a substitute for flint glass in the achromatic instrument. This is enclosed between two plate glasses, ground and polished to the proper curves, and placed at any distance behind the plate front lens, from actual contact to two-thirds of the focal length of the plate. This being premised, it may be observed that, in the usual construction of achromatic telescopes, the two or three lenses composing the object-glass are brought into immediate contact, and in the fluid telescope proposed by Dr. Blair the construction is the same, the fluid having been enclosed in the object-glass itself. Nor could any change in this arrangement in either case be introduced with advantage; because the dispersive ratio between the glasses in the former instance, and between the glass and fluid in the latter, is too close to admit of bringing the concave correcting medium far enough back to be of any sensible advantage. The case, however, is very different with the sulphuret of carbon. The dispersive ratio here varies (according to the glass employed) between the limits ·298 and ·334; which circumstance has enabled me to place the fluid correcting lens at a distance from the plate lens equal to half its focal length; and I might carry it still farther back, and yet possess sufficient dispersive power to render the object-glass achromatic. Moreover by this means the fluid lens, which is the most difficult part of the construction, is reduced to one-half, or to less than one-half of the size of the plate lens; consequently to construct a telescope of ten or twelve inches aperture involves no greater difficulty in the manipulation than in making a telescope of the usual description of five or six inches aperture, except in the simple plate lens itself: and, what will be thought perhaps of greater importance, a telescope of this kind of ten or twelve feet length will be equivalent in its focal power to one of sixteen or twenty feet. We may therefore by this means shorten the tube several feet, and yet possess a focal power more considerable than could be conveniently given to it on the usual principle of construction. This will be better understood from fig. 4, plate II.

In this figure A B C D represent the tube of the six inch telescope, C D the plate object-glass, F the first focus of rays, *d e* the fluid concave lens, distant from the former twenty-four inches. The focal length M F being forty-eight inches, and, consequently, as 48 : 6 : : 24 : 3 inches, the diameter of the fluid lens. The resulting compound focus is 62·5 inches; it is obvious, therefore, that the rays *d f*, *e f*, arrive at the focus under the same convergency, and with the same light, as if they proceeded from a lens of six inches diameter, placed at a distance beyond the object-glass C D (as C′ D′), determined by producing these rays till they meet the sides of the tube produced in C′ D′, viz. at 62·5 inches beyond the fluid lens. Hence it is obvious the rays will converge as they would do from an object-glass, C′ D′, of the usual kind, with a focus of ten feet five inches. We have thus, therefore, shortened the tube 38·5 inches, or have at least the advantage of a focus 38·5 inches longer than our tube; and the same principle may be carried much farther, so as to reduce the usual length of refracting telescopes nearly one-half, without increasing the aberration in the first glass beyond the least that can possibly belong to a telescope of the usual kind of the whole length. It should, moreover, be observed that the adjustment for focus may be made either in the usual way or by a slight movement of the fluid lens, as in the Gregorian reflectors by means of the small speculum. In the latter case the eye-piece is fixed, which may probably be convenient for astronomical purposes, in consequence of the great delicacy of the adjustment.

TELESIA, in ancient geography, a town of Italy in Campania. It was taken by Hannibal Liv. 21. c. 13, &c. It is now called Telese.

TELESILLA, a lyric poetess of Argos, who bravely defended her country against the Spartans.—Paus. ii. c. 20.

TELESINUS, a general of the Samnites, who joined the party of Marius, and fought against the generals of Sylla. He marched towards Rome, and defeated Sylla himself with great loss. But at last he was defeated and killed in a bloody battle, after displaying the utmost bravery.—Plut.

TELFORD (Thomas), civil engineer, was born at Langholm in Dumfriesshire, Scotland, in the year 1755, which he quitted at an early age, and, acquiring a knowledge of the bricklayer's and stonemason's trades, rose gradually from such an humble position, to the undisputed head of the profession of civil engineers. While Telford was employed in building with his own hands the round of the village school at Inverness, Alexander Nimmo, who subsequently rose to the head of the profession of civil engineers in Ireland, was instructor of the children; and these two distinguished men preserved the closest intimacy to their latest moments. In industry, integrity, and professional ability, Telford has not been exceeded. His works are so numerous, as to render individual or separate description inconvenient here. It must suffice to mention the most public and valuable; they are the Menai and Conway Bridges—Caledonian Canal—Aqueducts at Pont-y-Sysyllte and Chirk (N. Wales)—Holyhead road through the North Wales mountains—St. Katherine's Dock, London—Highland roads, and Salopian canals. He may be said to have been the founder of the Society of Civil Engineers, an Institution over which he presided until within a few weeks of his decease in 1834, and to which he bequeathed £2000, together with library, maps, and instruments. In early life Telford exhibited a taste for poetry, and was author of several small pieces, that do not by any means lessen the estimate formed of his genius. His remains were deposited in Westminster Abbey, whither they were followed by many of the members of the Institution of Civil Engineers.

TELINGANA, an ancient kingdom of Hindostan, now divided between the British and the Nizam. It was intersected by the river Godavery. The districts lying to the north of that river were called Andhra; those situated on the south of it, Kalinga. The Telinga language is still spoken by the Hindoos. Between Ganjam and Pulicat, it contains a number of Sanscrit words, and has some affinity to the Bengaly.

TELL, *v. a.* & *v. n.* } *Pret.* and *part. pass.*
TELL'TALE, *n. s.* } told; Sax. tellan; Belg. *taellan, tellen.* To utter; express; speak; relate; teach; discover; number: give an account: a telltale is one who gives petty or malicious information.

You speak to Casca, and to such a man
That is no flearing *telltale*. *Shakspeare, Julius Cæsar.*

'Tis done: report displays her *telltale* wings,
And to each ear the news and tidings brings.
Fairfax.

Numerous sails the fearful only *tell*;
Courage from hearts, and not from numbers, grows.
Id.

Eurydice and he are prisoners here,
But will not long be so: this *telltale* ghost
Perhaps will clear them both. *Id. and Lee.*

A child can *tell* twenty before he has any idea of infinite. *Locke.*

She doubts if two and two make four,
Though she has *told* them ten times o'er. *Prior.*

The rest are vanished, none repassed the gate,
And not a man appears to *tell* their fate.
Pope's Odyssey.

TELL (William), an illustrious Swiss patriot, the chief instrument of the revolution which delivered the Swiss cantons from the German yoke in 1307. See SWITZERLAND. Animated by William Tell's courage and patriotism the Swiss flew to arms; attacked and vanquished Grisler, who was shot to death by Tell; and the association for the independency was immediately formed. Tell was offered the government, but he refused it. While endeavouring to alter the course of a torrent, and prevent its farther desolations, he was carried off by the impetuous stream in 1354.

TELLIAS, or TELLIUS, a famous astronomer and soothsayer, of Elis, who flourished in the age of Xerxes.—Paus. x. 1.

TELLICHERY, a sea-port town of the south of India, province of Malabar. It is a place of considerable consequence, and ships of great burden may safely anchor opposite it, at two miles distance, in six fathoms water. The East India Company established a factory here, for the purchase of pepper, &c., so early as the year 1683, and in 1708 purchased the fort from the Colastry, or Cherical rajah.

TELLINA, in zoology, a genus of anima belonging to the class of vermes, and order of testacea. The animal is a tethys; the shell is bivalve, generally sloping to one side, with three teeth at the hinge. Gmelin reckons about ninety species. The tellinæ bury themselves in the mud or sand at the bottom of the sea, keeping a communication with the water above by means of short tubes or pipes.

TELLURIUM, in mineralogy, a new metal which Mueller first suspected to exist in the aurum paradoxicum or problematicum, which has the appearance of an ore of gold, though very little can be extracted from it. Klaproth afterwards established its existence, not only in this but in some other Transylvanian ores, and named it tellurium. Pure tellurium is of a tin white color, verging to lead-gray, with a high metallic lustre; of a foliated fracture; and very brittle, so as to be easily pulverised. Its specific gravity is 6·115. It melts before ignition, requiring a little higher heat than lead, and less than antimony; and, according to Gmelin, is as volatile as arsenic. When cooled without agitation, its surface has a crystallised appearance. Before the blowpipe on charcoal it burns with a vivid blue light, greenish on the edges; and is dissipated in grayish-white vapors, of a pungent smell, which condense into a white oxide. This oxide heated on charcoal is reduced with a kind of explosion, and soon again volatilised. Heated

in a glass retort it fuses into a straw-colored striated mass. It appears to contain about sixteen per cent. of oxygen.

Tellurium is oxidized and dissolved by the principal acids. To sulphuric acid it gives a deep purple color. Water separates it in black flocculi, and heat throws it down in a white precipitate. With nitric acid it forms a colorless solution, which remains so when diluted, and affords slender dendritic crystals by evaporation. The muriatic acid, with a small portion of nitric, forms a transparent solution, from which water throws down a white submuriate. This may be redissolved almost wholly by repeated affusions of water. Alcohol likewise precipitates it.

Sulphuric acid, diluted with two or three parts of water, to which a little nitric acid has been added, dissolves a large portion of the metal, and the solution is not decomposed by water. The alkalies throw down from its solutions a white precipitate, which is soluble in all the acids, and by an excess of the alkalies or their carbonates. They are not precipitated by prussiate of potash. Tincture of galls gives a yellow flocculent precipitate with them. Tellurium is precipitated from them in a metallic state by zinc, iron, tin, and antimony.

Tellurium fused with an equal weight of sulphur, in a gentle heat, forms a lead colored striated sulphuret. Alkaline sulphurets precipitate it from its solutions of a brown or black color. In this precipitate either the metal or its oxide is combined with sulphur. Each of these sulphurets burns with a pale blue flame, and white smoke. Heated in a retort, part of the sulphur is sublimed, carrying up a little of the metal with it. It does not easily amalgamate with quicksilver.

TELLURETTED Hydrogen, in chemistry, a gas formed by the combination of tellurium and hydrogen. To make this compound, hydrate of potash and oxide of tellurium are ignited with charcoal, and the mixture acted on by dilute sulphuric acid, in a retort connected with a mercurial pneumatic apparatus. An elastic fluid is generated, consisting of hydrogen holding tellurium in solution. It is possessed of very singular properties. It is soluble in water, and forms a claret-colored solution. It combines with the alkalies. It burns with a bluish flame, depositing oxide of tellurium. Its smell is very strong and peculiar, not unlike that of sulphureted hydrogen. This elastic fluid was discovered by Sir H. Davy in 1809. When tellurium is made the electrical negative surface in water, in the voltaic circuit, a brown powder is formed, which appears to be a solid combination of hydrogen and tellurium. It was first observed by Mr. Ritter in 1808. The composition of the gas and the solid hydruret has not been ascertained. The prime equivalent of tellurium, according to Sir H. Davy, is 4·93, reduced to the oxygen radix. Berzelius makes the oxide of tellurium a compound of metal 100 + oxygen 24·8. If we call the oxygen 25, then the atom or prime would be 4. In this case telluretted hydrogen, if analogous in its constitution to sulphuretted hydrogen, would have a specific gravity of 2·2916 (not 2·3074, as Dr. Thomson deduces it from the same data).

TELLUS, Lat., i. e. the earth, in the mythology, one of the Roman names of the goddess Cybele, and which in common language signified the same with terra, the earth; but in the mythology Terra was the name appropriated to the mother, the wife of Coelus, and Tellus to the daughter, the wife of Saturn. See Ops.

TEMENUS, a leader of the Heraclidæ, who became king of Argos. He was succeeded by Deiphon, who had married his daughter Hymetho.

TEMERA'RIOUS, *adj.* } Fr. *temeraire;*
Temer'ity, *n. s.* } Latin *temerarius.*
Rash; heady; unreasonably adventurous, or contemptuous of danger: the noun substantive corresponding.

The figures are bold even to *temerity.* *Cowley.*

Resolution without foresight is but a *temerarious* folly; and the consequences of things are the first point to be taken into consideration. *L'Estrange.*

Should he find upon one single sheet of parchment an oration written full of profound sense, adorned with elegant phrase, the wit of man could not persuade him that this was done by the *temerarious* dashes of an unguided pen. *Ray.*

TEMESVAR, Banat or Bannat of, a province in the south of Hungary, bounded by Transylvania, and by the rivers the Marosch, the Theyss, and the Danube. Its extent is about 9450 square miles; its population above 700,000. In the south-east it contains a range of high mountains, where pasturage and mining form the principal employment of its inhabitants; but the rest is level, and in many places marshy or sandy, though in general of great natural fertility. From the middle of the sixteenth century to 1716, this province was subject to the Turks, and had, under their management, become overrun with robbers; so that when the conquests of prince Eugene restored it to Austria, many parts of it were almost uninhabited: and the renewal of the Turkish war in 1737 ruined many of the European establishments. On the restoration of peace, however, a number of Servians, Rascians, Macedonians, and Bulgarians, repaired hither from the Turkish provinces, bringing their property along with them; and the new governor exerted himself with great zeal in the cause of improvement. In 1752 the government was changed from the military to the civil form, and, with the exception of a temporary check during the seven years' war, this province has gone on ever since in a gradual course of improvement.

Temesvar, a considerable town in the south of Hungary, the capital of the county of the same name, and one of the strongest fortresses of the Austrian empire. It stands at the confluence of the Temes and Rega, is well built for so backward a country, and contains a population of 11,000, a mixed race, of Rascian, German, and Greek origin. The chief public buildings are the cathedral, a Greek and a Catholic church, three monasteries, three hospitals, a synagogue, and extensive barracks for the garrison. The town is the residence both of a Catholic and of a Greek bishop. The chief manufacture is silk; but iron and woollens are also objects of traffic.

Temesvar, a frontier district of Hungary, in-

cluding the south and south-east parts of the bannat. On the west it is marshy, containing, however, fine and extensive plains; but in the east it is mountainous, with rich mines of copper. It is divided into the districts of German and Wallacho-Illyrian, and contains 173,000 inhabitants. The chief town is Pancsova, but the general's residence is at the town of Temesvar.

TEMESVAR, a palatinate of Hungary, occupying the central part of the bannat. Its area is 2460 square miles, with 244,000 inhabitants.

TEMPE, in ancient geography, a valley of Thessaly in Phthiotis, between Mount Olympus on the north, and Ossa on the south, through which the Peneus runs into the Ægean Sea. All the poets celebrate this valley as the most delightful spot on earth; with verdant walks, cool shady groves, and the melodious singing of birds, &c., and hence the name Tempe became proverbial for a pleasant spot. It was five miles long, but in some places not above an acre and a half broad. But Livy gives a quite different account of it, and says the Roman army were struck with horror in passing over the precipitous rocky chasm. Strabo accounts for the difference by the depredations of an earthquake. See Strabo ix. and Livy.

TEM'PER, *v. a.* & *n. s.*, TEM'PERAMENT, *n. s.*, TEMPERAMEN'TAL, *adj.*, TEM'PERANCE, *n. s.*, TEM'PERATE, *adj.*, TEM'PERATELY, *adv.*, TEM'PERATENESS, *n. s.*, TEM'PERATURE, TEM'PERED, *adj.* Fr. *temperer;* Lat. *tempero.* To mix so that one part qualifies the other; compound; bring to proper consistence or proportion: hence to soften; mollify; govern: the noun substantive means due mixture; middle course; mean constitution of body or mind; frame of mind; state to which certain metals are brought by art: temperament is also constitution; predominant disposition: the adjective corresponding: temperance, moderation; patience; calmness: temperate, moderate; unimpassioned: the adverb and noun substantive corresponding: temperature is natural constitution; degree of natural qualities; mediocrity; moderation: tempered is disposed in regard to the passions; adjusted, generally.

Prepare the sixth part of an ephah and the third part of an hin of oil, to *temper* with the fine flour.
Ezek. xlvi. 14.

Thy sustenance serving to the appetite of the eater, *tempered* itself to every man's liking.
Wisdom xvi. 21.

The potter *tempering* soft earth, fashioneth every vessel with much labour. *Id.* xv. 7.

His senseless speech and doted ignorance
When as the noble prince had marked well,
He calmed his wrath with goodly *temperance.*
Spenser.

Solon, in his laws to the Athenians, laboured to *temper* their warlike courage with sweet delights of learning and sciences: so that as much as the one excelled in arms, the other exceeded in knowledge.
Spenser on Ireland.

In that proud port, which her so goodly graceth,
Most goodly *temperature* you may descry. *Spenser.*

With which the damned ghosts he governeth,
And furies rules, and Tartare *tempereth.* *Id.*

When was my lord so much ungently *tempered,*
To stop his ears against admonishment?
Shakspeare.

If you could find out but a man
To bear a poison, I would *temper* it;
That Romeo should upon receipt thereof
Soon sleep in quiet. *Id.*

She's not forward, but modest as the dove:
She is not hot, but *temperate* as the morn. *Id.*

What! are you chafed?
Ask God for *temperance,* that's the appliance only
Which your disease requires. *Id. Henry VIII.*

Now will I to that old Andronicus,
And *temper* him with all the art I have. *Shakspeare.*

Here draw I
A sword, whose *temper* I intend to stain
With the best blood that I can meet withal. *Id.*

The brain may devise laws for the blood, but a hot *temper* leaps over a cold decree.
Id. Merchant of Venice.

Temperately proceed to what you would
Thus violently redress. *Shakspeare.*

Nothing better proveth the excellency of this soil and *temper* than the abundant growing of the palm trees. *Raleigh.*

Use a *temperate* heat; for they are ever *temperate* heats that digest and mature; wherein we mean *temperate,* according to the nature of the subject; for that may be *temperate* to fruits and liquors, which will not work at all upon metals. *Bacon.*

Birds that change countries at certain seasons, if they come earlier, shew the *temperature* of the weather.
Id.

As the world's sun doth effects beget
Different in divers places every day;
Here autumn's *temperature,* there summer's heat,
Here flowery spring-tide, and there winter grey.
Davies.

Restore yourselves unto your *tempers,* fathers,
And without perturbation hear me speak.
Ben Jonson.

It lieth in the same climate, and is of no other *temperature* than Guinea.
Abbot's Description of the World.

Langley's mild *temperateness*
Did tend unto a calmer quietness.
Daniel's Civil War.

This, I shall call it evangelical, *temper* is far from being natural to any corrupt child of Adam.
Hammond.

God esteems it a part of his service if we eat or drink; so it be *temperately,* and as may best preserve health. *Taylor.*

His sleep
Was airy, light, from pure digestion bred,
And *temperate* vapours bland. *Milton.*

Observe
The rule of not too much; by *temperance* taught
In what thou eatest and drinkest; seeking from thence
Due nourishment, not gluttinous delight. *Id.*

These soft fires with kindly heat
Of various influence foment and warm,
Temper or nourish. *Id.*

The sword
Of Michael from the armoury of God
Was given him *tempered* so, that neither keen
Nor solid might resist that edge. *Id.*

Remember with what mild
And gracious *temper* he both heard and judged,
Without wrath or reviling. *Id. Paradise Lost.*

The common law has wasted and wrought out those distempers, and reduced the kingdom to its just state and *temperament.* *Hale.*

Intellectual representations are received with as

unequal a fate, upon a bare *temperamental* relish or disgust. *Glanville.*

From *temperate* inactivity we are unready to put in execution the suggestions of reason.

Browne's Vulgar Errours.

That *temperamental* dignotions, and conjecture of prevalent humours, may be collected from spots in our nails, we concede. *Id.*

There may be as much difference as to the *temperature* of the air, and as to the heat and cold, in one mile, as in ten degrees of latitude; and he that would cool and refresh himself in the summer, had better go up to the top of the next hill, than remove into a far more northern country. *Id. Travels.*

Woman! Nature made thee
To *temper* man: we had been brutes without you.
Otway.

In the *tempering* of steel, by holding it but a minute or two longer or lesser in the other competent heat, gives it very different *tempers* as to brittleness or toughness. *Boyle.*

Temperance, that virtue without pride, and fortune without envy, gives indolence of body and tranquillity of mind; the best guardian of youth and support of old age. *Temple.*

Repeated peals they hear,
And, in a heaven serene, refulgent arms appear:
Reddening the skies, and glittering all around,
The *tempered* metals clash, and yield a silver sound.
Dryden.

This will keep their thoughts easy and free, the only temper wherein the mind is capable of receiving new informations. *Locke on Education.*

Bodies are denominated hot and cold, in proportion to the present *temperament* of that part of our body to which they are applied. *Locke.*

This body would be increased daily, being supplied from above and below; and, having done growing, it would become more dry by degrees, and of a temper of greater consistency and firmness.

Burnet's Theory of the Earth.

The good old knight, with a mixture of the father and master of the family, *tempered* the inquiries after his own affairs with kind questions relating to themselves. *Addison.*

By winds that *temperately* blow,
The bark should pass secure and slow. *Id.*

If, instead of this variation of heat, we suppose an equality or constant *temperature* of it before the deluge, the case would be much altered.

Woodward's Natural History.

Health itself is but a kind of *temper*, gotten and preserved by a convenient mixture of contrarieties.

Arbuthnot.

These needles should have a due *temper*; for, if they are too soft, the force exerted to carry them through the flesh will bend them; if they are too brittle, they snap. *Sharp.*

I advised him to be temperate in eating and drinking. *Wiseman.*

Teach me, like thee, in various nature wise,
To fall with dignity, with *temper* rise. *Pope.*

If the estates of some bishops were exorbitant before the reformation, the present clergy's wishes reach no further than that some reasonable *temper* had been used, instead of paring them so quick.

Swift's Miscellanies.

Memory depends upon the consistence and the *temperature* of the brain. *Watts.*

All irregular *tempers* in trade and business are but like irregular *tempers* in eating and drinking. *Law.*

Temperament, among physicians, is a certain disposition of the solids and fluids of the human body, by which it may be properly denominated strong, weak, lax, &c. In every person there is perhaps a temperament peculiar to himself, though the ancients only took notice of four, which indeed seem to have a real existence, and are capable of receiving an explanation. The two that are most distinctly marked are the sanguineous and melancholic, viz. the temperaments of youth and age. 1. Sanguineous.—Here there is laxity of solids, discoverable by the softness of hair and succulency; large system of arteries, redundancy of fluids, florid complexion; sensibility of the nervous power, especially to pleasing objects; irritability from the plethora; mobility and levity from lax solids. 2. Melancholic habit.—Here greater rigidity of solids occurs, discoverable by the hardness and crispature of the hair; small proportion of the fluids, hence dryness and leanness; small arteries, hence pale color; venous plethora, hence turgescency of these, and lividity; sensibility, frequently exquisite; moderate irritability, with remarkable tenacity of impressions; steadiness in action and slowness of motion, with great strength; for excess of this constitution in maniacs gives the most extraordinary instance of human strength we know. This temperament is most distinctly marked in old age, and in males. 3. The choleric temperament takes place between youth and manhood. In this the distribution of the fluids is more exactly balanced; there is less sensibility, and less obesity, with more irritability, proceeding from greater tension, less mobility and levity, and more steadiness in the strength of the nervous power. As to the 4. Phlegmatic, it cannot be distinguished by any characters of age or sex. It agrees with the sanguineous in laxity and succulency. It differs from that temperament and the melancholic, by the more exact distribution of the fluids. Again it differs from the sanguineous, by having less sensibility, irritability, mobility, and perhaps strength, though sometimes indeed this last is found to be great. These are the ancient temperaments. The temperaments indeed are much more various; and very far from being easily marked and reduced to their genera and species, from the great variety which is observable in the constitutions of different men. But the late Dr. Brown, among other bold assertions, insisted that there is no natural difference of constitution but what is occasioned by habit and accident.

Temperament, in music, is defined by Rousseau to be an operation, which, by a slight alteration in the intervals, causes the difference between two contiguous sounds to disappear, makes each of these sounds seem identical with the other, which, without offending the ear, may still preserve their respective intervals or distances one from the other. By this operation the scale is rendered more simple, and the number of sounds which would otherwise be necessarily retrenched. Had not the scale been thus modified, instead of twelve sounds alone, which are contained in the octave, more than sixty would be indispensably required to form what we properly call modulation in every tone. See Music.

TEMPERING, in the mechanic arts, the preparing of steel and iron, so as to render them

more compact, hard, and firm; or more soft and pliant, according to their respective occasions. See IRON and STEEL.

TEM'PEST. *n. s.* & *v. a.* TEMP'ESTBEATEN, *adj.* TEMP'ESTTOST, TEMPESTIV'ITY, *n. s.* TEMPEST'UOUS, *adj.* French *tempeste*; Lat. *tempestas*. The utmost violence of the wind: to disturb by a tempest. 'The names,' says Johnson, 'by which the wind is called according to the gradual increase of its force seem to be, a breeze; a gale; a gust; a storm; a tempest:' any commotion or storm: the two compounds following are of obvious meaning: tempestivity is a Latinism only used, as we find, by Brown for seasonableness: tempestuous is stormy; turbulent.

Tempestuous fortune hath spent all her spight,
And thrilling sorrow thrown his utmost dart.
Spenser.

I have seen *tempests*, when the scolding winds
Have rived the knotty oaks.
Shakspeare. Julius Cæsar.

The *tempest* in my mind
Doth from my senses take all feeling else,
Save what beats there. *Id. King Lear.*

Though his bark cannot be lost,
Yet it shall be *tempest-tost*. *Id. Macbeth.*

What at first was called a gust, the same
Hath now a storm's, anon a *tempest's* name. *Donne.*

Some have been driven by *tempest* to the south.
Abbot.

Part huge of bulk,
Wallowing unwieldy, enormous in their gait,
Tempest the ocean. *Milton.*

We, caught in a fiery *tempest*, shall be hurled
Each on his rock transfixed. *Id.*

Which of them rising with the sun, or falling,
Should prove *tempestuous*. *Id.*

Since their dispersion, the constitutions of countries admit not such *tempestivity* of harvest.
Browne's Vulgar Errours.

In the calm harbour of her gentle breast,
My *tempest-beaten* soul may safely rest.
Dryden's Aurengezebe.

Her looks grow black as a *tempestuous* wind,
Some raging thoughts are rowling in her mind.
Dryden.

Pompey, when dissuaded from embarking because the weather was *tempestuous*, replied, My voyage is necessary, my life is not so.
Collier on the Value of Life.

With clouds and storms
Around thee thrown, *tempest* o'er *tempest* rolled,
Thou humblest nature with thy northern blast.
Thomson.

TEMPESTA (Antony), an Italian painter, born at Florence in 1555. He studied under Strada, and excelled in landscapes with figures. He also engraved some prints. He died in 1630.

TEMP'LAR, *n. s.* TEM'PLE. From the Temple, a house near the Thames, anciently belonging to the knights templars, originally from the temple of Jerusalem. French, *temple*; Lat. *templum*. A student in the law: a building devoted to divine worship or to acts of religion.

The honoured gods
Throng our large *temples* with the shews of peace.
Shakspeare.

Most sacrilegious murther hath broke ope
The Lord's anointed *temple*, and stole thence
The life o' the' building. *Id. Macbeth.*

Wits and *templars* every sentence raise,
And wonder with a foolish face of praise.
Pope's Epistle.

TEMPLARS, TEMPLERS, or knights of the temple, a religious order instituted at Jerusalem in the beginning of the twelfth century, for the defence of the holy sepulchre, and the protection of Christian pilgrims. They were first called the poor of the holy city, and afterwards assumed the appellation of templars, because their house was near the temple. The order was founded by Baldwin II., king of Jerusalem, with the concurrence of the pope: and the principal articles of their rule were:—That they should hear the holy office throughout every day; or that, when their military duties should prevent this, they should supply it by a certain number of pater nosters; that they should abstain from flesh four days in the week, and on Fridays from eggs and milk meats; that each knight might have three horses and one esquire; and that they should neither hunt nor fowl. After the ruin of the kingdom of Jerusalem, about 1186, they spread themselves through Germany and other countries of Europe, to which they were invited by the liberality of the Christians. In 1228 this order acquired stability, by being confirmed in the council of Troyes, and subjected to a rule of discipline, drawn up by St. Bernard. In every nation they had a particular governor, called master of the temple, or of the militia of the temple. Their grand master resided at Paris. The order flourished for some time, and acquired, by the valor of its knights, immense riches and an eminent degree of military renown; but, as their prosperity increased, their vices multiplied, and their arrogance, luxury, and cruelty, rose at last to such a monstrous height, that their privileges were revoked, and their order suppressed, with the most terrible circumstances of infamy and severity. Their accusers were two of their own body, and their chief prosecutor Philip the Fair of France, who addressed his complaints to Clement V. The pope, though at first unwilling to proceed against them, was under a necessity of complying with the king's desire; so that, in 1307, upon an appointed day, and for some time afterwards, all the knights who were dispersed throughout Europe, were seized and imprisoned, and many of them, after trials for capital crimes, were convicted and put to death. In 1312 the whole order was suppressed by the council of Vienna. A part of the rich revenues they possessed was bestowed upon other orders, especially on the knights of St. John, now of Malta, and the rest confiscated to the respective treasuries of the sovereign princes in whose dominions their possessions lay.

TEMPLE (Sir William), an eminent statesman, born in London in 1628. His family was ancient, and assumed the surname of Temple from the manor of temple, in the hundred of Sparken Hall, Leicestershire. He was first sent to Pensehurst, in Kent, under his uncle, Dr. Hammond; but at ten he was removed to Bishop's Stortford, in Hertfordshire. In his seventeenth year he went to Cambridge, where he was placed under the tuition of Dr. Cudworth. After

acquiring a competency of French and Spanish, he was sent abroad to finish his education. Having resided two years in France, Mr. Temple made a tour through Holland, Flanders, and Germany. In 1654 he returned home, and married Miss Osborn, daughter of Sir Peter Osborn, of Chicksand. He rejected all offers of employment under Cromwell; but at the restoration, in 1690, being chosen a member of the Irish convention, while others were trying to make their court to the king, Mr. Temple opposed the poll-bill with so much spirit that his conduct soon attracted the attention of the public, and brought him into notice. In the next parliament, in 1661, he was elected with his father for the county of Carlow; and in 1662 was chosen one of the commissioners from that parliament to the king. Soon after he went back to Ireland, where he met with a very favorable reception from the duke of Ormond. In 1665 he was sent with a secret commission to the bishop of Munster, which he executed so much to the satisfaction of Charles II. that on his return to Brussels he appointed him resident there, and created him a baronet. In April 1666 he sent for his family; but, before their arrival, he had been again obliged to depart upon business to the prelate's court. Having finished his business at Munster he returned to Brussels, where he passed a year. In spring 1667, a new war breaking out between France and Spain, which exposed Brussels to danger, Sir William sent his lady and family to England; but he himself remained there with his sister till December 25th, when he was ordered by the king to come over privily to London. Taking the Hague in his way, he paid a visit to De Witt, and proposed those overtures which produced the triple alliance. Soon after his arrival at the British court, he returned, on the 16th of January, 1668, with the character of envoy extraordinary and plenipotentiary to Holland; where a conference being opened, he brought that treaty to a perfect conclusion in five days. The ratifications of this alliance being exchanged on the 15th of February, he repaired to Brussels; and a treaty being set on foot between France and Spain at Aix-la-Chapelle, he set out for that place on the 24th of April in quality of his majesty's ambassador extraordinary. He arrived on the 27th; and it was chiefly owing to his assistance that the Spaniards were brought to sign the articles of that peace on the 2d of May. He then returned to Brussels, with a view of remaining there in his former station of resident; but he received letters from the earl of Arlington, with the king's order to be his ambassador. Sir William upon this returned to England, and was received with every possible token of favor by the king. Setting out again for Holland, in his new character of ambassador, he arrived at the Hague in August, 1668; where he enjoyed the confidence of that great minister De Witt, and lived in great intimacy with the prince of Orange, then only eighteen years of age; but in September, 1669, he was hurried back to England by lord Arlington, and pressed to return to the Hague, and pave the way for a war with Holland. This, however, he refused to have any hand in; which so much provoked the lord treasurer Clifford that he refused to pay him an arrear of £2000 due from his embassy. Disgusted with Arlington's behaviour, Sir William returned to his house at Sheen, near Richmond, in Surrey. About the end of summer, however, 1673, the king, wishing to put an end to the war, sent for Sir William to negociate a peace; but, powers having been sent from Holland to the marquis de Fresno, the Spanish ambassador at London, Sir William was ordered to confer with him; and a treaty was concluded in three days, and the point carried respecting the superiority of the British flag, which had been so long contested. In June 1674 he was again sent ambassador to Holland to offer the king's mediation between France and the confederates, then at war, which was accepted soon after; lord Berkeley, Sir William Temple, and Sir Leoline Jenkins, being declared ambassadors and mediators; Nimeguen, which Sir William had proposed, was at length agreed upon by all parties to be the place of treaty. During his stay at the Hague, the prince of Orange, who was fond of the English language, constantly dined and supped once or twice a-week at his house; and by this familiarity he so much gained the prince's confidence and esteem, that he had a considerable hand in his marriage with the princess Mary, daughter of James II. In July, 1676, he removed his family to Nimeguen, and in 1677 his son was sent over with letters ordering him to return, and succeed Mr. Coventry as secretary of state. In consequence of this order, Sir William came over to England in spring 1677; and, though the affair of the secretaryship was dropped at his desire, he did not return to Nimeguen that year. About this time the prince of Orange came over, and married the princess Mary; and this gave occasion for a new coolness between lord Arlington and Sir William, as he and the lord treasurer Osborn, who was related to Sir William's lady, were only privy to that affair. After the prince and princess were gone to Holland, as the court seemed inclined to favor France, the king wished to engage Sir William in some negociations with that crown; but he was so ill satisfied with this proposal, that he offered to give up all pretensions to the office of secretary; and, desiring the lord treasurer to acquaint his majesty with his intentions, retired to Sheen, in hopes of being taken at his word. Upon a discovery, however, of the French designs not to evacuate the Spanish towns agreed by the treaty to be delivered up, the king commanded him to go upon a third embassy to the states; with whom he concluded a treaty; by which England engaged, in case France refused to evacuate the towns in forty days, to declare war immediately against that nation; but, before half that time was elapsed, one Du Cross was sent from the English court to Holland upon a business which damped all the good humor excited by the treaty there, and which produced such sudden changes here as gave Sir William a distaste for all public employments. In 1679 he went back to Nimeguen, where the French delayed to sign the treaty till the last hour; but,

having concluded it, he returned to the Hague, whence he was soon after sent for to enter upon the secretary's office, which Mr. Coventry at length resolved to resign. He accordingly came over and went to court, with a full intention of assuming his office; but he started a difficulty that he had not a seat in the house of commons; and, notwithstanding the king's repeated intreaties, refused to accept, but advised him to choose a council in whom he could confide, and upon whose abilities he could depend. This advice was followed, and, the choice of the persons being concerted between the king and Sir William, the old council was dissolved four days after, and the new one established, of which Sir William was a member. In 1680 the council began again to be changed on the king's illness, at the end of the summer, and the duke of York returned privately to court. In this juncture Sir William, endeavouring to restore to the king's favor some persons to whom he had taken a dislike, he met with such treatment as gave him a fresh distaste to the court; so that he resided principally at Sheen. Soon after this the king sent for him again; and, having proposed that he should go as ambassador into Spain, Sir William consented; but when his equipage was almost ready, and part of the money paid down for it, the king proposed to defer his journey till the end of the session of parliament, in which he was chosen a member for the university of Cambridge. In this session the spirit of party ran so high that it was impossible to bring the house to any temper. The duke was sent into Scotland; but nothing would satisfy them but a bill of exclusion, which Sir William strenuously opposed. Not long after this period, the parliament being dissolved by the king, without the advice of his privy council, and contrary to his promise, Sir William made a bold speech against it; for which he was very ill used by some of those who had been most earnest in promoting the last change in the ministry. Upon this he grew quite tired of public business, declined the offer he had of again serving for the university in the next parliament, that soon after met at Oxford; and, seeing the king resolved to govern without his parliament, and to supply his treasury through another channel, he retired to Sheen, resolving never more to meddle with public affairs. From that time Sir William lived at this place, till, having purchased a seat, called Moor-Park, near Farnham in Surrey, which he conceived a great fondness for, he resolved to spend the remainder of his life in this agreeable retreat. At the time of the revolution, in 1688, Moor-Park becoming unsafe, as it lay in the way of both armies, he went back to the house at Sheen, which he had given up to his son. When the prince reached Windsor, he went thither to wait upon his highness, and carried his son along with him. The prince pressed him to enter into his service, and to be secretary of state; but, his age and infirmities confirming him in the resolution he had made not to meddle any more with public affairs, he was satisfied that his son alone should enjoy his majesty's favor. Mr. John Temple was appointed secretary at war; but he had hardly been a week in that office when he drowned himself. In 1694 Sir William lost his lady. After this he lived four years, very much afflicted with the gout; and died in January 1698. His body was interred in Westminster Abbey, and a marble monument erected in 1722. Sir William's principal works are, 1. Memoirs from 1672 to 1692. 2. Remarks upon the State of the United Provinces. 3. An Introduction to the History of England. 4. Letters written during his last embassies: and, 5. Miscellanies, which contain many curious pieces. He was an accomplished gentleman, a sound politician, a patriot, and a scholar.

A Temple is a public building erected in honor of some deity, either true or false; and wherein the people meet to pay religious worship. The word is formed from the Latin templum, the Greek τεμενος, signifying the same thing; from τεμνω, I separate, as a temple is a place separated from common uses. Others with more probability derive it from the old Latin word templare, to contemplate. It is certain the ancient augurs gave the name templa to those parts of the heavens which were marked out for the observation of the flight of birds. Their formula was, Templa tesqua sunto. Temples were originally all open, and hence received their name. See Philosophical Transactions No. 471, sect. 5, where we have an account of an ancient temple in Ireland of the same sort as Stonehenge.

Templum, among the old Romans, signified a place consecrated by the augurs, whether enclosed or open, in the city or in the fields. Clemens Alexandrinus and Eusebius refer the origin of temples to the sepulchres built for the dead. This notion has been lately illustrated and confirmed by Mr. Farmer in his Treatise on the Worship of Human Spirits, p. 373, &c. Herodotus and Strabo say, the Egyptians were the first who built temples to the gods. The first erected in Greece is ascribed to Deucalion, by Apollonius, Argonaut. lib. iii. The Druids and others of the ancients performed their sacrifices in all places indifferently, from a persuasion that the whole world is the temple of God, and that he required no other. This was the doctrine of the magi, followed by the Persians, the Scythians, the Numidians, and many other nations mentioned by Herodotus, lib. i, Strabo, lib. xv, and Cicero in Verrem. 2. The Romans had several kinds of temples; whereof those built by the kings, &c., consecrated by the augurs, and wherein the exercise of religion was regularly performed, were called, by way of eminence, templa. Those that were not consecrated were called ædes. The little temples, that were covered or roofed, they called ædiculæ. Those open sacella. Some other edifices, consecrated to particular mysteries, they called fana and delubra. The most celebrated temples among the Romans were the Capitol and Pantheon. They had also the temple of Saturn, which served for the public treasury; and the temple of Janus. The Indian temples, or pagodas, are sometimes of a prodigious size. They are commonly erected near the banks of the Ganges, Kistna, or other sacred rivers, for the benefit of ablution in the purifying stream. Where no river

flows near the foot of the pagoda, there is invariably in the front of it a large tank or reservoir of water. These are, for the most part, of a quadrangular form, are lined with freestone or marble, have steps regularly descending from the margin to the bottom, and Mr. Crauford observed many between 300 and 400 feet in breadth. At the entrance of all the more considerable pagodas there is a portico, supported by rows of lofty columns, and ascended by a handsome flight of stone steps; sometimes, as in the instance of Tripetti, to the number of more than a hundred. Under this portico, and in the courts that generally enclose the whole building, an innumerable multitude assemble at the rising of the sun; and, having bathed in the stream below, and, in conformity to an immemorial custom over all the east, having left their sandals on the border of the tank, impatiently await the unfolding of the gates by the ministering brahmin. The gate of the pagoda universally fronts the east, to admit the rays of the solar orb; and, opening, presents to the view an edifice partitioned out, according to M. Thevenot in his account of Chitanagar, in the manner of the ancient cave temples of Elora, having a central nave or body; a gallery ranging on each side; and, at the farther end, a sanctuary, or chapel of the deity adored, surrounded by a stone balustrade to keep off the populace. Those who wish to peruse a more particular account of the Indian temples may consult Maurice's Indian Antiquities. See also PAGODA and SERINGHAM.

The TEMPLE AT JERUSALEM was similar in its plan to the tabernacle. The first temple was begun by Solomon about A. M. 2992, and A. A. C. 1012, and finished in eight years. It consisted of the holy of holies, the sanctuary, and a portico. The holy of holies was a square room of twenty cubits; the sanctuary, or holy place, was forty cubits long, and twenty broad, consequently the length of both these together was sixty cubits. The portico, which stood before the sanctuary, was twenty cubits long, and ten broad. The whole length of the temple, computing the cubit at twenty-two inches, did not exceed 110 feet in length, and thirty-six feet eight inches in breadth. In the portico stood the two brazen pillars called Jachin and Boaz, which appear to have been forty cubits high, and about four in diameter. The court about the tabernacle was 100 cubits long, and fifty broad; and, as Solomon made every part of the temple about twice as large as the corresponding part in the tabernacle, we may conclude, that the court around the temple was 200 cubits long, and 100 broad. According to this description, the temple of Solomon was by no means so large as it is commonly represented. Still, however, it was very magnificent in size, and splendid in ornament. It was plundered of its treasures in the reign of Rehoboam, and repaired by Joash; it was again spoiled in the time of Ahaz and of Hezekiah; and, after being restored by Josiah, was demolished by Nebuchadnezzar in A. M. 3416, after it had stood 476 years according to Josephus, and, according to Usher, 428 years. The second temple was built by the Jews, after their return from the Babylonish captivity, under the direction of Zerubbabel their governor, and of Joshua the high priest, with the encouragement of Cyrus the Great to whom Judea was become a tributary kingdom. This temple was destitute of five remarkable appendages, which were the chief glory of the first temple; viz. the ark and mercy-seat, the shechinah, the holy fire on the altar, which had been first kindled from heaven, the urim and thummim, and the spirit of prophecy. This temple was plundered and profaned by Antiochus Epiphanes (see JEWS), but afterwards purified by Judas Maccabæus, who restored the divine worship; and, after having stood 500 years, rebuilt by Herod, with a magnificence approaching to that of Solomon's. Tacitus calls it immensæ opulentiæ templum; and Josephus says, it was the most astonishing structure he had ever seen, as well on account of its architecture as its magnitude, and the richness and magnificence of its various parts and sacred appurtenances. This temple, which Herod began to build about sixteen years before the birth of Christ, and so far completed in nine years and a half as to be fit for divine service, was at length destroyed by the Romans on the same month and day of the month on which Solomon's temple was destroyed by the Babylonians.

TEMPLES, in architecture. The ancient temples were distinguished, with regard to their construction, into various kinds; as templum in antis, or Ædes in antis. These, according to Vitruvius, were the most simple of all temples, having only angular pilasters, called antæ or parastatæ, at the corners, and two Tuscan columns on each side of the doors. Temple, tetrastyle, or simply tetrastyle, was a temple that had four columns in front, and as many behind. Such was the temple of Fortuna Virilis at Rome. Temple, prostyle, that which had only columns in its front or fore-side; as that of Ceres at Eleusis in Greece. Temple, amphiprostyle, or double prostyle, that which had columns both before and behind, and which was also tetrastyle. Temple, periptere, that which had four rows of insulated columns around, and was hexastyle, i. e. had six columns in front; as the temple of Honor at Rome. Temple, diptere, that which had two wings, and two rows of columns around, and was also octostyle, or had eight columns in front; as that of Diana at Ephesus.

TEM'PLES, *n. s.* Lat. *tempora.* The upper part of the sides of the head where the pulse is felt.

> Her sunny locks
> Hang on her *temples* like a golden fleece.
> *Shakspeare.*

> The weapon entered close about his ear,
> Cold through his *temples* glides the whizzing spear.
> *Pope.*

> We may apply intercipients of mastich upon the *temples*; frontals also may be applied.
> *Wiseman's Surgery.*

> To procure sleep, he uses the scratching of the *temples* and ears; that even mollifies wild beasts.
> *Arbuthnot.*

TEMPLES, in anatomy, a double part of the head, reaching from the forehead and eyes to the two ears. The temples are chiefly formed of two bones called ossa temporis. These parts, accord

ing to physicians, were called tempora, from their showing the age or time of a man by the color of the hair, which turns white in this part before any other; which Homer seems to have been aware of, by his calling men poliocrotaphi, i. e. gray templed.

Temples also denote two inns of court in London, thus called, because anciently the dwelling-house of the knights-templars. At the suppression of that order, they were purchased by the professors of the common law, and converted into hospitia or inns. They are called the inner and middle temple, in relation to Essex-house; which was also a part of the house of the templars, and called the outer temple, because situated without Temple Bar. In the middle temple, during the time of the templars, the king's treasure was kept; as was also that of the kings of France in the house of the templars at Paris. The chief officer was the master of the temple, who was summoned to parliament in 47 Hen. III.; and from him the chief minister of the temple church is still called master of the temple.

TEMP'LET, *n. s.* A diminutive of temple. A piece of timber in a building.

When you lay any timber on brick-work, as lintels over windows, or *templets* under girders, lay them in loom. *Moxon's Mechanical Exercises.*

TEM'PORAL, *adj.* Temporal'ity, *n. s.* Tem'porals, Tem'porally, *adv.* Temporal'ty, *n. s.* Tem'porary, *adj.* Fr. *temporal;* low Lat. *temporalis.* Measured by time; not eternal; not spiritual; placed at the temples: temporality and temporals mean temporal or secular possessions: temporalty, the laity; secular people: temporary, lasting only for a limited time.

As there they sustain *temporal* life, so here they would learn to make provision for eternal. *Hooker.*

All the *temporal* lands which men devout
By testament have given to the church,
Would they strip from us. *Shakspeare. Henry V.*

Call not every *temporal* end a defiling of the intention, but only when it contradicts the ends of God, or when it is principally intended: for sometimes a *temporal* end is part of our duty; and such are all the actions of our calling. *Taylor.*

The residue of these ordinary financies is casual, as the *temporalities* of vacant bishopricks, the profits that grow by the tenures of lands. *Bacon.*

These *temporary* truces were soon made and soon broken; he desired a straighter amity. *Id. Henry VII.*

The pope sucked out inestimable sums of money, to the intolerable grievance of clergy and *temporalty.* *Abbot.*

If the Lord's immediate speaking, uttering, and writing, doth conclude, by a necessary inference, that all precepts uttered and written in this manner are simply and perpetually moral; then, on the contrary, all precepts wanting this are merely *temporary.* *White.*

There is scarce any of those decisions but gives good light, by way of authority or reason, to some questions that arise also between *temporal* dignities, especially to cases wherein some of our subordinate *temporal* titles have part in the controversy. *Selden.*

Such revenues, lands, and tenements, as bishops have had annexed to their sees by the kings and others from time to time, as they are barons and lords of the parliament. *Cowell.*

Sinners, who are in such a *temporally* happy condition, owe it not to their sins, but wholly to their luck. *South.*

The king yielded up the point, reserving the ceremony of homage from the bishops, in respect of the *temporalities,* to himself. *Ayliffe.*

The republick, threatened with danger, appointed a *temporary* dictator, who, when the danger was over retired again into the community. *Addison.*

Prayer is the instrument of fetching down all good things to us, whether spiritual or *temporal.* *Duty of Man.*

Our petitions to God, with regard to *temporals,* must be that medium of convenience proportioned to the several conditions of life. *Rogers's Sermons.*

Copious bleedings, by opening the *temporal* arteries, are the most effectual remedies for a phrensy. *Arbuthnot on Aliments.*

All *temporal* power hath been wrested from the clergy, and much of their ecclesiastick. *Swift.*

Temporal Arteries, the arteries of the temples. See Anatomy, Index, and Temples.

Temporalty. Those of bishops are the revenues, lands, tenements, and lay fees, belonging to bishops, as they are barons and lords of parliament. The custody of the temporalties of bishops forms a branch of the king's ordinary revenues. These, upon the vacancy of the bishopric, are immediately the right of the king, as a consequence of his prerogative in church matters; whereby he is considered as the founder of all archbishoprics and bishoprics, to whom, during the vacancy, they revert. This revenue of the king, which was formerly very considerable, is now by a customary indulgence almost reduced to nothing: for, at present, as soon as the new bishop is consecrated and confirmed, he usually receives the restitution of his temporalties quite entire and untouched from the king; and then, and not sooner, he has a fee-simple in his bishopric, and may maintain an action for the profits.

TEM'PORIZE, *v. n.* Tempori'zer, *n. s.* Fr. *temporiser;* Lat. *tempus.* To delay; procrastinate; comply with the times; compound: the noun substantive corresponds.

If Cupid hath not spent all his quivers in Venice, thou wilt quake for this shortly.
—I look for an earthquake too then.
—Well, you will *temporise* with the hours. *Shakspeare.*

The dauphin is too wilful opposite,
And will not *temporize* with my entreaties:
He flatly says, he'll not lay down his arms. *Id.*

I pronounce thee a hovering *temporizer,* that
Canst with thine eyes at once see good and evil,
Inclining to them both. *Id. Winter's Tale.*

The earl of Lincoln, deceived of the country's concourse, in which case he would have *temporised,* resolved to give the king battle. *Bacon's Henry VII.*

They might their grievance inwardly complain,
But outwardly they needs must *temporize.* *Daniel.*

TEMPT, *v. a.* Tempt'able, *adj.* Tempta'tion, *n. s.* Tempt'er. Fr. *tenter;* Lat. *tento.* To incite; entice; solicit to ill; try; attempt: the adjective and noun substantives corresponding.

Come together, that Satan *tempt* you not. 1 *Cor.* vii. 5.

'Tis not the king that sends you to the Tower:
My lady Gray *tempts* him to this harsh extremity. *Shakspeare.*

I'm much too vent'rous
In *tempting* of your patience. *Id. Henry VIII.*

Set a deep glass of rhenish wine on the contrary casket; for if the devil be within, and that *temptation* without, he will chuse it. *Id. Merchant of Venice.*

Is this her fault or mine?
The *tempter* or the *tempted*, who sins most?
Not she; nor doth she *tempt*.
Id. Measure for Measure.

The experience of our own frailties, and the watchfulness of the *tempter*, discourage us.
Hammond's Fundamentals.

When by human weakness and the arts of the *tempter*, you are led into *temptations*, prayer is the thread to bring you out of this labyrinth. *Duppa.*

He that hath not wholly subdued himself, is quickly *tempted* and overcome in small things.
Bishop Taylor.

Fixed on the fruit she gazed, which to behold
Might *tempt* alone. *Milton.*
Still his strength concealed
Which *tempted* our attempt, and wrought our fall. *Id.*
All *temptation* to transgress repel. *Id.*
Foretold what would come to pass,
When first this *tempter* crossed the gulf from hell.
Id.

Those who are bent to do wickedly will never want *tempters* to urge them on. *Tillotson.*

Withhold
Your talons from the wretched and the bold;
Tempt not the brave and needy to despair;
For, though your violence should leave 'em bare
Of gold and silver, swords and darts remain.
Dryden.

This from the vulgar branches must be torn,
And to fair Proserpine the present born,
Ere leave be given to *tempt* the nether skies. *Id.*

Dare to be great without a guilty crown;
View it and lay the bright *temptation* down:
'Tis base to seize on all. *Id. Aurengzebe.*

My work is done:
She's now the *tempter* to ensnare his heart. *Dryden.*

The devil can but *tempt* and deceive; and, if he cannot destroy so, his power is at an end. *South.*

O wretched maid!
Whose roving fancy would resolve the same
With him who next should *tempt* her easy fame.
Prior.

The roving crew,
To *tempt* a fair clothe all their tilts in blue. *Gay.*

If the parliament were as *temptable* as any other assembly, the managers must fail for want of tools to work with. *Swift.*

TEMSENA, a province in the empire of Morocco, bordering on the Atlantic, is very productive in corn, and abounds in cattle. The best cavalry in the empire are found in this province. The men are a strong, robust, copper race, while the women possess a great share of beauty. The very name is said to signify the salubrity of the air, being derived from the two words Tamam Sana, 'once a year,' to express that such a residence is sufficient to restore health to the invalid. In the forests is found a kind of resinous cedar, a remarkably hard and incorruptible wood. The inhabitants of this province, with that of Shawia, which is contiguous, and closely connected, are stated by Mr. Jackson at 1,160,000.

TEN, *adj.* Sax. tȳn; Goth. and Belg. *tien.* The decimal number; twice five, the number by which we multiply numbers into new denominations; a proverbially large number.

Thou shalt have more
Than two *tens* to a score. *Shakspeare. King Lear.*

Ten hath been extolled as containing even, odd, long, and plain, quadrate and cubical numbers; and Aristotle observed, that Barbarians as well as Greeks used a numeration unto *ten*.
Browne's Vulgar Errours.

With twice *ten* sail I crossed the Phrygian sea,
Scarce seven within your harbour meet. *Dryden.*

There's a proud modesty in merit,
Averse from begging; and resolved to pay
Ten times the gift it asks. *Id. Cleomenes.*

From the soft lyre,
Sweet flute, and *ten*-stringed instrument, require
Sounds of delight. *Prior.*

Although English is too little cultivated, yet the faults are nine in *ten* owing to affectation.
Swift's Miscellanies.

TEN'ABLE, *adj.* Fr. *tenable.* Such as may be maintained against opposition or attack.

The town was strong of itself, and wanted no industry to fortify and make it *tenable*.
Bacon's War with Spain.

Sir William Ogle seized upon the castle, and put it into a *tenable* condition. *Clarendon.*

Infidelity has been driven out of all its out-works; the Atheist has not found his post *tenable*, and is therefore retired into Deism. *Addison's Spectator*

TENA'CIOUS, *adj.* Lat. *tenax.* Grasping hard; inclined to hold fast; retentive; cohesive; not willing to let go; with *of* before the thing held: the adverb and noun substantives corresponding.
TENA'CIOUSLY, *adv.*
TENA'CIOUSNESS, *n. s.*
TENA'CITY.

Some things our juvenile reasons *tenaciously* adhere to, which yet our maturer judgments disallow of.
Glanville.

Griping, and still *tenacious* of thy hold,
Would'st thou the Grecian chiefs, though largely souled,
Should give the prizes they had gained? *Dryden.*

True love's a miser; so *tenacious* grown,
He weighs to the least grain of what's his own. *Id.*

Men are *tenacious* of the opinions that first possess them. *Locke.*

A resolute *tenacious* adherence to well chosen principles, makes the face of a governor shine in the eyes of those that see his actions. *South.*

Three equal round vessels filled, the one with water, the other with oil, the third with molten pitch, and the liquors stirred alike to give them a vertical motion; the pitch by its *tenacity* will lose its motion quickly, the oil being less *tenacious* will keep it longer, and the water being less *tenacious* will keep it longest, but yet will lose it in a short time.
Newton.

If many contiguous vortices of molten pitch were each of them as large as those which some suppose to revolve about the sun and fixed stars, yet these and all their parts would, by their *tenacity* and stiffness, communicate their motion to one another till they all rested among themselves. *Id.*

He is *tenacious* of his own property, and ready to invade that of others. *Arbuthnot.*

Substances, whose *tenacity* exceeds the powers of digestion, will neither pass, nor be converted into aliment. *Id.*

When winter soaks the fields, and female feet,
Too weak to struggle with *tenacious* clay,
Or ford the rivulets, are best at home,
The task of new discoveries falls on me. *Cowper.*

TENACITY, in natural philosophy, is that quality of bodies by which they sustain a consider-

able pressure or force of any kind without breaking. It is the quality opposite to fragility or brittleness. See STRENGTH.

TENACULUM, in surgery, an instrument used in amputation, for pulling out bleeding vessels that are to be tied by ligatures. See SURGERY, Index.

TENAILLES, and TENAILLIONS. See FORTIFICATION.

TEN'ANCY, *n. s.* Old Fr. *tenanche;* law Lat. *tenentia,* from tenant. Temporary possession of what belongs to another.

This duke becomes seized of favour by descent, though the condition of that estate be commonly no more than a *tenancy* at will. *Wotton.*

TEN'ANT, *n. s.* & *v. a.* TEN'ANTABLE, *adj.* TEN'ANTLESS. Fr. *tenant.* One that holds of another; one that on certain conditions has temporary possession and use of that which is the property of another: correlative to landlord; the adjectives corresponding.

I have been your *tenant,*
And your father's *tenant,* these fourscore years.
Shakspeare.

O thou, that dost inhabit in my breast,
Leave not the mansion so long *tenantless;*
Lest growing ruinous the building fall,
And leave no memory of what it was! *Id.*

The ruins that time, sickness, or melancholy, shall bring, must be made up at your cost; for that thing a husband is but *tenant* for life in what he holds, and is bound to leave the place *tenantable* to the next that shall take it. *Suckling.*

That the soul may not be too much incommoded in her house of clay, such necessaries are secured to the body as may keep it in *tenantable* repair.
Decay of Piety.

The English being only *tenants* at will of the natives for such conveniency of fishing. *Heylyn.*

O fields, O woods, oh when shall I be made
The happy *tenant* of your shade! *Cowley.*

Such is the mold, that the blest *tenant* feeds
On precious fruits, and pays his rent in weeds.
Waller.

Jupiter had a farm long for want of a *tenant.*
L'Estrange.

Sir Roger's estate is *tenanted* by persons who have served him or his ancestors. *Addison.*

His cheerful *tenants* bless their yearly toil,
Yet to their lord owe more than to the soil. *Pope.*

The father is a tyrant over slaves and beggars, whom he calls his *tenants.* *Swift.*

The bear, rough *tenant* of these shades. *Thomson.*

The *tenants* of a manor fall into the sentiments of their lord. *Watts.*

The beams of April, ere it goes,
A worm, scarce visible, disclose;
All winter long content to dwell
The *tenant* of his native shell. *Cowper.*

Kind souls! to teach their *tenantry* to prize
What they themselves, without remorse, despise:
Nor hope have they, nor fear of aught to come,
As well for them had prophecy been dumb. *Id.*

TENANT, in English law, is used with divers additions; thus, tenant in dower, is she that possesses land by virtue of her dower. Tenant by statute-merchant, he that holds land by virtue of a statute forfeited to him. Tenant in frank-marriage, he that holds lands or tenements by virtue of a gift thereof made to him upon marriage between him and his wife. Tenant by the curtesy, he that holds for his life, by reason of a child begotten by him of his wife, being an inheritrix, and born alive. Tenant by elegit, that holds by virtue of the writ called an elegit. Tenant in mortgage, that holds by means of a mortgage. Tenant by the verge, in ancient demesne, who is admitted by the rod in the court of ancient demesne. Tenant by copy of court-roll, who is admitted tenant of any lands, &c., within a manor, which, time out of mind, had been demisable according to the custom of the manor. Tenant by charter, that holdeth by feoffment in writing, or other deed. There were also tenants by knights'-service, tenant in burgage, tenant in soccage, tenant in frank-fee, tenant in villeinage: so there is tenant in fee-simple; tenant in fee-tail; tenant at the will of the lord, according to the custom of the manor; tenant at will by the common law; tenant upon sufferance; tenant of estate of inheritance; tenant in chief, that holdeth of the king in right of his crown; tenant of the king's, he that holds of the person of the king, or has some honor; very tenant, that holds immediately of his lord, Kitch. fol. 99; tenant per-avail, the lowest tenant of the fee who is tenant to one who holds over of another. F. N. B. 135. So there are also joint-tenants, that have equal right in lands and tenements by virtue of one title; tenants in common, that have equal right, but hold by divers titles; particular tenant, as tenant for years, for life, &c., that holds only for his term; sole tenant, he that hath no other joined with him; several tenant, as opposite to joint-tenant, or tenant in common.

And there is tenant to the præcipe, in case of fines and recoveries; tenant in demesne, which is he that holdeth the demesnes of a manor for a rent, without service; tenant on service, he that holdeth by service; tenants by execution, that hold lands by virtue of an execution upon any statute, recognisance, &c., with divers others — Cowell.

TENANTS IN COMMON, are such as hold by several and distinct titles, but by unity of possession; because none knoweth his own severalty, and therefore they all occupy promiscuously. This tenancy therefore happens, where there is a unity of possession merely, but perhaps an entire disunion of interest, of title, and of time. For, if there be two tenants in common of lands, one may hold his part in fee-simple, the other in tail, or for life; so that there is no necessary unity of interest: one may hold by descent, the other by purchase; or the one by purchase from A., the other by purchase from B.; so that there is no unity of title. One's estate may have been vested fifty years, the other's but yesterday; so there is no unity of time. The only unity there is, is that of possession: and for this Littleton gives the true reason, because no man can certainly tell which part is his own. otherwise, even this would be soon destroyed.—2 Comm. c. 12.

Tenancy in common may be created, either by the destruction of two estates, in joint-tenancy and co-parcenary, or by special limitation in a deed. By the destruction of the two estates mentioned is intended such destruction as does not sever the unity of possession, but only the

unity of title or interest. as, if one of two joint-tenants in fee alienes his estate for the life of the alienee, the alienee and the other joint-tenant are tenants in common; for they now have several titles, the other joint-tenant by the original grant, the alienee by the new alienation; and they also have several interests, the former joint-tenant in fee-simple, the alienee for his own life only. Litt. s. 293. So, if one joint-tenant gives his part to A. in tail, and the other gives his to B. in tail, the donees are tenants in common, as holding by different titles and conveyances. Litt. s. 292. If one or two parceners alienes, the alienee and the remaining parcener are tenants in common; because they hold by different titles, the parcener by descent, the alienee by purchase. Litt. s. 309. So likewise, if there be a grant to two men, or two women, and the heirs of their bodies, here the grantees shall be joint-tenants of the life-estate, but they shall have several inheritances; because they cannot possibly have one heir of their two bodies, as might have been the case had the limitation been to a man and a woman, and the heirs of their bodies begotten: and, in this and the like cases, their issues shall be tenants in common; because they must claim by different titles, one as heir of A., and the other as heir of B.; and those too not titles by purchase, but descent. See Litt. s. 283. In short, whenever an estate in joint-tenancy or coparcenary is dissolved, so that there be no partition made, but the unity of possession continues, it is turned into a tenancy in common. 2 Comm. c. 12. A tenancy in common may also be created by express limitation in a deed: but here care must be taken not to insert words which imply a joint estate; and then if lands be given to two or more, and it be not joint-tenancy, it must be a tenancy in common. Land given to two, to be holden, the one moiety to one, and the other moiety to the other, is an estate in common; and, if one grants to another half his land, the grantor and grantee are also tenants in common: because joint-tenants do not take by distinct halves or moieties; and by such grants the division and severalty of the estate is so plainly expressed that it is impossible they should take a joint interest in the whole of the tenements. But a devise to two persons to hold jointly and severally has been held to be a joint-tenancy; because that is necessarily implied in the word 'jointly;' the word 'severally,' perhaps only implying the power of partition: and an estate given to A. and B., equally to be divided between them, though in deeds it hath been said to be a joint-tenancy (for it implies no more than the law has annexed to that estate, viz. divisibility), yet in wills it is certainly a tenancy in common, because the devisor may be presumed to have meant what is most beneficial to both the devisees, though his meaning is imperfectly expressed. See 1 Eq. Ab. 291: 1 P. Wms. 17: 3 Rep. 39: 1 Vent. 32. And this nicety in the wording of grants makes it the most usual as well as the safest way (in them as well as in wills), when a tenancy in common is meant to be created, to add express words of exclusion as well as description, and limit the estate to A and B., to hold as tenants in common and not as joint-tenants.

The tenure of joint-tenants, though formerly favored in law, is now considered as odious. In consequence of this, in wills, the expressions, equally to be divided, share and share alike, respectively between and amongst, have been held to create a tenancy in common. And there seems but little doubt that the same construction would now be put even upon the word severally: but these words certainly are only evidence of intention, and will not create a tenancy in common, where the contrary, from the other parts of the will, appears to be the manifest intention of the testator.—3 Bro. C. R. 215.

As to the incidents attending a tenancy in common: tenants in common (like joint-tenants) are compellable by the statutes 31 Hen. VIII. c. 1; 32 Hen. VIII. c. 32, to make partition of their lands; which they were not at common law. They properly take by distinct moieties, and have no entirety of interest; and therefore there is no survivorship between tenants in common. Their other incidents are such as merely arise from the unity of possession; and are therefore the same as appertain to joint-tenants merely upon that account: such as being liable to reciprocal actions of waste and of account, by the stats. Westm. 2, c. 22: 4 Ann. c. 16, and see 8 Term Rep. K. B. 145.—For by the common law no tenant in common was liable to account with his companion for embezzling the profits of the estate; though, if one actually turns the other out of possession, an action of ejectment will lie against him.—1 Inst. 199, 200. See 2 Comm. c. 12. Adverse possession, or the uninterrupted receipt of the rents and profits, is now held to be evidence of an actual ouster. And where one tenant in common has been in undisturbed possession for twenty years, in an ejectment brought against him by the co-tenant, the jury will be directed to presume an actual ouster, and consequently to find a verdict for the defendant. —Cowp. 217. Other incidents of joint-tenants, which arise from the privity of title, or the union and entirety of interest (such as joining or being joined in actions, unless in the case where some entire or indivisible thing is to be recovered), these are not applicable to tenants in common, whose interests are distinct, and whose titles are not joint, but several.

Estates in common can only be dissolved two ways. 1. By uniting all the titles and interests in one tenant, by purchase or otherwise; which brings the whole to one severalty. 2. By making partition between the several tenants in common, which gives them all respective severalties. For indeed tenancies in common differ in nothing from sole estates, but merely in the blending and unity of possession.

TENANT-SAW seems rather to be derived from tenant, and it is a principal instrument used in that branch of carpentry.

TENAR, or Thenar, in anatomy, the muscle, which draws the thumb from the fingers, called also abductor brevis pollicis, and abductor pollicis manus. See Abductor, and Anatomy.

TENASSERIM, or Tanengsari, a district in the Birman empire, extending along the sea coast from 11° to 14° N. lat. The west coast is protected from the south-west monsoon, by a

connected barrier of islands, extending 135 miles from north to south, with a strait between them and the main land, from fifteen to thirty miles broad. The language of the inhabitants, denominated Tinnaw by the Siamese, differs considerably from the common Birman, and has many peculiarities. The natives are named by the Birmans Dawayza and Byeitza, from the two governments of which their country consists. They have most frequently been subject to Siam and Pegu.

Tenasserim, a post town in the Birman empire, the capital of a province of the same name. Lat. 11° 42′ N., long. 98° 50′ E. In 1688 the court of directors of the East India Company ordered their servants at Madras to endeavour to obtain possession of it from the king of Siam, and to fortify it. In 1759 it was taken from the Siamese by Alompra, the Birman monarch, after a feeble resistance. It was then a flourishing place.

TENBURY, a market town of Doddingtree hundred, Worcestershire, situate on the river Teme, which divides it from Salop. Nine miles north-east from Leominster, and 134 north-west from London. The town is well built and partly paved. Over the Teme is a neat stone bridge of six arches. The church has a square tower, with six bells. The corn-market is an ancient building; but the butter-cross modern and convenient. The trade of the town is principally in hops, cyder, and the tanning of leather. The Leominster canal runs at a short distance. Market on Tuesday. Fairs, April 25th, July 18th, and September 26th. Here are annual horse-races.

TENBY, or Tenbigh, a sea-port town of South Wales in Pembrokeshire, with markets on Wednesdays and Saturdays. It is a rapidly improving and beautiful bathing place, and is remarkable for the exquisitely romantic and picturesque charms of its situation, being on the western edge of the fine bay of Caermarthen, with a harbour capable of sheltering vessels of 200 or 300 tons burden. The Tenby season usually commences in May and ends in October. It is ten miles east of Pembroke, and 250 west of London, and shares with Pembroke and other places in sending a member to parliament.

TENCH, *n. s.* Sax. tince; Lat. *tinca.* A pond fish.

Having stored a very great pond with carps, *tench*, and other pond-fish, and only put in two small pikes, this pair of tyrants in seven years devoured the whole. *Hale.*

Tench, in ichthyology. See Cyprinus.

TENCHTHERI, an ancient nation of Germany, who often changed the place of their residence. Tacitus, Ann. xiii. c. 56, H. iv. c. 21.

TEND, *v. a.* & *v. n.* Ten'dance, *n. s.* Ten'dence, Ten'dency. } Contracted from attend. To accompany as an assistant or defender; watch; guard: as a verb neuter, move toward a given point; to aim at; contribute; wait; attend: tendance is, state of or persons attending; care; act of tending: tendence and tendency, direction; course; drift.

Unhappy wight, born to disastrous end,
That doth his life in so long *tendance* spend! *Spenser.*

Nymphs of Mulla which, with careful heed,
The silver scaly trouts did *tend* full well.
Id. Epithal.

Go thou to Richard, and good angels *tend* thee!
Shakspeare.

She purposed,
By watching, weeping, *tendance*, to
Overcome you with her shew. *Id. Cymbeline.*

The bark is ready, and the wind at help;
The associates *tend*. *Id. Hamlet.*

His lobbies fill with *tendance*,
Rain sacrificial whisperings in his ear! *Shakspeare.*

Give him *tending*,
He brings great news. *Id.*

They had a view of the princess at a mask, having overheard two gentlemen *tending* towards that sight. *Wotton.*

Many times that which we ask would, if it should be granted, be worse for us, and perhaps *tend* to our destruction; and then God, by denying the particular matter of our prayers, doth grant the general matter of them. *Hammond.*

It is not much business that distracts any man, but the want of purity, constancy, and *tendency* towards God. *Taylor.*

The greater congruity or incongruity there is in any thing to the reason of mankind, and the greater *tendency* it hath to promote or hinder the perfection of man's nature, so much greater degrees hath it of moral good or evil; to which we ought to proportion our inclination or aversion. *Wilkins.*

Despair
Tended the sick, busiest from couch to couch.
Milton.

Admiration seized
All heaven, what this might mean and whither *tend*.
Id.

They at her coming sprung,
And touched by her fair *tendance* gladlier grew. *Id.*

The laws of our religion *tend* to the universal happiness of mankind. *Tillotson.*

He led a rural life, and had command
O'er all the shepherds, who about those vales
Tended their numerous flocks.
Dryden and Lee's Oedipus.

To these abodes our fleet Apollo sends:
Here Dardanus was born, and hither *tends*.
Dryden.

These opinions are of so little moment that, like motes in the sun, their *tendencies* are little noticed. *Locke.*

Writings of this kind, if conducted with candour, have a more particular *tendency* to the good of their country, than any other compositions.
Addison's Freeholder.

All of them are innocent, and most of them had a moral *tendency* to soften the virulence of parties, or laugh out of countenance some vice or folly. *Swift.*

Those with whom I now converse
Without a tear will *tend* my herse. *Id.*

Our humbler province is to *tend* the fair;
To save the powder from too rude a gale,
Nor let the imprisoned essences exhale. *Pope.*

We may acquaint ourselves with the powers and properties, the *tendencies* and inclinations, of body and spirit. *Watts.*

TEND'ER, *adj.*, *v. a.*, & *n. s.* Ten'derly, *adv.* Ten'derness, *n. s.* } Fr. *tendre.* Soft; easily impressed or injured; sensible; dilute; not firm or hard: amorous; young; weak: as a verb active, to offer; exhibit; hold; esteem; hold in regard or kindness: an offer; proposal; regard; concern: the

adverb and noun substantive following agree with tender, adjective.

Instead of their warlike musick [Cyrus] appointed to them certain lascivious lays, by which their minds were so mollified and abated, that they forgot their former fierceness, and became most *tender* and effeminate. *Spenser on Ireland.*

The *tender* kindness of the church it well beseemeth to help the weaker sort, although some few of the perfecter and stronger be for a time displeased. *Hooker.*

Some of the chiefest laity professed with greater stomach their judgments, that such a discipline was little better than popish tyranny disguised, and *tendered* unto them. *Id.*

Think yourself a baby;
That you have ta'en his *tenders* for true pay,
Which are not sterling. *Shakspeare, Hamlet.*

I thank you, madam, that you *tender* her:
Poor gentlewoman, my master wrongs her much. *Shakspeare.*

Unneath may she endure the flinty street,
To tread them with her *tender* feeling feet! *Id.*

Tenderly apply to her
Some remedies for life. *Id.*

I love Valentine;
His life's as *tender* to me as my soul. *Id.*

Well we know your *tenderness* of heart,
And gentle, kind, effeminate remorse
To your kindred. *Id. Richard III.*

All conditions, all minds, *tender* down
Their service to lord Timon. *Shakspeare.*

Tender yourself more dearly;
Or, not to crack the wind of the poor phrase,
Wringing it thus, you'll *tender* me a fool. *Id.*

Some are unworthily censured for keeping their own, whom *tenderness* how to get honestly teacheth to spend discreetly; whereas such need no great thriftiness in preserving their own, who assume more liberty in exacting from others. *Wotton.*

In things that are *tender* and unpleasing, break the ice by some whose words are of less weight, and reserve the more weighty voice to come in as by chance. *Bacon.*

Pied cattle are spotted in their tongues, the *tenderness* of the part receiving more easily alterations than any other parts of the flesh. *Id.*

Beneath the dens where unfletched tempest lie,
And infant winds their *tender* voices try. *Cowley.*

From each *tender* stalk she gathers. *Milton.*

This not mistrust but *tender* love enjoins. *Id.*

Owe not all creatures by just right to thee
Duty and service, not to stay till bid,
But *tender* all their power? *Id. Paradise Regained.*

She embraced him, and for joy
Tenderly wept. *Milton.*

What mad lover ever died,
To gain a soft and gentle bride?
Or, for a lady *tender*-hearted,
In purling streams or hemp departed? *Hudibras.*

The civil authority should be *tender* of the honour of God and religion. *Tillotson.*

Be *tender*-hearted and compassionate towards those in want, and ready to relieve them. *Id.*

The earl accepted the *tenders* of my service. *Dryden.*

Our bodies are not naturally more *tender* than our faces; but, by being less exposed to the air, they become less able to endure it. *L'Estrange.*

The face when we are born is no less *tender* than any other part of the body: it is use alone hardens it, and makes it more able to endure the cold. *Locke on Education.*

A quickness and *tenderness* of sight could not endure bright sunshine. *Locke.*

True *tenderness* of conscience is nothing else but an awful and exact sense of the rule which should direct it; and, while it steers by this compass, and is sensible of every declination from it, so long it is properly *tender*. *South.*

To declare the calling of the Gentiles by a free unlimited *tender* of the gospel to all. *Id. Sermons.*

As I have been *tender* of every particular person's reputation, so I have taken care not to give offence. *Addison.*

With what a graceful *tenderness* he loves!
And breathes the softest, the sincerest vows! *Id.*

Our *tenders* of duty every now and then miscarry. *Id.*

There being implanted in every man's nature a great *tenderness* of reputation, to be careless of it is looked on as a mark of a degenerous mind. *Government of the Tongue.*

He had never heard of Christ before; and so more could not be expected of him than to embrace him as soon as he was *tendered* to him. *Duty of Man.*

When the frame of the lungs is not so well woven, but is lax and *tender*, there is great danger that, after spitting of blood, they will by degrees putrify and consume. *Blackmore.*

The difference of the muscular flesh depends upon the hardness, *tenderness*, moisture or dryness of the fibres. *Arbuthnot.*

There are examples of wounded persons, that have roared for anguish at the discharge of ordnance, though at a great distance; what insupportable torture then should we be under upon a like concussion in the air, when all the whole body would have the *tenderness* of a wound! *Bentley's Sermons.*

Marcus with blushes owns he loves,
And Brutus *tenderly* reproves. *Pope.*

As in the bosom of the stream
The moon-beam dwells at dewy e'en;
So trembling, pure, was *tender* love,
Within the breast o' bonnie Jean. *Burns.*

They are the most perfect pieces of Ovid, and the style *tenderly* passionate and courtly. *Preface to Ovid.*

TENDER, in law, is the offering of money or any other thing in satisfaction; or circumspectly to endeavour the performance of a thing: as a tender of rent is to offer it at the time and place when and where it ought to be paid. See RENT. Also it is an act done to save the penalty of a bond before action brought, &c. There are several statutes which authorise a tender of amends where otherwise it would not have been allowable. As stat. 11 Geo. II. c. 19, § 20, in cases of distress for rent. Stat. 17 Geo. II. c. 38, § 10, in cases of distress for poor's rates. Stat. 24 Geo. II. c. 44, in actions against justices of the peace. Stat. 23 Geo. III. c. 70, § 30, in actions against excise officers. And stat. 24 Geo. III. c. 47, § 35, in actions against custom-house officers.

Tender of money on a bond is to be made to the person of the obligee at the day appointed to save the penalty and forfeiture of the bond, and it ought to be done before witnesses; though, if the obligor be sued afterwards, he must still pay it. But if the obligor be to do any collateral thing, or which is not part of the obligation, as to deliver a horse, &c., and the obligor offer to do his part, and the obligee refuseth it, the condition is performed, and the obligation discharged for ever. By stat. 4 & 5 Ann. c. 16, § 12, the plea of solvit post diem is granted to an act-

tion on bond; but a tender and refusal of principal and interest at a subsequent day cannot be pleaded, as not being within the equity of the statute: for such construction would be prejudicial; as it would empower the obligor, at any time, to compel the obligee to take his money without notice.—Bull. Ni. Pri. 171: Sellon's Pract. Tender.

Every tender at the common law, or which is given by statute, must be made before the writ sued out. If a tender be in fact made before the bringing of the action, though, by the teste of the writ it may appear to have been afterwards (as if tender in vacation and teste of preceding term), the exact time when the writ was in fact sued out may be shown in pleading, or sometimes given in evidence contrary to the teste: but if a bill be filed on the same day the tender is made, though subsequent thereto, it seems that the defendant can no way avail himself by pleading the prior tender; as there is no fraction of a day in law.—See Sellon's Pract. Tender.

It is no answer to a plea of tender, before the exhibiting of the plaintiff's bill, that the plaintiff had before such tender retained an attorney, and instructed him to sue out a writ against the defendant; and that the attorney had accordingly applied, before the tender, for such writ, which was afterwards sued out. A right to damages on account of the non-payment of a debt, or non-performance of a duty, may, after being taken away by a tender and refusal, be revived again by a demand subsequent to the tender and refusal; a new cause of action arises from the non-payment or non-performance thereof upon such demand: and therefore the plaintiff may reply such subsequent demand and refusal by the defendant, which, if proved, the plaintiff must have a verdict.—Brownl. 7.

Wherever the debt or duty arises at the time of the contract, and is not discharged by a tender and refusal, it is not enough for the party who pleads the tender, to plead a tender and refusal, and uncore prist (that he is still ready), but he must also plead tout temps prist (that he was always ready).

A plea of tender after the day of payment of a bill of exchange, and before action brought, is not good; though the defendant aver that he was always ready to pay from the time of the tender, and that the sum tendered was the whole money then due, owing, or payable to the plaintiff in respect of the bill, with interest from the time of the default, for the damages sustained by the plaintiff, by reason of the non-performance of the promise.—8 East's Rep. 168. Every requisite which is in a particular case necessary to the validity of a tender must, in pleading such tender, be showed to have been complied with; else the plea is not good.—Salk. 624.

On a tender being pleaded, and the money paid into court, the plaintiff replied a subsequent demand and refusal, whereupon issue being joined and tried, a verdict was found for the defendant. Whereupon he moved to have the money paid into court returned, in part of his costs; but the court was of opinion it could not be done.—Hardw. 206. Though a tender is made, and the plaintiff refuses the money, yet the tender cannot be pleaded in bar of the action either in debt or assumpsit, but in bar of the damages only.—Ld. Raym. 254.

There is a difference in pleading a tender in action of debt, and in action on the case: in an action of debt, the defendant ought to conclude his plea by praying judgment, if the plaintiff ought to have or maintain his action to recover any damages against him; for, in this action, the debt is the principal, and the damages are only accessary. But, in assumpsit, the damages are the principal; and therefore, in pleading a tender, the defendant ought to conclude his plea with a prayer of judgment, if the plaintiff ought to have or maintain his action, to recover any more or greater damages than the sum tendered, or any damages by reason of the non-payment thereof.

Tender may be of money in bags, without showing or telling it, if it can be proved there was the sum to be tendered; it being the duty of him that is to receive the money to put out and tell it.—5 Rep. 115. Though where the person held the money on his arm in a bag, at the time of offering, this was adjudged no good tender, for it might be counters or base money.—Noy. 74. A tender in bank notes is sufficient, unless the creditor expressly refuses to receive notes, and insists upon cash. If a tender is made of more than is due it is good.

TENDO ACHILLIS, in anatomy, the tendon of Achilles, a large tendon of the heel, so named from the tradition that Achilles got his mortal wound in that part. See ANATOMY. The celebrated Dr. Monro senior made a capital cure of a rupture of this tendon upon himself. See SURGERY.

TEN'DON, *n.s.* } Lat. *tendon.* A sinew;
TEN'DINOUS, *adj.* } a ligature by which the joints are moved: the adjective corresponding.

The entrails these embrace in spiral strings.
Those clasp the' arterial tubes in tender rings;
The *tendons* some compacted close produce,
And some thin fibres for the skin diffuse.
Blackmore.

Nervous and *tendinous* parts have worse symptoms, and are harder of cure than fleshy ones. *Wiseman.*

A struma in her instep lay very hard and big amongst the *tendons.* *Id. Surgery.*

TENDONS, in anatomy, are white, firm, and tenacious parts, contiguous to the muscles, and usually forming their extremities. See ANATOMY.

TEN'DRIL, *n.s.* Fr. *tendrillon.* The clasp of a vine or other climbing plant.

In wanton ringlets waved,
As the vine curls her *tendrils;* which implied
Subjection. *Milton's Paradise Lost.*

So may thy tender blossoms fear no blite;
Nor goats with venomed teeth thy *tendrils* bite.
Dryden.

The *tendrils* or claspers of plants are given only to such as have weak stalks, and cannot raise up or support themselves. *Ray on the Creation.*

TENEBRIO, in entomology, a genus of insects belonging to the order of coleoptera. The antennæ are moniliform, the last joint being roundish; the thorax is plano-convex and marginated; the head projecting, and the elytra are somewhat stiff. Gmelin enumerates about sixty-three species. The larvæ of some live in damp

places under ground among rubbish; of others in flour and different kinds of food, where they undergo their metamorphosis. The perfect insects are very troublesome in houses, eating bread, meat, &c. They precipitately avoid the light; resorting in troops to dark damp cellars, where putrefaction allures and nourishes them. They are all of a very dark gloomy appearance, from which circumstance they take their name.

TENEDIA SECURIS [Lat.], i. e. the axe of Tenedos, a proverbial expression for a severe law, derived from a law made by Tenes the first king of that island, that adulterers should be beheaded with an axe. See TENEDOS. This sentence was executed on the king's son. Aristotle says that this was commemorated on the coins of Tenedos, which on one side had two heads of the king and his son, and on the reverse an axe.

TENEDOS, in ancient geography, an island on the coast of Troas, forty stadia from the continent, and eighty in compass; with a cognominal Æolian town, and a temple of Apollo Smintheus. Its origin is derived from Tenes, who being exposed in a coffer or bog by his father Cygnus the Thracian, at the instigation of his stepmother, was by fate carried to this island, made king of it, and at length worshipped as a god on account of his virtues. The island was famous for its earthen-ware, for which purpose it had an excellent red clay; and hence Bochart would derive the appellation from tinedom, a red clay. This island still retains its ancient name, and is one of the smallest of the archipelago, situated near the coast of Lesser Asia, west of the ruins of Troy.

TENEDOS, a small rocky island of the Grecian archipelago, close to the coast of Asia Minor and at a small distance from the entrance of the Dardanelles. It is mentioned by Homer under the name which it now bears, and its position tends to identify the site of the plain of Troy. Vessels bound to the city successively called Byzantium and Constantinople have found shelter in its ports, or safe anchorage in the road, during contrary winds. The emperor Justinian erected a large magazine here. In 1302 it was annexed by the caliph Othman to the Turkish empire. The harbour has formerly been enclosed by a mole, of which no part now appears above water, but loose stones are piled on the foundations. The Turks give to it now the name of Bogtcha-Adassi. This island is remarkable for producing the finest wine in the archipelago. A mountainous ridge encloses the port, and the town stands on the slope of a hill. It is supposed to contain 600 Turkish and 300 Greek families. Long. 26° E., lat. 39° 53′ N.

TEN'EMENT, *n. s.* Fr. *tenement;* law Lat. *tenementum.* Any thing held by a tenant.

What reasonable man will not think that the *tenement* shall be made much better, if the tenant may be drawn to build himself some handsome habitation thereon, to ditch and enclose his ground.
Spenser on Ireland.

'Tis policy for father and son to take different sides; for then lands and *tenements* commit no treason.
Dryden.

Who has informed us that a rational soul can inhabit no *tenement,* unless it has just such a sort of frontispiece. *Locke.*

Treat on, treat on, is her eternal note,
And lands and *tenements* glide down her throat.
Pope.

TENERIFFE, a considerable island of the group of the Canaries, off the western coast of Africa. It is of a triangular form, each side being about thirty-six miles in length. It is chiefly remarkable for its lofty peak, of the sloping sides of which the island actually consists, and the volcanic eruptions which issue from its sides. By none, however, has it been so carefully examined as by Humboldt.

The climate is delightful and salutary; and by the rapidity of its rise it presents, within a very short distance, every variation of temperature, from the colder climates of Europe to those of the equinoctial regions. The port of Santa Cruz, indeed, from which the principal trade is carried on, is intensely hot, not only from the lowness of its situation, but from the reflection of the basaltic rocks above it. Laguna, however, elevated about 2000 feet above it, is cool and agreeable. Nothing prevents it from being the capital of the island, except the filling up of its port of Garachico by the ravages of a volcano. Teneriffe is here encircled by a darkish brown basaltic rock, which, however, is not formed into columns. The traveller, crossing a hilly tract from Laguna, comes to the western coast, of the beauty of which all visitors speak with enthusiasm.

Humboldt, after having traversed the banks of the Orinoco, the Cordilleras, and the most beautiful valleys of Mexico, declares that he never beheld a landscape more agreeable, more harmonious, and more attractive. Orange, myrtle, and cypress trees, entwine the chapels reared on the eminences. The declivities and rising hills are covered with vines and cultivated like a garden. Perpetual spring prevails in the district, and in the summer evenings the breeze from the sea comes loaded with delicious coolness. In this part of the island the date tree, the plantain, the sugar-cane, the Indian fig, the arum colocasia (the root of which furnishes the lower class with a nutritive meal), the olive tree, the fruit trees of Europe, the vine and corn, are cultivated. Wheat is reaped from the end of March to the beginning of May; and the culture of the bread-fruit tree of Otaheite, of the cinnamon, the coffee, and the cocoa, have been tried with success. Above this fertile tract rises what is called the region of the laurels, forming an extensive border that extends all round Teneriffe. These trees are fed by a vast number of springs that rise up amid a turf covered with perpetual verdure. Extensive plantations of chestnut occur in the lower part, above which rise four species of laurel, and an oak resembling that of Thibet, besides some other trees. The underwood in the lower part consists of arborescent heath, and in the upper part of ferns. Above this is a vast forest of oak and pine, those trees which characterise the colder regions of the earth. The prevailing species has the appearance of the Scotch fir, with very long and stiff leaves sprouting by two, or oftener by three in one sheath. Above this is a vast plain, like a sea of sand, covered with the dust of pumice stone, which continually fills the air. It is embellished with tufts of the

beautiful shrub called the retama, growing to the height of nine feet, and loaded with odoriferous flowers. It is said to communicate a peculiar excellence to the flesh of the goats which feed upon it. At the entrance of this plain the rich verdure of the island terminates, as well as all appearance of habitation; and the traveller ascends afterwards through a complete solitude. Above this plain are the Malpays, a name which the Spaniards, in all their volcanic districts, apply to a ground destitute of vegetable mould, and covered with loose and broken fragments of lava. The ascent here is steep and extremely fatiguing, as the blocks of lava roll from beneath the feet and often leave deep hollows. At the extremity of the Malpays are found those spiracles which are called by the natives the Nostrils of the Peak, consisting of watery and heated vapors, which issue at intervals from crevices in the ground. The Piton, or summit, is of a conical form; the ascent steep, and rendered difficult by the loose ashes with which it is covered. At the top there is scarcely room to stand, and the crater is enclosed by a wall so steep that it could not be entered were there not a breach in one spot. The sides of the crater are almost perpendicular, though it can be descended by pieces of broken lava. This crater has long ceased to emit flames, and the heat is perceptible only in a few crevices which give vent with a buzzing noise to aqueous vapors. The view from the top is characterised by peculiar beauty.

From the flanks of the Peak several violent eruptions have taken place in the course of the present century. In 1704 there occurred one in the district of Guimar, which buried several valleys, and approached within a short distance of the port of Orotava. Two years after, the lava issuing forth in a different quarter, buried the port of Garachico, then the finest and most frequented harbour in the island. In two hours this opulent and populous city was totally destroyed, not a single edifice being left standing. The port was filled up and converted into a promontory, and the whole surface of the surrounding country entirely changed. The volcanic power now remained dormant for nearly a century, till 1796, when the mountain of Chahorra, which had always been considered as an extinguished volcano, began pouring out, by four mouths, vast torrents of lava for three months and six days, but being fortunately in an uncultivated part of the island no serious injury followed. The commercial importance of Teneriffe depends chiefly on its wine, which is in considerable demand. From 10,000 to 15,000 pipes are annually exported.

TENES, the first king of Tenedos, who acquired his kingdom in consequence of his stepmother Philonome's lust, and his father's credulity. See Tenedia and Tenedos.

TENESIS, a district of ancient Ethiopia. Strabo.

TENESMUS, *n. s.* Barb. Lat. *tenesmus*. Defined below.

The stone shutting up the orifice of the bladder is attended with a *tenesmus*, or needing to go to stool. *Arbuthnot.*

Tenesmus, in medicine, a name given by medical writers to a complaint which is a continual desire of going to stool, but without any stool being ready to be voided. This is properly no primary disease, but merely a symptomatic one, and differs in degree according to the disease on which it is an attendant. See Medicine.

TEN'ET, *n. s.* Lat. *tenet*, he holds. Sometimes written tenent. Position; principle; opinion.

While in church matters, profit shall be the touchstone for faith and manners, we are not to wonder if no gainful *tenet* be deposited. *Decay of Piety.*

That all animals of the land are in their kind in the sea, although received as a principle, is a *tenet* very questionable. *Browne's Vulgar Errours.*

This savours of something ranker than Socinianism, even the *tenets* of the fifth monarchy, and of sovereignty founded only upon saintship. *South.*

They wonder men should have mistook
The *tenets* of their master's book. *Prior.*

TENIERS (David), the elder, a Flemish painter, born at Antwerp in 1582. He received the first rudiments of his art from the famous Rubens, and afterwards finished his studies at Rome. He attached himself to Adam Elsheimer for six years; and formed to himself a peculiar style, which his son cultivated so happily afterwards as to bring it to the utmost perfection. His pictures were small; and his subjects usually shops, elaboratories, humorous conversations, and rural festivities. He died at Antwerp in 1649.

Teniers (Abraham), son of David, was equal to his father and brother in the expression of his characters, and in the clara obscuro; though he was inferior in sprightliness of touch and lightness of pencil.

Teniers (David), the younger, also an admirable painter, was the son of the former, and was born at Antwerp in 1610. He obtained the name of Ape of Painting, from his imitating the manner of different painters with such exactness as to deceive even the nicest judges. His principal talent lay in landscapes adorned with small figures. He also painted men drinking and smoking, chemists' elaboratories, country fairs, and the like. His small figures are superior to his large ones. He died in 1694.

TENISON (Dr. Thomas), archbishop of Canterbury, was born at Cottenham in Cambridgeshire in 1636; and studied at Corpus Christi College in Cambridge. In his youth he applied himself to physic; but afterward went into orders, and became minister of St. Andrew's church, Cambridge. He showed himself very active against the growth of popery, by his writings, both in the reigns of Charles II. and James II. In 1680 he was made vicar of St. Martin's in the Fields, London, to which parish he made several donations; and, among others, endowed a free school and built a handsome library, which he furnished with useful books. King William and queen Mary, in 1689, appointed him archdeacon of London; in 1691 he was nominated bishop of Lincoln; and in 1694 he succeeded Dr. Tillotson as archbishop of Canterbury. He performed all the duties of a good primate for twenty years, and died in 1715.

TENNESSEE, one of the United States of North America, bounded north by Kentucky; east by North Carolina and Virginia; south by Georgia, Alabama territory, and Mississippi state; and west by the Mississippi. Long. 81° 28′ to 91° 37′ W. It is 420 miles long and 102 broad; containing 40,000 square miles. The number of militia in 1812 was 29,193. This state is divided by the Cumberland mountains into two divisions, East Tennessee and West Tennessee. The counties, population in 1810, and chief towns, are exhibited in the following table:—

East Tennessee.

Counties.	Pop.	Chief Towns.
Anderson . .	3,959	Clinton
Bledsoe . .	8,839	Pikeville
Blount . .	3,259	Maryville
Campbell . .	2,668	Jacksonburg
Carter . . .	4,190	Elizabethtown
Claiborne . .	4,798	Tazewell
Cocke . . .	5,154	Newport
Granger . .	6,397	Rutledge
Greene . .	9,713	Greenville
Hawkins . .	7,643	Rogersville
Jefferson . .	7,309	Dandridge
Knox . . .	10,171	Knoxville
Rhea . . .	2,504	Washington
Roane . . .	5,581	Kingston
Sevier . . .	4,595	Sevierville
Sullivan . .	6,847	Blountsville
Washington . .	7,740	Jonesborough

West Tennessee.

Counties.	Pop.	Chief Towns.
Bedford . .	8,247	Shelbyville
Davidson .	15,608	Nashville
Dickson . .	4,516	Charlotte
Franklin . .	5,730	Winchester
Giles . . .	4,536	Pulaski
Hickman . .	2,583	Vernon
Humphries . .	1,511	Reynoldsburg
Jackson . .	5,401	Williamsburg
Lincoln . .	6,104	Fayetteville
Montgomery .	8,021	Clarkesville
Maury . .	10,359	Columbia
Overton . .	5,643	Monroe
Robertson . .	7,270	Springfield
Rutherford .	10,265	Murfreesborough
Sumner . .	13,792	Gallatin
Smith . .	11,649	Carthage
Stuart . .	4,262	Dover
Wilson . .	11,952	Lebanon
Williamson . .	13,153	Franklin
White . . .	4,028	Sparta
Warren . .	5,725	M'Minville

Murfreesborough is the seat of government. The other most considerable towns in West Tennessee are Nashville, Franklin, Fayetteville, Shelbyville, Columbia, Clarkesville, Carthage, and Gallatin; in East Tennessee, Knoxville, Jonesborough, Greenville, and Rogersville. The state bank of Tennessee is at Knoxville, with a branch at Nashville. There are independent banks at Nashville and Franklin. These three banks have each a capital of 400,000 dollars. The legislature, in 1817, granted charters for ten new banks, with a capital of 400,000 dollars each, to be established at Murfreesborough, Jonesborough, Columbia, Maryville, Shelbyville, Rogersville, Fayetteville, Carthage, Nashville, and Kingston. Four colleges have been incorporated in this state at Knoxville, Nashville, Greenville, and in Washington county. Those at Knoxville and Nashville have never gone into operation. There are academies at Knoxville, Nashville, Carthage, Murfreesborough, Rogersville, Gallatin, Fayetteville, and near Franklin, Springfield, Lebanon, and Clarkesville. The principal denominations of Christians in Tennessee are Baptists, Methodists, and Presbyterians. The legislature is composed of a senate and house of representatives; the members of each, together with the governor, are chosen biennially on the first Thursday in August and the day succeeding. The meeting of the general assembly is on the third Monday in September.

Tennessee is marked by bold features. It is washed by the great river Mississippi on the west, and the fine rivers Tennessee and Cumberland pass through it in very serpentine courses. The western part is undulating; some of it level; in the middle it is hilly; and the eastern part, known by the name of East Tennessee, abounds in mountains, many of them lofty, and presenting scenery peculiarly grand and picturesque. Of these mountains the Cumberland, or great Laurel Ridge, is the most remarkable. Stone, Yellow, Iron Bald, Smoky, and Unaka mountains, join each other, and form, in a direction nearly north-east and south-west, the eastern boundary of the state. North-west of these, and separated from each other by valleys of from five to fifteen miles wide, are Bay's Mountain, Copper Ridge, Clinch Mountain, Powell's Mountain, and Welling's Ridge. The last four terminate north of Tennessee river. The principal rivers are the Tennessee, Cumberland, Holston, Clinch, French-Broad, Notahacky, Hiwassee, Tellico, Duck, Reelfoot, Obian, Forked Deer, and Wolf. The mountains last mentioned are all encircled by valleys which open passages for rivers and roads, and which, together with the numerous cascades, render the views very sublime. Caves of great depth and extent are found throughout the state.

The geological formation of this state is wholly secondary, except a small portion of the eastern part which is transition, and numerous spots on the banks of rivers which are alluvial. A considerable portion of the state is bedded on limestone. A large deposit of gypsum has been lately discovered. Copperas, alum, nitre, and lead, are among the minerals. Some silver has been found. Coal is supposed to be plentiful. Saltpetre is so abundant as to form a great article of commerce. There are several mineral springs, and many valuable salt springs. The soil in a country so uneven must be very various. The western part of the state has a black rich soil; in the middle are great quantities of excellent land; in the eastern part of the mountains are lean, but many fertile valleys.

There is a great profusion of natural timber, poplar, hickory, walnut, oak, beach, sycamore, locust, cherry, sugar-maple, &c., and in many places are great quantities of cane remarkably thick and strong. The state also abounds with medicinal plants, such as snake root, ginseng, Carolina pink, angelica, senna, annise, spikenard, &c. Tennessee is also well supplied with animals and birds of various kinds, and the rivers abound in divers sorts of fish.

The climate is generally healthy. In East Tennessee the air is so tempered by the mountain air on one side, and by refreshing breezes from the gulf of Mexico on the other, that this part of the state has one of the most desirable climates in North America. The middle part resembles Kentucky in climate. The winter in Tennessee resembles the spring in New England. Snow seldom falls to a greater depth than ten inches, or lies longer than ten days. Cumberland river has been frozen over but three times since the country was settled. Cattle are rarely sheltered in winter. In the western parts there are some low bottoms on which the inhabitants are subject to bilious fevers; and fever and ague in the autumn.

The great business of the state is agriculture. The soil produces abundantly cotton and tobacco, which are the staple commodities. The inhabitants also raise a plentiful supply of grain, grass, and fruit. They export cotton, tobacco, and flour in considerable quantities; also saltpetre and many other articles. The principal commerce is carried on through the Tennessee and Cumberland rivers, and from them through the Ohio and Mississippi to New Orleans. This state also supplies Kentucky, Ohio, &c., with cotton for inland manufactures; and from East Tennessee considerable numbers of cattle are sent to the sea-ports on the Atlantic. It is probable that a new avenue to commerce will soon be opened, by means of roads or a canal, between the Tennessee river and the navigable waters of the Tombigbee. The western part of this state, lying between the Tennessee river and the Mississippi, belongs to the Chickasaw Indians; and a large district in the south-east part is included in the Cherokee country.

Tennessee Ridge, mountains in the state of Tennessee, between the rivers Tennessee and Cumberland.

TEN'NIS, *n. s.* Supposed by Skinner to be so named from the word *tonez*, take it, hold it, or there it goes, used by the French when they drive the ball. A play at which a ball is driven with a racket.

Those four garrisons, issuing forth upon the enemy, will so drive him from one side to another, and *tennis* him amongst them, that he shall find no where safe to keep his feet in, nor hide himself.
Spenser on Ireland.

The barber's man hath been seen with him, and the old ornament of his cheek hath already stuffed *tennis* balls. *Shakspeare.*

It can be no more disgrace to a great lord to draw a fair picture than to play at *tennis* with his page.
Peacham.

A prince, by a hard destiny, became a *tennis* ball long to the blind goddess. *Howel's Vocal Forest.*

The inside of the uvea is black like the walls of a *tennis* court, that the rays falling upon the retina may not, by being rebounded thence upon the uvea, be returned again; for such a repercussion would make the sight more confused. *More against Atheism.*

We conceive not a *tennis*-ball to think, and consequently not to have any volition or preference of motion to rest. *Locke.*

We have no exedra for the philosophers adjoining to our *tennis* court, but there are ale-houses.
Arbuthnot and Pope.

Tennis, from Fr. *tenez*, or from Tennois, an ancient town of France. A play at which a ball is driven by a racket. The size of a tennis court is generally about ninety-six or ninety-seven feet by thirty-three or thirty-four. A line or net hangs exactly across the middle, over which the ball must be struck. Upon the entrance of a tennis court, there is a long gallery which goes to the dedans, that is a kind of front gallery, into which, whenever a ball is struck, it tells for a certain stroke. This long gallery is divided into different compartments or galleries, each of which has its particular name, as follows; from the line towards the dedans are the first gallery door, second gallery, and the last gallery, which is called the service side. From the dedans to the last gallery are the figures 1, 2, 3, 4, 5, 6, at a yard distance each, by which the chaces are marked. On the one side of the line are also the first gallery door, second gallery, and last gallery; which is called the hazard side. Every man struck into the last gallery on this side reckons for a certain stroke the same as the dedans. Between the second and this last gallery are the figures 1, 2, to mark the chaces on the hazard side. Over this long gallery, or these compartments, is a covering, called the pent-house, on which they play the ball from the service-side, in order to begin a set of tennis, from which it is called a service. When they miss putting the ball (so as to rebound from the pent-house) over a certain line on the service-side, it is deemed a fault, two of which are reckoned for a stroke. If the ball rolls round the pent-house, on the opposite side of the court, so as to fall beyond a certain line described for that purpose, it is called passe, reckons for nothing on either side, and the player must serve again. On the right hand side of the court from the dedans is the tambour, a part of the wall which projects, and is so contrived in order to make a variety in the stroke, and render it more difficult to be returned by the adversary; for, when a ball strikes the tambour, it varies its direction, and requires some extraordinary judgment to return it over the line. The last thing on the right hand side is called the grill, wherein if the ball is struck, it is also fifteen, or a certain stroke. The game of tennis is played by what they call sets; a set of tennis consists of six games; but if they play what is called an advantage set, two above five games must be won successively by one of the parties. When the player gives his service at the beginning of a set, his adversary is supposed to return the ball; and, whenever it falls after the first rebound untouched, the chace is called accordingly; for example, if the ball at the figure 1, the chace is called at a yard, that is to say, at a yard from the dedans: this chace

remains till a second service is given; and if the player on the service-side lets the ball go after his adversary returns it, and if the ball falls on or between any of these figures or chaces, they must change sides, there being two chaces; and he who then will be on the hazard side, must play to win the first chace: which if he wins by striking the ball so as to fall, after its first rebound, nearer to the dedans than the figure 1, without his adversary's being able to return it from its first hop, he wins a stroke, and then proceeds in like manner to win the second chace, wherever it should happen to be. If a ball falls on the line with the first gallery door, second gallery, or last gallery, the chace is likewise called at such or such a place, naming the gallery door, &c. When it is just put over the line, it is called a chace at the line. If the player on the service-side returns a ball with such force as to strike the wall on the hazard-side so as to rebound, after the first hop over the line, it is also called a chace at the line. The chaces on the hazard-side proceed from the ball being returned either too hard or not quite hard enough; so that the ball, after its first rebound, falls on this side of the blue line, or line which describes the hazard-side chaces; in which case it is a chace at 1, 2, &c., provided there is no chace depending. When they change sides, the player, in order to win this chace, must put the ball over the line any where, so that his adversary does not return it. When there is no chace on the hazard-side, all balls put over the line from the service-side, without being returned, reckon for a stroke. This game is marked in a singular manner. The first stroke is called fifteen, the second thirty, the third forty, and the fourth game, unless the players get four strokes each; in that case, instead of calling it forty all, it is called deuce; after which, as soon as any stroke is got, it is called advantage; and, in case the stroke becomes equal again, deuce again, till one or the other gets two strokes following, which win the game. Although but one ball at a time is played with, a number of balls are made use of at this game to avoid trouble, and are handed to the players in baskets for that purpose; by which they can play as long as they please, without ever having occasion to look for a ball.

TEN'ON, *n. s.* Fr. *tenon.* The end of a piece of timber cut to be fitted into another piece.

Such variety of parts, solid with hollow; some with cavities as mortices to receive, others with *tenons* to fit them. *Ray.*

The *tenant* saw, being thin, hath a back to keep it from bending. *Moxon's Mechanical Exercises.*

TEN OR, *n. s.* Lat. *tenor;* Fr. *teneur.* Continuity of state; constant mode; currency; course; drift; in music, see below.

We might perceive his words interrupted continually with sighs, and the *tenor* of his speech not knit together to one constant end, but dissolved, in itself, as the vehemency of the inward passion prevailed. *Sidney.*

When the world first out of chaos sprang,
So smiled the days and so the *tenor* ran
Of their felicity; a spring was there,
An everlasting spring the jolly year
Led round in his great circle; no wind's breath
As now did smell of winter or of death. *Crashaw.*

By the stern brow and waspish action,
Which she did use as she was writing of it,
It bears an angry *tenor.* *Shakspeare. As you like it.*

The treble cutteth the air too sharp to make the sound equal; and therefore a mean or *tenor* is the sweetest part. *Bacon's Natural History.*

Water and air he for the *tenor* chose,
Earth made the base, the treble flame arose. *Cowley.*

Still I see the *tenor* of man's woe
Held on the same, from woman to begin. *Milton.*

Inspire my numbers,
Till I my long laborious work complete,
And add perpetual *tenor* to my rhimes,
Deduced from Nature's birth to Cæsar's times.
Dryden.

Can it be poison! poison 's of one *tenor,*
Or hot, or cold. *Id. Don Sebastian.*

Does not the whole *tenor* of the divine law positively require humility and meekness to all men! *Sprat.*

Reading it must be repeated again and again, with a close attention to the *tenor* of the discourse, and a perfect neglect of the divisions into chapters and verses. *Locke.*

There is so great an uniformity amongst them, that the whole *tenor* of those bodies, thus preserved, clearly points forth the month of May.
Woodward's Natural History.

In such lays as neither ebb nor flow,
Correctly cold, and regularly low,
That, shunning faults, one quiet *tenor* keep,
We cannot blame indeed—but we may sleep. *Pope.*

TENOR, or TENOUR, the purport or content of a writing or instrument in law, &c.

TENOR, in music, the first mean or middle part, or that which is the ordinary pitch of the voice, when neither raised to a treble nor lowered to a bass. See TENOUR.

TENOS, TINE, or ISTENDIL, a pleasant and fertile island of the Cyclades group, in the Grecian archipelago, between Myconi and Andros. Its circumference is about thirty-four miles; its population nearly 25,000 souls, almost all Greeks. The surface is hilly, and covered with rocks, but the soil is well cultivated and very fertile. The chief products are silk, wine, figs, oranges, and honey. The island has no good harbour. St. Nicolo is the chief town.

TENSE, *adj.* TENSE'NESS, *n. s.* TEN'SIBLE, *adj.* TEN'SILE, TEN'SION, *n. s.* TEN'SIVE, *adj.* TEN'SURE, *n. s.* } Lat. *tensus.* Stretched; stiff; not lax: tenseness is contraction; tension: tensible, and tensile, capable of extension: tension, the act of stretching, or state of being stretched: this also is the meaning of tensure: tensive is giving a sense of stiffness.

All bodies ductile and *tensile,* as metals that will be drawn into wires, have the appetite of not discontinuing. *Bacon.*

Gold is the closest and therefore the heaviest of metals, and is likewise the most flexible and *tensible.* *Id.*

This motion upon pressure, and the reciprocal thereof, motion upon *tensure,* we call motion of liberty, which is, when any body being forced to a preternatural extent restoreth itself to the natural. *Id.*

All bodies, ductile and *tensile,* as metals, that will be drawn into wires; wool and tow, that will be

drawn into yarn or thread; have in them the appetite of not discontinuing strong, which maketh them follow the force that pulleth them out, and yet so as not to discontinue or forsake their own body. *Id.*

For the free passage of the sound into the ear, it is requisite that the tympanum be *tense*, and hard stretched, otherwise the laxness of the membrane will certainly dead and damp the sound. *Holder.*

It can have nothing of vocal sound, voice being raised by stiff *tension* of the larynx; and, on the contrary, this sound by a relaxed posture of the muscles thereof. *Id.*

Still are the subtle strings in *tension* found,
Like those of lutes, to just proportion wound
Which of the air's vibration is the force.
Blackmore.

Should the pain and *tenseness* of the part continue, the operation must take place.
Sharp's Surgery.

From choler is a hot burning pain; a beating pain from the pulse of the artery; a *tensive* pain from distension of the parts by the fulness of humours.
Floyer on Humours.

TENSE, *n. s.* Fr. *temps*; Lat. *tempus*. In grammar, tense, in strict speaking, is only a variation of the verb to signify time.

As foresight, when it is natural, answers to memory; so when methodical it answers to reminiscence, and may be called forecast; all of them expressed in the *tenses* given to verbs. Memory saith, I did see; reminiscence, I had seen; foresight, I shall see; forecast, I shall have seen. *Grew.*

Ladies, without knowing what *tenses* and participles are, speak as properly and as correctly as gentlemen. *Locke.*

He should have the Latin words given him in their first case and *tense*, and should never be left to seek them himself from a dictionary. *Watts.*

TENSE, in grammar, an inflection of verbs, whereby they are made to signify or distinguish the circumstance of time in what they affirm. See GRAMMAR.

TENT, *n.s.* & *v. a.* Fr. *tente*. A roll of lint put into a sore: to search as with such a roll.

Modest doubt is called
The beacon of the wise; the *tent* that searches
To the bottom of the worst.
Shakspeare. Troilus and Cressida.

I have some wounds upon me, and they smart.
—Well might they fester 'gainst ingratitude,
And *tent* themselves with death. *Id. Coriolanus.*

A declining orifice keep open by a small *tent* dipt in some medicaments, and after digestion withdraw the *tent*, and heal it. *Wiseman's Surgery.*

Some surgeons, possibly against their own judgments, keep wounds *tented*, often to the ruin of their patient. *Wiseman.*

TENT, *n. s.* & *v. n.* } Fr. *tente*; Lat. *tentorium*. A soldier's moveable lodging-place: to lodge as in a tent: covered or furnished with tents.
TENTED, *adj.*

Because of the same craft he wrought with them; for by occupation they were *tent* makers.
Acts xviii. 23.

The Turks, the more to terrify Corfu, taking a hill not far from it, covered the same with *tents*.
Knolles.

These arms of mine till now have used
Their dearest action in the *tented* field.
Shakspeare. Othello.

The smiles of knaves
Tent in my cheeks, and schoolboy's tears take up
The glasses of my sight. *Shakspeare.*

He saw a spacious plain, whereon
Were *tents* of various hue: by some were herds
Of cattle grazing. *Milton's Paradise Lost.*

To Chassis' pleasing plains he took his way,
There pitched his *tents*, and there resolved to stay.
Dryden.

The foe deceived, he passed the *tented* plain,
In Troy to mingle with the hostile train.
Pope's Odyssey.

A TENT, in war, is a pavilion or portable house. Tents are made of canvas, for officers and soldiers to lie under when in the field. The size of the officers' tents is not fixed; some regiments have them of one size and some of another; a captain's tent and marquee is generally ten feet and a half broad, fourteen deep, and eight high; the subalterns' are a foot less; the major's and lieutenant-colonel's a foot larger; and the colonel's two feet larger. The subalterns of foot lie two in a tent, and those of horse but one. The tents of private men are six feet and a half square, and five feet high, and hold five soldiers each. The tents for horse are seven feet broad and nine feet deep; they hold likewise five men and their horse accoutrements.

TENT, in surgery, a roll of lint made into the shape of a nail with a broad flat head, chiefly used in deep wounds and ulcers. They are of service, not only in conveying medicines to the most intimate recesses and sinuses of the wound, but to prevent the lips of the wound from uniting before it is healed from the bottom; and by their assistance grumous blood, sordes, &c. are readily evacuated.

TEN'TATIVE, *adj.* } Fr. *tentative*; Lat. *tento*.
TENTA'TION, *n. s.* } Trying; essaying: trial; temptation.

The first delusion Satan put upon Eve, and his whole *tentation*, when he said, Ye shall not die, was, in his equivocation, You shall not incur present death. *Browne's Vulgar Errours.*

This is not scientifical, but *tentative*. *Berkley.*

TEN'TER, *n. s.*, *v. a.*, & *v. n.* Lat. *tendo*, *tentus*. A hook on which things are stretched: 'to be on the tenters' is to be on the stretch: be in difficulties: to tenter is to stretch by hooks: admit extension.

A blown bladder pressed riseth again; and when leather or cloth is *tentered*, it springeth back.
Bacon's Natural History.

Woollen cloth will *tenter*, linen scarcely. *Bacon.*

In all my past adventures,
I ne'er was set so on the *tenters*;
Or taken tardy with dilemma,
That every way I turn does hem me. *Hudibras.*

TENTER, TRIER, or PROVER, a machine used in the cloth manufactory, to stretch out the pieces of cloth, stuff, &c., or only to make them even and set them square. It is usually about four feet and a half high, and for length exceeds that of the longest piece of cloth. It consists of several long square pieces of wood, placed like those which form the barriers of a manege; so, however, as that the lower cross pieces of wood may be raised or lowered as is found requisite, to be fixed at any height by means of pins. Along the cross pieces, both the upper and under one, are hooked nails, called tenter-hooks, driven in from space to space.

Tenter, to put a piece of Cloth on the. While the piece is yet quite wet, one end is fastened to one of the ends of the tenter; then it is pulled by force of arms towards the other end, to bring it to the length required; that other end being fastened, the upper list is hooked on to the upper cross-piece, and the lowest list to the lowest cross-piece, which is afterwards lowered by force, till the piece have its desired breadth. Being thus well stretched, both as to length and breadth, they brush it with a stiff hair-brush, and thus let it dry. Then they take it off; and, till they wet it again, it will retain the length and breadth the tenter gave it.

TENTERDEN, a market-town in Tenterden hundred, lathe of Scray, Kent, five miles east by south from Cranbrook, and fifty-seven east by south of London. The church, standing at the north end of the town, has a lofty steeple, on which formerly was a beacon, for alarming the country in case of invasion. Here are two chapels for dissenters, a free-school, a town-hall in which assemblies are occasionally held, and a market-house. At the first introduction of the woollen manufacture, this place had a considerable trade in weaving, but at present the grazing business is the chief occupation of its inhabitants. This is a member of the cinque ports, and is annexed to the town of Rye; the corporation consists of a mayor, twelve jurats, and twelve common-councilmen. Market on Friday. Fairs, first Monday in May, for cattle and pedlary.

Tenth, and First Fruits of Spiritual Preferments, a branch of the king's revenue. See Revenue. These were originally a part of the papal usurpations over the clergy of this kingdom; which were annexed to the revenue of the crown. By statute 26 Hen. VIII. c. 3 (confirmed by stat. 1 Eliz. c. 4) queen Anne granted her royal charter, which was confirmed by the stat. 2 Anne c. 11, whereby all the revenue of first fruits and tenths is vested in trustees for ever to form a perpetual fund for the augmentation of poor livings. This is usually called Queen Anne's bounty; which has been still farther regulated by subsequent statutes.

TENTHREDO, the saw-fly, a genus of insects belonging to the order of hymenoptera. The mouth is furnished with jaws, which are horny, arched, dentated within; the right jaw being obtuse at the apex; the lip cylindrical, trifid; there are four feelers, unequal and filiform; the wings are plain and turned; the sting consists of two serrated laminæ, and the scutellum of two grains placed at a distance. Gmelin mentions 143 species. These insects are not very shy. Some by means of their saw deposit in the buds of flowers, others on the twigs of trees or shrubs, eggs from which are produced caterpillars. The implement with which they are armed is nowise formidable; as it appears only destined to the purpose of depositing their eggs.

TENTZELIUS (William Ernest), a learned German, born at Armstadt in Thuringia, in 1659. He wrote, 1. Saxonia Numismatica, in 4 vols.; and 2. Supplementum Historiæ Gothanæ, 3 tom. 4to.—Moreri.

TENU'ITY, *n. s.* } Fr. *tenuité*; Lat. *tenu-*
Ten'uous, *adj.* } *itas*, *tenuis*. Thinness; exility; smallness; meanness: the adjective corresponding.

Firs and pines mount of themselves in height without side boughs; partly heat, and partly *tenuity* of juice, sending the sap upwards.
Bacon's Natural History.

The *tenuity* and contempt of clergymen will soon let them see what a poor carcass they are, when parted from the influence of that supremacy.
King Charles.

Another way of their attraction is by a *tenuous* emanation, or continued effluvium, which after some distance retracteth unto itself.
Browne's Vulgar Errours.

Consider the divers figurings of the brain; the strings or filaments thereof; their difference in *tenuity*, or aptness for motion. *Glanville's Scepsis.*

Aliment, circulating through an animal body, is reduced to an almost imperceptible *tenuity* before it can serve animal purposes. *Arbuthnot.*

At the height of four thousand miles the æther is of that wonderful *tenuity*, that if a small sphere of common air, of an inch diameter, should be expanded to the thinness of that æther, it would more than take up the orb of Saturn; which is many million times bigger than the earth. *Bentley.*

TEN'URE, *n. s.* Fr. *tenure*; Lat. *teneo*. The legal manner in which a tenement is held.

The service follows the *tenure* of lands; and the lands were given away by the kings of England to those lords. *Spenser.*

The uncertainty of *tenure*, by which all worldly things are held, ministers very unpleasant meditation
Raleigh.

Man must be known, his strength, his state,
And by that *tenure* he holds all of fate. *Dryden.*

Tenure, in the English law, signifies the manner whereby lands or tenements are held, or the service that the tenant owes to his lord. Almost all the real property of England is by the policy of the law supposed to be granted by, dependent upon, and holden of, some superior lord, by and in consideration of certain services to be rendered to the lord by the tenant or possessor of this property. The thing holden is therefore styled a tenement, the possessors thereof tenants, and the manner of their possession a tenure. Thus all the lands of the kingdom are supposed to be holden, mediately or immediately, of the king; who is styled the lord paramount, or above all. Such tenants as held under the king immediately, when they granted out portions of the lands to inferior persons, became also lords with respect to those inferior persons, as they were still tenants with respect to the king; and, thus partaking of a middle nature, were called mesne or middle lords. All tenures being thus derived from the king, those that held immediately under him, in right of his crown and dignity, were called his tenants in capite, or in chief. 'Tenements are of two kinds, frank-tenement and villenage. And, of frank-tenements, some are held freely in consideration of homage and knight-service; others in free-soccage, with the service of fealty only. And again, of villenages, some are pure, and others privileged. He that holds in pure villenage shall do whatsoever is commanded him, and always be bound to an uncertain service. The other kind of villenage is called villein-soccage; and these villein-socmen do villein-services, but such as are cer-

tain and determined.' Of which the sense seems to be as follows: first, where the service was free, but uncertain, as military service with homage, that tenure was called the tenure in chivalry, per servitium militaire, or by knight-service. Secondly, where the service was not only free, but also uncertain, as by fealty only, by rent and fealty, &c., that tenure was called liberum socagium, or free soccage. These were the only free holdings or tenements; the others were villenous or servile: as, thirdly, where the service was base in its nature, and uncertain as to time and quantity, the tenure was purum villenagium, absolute or pure villenage. Lastly, where the service was base in its nature, but reduced to a certainty, this was still villenage, but distinguished from the other by the name of privileged villenage, villinagium privelegiatum; or it might still be called soccage (from the uncertainty of its services), but degraded by their baseness into the inferior title of villanum socagium, villein-soccage. 1. The military tenure, or that by knight-service, was done away by stat. 12 Car. II. For an account of this species of tenure see FEUDAL SYSTEM, and KNIGHT-SERVICE; and for its incidents, see RELIEF, PRIMER-SEISIN, WARDSHIP, MARRIAGE, FINES, and ESCHEAT. 2. The second species of tenure or free-soccage, not only subsists to this day, but has in a manner absorbed and swallowed up (since the statute of Charles II.) almost every other other species of tenure. See SOCCAGE. The other grand division of tenure, mentioned by Bracton, is that of villenage, as contradistinguished from liberum tenementum, or frank-tenure. And this he subdivides into two classes, pure and privileged villenage; whence have arisen two other species of our modern tenures. 3. From the tenure of pure villenage have sprung the present copyhold tenures, or tenure by copy of court-roll at the will of the lord. See MANOR. Two main principles are held to be the supporters of a copyhold tenure, and without which it cannot exist: 1. That the lands be parcel of and situate within that manor under which it is held. 2. That they have been demised, or demisable, by copy of court-roll immemorially. For immemorial custom is the life of all tenures by copy; so that no new copyhold can, strictly speaking, be granted at this day. In some manors, where the custom hath been to permit the heir to succeed the ancestor in his tenure, the estates are styled copyholds of inheritance; in others, where the lords have been more vigilant to maintain their rights, they remain copyholds for life only; for the custom of the manor has in both cases so far superseded the will of the lord, that, provided the services be performed or stipulated for by fealty, he cannot in the first instance refuse to admit the heir of the tenant upon his death; nor, in the second, can he remove his present tenant so long as he lives, though he holds nominally by the precarious tenure of his lord's will. The fruits and appendages of a copyhold tenure, that it hath in common with free tenures, are fealty, services (as well in rents as otherwise), reliefs, and escheats. The two latter belong only to copyholds of inheritance; the former to those for life also. But, besides these, copyholds have also heriots, wardship, and fines. Heriots, which are agreed to be a Danish custom, are a render of the best beast or other good (as the custom may be) to the lord on the death of the tenant. This is plainly a relic of villein tenure; there being originally less hardship in it, when all the goods and chattels belonged to the lord, and he might have seized them even in the villein's lifetime. These are incident to both species of copyhold; but wardship and fines to those of inheritance only. Wardship, in copyhold estates, partakes both of that in chivalry and that in soccage. Like that in chivalry, the lord is the legal guardian, who usually assigns some relation of the infant tenant to act in his stead; and he, like guardian in soccage, is accountable to his ward for the profits. Of fines, some are in the nature of primer-seisins, due on the death of each tenant; others are mere fines for alienations of the lands; in some manors only one of those sorts can be demanded, in some both, and in others neither. They are sometimes arbitrary and at the will of the lord, sometimes fixed by custom; but, even when arbitrary, the courts of law, in favor of the liberty of copyholders, have tied them down to be reasonable in their extent; otherwise they might amount to disherison of the estate. No fine therefore is allowed to be taken upon descents and alienations (unless in particular circumstances) of more than two years improved value of the estate. From this instance we may judge of the favorable disposition that the law of England (which is a law of liberty) hath always shown to this species of tenants, by removing, as far as possible, every real badge of slavery from them, however some nominal ones may continue. It suffered custom very early to get the better of the express terms upon which they held their lands; by declaring that the will of the lord was to be interpreted by the custom of the manor; and, where no custom has been suffered to grow up to the prejudice of the lord, as in this case of arbitrary fines, the law itself interposes in an equitable method, and will not suffer the lord to extend his power so far as to disinherit the tenant. 4. There is yet a fourth species of tenure, described by Bracton, under the name sometimes of privileged villenage, and sometimes of villein-soccage. See VILLENAGE, PRIVILEGED. There is still one other species of tenure, reserved by the statute of Charles II., which is of a spiritual nature, and called the tenure in FRANK ALMOIGN; see that article.

TEOS, one of the twelve Ionian cities, was situated on the south side of the Ionian peninsula, and distinguished by being the birth place of the poet Anacreon and the historian Hecatæus.

TEP'ID, *adj.* } Latin, *tepidus.* Luke-
TE'POR, *n. s.* } warm; warm in a small degree: the noun substantive corresponding.

The *tepid* caves, and fens, and shores,
Their brood as numerous hatch. *Milton.*

He with his *tepid* rays the rose renews,
And licks the dropping leaves, and dries the dews. *Dryden.*

Such things as relax the skin are likewise sudorifick; as warm water, friction, and *tepid* vapours. *Arbuthnot.*

The small-pox, mortal during such a season, grew more favourable by the *tepor* and moisture in April. *Id.*

TEQUENDAMA, Cataract of, a remarkable fall of the Rio Bogota, in South America. This river receives numerous tributary streams as it passes over the plain of Bogota, and it is about 140 feet in breadth, a short distance above the fall. Approaching the crevice through which it dashes, its breadth is diminished to thirty-five; when, with accumulated force, it rushes down a perpendicular rock at two bounds, to the astonishing depth of 600 feet, into a dark unfathomable gulf, out of which the river again issues under the name of Rio Meta, and continues its course, by an immense descent, till it joins the Magdalena. In the fall of this river may be observed a strange variety of climate. The plain of Bogota is covered with crops of wheat, with oaks, elms, and other productions of a temperate region. At the foot of the fall are seen the palms of the equinoctial low lands. The face of the rock, which finishes and borders the vast plain of Bogota, near the cataract, is so steep that it takes three hours to descend from the river Funza to the Rio Meta; and the basin or gulf cannot be approached very close, as the rapidity of the water, the deafening noise of the fall, and dense mass of vapor, render it impossible to get nearer the edges of the abyss than 400 or 500 feet. The loneliness of the spot, the dreadful noise, and the beauty of the vegetation, render this situation one of the wildest and most picturesque scenes in the whole world.

TERAPHIM, or Theraphim, a word in the Hebrew language, which has exercised much the ingenuity of the critics. It occurs thirteen or fourteen times in the Old Testament, and is commonly interpreted idols.

TERCE, *n. s.* Fr. *tierce;* Lat. *triens.* A vessel containing forty-two gallons, or the third part of a butt or pipe of wine.

> In the poet's verse
> The king's fame lies, go now deny his *tierce.*
>
> *Ben Jonson.*

TERCERA, an island forming part of the group of the Azores, near the coast of Africa. The Portuguese gave this name to it from its being the third in succession that was discovered. In consequence of its central situation, and the safety of the roadstead at Angra, it has been made the seat of government; and it is about fifty-four miles in circumference, surrounded with steep rocks, which render it inaccessible, except at a few points, which are strongly fortified. The interior is extremely agreeable, the summits of the mountains consisting, for the most part, of beautiful and fertile plains, abundantly supplied with fine water. Vines are cultivated, but the wine is by no means excellent. Agriculture and pasturage are the chief employments; and fruit, grain, and cattle, are in such abundance, that the population, though amounting to 50,000 souls, subsist in the greatest plenty, and export corn to Lisbon. The only two places of consequence are Angra and Praya.

TEREBELLA, the piercer, in entomology, a genus of insects belonging to the class of vermes and order of molusca. The body is filiform, the mouth placed before; the preputium puts forth a pedunculated tubulous gland. There are several capillary tentacula about the mouth. There are ten species.

TEREBIN'THINATE, *adj.* } Fr. *terebinthine;* Lat. *terebinthum.*
Terebin'thine. }
Consisting of turpentine; mixed with turpentine.

> Salt serum may be evacuated by urine, by *terebinthinates:* as tops of pine in all our ale. *Floyer.*

TEREBRATULÆ, in zoology, or rather ichthyology, a species of anomia which have been supposed not to exist now but as petrified shells. See Anomia. This, however, is a mistake. The anomia is an inhabitant of every region, and has existed in every age.

TER'EBRATE, *v. a.* } Latin, *terebro.* To
Terebra'tion, *n. s.* } bore; perforate; pierce: the noun substantive corresponding.

> *Terebration* of trees makes them prosper better; and also it maketh the fruit sweeter and better.
>
> *Bacon.*

> Consider the threefold effect of Jupiter's trisulk, to burn, discuss, and *terebrate.*
>
> *Browne's Vulgar Errours.*

> Earth-worms are completely adapted to their way of life, for *terebrating* the earth and creeping.
>
> *Derham.*

TEREDO, in entomology, a genus of vermes belonging to the order of testacea. The animal is a terebella; there are two valves, calcareous, hemispherical, and cut off before, and two lanceolated. The shell is tapering, bending, and capable of penetrating wood. There are only three species; viz. 1. T. clava, the nail worm. 2. T. navalis, the ship worm, has a very slender smooth cylindrical shell, inhabits the Indian seas, whence it was imported into Europe. It penetrates easily into the stoutest oak-planks, and produces dreadful destruction to the ships by the holes it makes in their sides; and it is to avoid the effects of this insect that vessels require sheathing. The head of this creature is coated with a strong armour, and furnished with a mouth like that of a leech; a little above this it has two horns which seem a kind of continuation of the shell; the neck is furnished with several strong muscles; the rest of the body is only covered by a very thin and transparent skin, through which the motion of the intestines is plainly seen by the naked eye. This creature is wonderfully minute when newly excluded from the egg, but it grows to the length of four or six inches, and sometimes more. When the bottom of a vessel, or any piece of wood which is constantly under water, is inhabited by these worms, it is full of small holes; but no damage appears till the outer parts are cut away. Then their shelly habitations come into view; in which there is a large space for enclosing the animal and surrounding it with water. There is an evident care in these creatures never to injure one another's habitations; by these means each case or shell is preserved entire. Dissection has shown that every individual has the parts of both sexes, and is therefore supposed to propagate by itself. 3. T. utriculus, the bottle worm.

TEREDON, in ancient geography, a town on the coast of the Arabic Gulf.—Dion Perieg.

TERENCE. See Terentius.

TERENTIA, 1. the wife of Cicero, and mo-

ther of his son Marcus and his daughter Tulliola. While the orator was in Asia she behaved so ill that he divorced her. She afterwards married his enemy Sallust. 2. Terentia the wife of Mæcenas who behaved equally ill to that great man.

TERENTIANUS. See MAURUS.

TERENTIUS AFER (Publius or Terence), a celebrated comic poet of ancient Rome, born at Carthage in Africa. He was slave to Terentius Lucanus the senator, who gave him his liberty on account of his wit, his good mien, and great abilities. Terence, on his becoming a freedman, applied himself to the writing of comedies. Terence died while on a voyage into Greece, about the fifteenth year before the Christian era. There are six of his comedies extant, of which the best editions are the Elzevir one 1635, 12mo.; that cum integris notis Donati, et selectis variorum, 1686, 8vo.; Westerhovius's, in 2 vols. 4to. 1726; and that of Bentley the same year, 4to. A very good English translation was published in 4to. 1768, by Mr. Colman.

TERGIVERSATION, *n. s.* Lat. *tergum* and *verso*. Shift; subterfuge; evasion.

Writing is to be preferred before verbal conference, as being freer from passions and *tergiversations*. *Bishop Bramhall.*

The colonel, after all his *tergiversations*, lost his life in the king's service. *Clarendon.*

TERLIZZI, a large town of Italy, in the south-east of Naples. Its population is said to amount to 8000, and it stands on the high road leading from the town of Bari on the coast, in a north-west direction, across the Ofanto or Aufidus. This part of Italy, the ancient Apulia, is thinly peopled; and Terlizzi has few manufactures. It stands twenty miles south of the site of Cannæ, and sixty north-west of Tarentum.

TERM, *n. s.* & *v. a.* / TERM'LESS, *adj.* / TERM'LY, *adv.* / TERM'ER, *n. s.* Lat. *terminus*. Limit; boundary: hence words expressing a certain thing or meaning; language; condition; limited time: for legal terms see below: to term is, to name; call; describe: the adjective corresponding: termly is, term by term: a termer is one who travels up to the term.

Would curses kill, as doth the mandrake's groan,
I would invent as bitter searching *terms*,
As curst, as harsh, as horrible to hear. *Shakspeare.*

I am thy father's spirit,
Doomed for a certain *term* to walk the night. *Id.*

These betraying lights look not up towards *termless* joys, nor down towards endless sorrows. *Raleigh.*

To apply notions philosophical to plebeian *terms*, or to say, where the notions cannot be fitly reconciled, that there wanted a *term* or nomenclature for it, be but shifts of ignorance. *Bacon.*

Corruption is a reciprocal to generation; and they two are as nature's two *terms* or boundaries, and the guides to life and death. *Id. Natural History.*

The clerks are partly rewarded by that means also, besides that *termly* fee which they are allowed. *Bacon.*

Nor have my title leaf on post or walls,
Or in cleft sticks advanced to make calls
For *termers*, or some clerk-like serving man. *Ben Jonson.*

The *term* suiters may speed their business: for the end of these sessions delivereth them space enough to overtake the beginning of the *terms*. *Carew.*

God to Satan first his doom applied
Though in mysterious *terms*. *Milton.*

Too long vacation hastened on his *term*. *Id.*

Those men employed as justices daily in *term* time consult with one another. *Hale.*

What are these to those vast heaps of crimes
Which *terms* prolong? *Dryden.*

Live, though unhappy, live on any *terms*. *Id.*

In painting, the greatest beauties cannot always be expressed for want of *terms*. *Id.*

Men *term* what is beyond the limits of the universe imaginary space, as if nobody existed in it. *Locke.*

Those parts of nature into which the chaos was divided, they signified by dark and obscure names, which we have expressed in their plain and proper *terms*. *Burnet.*

We flattered ourselves with reducing France to our own *terms* by the want of money, but have been still disappointed by the great sums imported from America. *Addison.*

Why should Rome fall a moment ere her time?
No; let us draw her *term* of freedom out
In its full length, and spin it to the last. *Id.*

Did religion bestow heaven, without any *terms* or conditions, indifferently upon all, there would be no infidel. *Bentley.*

Had the Roman tongue continued vulgar, it would have been necessary, from the many *terms* of art required in trade and in war, to have made great additions to it. *Swift.*

TERM, in law, is generally taken for a limitation of time or estate; as a lease for term of life or years. Term is more particularly used for that time wherein our courts of justice are open; in opposition to which the rest of the year is called vacation.

TERM, in grammar, denotes some word or expression in a language. The word term (from terminus) is borrowed metaphorically, by the grammarians and philosophers, from the measurers or surveyors of lands: as a field is defined and distinguished by its termini or limits, so is a thing or matter spoken of by the word or term it is denoted by.

TERM, in the arts, or term of art, is a word which, besides the literal and popular meaning which it has or may have in common language, bears a further and peculiar meaning in some art or science.

The TERMS in law above enumerated are not observed by the high court of parliament, the chancery, and inferior courts; only the courts of king's bench, common pleas, and exchequer, which are the highest courts at common law. These terms are supposed by Mr. Selden to have been instituted by William the Conqueror; but Sir H. Spelman hath shown that they were gradually formed from the canonical constitutions of the church; being no other than those leisure seasons of the year which were not occupied by the great festivals or fasts, or which were not liable to the general avocations of rural business. Throughout all Christendom, in very early times, the whole year was one continued term for hearing and deciding causes.

Oxford terms.—These are four; which begin and end as below:—

	LENT-TERM
Begins . .	January 14th.
Ends . .	Saturday before Palm Sunday.

EASTER-TERM
Begins . . Wednesday after Low Sunday.
Ends . . Thursday before Whit-Sunday.

TRINITY-TERM
Begins . . Wednesday after Trinity-Sunday.
Ends . . Saturday after the Act.

MICHAELMAS-TERM
Begins . . October 10th.
Ends . . December 16th.

N. B. The Act is the first Monday after the 6th of July. When the day of the beginning or ending happens on a Sunday, the terms begin or end the day after.

Cambridge terms.—These are three, as below:

LENT-TERM
Begins . . January 13th.
Ends . . Friday before Palm-Sunday.

EASTER-TERM
Begins . . Wednesday after Low-Sunday.
Ends . . Friday after Commencement.

MICHAELMAS-TERM
Begins . . October 10th.
Ends . . December 16th.

N. B. The commencement is the first Tuesday in July. There is no difference on account of the beginning or ending being Sunday.

TERMS, IRISH. In Ireland the terms are the same as at London, except Michaelmas term, which begins October 13th, and adjourns to November 3rd, and thence to the 6th.

TERMS, SCOTTISH. The court of session has two terms, the winter and summer. The winter begins on the 12th of November, and ends the 11th of March, only there is a recess of three weeks at Christmas. The summer term commences on the 12th of May, and ends the 11th of July. The court of exchequer has four terms. 1. Candlemas term begins January 15th, and ends February 3rd. 2. Whitsuntide term begins May 12th, and ends June 2nd. 3. Lammas term begins June 17th, and ends July 5th. 4. Martinmas term begins November 24th, and ends December 20th.

TER'MAGANT, *adj.* & *n. s.* } Sax. tŷr and
TER'MAGANCY, *n. s.* } magan, eminently powerful: or tŷr, taken as a name of Mars. Tumultuous; turbulent: a turbulent person: turbulence; tumultuous violence.

'Twas time to counterfeit, or that hot *termagant*
Scot had paid me scot and lot too.
Shakspeare. Henry IV.

I would have such a fellow whipt for o'erdoing *Termagant;* it outherods Herod. *Id. Hamlet.*

For zeal's a dreadful *termagant,*
That teaches saints to tear and rant. *Hudibras.*

She threw his periwig into the fire: Well, said he, thou art a brave *termagant.* *Tatler.*

The eldest was a *termagant,* imperious, prodigal, profligate wench. *Arbuthnot's History of John Bull.*

The sprites of fiery *termagants* in flame
Mount up, and take a salamander's name. *Pope.*

By a violent *termagancy* of temper, she may never suffer him to have a moment's peace. *Barker.*

TERMES, in entomology, a genus of insects belonging to the order of aptera according to Linnæus; but by others it is arranged more properly under the neuroptera. The mouth has two horny jaws; the lip is horny and quadrifid, the laciniæ being linear and acute; there are four feelers, which are equal and filiform. The antennæ are moniliform in most species, and the eyes two. There are eight species according to Gmelin; viz. T. arda, Capensis, destructor, divinatorius, fatalis, fatidicus, mordax, and pulsatorius. But, as Gmelin has followed the classification of Linnæus in arranging the termes under the order of aptera, it is not improbable that several of those which are mentioned as species of the termes may belong to a different genus. It will be sufficient here to describe the fatalis, which we are enabled to do from very accurate information.

T. fatalis bellicosus, or the white ant, is of a yellow color above; the wings also yellowish; the costa is ferruginous; the stemmata are near the eyes, the central point being somewhat prominent. Of the white ant we have a very curious and interesting description in the Philosophical Transactions for 1781 by Mr. Henry Smeathman of Clement's Inn. According to this account the works of these insects surpass those of the bees, wasps, beavers, and other animals, as much at least as those of the most polished European nations excel those of the least cultivated savages. In the interior construction of their habitations they appear greatly to exceed any work of human construction. The most striking parts of these structures are the royal apartments, the nurseries, magazines of provisions, arched chambers and galleries, with their various communications; the ranges of gothic-shaped arches, projected, and not formed by mere excavation, some of which are two or three feet high, but which diminish rapidly like the arches of aisles in perspective; the various roads, sloping staircases, and bridges, consisting of one vast arch, and constructed to shorten the distance between the several parts of the building, which would otherwise communicate only by winding passages. In some parts near Senegal their number, magnitude, and closeness of situation, make them appear like the villages of the natives. But these and many other curious instances of the great sagacity and powers of these insects cannot be understood without viewing the plates in which their feeble frames, and comparatively stupendous works, are delineated. See Philosophical Transactions above referred to. There are three distinct ranks among them. These are, first, the laborers, or working insects; next the soldiers, or fighting order, who do no kind of labor, and are about twice as long as the former, and equal in bulk to about fifteen of them; and, lastly, the winged or perfect insects, which may be called the nobility or gentry of the state; for they neither labor nor fight, being scarcely capable even of self-defence. 'These only are capable of being elected kings or queens; and nature has so ordered it that they emigrate within a few weeks after they are elevated to this state, and either establish new kingdoms or perish within a day or two.' The first order, the working insects, are most numerous, being in the proportion of 100 to one of the soldiers. In this state they are about a quarter of an inch long,

and twenty-five of them weigh about a grain; so that they are not so large as some of our ants. The second order, or soldiers, have a very different form from the laborers, and have been by some authors supposed to be the males, and the former neuters; but they are, in fact, the same insects as the foregoing, only they have undergone a change of form and approached one degree nearer to the perfect state. They are now much larger, being half an inch long, and equal in bulk to fifteen of the laborers. The third order, or the insect in its perfect state, varies its form still more than ever. The head, thorax, and abdomen, differ almost entirely from the same parts in the laborers and soldiers; and besides this the animal is now furnished with four fine large, brownish, transparent wings, with which it is, at the time of emigration, to wing its way in search of a new settlement. It differs so much from the other two that they have not hitherto been supposed to belong to the same community. In fact they are not to be discovered in the nest till just before the commencement of the rainy season; when they undergo the last change, which is preparative to the formation of new colonies. They are equal in bulk to two soldiers, and about thirty laborers; and, by means of the wings with which they are furnished, they roam about for a few hours; at the end of which time they lose their wings, and become the prey of innumerable birds, reptiles, and insects; while probably not a pair out of many millions of this unhappy race get into a place of safety, fulfil the first law of nature, and lay the foundation of a new community. In this state many fall into the neighbouring waters and are eaten with avidity by the Africans. The author found them delicate, nourishing, and wholesome, without sauce or other help from cookery than merely roasting them in the manner of coffee. The few fortunate pairs who happen to survive this annual massacre and destruction are represented by the author as being casually found by some of the laborers that are continually running about on the surface of the ground, and are elected kings and queens of new states. Those who are not so elected and preserved, certainly perish, and most probably in the course of the following day. By these industrious creatures the king and queen elect are immediately protected from their innumerable enemies, by enclosing them in a chamber of clay, where the business of propagation soon commences. Their 'voluntary subjects' then busy themselves in constructing wooden nurseries, or apartments entirely composed of wooden materials, seemingly joined together with gums. Into these they afterwards carry the eggs produced from the queen, lodging them there as fast as they can obtain them from her. After impregnation a very extraordinary change begins to take place in her person, or rather in her abdomen only. It gradually increases in bulk, and at length becomes of such an enormous size as to exceed the bulk of the rest of her body 1500 or 2000 times. She becomes 1000 times heavier than her consort, and exceeds 20,000 or 30,000 times the bulk of one of the laborers. In this state the matrix has a constant peristaltic or undulating motion; the consequence of which is (as the author has counted them) the protrusion of 80,000 eggs in twenty-four hours.

TERMINALIA, in antiquity, feasts celebrated by the Romans in honor of the god Terminus.

TERMINALIA, in botany, a genus of plants belonging to the class of polygamia and order of monœcia. The male calyx is quinquepartite; there is no corolla; the stamina are ten. The hermaphrodite flower is the same with that of the male; there is one style; the fruit, which is a drupe or plum, is below, and shaped like a boat. There are two species; viz. 1. T. augustifolia, the narrow-leaved, or benzoin plant; but though it has this name it does not yield benzoin. See STYRAX. 2. T. Catappa.

TER'MINATE, *v.a.* & *v.n.* } Fr. *terminer*;
TERMINA'TION, *n.s.* } Latin *termino*.

See TERM. To bound; limit; put an end to: be limited; or at an end: the noun substantive corresponding.

She speaks poniards, and every word stabs: if her breath were as terrible as her *terminations*, there were no living near her, she would infect to the north star. *Shakspeare.*

It is not an idol ratione termini, in respect of *termination*; for the religious observation thereof is referred and subservient to the honour of God and Christ: neither is it such ratione modi, for it is kept holy by the exercise of evangelical duties. *White.*

These are to be reckoned with the heathen, with whom you know we undertook not to meddle, treating only of the scripture-election *terminated* in those to whom the scripture is revealed. *Hammond.*

Its earthly and salinous parts are so exactly resolved, that its body is left imporous, and not discreted by atomical *terminations*. *Browne's Vulgar Errours.*

Ere I the rapture of my wish renew,
I tell you, then, it *terminates* in you.
Dryden's Aurengzebe.

Bodies that are solid, separable, *terminated*, and moveable, have all sorts of figures. *Locke.*

TERMINI, in architecture, denotes a kind of statues or columns, adorned on the top with the figure of a man's, woman's, or satyr's head, as a capital; and the lower part ending in a kind of sheath or scabbard. Suidas thinks they should rather be called hermetes than termini, as they originated from the Athenian hermeses, which were used as ornaments, and not from the Roman termini, which were used as land-marks. See HERMES.

TERMINI, a considerable sea-port of Sicily, in the Val di Mazzara, on the north coast, and at the mouth of a river of this name. It stands on a rocky eminence, surrounded by a wall, and has, on the side of the sea, an old castle. The public establishments consist of a Monte di Pieta, two hospitals, a poor-house for females, several convents, and some rather richly ornamented churches. Here is a tolerable port, and the inhabitants have long been in the practice of exporting corn, olive oil, and other products. Though a place of some note in antiquity, it has at present few remains, but it has long been celebrated for its hot mineral springs. Inhabitants about 8700. Eighteen miles E.S.E. of Palermo. Long 13° 45′ E., lat. 38° 5′ N

TERMIN'THUS, *n. s.* Greek τέρμινθος. A tumor.

Terminthus is of a blackish colour; it breaks, and within a day the pustule comes away in a slough. *Wiseman.*

TERMINUS, in Pagan worship, an ancient deity among the Romans, who presided over the stones or land-marks called termini, which were held so sacred that it was accounted sacrilege to move them; and as the criminal became devoted to the gods it was lawful for any man to kill him. The worship of this deity was instituted by Numa Pompilius, who, to render land-marks, and consequently the property of the people, sacred, erected a temple on the Tarpeian mount to Terminus.

TERMIOVA, a town of Maritime Austria, in Istria, eighteen miles north-east of Pedena.

TERMITES. See TERMES.

TERMOLI. See TERMINI.

TERMUYDEN, a strong town of Holland, in the department of the Meuse and ci-devant province of Dutch Flanders, north-east of Sluys.

TERN, in ornithology. See STERNA.

TERNAI, the name given by Perouse to a very fine bay which he discovered on the coast of Tartary in lat. 45° 13′ N., long. 135° 9′ E. of Paris. The bottom is sandy, and diminishes gradually to six fathoms within a cable's length of the shore. The tide rises five feet; it is high water at eight hours fifteen minutes at full and change; and the flux and reflux do not alter the direction of the current at half a league from the shore.

TER'NARY, or TER'NION, *n. s.* } Latin *ternarius, ternio.* The number three.

These nineteen consonants stood in such confused order, some in *ternaries*, some in pairs, and some single. *Holder.*

TERNATE, the northernmost of a chain of islands on the west coast of Gilolo, and formerly the seat of sovereignty over all the adjacent Molucca islands, Tidore, Bachian, Motir, and Machian. The first Mahometan sovereign of Ternate is said to have reigned from A. D. 1466 to 1486. In 1521 it was visited by the Portuguese, who took formal possession; but they were expelled in 1530. In 1579 it was touched at by Sir Francis Drake, who, according to the fashion of the day, took possession of it in the name of queen Elizabeth. Along with the kingdom of Portugal it devolved to the Spaniards, who lost Ternate in 1606; but retained a footing in the Molucca so late as 1663. In 1680 the Dutch compelled the sultan of Ternate to become tributary to them, and the princes of the other Moluccas were so thoroughly subdued that in the year 1778 the kings of Tidore and Bachian were deposed, and exiled to Batavia. It was taken from the Dutch in the course of the revolutionary war, but was restored at the peace of Amiens. It was again taken in August 1810, and was restored to the Dutch, with their other possessions in India, by the peace of Paris.

TERNAVASSO, a town of the French empire, in the department of the Po, and ci-devant province of Piedmont, six miles north-east of Carmagnola, and eight south of Chieri.

TERNI, a town in the State of the Church, situated in a luxuriant valley, between two branches of the Nera. It has a cathedral and several churches, but no other public building of consequence. It is a place of antiquity, and still contains several interesting ruins. The cascades of the Eveline, called the Caduta delle Marmore are very fine. Population about 7000. Twelve miles south of Spalato, and forty-five north of Rome.

TERNSTROMIA, in botany, a genus of plants belonging to the class of polyandria and order of monogynia. The calyx is monophyllous and quinquepartite; the corolla is monopetalous, quinquepartite or sexpartite, globular, and bell-shaped; the berry is dry, bilocular, and valveless. There is only one species, viz. T. meridionalis.

TERPANDER, a celebrated Greek poet and musician. The Oxford marbles tell us that he was the son of Derdeneus of Lesbos, and that he flourished in the thirty-eighth year of these records; which nearly answers to the twenty-seventh Olympiad, and sixty-first year B. C. The marbles inform us likewise that he taught the nomes, or airs, of the lyre and flute, which he performed himself upon this last instrument in concert with other players on the flute. Several writers tell us that he added three strings to the lyre, which before his time had but four. See LYRE. Among the many signal services which Terpander is said to have done to music, none was of more importance than the notation that is ascribed to him for ascertaining and preserving melody, which before was traditional and wholly dependent on memory. The invention indeed of musical characters has been attributed by Alypius and Gaudentius, two Greek writers on music, and upon their authority by Boethius, to Pythagoras, who flourished full two centuries after Terpander. But Plutarch gave the invention to Terpander, and so does Clemens Alexandrinus. Plutarch says, 'no other proof need be urged of the excellence of Terpander in the art of playing upon the cithara than what is given by the register of the Pythic games, from which it appears that he gained four prizes successively at those solemnities. Of the works of this poet only a few fragments are now remaining.

TERPSICHORE, in the mythology, one of the Nine Muses. She presided over dancing, of which she was reckoned the inventress. In painting she is drawn with a musical instrument in her hand, and crowned with laurel.—Juv. vii. v. 35.

TERRA (Lat. the earth), in the mythology, the wife of Cœlus and mother of Saturn and Ops, or Tellus. See OPS and TELLUS.

TERRA DEL FUEGO, an island separated from the southern extremity of America, by a narrow sea called the Straits of Magellan; so called from the volcanoes observed on it. Of the south-west coast of Terra del Fuego, captain Cook says:—'With respect to inlets, islands, &c., it may be compared to the coast of Norway; for I doubt if there be an extent of three leagues where there is not an inlet or harbour which will receive and shelter the largest shipping. The

worst is that, till these inlets are better known, one has, as it were, to fish for anchorage. There are several lurking rocks on the coast; but happily none of them lie far from land, the approach to which may be known by sounding, supposing the weather so obscure that you cannot see it. For, to judge of the whole by the parts we have sounded, it is more than probable that there are soundings all along the coast, and for several leagues out to sea. Upon the whole, it is by no means the dangerous coast it has been represented. The currents between Cape Deseada and Cape Horn set from west to east, that is, in the same direction as the coast; but they are by no means considerable. To the east of the Cape their strength is much increased, and their direction is north-east to Staten Land. They are rapid in Strait le Maire and along the south coast of Staten Land, and set like a torrent round Cape St. John, where they take a north-west direction, and continue to run very strong both within and without New Year's Isle. While we lay at anchor within this island, I observed that the current was strongest during the flood; and that on the ebb its strength was so much impaired that the ship would sometimes ride head to the wind when it was at west and west-north-west. This is only to be understood of the place where the ship lay at anchor; for, at the very time we had a strong current setting to the westward, one of equal strength was found near the coast of Staten Land setting to the eastward; though probably this was an eddy current or tide.'

The aspect of the country is dreary and uncomfortable, consisting of a chain of stupendous rocks, continually covered with snow. The inhabitants are said to be naturally as fair as Europeans, but go naked, and paint their bodies with the most gorgeous colors. Those on the south side are particularly barbarous; while those on the opposite side are simple and affable. The skins of wild animals are sometimes used to cover their bodies, upon occasions of extraordinary pomp; and their tents are made of poles, disposed in a conical form, covered with skins, or the bark or leaves of trees. Long. 51° 20′ to 58° W., lat. 52° 30′ to 55° 35′ S.

Terra Firma, an extensive tract of country in South America, which comprehends the three provinces of Darien, Veragua, and Panama or Terra Firma proper. Towards the east it is bounded by the province of Carthagena, the river St. Juan being the mutual boundary; on the west by the province of Costa Rica, in the kingdom of Guatamala; and on the north and south by the Atlantic and Pacific oceans. Its length from east to west is about 150 leagues, but if measured along the coast it is above 200. It is ninety leagues wide in the broadest part; and at the isthmus of Darien, where it is narrowest, its breadth is only eight leagues. It is watered by a variety of rivers.

Terra Japonica, more commonly called catechu, a drug formerly supposed to be an extract from the seeds of the areca catechu, but lately discovered by Mr. Kerr, assistant surgeon to the civil hospital at Bengal, to be obtained from the mimosa catechu. Mr. Kerr gives the following account of the manner in which the extract is made:—'After felling the trees the manufacturer carefully cuts off all the exterior white part of the wood. The interior colored wood is cut into chips, with which he fills a narrow-mouthed unglazed earthen pot, pouring water upon them until he sees it among the upper chips; when this is half evaporated, by boiling, the decoction, without straining, is poured into a flat earthen pot, and boiled to one-third part; this is set in a cool place for one day, and afterwards evaporated by the heat of the sun, stirring it several times in the day. When it is reduced to a considerable thickness it is spread upon a mat or cloth, which has previously been covered with the ashes of cowdung; this mass is divided into square or quadrangular pieces by a string, and completely dried by turning them frequently in the sun until they are fit for sale.' This extract is called cutt by the natives, by the English cutch, and by different authors terra japonica, catechu, khaath, cate, cachou, &c. 'In its purest state it is a dry pulverable substance, outwardly of a reddish color, internally of a shining dark brown, tinged with a reddish hue; in the mouth it discovers considerable astringency, succeeded by a sweetish mucilaginous taste.' According to Lewis 'it dissolves almost totally in water, excepting the impurities which are usually of the sandy kind, and amounting in the specimens I examined to about one-eighth of the mass. Of the pure matter, rectified spirit dissolves about seven-eighths into a deep red color; the part which it leaves undissolved is an almost insipid mucilaginous substance.' Catechu may be usefully employed for most purposes where an astringent is indicated, provided the most powerful be not required. But it is particularly useful in alvine fluxes; and, where these require the use of astringents, we are acquainted with no one equally beneficial. Besides this it is employed also in uterine profluvia, in laxity and debility of the viscera in general, in catarrhal affections, and various other diseases where astringents are necessary. It is often suffered to dissolve leisurely in the mouth, as a topical astringent for laxities and exulcerations of the gums, for apthous ulcers in the mouth, and similar affections. This extract is the basis of several fixed formulæ in our pharmacopœias, particularly of a tincture and an electuary; but one of the best forms under which it can be exhibited is that of a simple infusion in warm water, with a proportion of cinnamon or cassia; for it is thus at once freed from its impurities, and improved by the addition of the aromatic.

Terra Nuova, a considerable sea-port on the south coast of Sicily, in the Val di Noto, at the mouth of a river of this name. Among its public establishments are eight convents, an asylum, hospital, castle, and several well-built churches. Although the bay is somewhat exposed, there is good anchorage during the summer season, within a mile of the town, in eight or nine fathoms water. Terra Nuova is noted for its export of sulphur, dug up and manufactured in large quantities in the neighbourhood. Wine, corn, and fruits of various kinds, likewise form articles of export. Population 9000. Nineteen miles east of Licata, and fifty west of Syracuse.

TER'RACE, *n. s.* } French *terrace*; Ital. *ter-*
TER'RACED, *adj.* } *raccia*; of Lat. *terra*. A small mount of earth covered with grass: the adjective corresponding.

The reception of light into the body of the building must now be supplied, by *terracing* any story which is in danger of darkness.
Wotton's Architecture.

He made her gardens not only within the palaces, but upon *terrasses* raised with earth over the arched roofs, planted with all sorts of fruits. *Temple.*

Fear broke my slumbers: I no longer stay,
But mount the *terrace*, thence the town survey.
Dryden.

Clermont's *terraced* height and Eshei's groves.
Thomson.

A TERRACE is a walk or bank of earth raised in a garden or court to a due elevation for a prospect. The name is also given to the roofs of houses that are flat, and whereon we may walk.

TERRACINA, an ancient city of Italy, in the pope's territory, in the Campagna of Rome, with a bishop's see. It was anciently called Anxur, and was the capital of Volsci. See ANXUR and TERRACINA. Its principal church was originally a temple of Jupiter, who was supposed to have a great partiality for the town, and is therefore styled Anxurus by Virgil. It is seated on the sea-coast, on the side of a mountain, forty-six miles south-east of Rome. Long. 13° 15′ E., lat. 41° 24′ N.

TERRÆ FILIUS, son of the earth, a student of the university of Oxford, formerly appointed in public acts to make satirical and jesting speeches against the members thereof, to tax them with any growing corruptions, &c.

TERRANTONA, a town of Spain in Arragon, eight miles south-east of Ainsa.

TERRA'QUEOUS, *adj.* Lat. *terra* and *aqua*. Composed of land and water.

The *terraqueous* globe is, to this day, nearly in the same condition that the universal deluge left it.
Woodward.

TERRAS, or TRAAS, in mineralogy, a species of argillaceous earth. It differs but little in its principles from puzzolana, but is much more compact and hard, porous and spongy. It is generally of a whitish yellow color, and contains more heterogeneous particles, a spar, quartz, shoerl, &c., and something more of calcareous earth; it effervesces with acids, is magnetic, and fusible per se. When pulverised it serves as a cement, like puzzolana. It is found in Germany and Sweden. A species of red earth has been found in the parish of St. Elizabeth in Jamaica, which turns out to be an excellent substitute for terras or puzzolana earth, and may therefore be of great value to the inhabitants of the West Indies. One measure of this earth, mixed with two of well slaked lime and one of sand, form a cement that answers extremely well for building any dam or bridge, or any structure in water; for it will soon harden and become like a stone.

TERRASSON (Andrew), a French divine and priest of the oratory, born at Lyons, and much admired for his eloquence. His Sermons in 4 vols. 12mo. are esteemed. He died at Paris in 1723.

TERRASSON (Abbé John), brother of Andrew, a French writer, born at Lyons in 1669. He distinguished himself in the dispute concerning Homer between La Motte and Madam Dacier, by writing a Dissertation contre l'Iliade. He wrote a political and moral romance called Sethos, full of learning and philosophy; and another capital work of his is a French translation of Diodorus Siculus. He died in 1750.

TERRASSON (Anthony), a relation of the two preceding, was born at Paris in 1705. He was eminent as an advocate, and wrote the History of Roman Jurisprudence, in folio, for which he was appointed censor royal, and a professor in the royal college. He also wrote Miscellanies of History, Literature, &c., 12mo. He died in 1782.

TERRE'-BLUE, *n. s.* Fr. *terre* and *bleu*. A sort of earth.

Terre-blue is a light, loose, friable kind of lapis armenus. *Woodward on Fossils.*

TERRELLA, or little earth, is a magnet turned of a spherical figure, and placed so as that its poles, equators, &c., do exactly correspond with those of the world.

TERRENE', *adj.* Lat. *terrenus*. Earthly; terrestrial.

They think that the same rules of decency which serve for things done unto *terrene* powers, should universally decide what is fit in the service of God.
Hooker.

Our *terrene* moon is now eclipsed,
And it portends alone the fall of Antony.
Shakspeare.

God set before him a mortal and immortal life, a nature cœlestial and *terrene*; but God gave man to himself. *Raleigh.*

Over many a tract
Of heaven they marched, and many a province wide,
Tenfold the length of this *terrene*.
Milton's Paradise Lost.

TER'REOUS, *adj.* } Lat. *terreus*. Earthy;
TERRES'TRIAL, } consisting of earth: this
TERRES'TRIFY, *v. a.* } also terrestrial and ter-
TERRES'TRIOUS, *adj.* } restrious signify: terrestrify is to reduce to an earthly state.

Far passing the height of men *terrestrial*,
Like an huge giant of the Titan race. *Spenser.*

Terrestrial heaven! danced round by other heavens
That shine, yet bear their bright officious lamps,
Light above light. *Milton.*

There is but little similitude betwixt a *terreous* humidity and plantal germinations.
Glanville's Scepsis.

According to the temper of the *terreous* parts at the bottom, variously begin intumescencies.
Browne's Vulgar Errours.

Though we should affirm, that heaven were but earth celestified, and earth but heaven *terrestrified*; or, that each part above had an influence on its divided affinity below; yet to single out these relations is a work to be effected by revelation. *Id.*

This variation proceedeth from *terrestrious* eminences of earth respecting the needle. *Browne.*

Thou broughtest Briareus with his hundred hands
So called in heaven; but mortal men below
By his *terrestrial* name Ægeon know. *Dryden.*

I did not confine these observations to land, or *terrestrial* parts of the globe, but extended them to the fluids. *Woodward.*

TERRE-PLEIN, or TERRE-PLAIN, in fortification, the top, platform, or horizontal surface of

the rampart upon which the cannon are placed, and where the defenders perform their office. It is so called because it lies level, having only a little slope outwardly to counteract the recoil of the cannon. Its breadth is from twenty-four to thirty feet; being terminated by the parapet on the outer side, and inwardly by the inner talus.

TERRE'-VERTE, *n. s.* Fr. *terre-verte.* A sort of earth.

Terre-verte owes its colour to a slight admixture of copper. *Woodward on Fossils.*

Terre-verte, or green earth, is light; it is a mean betwixt yellow-ochre and ultramarine.
Dryden's Dufresney.

TERRE-VERTE, in the color trade, green earth, is much used by painters, both singly for a good standing green, and in mixture with other colors. It is an indurated clay, of a deep bluish green color, and is found in the earth not in continued strata or beds, as most of the other earths are, but in large flat masses of different sizes imbedded in other strata; these break irregularly in the cutting, and the earth is generally brought out of the pit in lumps of different sizes. It is of a fine regular and even structure, and not very hard. It is of an even and glossy surface, very smooth to the touch, and in some degree resembling the morochthus or French chalk, but adhering firmly to the tongue. It does not stain the hands in touching it; but being drawn along a rough surface it leaves an even white line with a greenish cast. It does not ferment with acids, and it burns to a dusky brown color. It is dug in the island of Cyprus, and in many parts of France and Italy. That from the neighbourhood of Verona has been esteemed the best in the world; but of late there has been some dug in France that equals it. There is also an earth dug on Mendip Hills, in the sinking for coal, which, though wholly unobserved, is nearly, if not wholly, of equal value. When scraped, and the finer parts separated, it is ready to be made up with oil for the use of the painters, and makes the most true and lasting green of any body they use.

TER'RIBLE, *adj.* } Fr. *terrible*; from
TER'RIBLY, *adv.* } Lat. *terribilis.* Dread-
TER'RIBLENESS, *n. s.* } ful; formidable; causing fear: hence great, so as to overpower or offend: the adverb and noun substantive corresponding.

Having quite lost the way of nobleness, he strove to climb to the height of *terribleness.* *Sidney.*

Was this a face to be exposed
In the most *terrible* and nimble stroke
Of quick, cross lightning? *Shakspeare. King Lear.*

Being indisposed by the *terrible* coldness of the season, he reposed himself till the weather should mend. *Clarendon.*

Fit love for gods,
Not *terrible*, though terrour be in love. *Milton.*

I began to be in a *terrible* fear of him, and to look upon myself as a dead man. *Tillotson.*

The polished steel gleams *terribly* from far,
And every moment nearer shows the war. *Dryden.*

Thy native Latium was thy darling care,
Prudent in peace, and *terrible* in war. *Prior.*

Their *terribleness* is owing to the violent contusion and laceration of the parts. *Sharp's Surgery.*

The poor man squalled *terribly.* *Swift.*

TERRICOLIST (from terra and colo), one who cultivates or inhabits the earth.—Ash.

TER'RIER, *n. s.* Fr. *terrier*; From Latin *terra.* A dog that follows his game underground.

The fox is earthed, but I shall send my two *terriers* in after him. *Dryden's Spanish Friar.*

King James's canons require that the bishops procure a *terrier* to be taken of such lands. *Ayliffe.*

TERRIER, in zoology. See CANIS.

TER'RIFY, *v. a.* } Latin *terror* and *facio.*
TERRIF'IC, *adj.* } To fright; shock with fear; to make afraid: the adjective corresponding.

Thou scarest me with dreams, and *terrifiest* me through visions. *Job* vii. 14

In nothing *terrified* by your adversaries.
Phil. i. 28.

Neither doth it beseem this most wealthy state to be *terrified* from that which is right with any charges of war. *Knolles.*

The serpent, subtlest beast of all the field,
Of huge extent sometimes, with brazen eyes
And hairy mane *terrifick.* *Milton's Paradise Lost.*

Though he was an offender against the laws, yet in regard they had treated him illegally, in scourging him and Silas uncondemned, against the privilege of Romans, he *terrifies* them with their illegal proceedings. *Kettlewell*

The British navy through ocean vast
Shall wave her double cross, t' extremest climes
Terrifick. *Philip.*

The amazing difficulty of his account will rather *terrify* than inform him, and keep him from setting heartily about such a task as he despairs ever to go through with. *South.*

Meteors for various purposes to form;
The breeze to cheer; to *terrify*, the storm.
Blackmore.

TER'RITORY, *n. s.* Fr. *territoire*; law Lat. *territorium.* Land; country; dominion; district.

Linger not in my *territories* longer than swiftest expedition will give thee time to leave our royal court. *Shakspeare.*

They erected a house within their own *territory*, half-way between their fort and the town.
Hayward.

Ne'er did the Turk invade our *territory*,
But fame and terror doubled still their files.
Denham.

He saw wide *territory* spread
Before him, towns and rural works between.
Milton.

Ars and sciences took their rise, and flourished only in those small *territories* where the people were free. *Swift.*

TER'ROR, *n. s.* Lat. *terror*; Fr. *terreur.* Fear communicated or received.

They shot through both the walls of the town and the bulwark also, to the great *terrour* of the defendants. *Knolles.*

It is the cowish *terrour* of his spirit,
That dares not undertake. *Shakspeare. King Lear.*

O sight
Of *terrour*, foul and ugly to behold,
Horrid to think, how horrible to feel! *Milton.*

So spake the griesly *terrour.* *Id.*

Those enormous *terrors* of the Nile. *Prior.*

The pleasures of the land and *terrours* of the main.
Blackmore.

TERRORISTS, a name too justly given to that furious party of the French jacobins, who,

during the dictatorship of Robespierre, supported and applauded all his worst measures, while he murdered the greatest and best men of France, constantly calling out 'let terror be the order of the day,' and thus paved the path of blood that led to the establishment of the imperial despotism. See FRANCE.

TERSE, *adj.* Lat. *tersus;* Fr. *ters.* Smooth. Not in use.

Many stones precious and vulgar, although *terse* and smooth, have not this power attractive.
Browne's Vulgar Errours.

To raw numbers and unfinished verse,
Sweet sound is added now to make it *terse.* *Dryden.*

These accomplishments in the pulpit appear by a quaint, *terse,* florid style, rounded into periods without propriety or meaning. *Swift's Miscellanies.*

Various of numbers, new in every strain;
Diffused, yet *terse,* poetical, though plain. *Harte.*

TERTIAN, *n. s.* Lat. *tertiana.* Is an ague intermitting but one day, so that there are two fits in three days.

Tertians of a long continuance do most menace this symptom. *Harvey on Consumptions.*

TERTIAN FEVER. See MEDICINE.

TERTIUS, a prænomen very common among the Romans, who often distinguished their children by their numbers in the order of their birth, as Secundus, Tertius, Quartus, Quintus, Sextus, Septimus, Octavius, Decimus, &c.

TERTRE (John Baptist), a learned dominican, born at Calais in 1610. After having figured as a soldier, he entered into the monastic state, and became a zealous missionary in America, whence he returned in 1658. He wrote a General History of the French West India Islands, in 4 vols. 4to., and died at Paris in 1687.

TERTRE (Francis Joachim Duport Du), a learned French Jesuit, born at St. Malo in 1715. He wrote, 1. An Abridgment of the History of England, in 3 vols. 12mo. 2. An Abridgment of the History of Spain, in 5 vols. 12mo.; and other works. He died in 1759.

TERTULLIAN, or Quintus Septimus Florens Tertullianus, a celebrated priest of Carthage, was the son of a centurion in the militia, who served as a proconsul of Africa. He was educated in the Pagan religion; but being convinced of its errors, embraced Christianity, and became a zealous defender of the faith. He married, it is thought, after his baptism. Afterwards he took orders, and went to Rome: where, during the persecution under the emperor Severus, he published his Apology for the Christians; and, at the beginning of the third century, he embraced the sect of the Montanists. He lived to a very great age, and died in the reign of Caracalla, about the year 216. Many of his works are still extant. The best editions are those of Rigault; especially that of Venice in 1746, folio

TERUNCIUS, in antiquity, a very small brass coin, in use among the Romans. The inconvenience of such very small pieces being soon found, the teruncius became disused, but its name was still retained in reckoning, and thus it became a money of account. The teruncius at first was a quarter of the as or libra: hence, as the as contained twelve ounces, the teruncius contained three, whence the name, which is formed of the Latin tres unciæ. Teruncius was also used for the quarter of the denarius; so that when the denarius was at ten asses, the teruncius was worth two and a half: and, when the denarius was risen to sixteen, the teruncius was worth four. See DENARIUS.

TESCHEN, a town and circle of Austrian Silesia, comprehending the eastern part of that province, with an area of 740 square miles, and 152,000 inhabitants. It is very hilly on the south side, where the Carpathian chain commences, but the north is flat and marshy, so that throughout it is better adapted for grazing than tillage. The inhabitants are mostly of Sclavonian origin.

TESCHEREMISSES, a nation of Tartars. See TARTARY.

TESHOO LOOMBOO, or Skiggatzee Jeung, the seat of the Teshoo Lama, and the capital of all that part of Tibet immediately subject to his authority. Lat. 29° 4′ N., long. 89° 7′. E.

This place is properly a large stone monastery, consisting of 300 or 400 houses, the habitations of the gylongs, besides temples, mausoleums, and the palace of the sovereign pontiff. The buildings are none less than two stories high, flat roofed, and crowned with a parapet rising considerably above the roof, composed of heath and brushwood. The fortress of Shiggatzee Jeung stands on a prominent ridge of rock, and commands the pass. From hence are roads to Bootan and Bengal, to Lahdack and Cashmere; to the mines of lead, copper, cinnabar, and gold; by Tingri Meidaun to Nepaul; to Lassa and China. The distance to Catmandoo, the capital of Nepaul, by the marching road, is estimated at 400 miles. In 1780 the journey of the deceased lama's attendants, from Pekin to Teshoo Loomboo, occupied seven months and eight days. On the north is situated the territory of Taranath Lama, bordering upon Russia and Siberia, and whose influence more especially extends over the Kilmuaks, or hordes of Calmuc Tartars.

The rock of Teshoo Loomboo is by far the loftiest in this neighbourhood. From the summit the eye commands a very extensive prospect, but no striking traces of population are to be discovered, the natives crowding into the hollow recesses. From the north side the celebrated river Brahmapootra, styled in the language of Tibet Erechoomboo, is visible. It here flows in a widely-extended bed through many channels, forming a multitude of islands. Its principal channel is described as being narrow, deep, and never fordable. In 1783 there were reckoned on the establishment of the monastery at Teshoo Loomboo no less than 3700 gylongs for the performance of daily prayer in the goomba or temple. Four lamas, chosen from among them, superintend and direct their religious ceremonies. Their stated periods of devotion are the rising of the sun, moon, and sunset. Youth, intended for the service of the monastery, are received into it at the age of eight or ten years. On admission they are enjoined sobriety, forego the society of women, and confine themselves to the austere practices of the cloister. There are also a considerable number of nunneries, the regulations of which are equally strict. And at this

place there is an extensive establishment, under the direction of the monastery, for the manufacture of images, in which they excel the Chinese.

The annual consumption of tea in the territory of Teshoo Loomboo amounts to the value of £70,000. At the capital 300 Hindoos, Gosains, and Sunyasses, are daily fed by the bounty of the lama. The whole system exhibits a hierarchy of long duration, great opulence, and many practical benefits to the people. The gylongs, or monks, having devoted themselves to the duties of religion, obtain a large portion of respect from their countrymen, who follow worldly avocations. Being attached by a common bond of union, the one portion to labor, and the other to pray, they enjoy in peace and harmony the bounties of nature; and find it unnecessary to employ a single man in arms, either to defend their territory, or maintain their rights.

TES'SELLATED, *adj.* Lat. *tessella.* Variegated by squares.

Van Helmont produced a stone very different from the *tessellated* pyrites. *Woodward on Fossils.*

TESSELLATED PAVEMENTS, those of rich Mosaic work made of curious square marbles, bricks, or tiles, called tesselæ from their resembling dice.

TESSERA, in Roman antiquity, denoted in its primary sense a cube or dye; so called from the Greek word τεσσαρα or τεσσερα, four; respect being had to its number of sides, distinct from the two horizontal planes above and below. And it was thus distinguished from the talus, which, being round at each end, contained only four planes or faces on which it could stand; and therefore when thrown had no more than two side faces in view. Hence ludere talis et ludere tesseris are spoken of by Roman writers as two different games. The syllable tes occurs often in Roman inscriptions. The word tessera was applied to many other things, not so much from a similitude in the figure, as from the relation they bore to some other thing of which they were the sign or token; as the points on the upper plane of the dye denoted the good or ill success of the cast. 1. T. frumentaria was a small tally given by the emperors to the populace at Rome, entitling them to the reception of a quantity of corn from the public at stated seasons. The person who had the inspection of these was called tesserarius. They were made of wood and of stone. There was another kind of tessera which entitled persons to a sight of the public games and other diversions, usually made in the form of an oblong square.

2. T. hospitalis was either public or private. As to the former, we find, among the inscriptions published by Gruter, instances of two municipal towns which put themselves under the patronage of the Roman governor; and the reciprocal engagement between them, engraved on two copper plates, in the form of an oblong square, with a pediment at the top, is called in both tessera hospitalis. The design of it was to cultivate or maintain a lasting friendship between private persons and their families; and gave a mutual claim to the contracting parties and their descendants of a reception and kind treatment at each other's houses, as occasion offered. For which end those tesseræ were so contrived as best to preserve the memory of that transaction to posterity; and one method of doing this was by dividing one of them lengthwise into two equal parts; upon each of which one of the parties wrote his name, and interchanged it with the other. From this custom came the prevailing expression tesseram hospitalem confringere, applied to persons who violated their engagements.

3. T. militaris was a signal given by the general, or chief commander of an army, as a direction to the soldiers for executing any duty or service required of them. This, upon urgent occasions, was only vocal; but, in ordinary cases, it was written on a tablet, commonly made of wood. Besides these civil and military tesseræ, there are others which relate to religious affairs, and may be called sacred.

TEST, *n. s.* } Fr. *test;* Ital. *testa.* The
TEST'ED, *adj.* } cupel by which refiners try their metals; trial; examination; any means of trial; judgment; distinction: tested is tried by a test.

Let there be some more *test* made of my metal,
Before so noble and so great a figure
Be stampt upon it.
Shakspeare. Measure for Measure.

Not with fond shekels of the *tested* gold.
Shakspeare.

Whom should my muse then fly to, but the best
Of kings for grace; of poets, for my *test?*
Ben Jonson.

They who thought worst of the Scots, did not think there would be no fruit or discovery from that *test.* *Clarendon.*

What use of oaths, of promise, or of *test,*
Where men regard no god but interest? *Waller.*

To be read herself she need not fear:
Each *test,* and every light, her muse will bear.
Dryden.

Our penal laws no sons of yours admit,
Our *test* excludes your tribe from benefit. *Id.*

Thy virtue, prince, has stood the *test* of fortune
Like purest gold, that, tortured in the furnace,
Comes out more bright, and brings forth all its weight. *Addison.*

Unerring Nature, still divinely bright,
One clear, unchanged, and universal light,
Life, force and beauty, must to all impart,
At once the source, and end, and *test* of art. *Pope.*

The TEST is a vessel used in metallurgy for absorbing the scoria of metallic bodies when melted. See CUPEL. Some of the German writers recommended, both for tests and cupels, a sort of friable opaque stone, called white spath, which appears to be a species of gypsum, or of the stones from which plaster of Paris is prepared. The spath is directed to be calcined with a gentle fire, in a covered vessel, till the slight crackling which happens at first has ceased, and the stone has fallen in part into powder: the whole is then reduced into subtle powder, which is passed through a fine sieve, and moistened with so much of a weak solution of green vitriol as is sufficient for making it hold together. Gellert, however, finds, that if the stone is of the proper kind, which can be known only by trials, calcination is not necessary. Scheffer observes, that these kinds of tests are liable to soften or fall asunder in the fire, and that this inconvenience may be remedied by the mixing with the

uncalcined stone somewhat less than equal its weight, as eight-ninths of such as has been already used and is penetrated by the scoria of the lead, taking only that part of the old test which appears of a green gray color, and rejecting the red crust on the top. Tests or cupels made of the spath are said not to require so much caution in nealing and heating them as the common ones; it appears, however, from Scheffer's account, that they are less durable than those made of the ashes of bones, though greatly superior to those of wood-ashes. Vegetable ashes, which stand pretty well the testing of silver, can scarcely bear any great quantity of gold, this metal requiring a considerably stronger fire than the other; but bone-ashes answer so effectually, and are among us so easily procurable, that it is not needful for the refiner to search for any other materials; though those who work off large quantities of lead, in order to gain a little silver or gold contained in it, may possibly, in places remote from populous cities, avail themselves of substances similar to the spath above-mentioned. The test, for its greater security, is fixed in the mould in which it was formed; which is sometimes a shallow vessel made of crucible earth or cast-iron, more commonly an iron-hoop, with three bars arched downwards across the bottom, about two inches deep, and of different widths, from three or four inches to fifteen or more, according to the quantity of metal to be tested at once. The ashes or earthy powder, moistened as for making cupels, are pressed down in the mould so as to completely fill it or rise a little above the sides; with care to make the mass equally solid, and to put in at once, or at least after the bottom has been pressed close, as much of the matter as will be sufficient for the whole; for any additional quantity will not unite thoroughly with the test, but be apt to part from it in the fire. The edges are pared smooth, and a portion cut out from the middle with a bent knife, so as to leave a proper cavity, which is smoothed by strewing some dry powder on the surface, and rolling on it a wooden, or rather a glass ball. The process of testing is often performed in the same manner as that of cupellation; but, where great quantities of base metal are to be worked off from a little gold, recourse is had to a more expeditious method, that of testing before the bellows. An oval test is placed in a cavity, made in a hearth of a convenient height, and some moistened sand or ashes pressed round it to keep it steady; the nose of a bellows is directed along its surface, in such a manner, that if ashes are sprinkled in the cavity of the test, the bellows may blow them completely out; some have an iron plate fixed before the bellows, to direct the blast downwards. To keep the surface of the test from being injured in putting in the metal, some cloths or pieces of paper are interposed. The fuel consists of billets of barked oak laid on the sides of the test, with others laid crosswise on these; the bellows impel the flame on the metal, clear the surface of ashes or sparks of coal, hasten the scorification of the lead, and blow off the scoria, as fast as it forms, to one end of the test, where it runs out through a notch made for that purpose. About two-thirds of the scorified lead may be thus collected; the rest being partly absorbed by the test, and partly dissipated by the action of the bellows. Care must be taken not to urge the blast too strongly, lest some portion of the gold should be carried away by the fumes impetuously forced off from the lead, and some minute particles of it entangled and blown off with the scoriæ.

Test Act, in law, was the statute. 25 Car. II. cap. 2, which directs all officers, civil and military, to take the oaths, and make the declaration against transubstantiation, in the court of king's bench or chancery, the next term, or at the next quarter-sessions, or (by subsequent statutes) within six months after their admission; and also within the same time to receive the sacrament of the Lord's Supper, according to the usage of the church of England, in some public church, immediately after divine service or sermon, and to deliver into court a certificate thereof, signed by the minister and churchwarden, and also to prove the same by two credible witnesses, upon forfeiture of £500, and disability to hold the said office. It has been the honor of the ministry of the duke of Wellington to procure the repeal of this most objectionable and absurd law.

TESTACEA, in the Linnæan system of zoology, the third order of vermes. This order comprehends all the shell-fish arranged by Linnæus under thirty-six genera. Shell-fish are animals with a soft body, covered by or enclosed in a firm, hard, and as it were, stony habitation, composed, according to their three separate orders, 1st, Of many parts which are arranged under the name of multivalve; 2d, Of two parts which are called bivalves; 3d, Of one part o piece only, which we call univalves. Those parts, pieces, or valves, are more or less moveable at the animal's pleasure. See Conchology.

TESTA'CEOUS, *adj.* Fr. *testacée;* Lat. *testaceus.* Consisting of shells; composed of shells; having continuous, not jointed shells; opposed to crustaceous.

Testaceous, with naturalists, is a term given only to such fish whose strong and thick shells are entire, and of a piece; because those which are joined, as the lobsters, are crustaceous: but, in medicine, all preparations of shells and substances of the like kind are thus called. *Quincy.*

Several shells were found upon the shores, of the crustaceous and *testaceous* kind.

Woodward's Natural History.

Testaceous, in medicine, all preparations of shells, and such like substances, are called testaceous. Such are powders of crabs' claws and eyes, pearls, &c. Dr. Quincy and others suppose the virtue of all testaceous medicines to be alike; that they seldom or never enter the lacteals, but that the chief of their action is in the first passages; in which, however, they are of great use in absorbing acidities. Hence they become of use in fevers, and especially in rectifying the many distempers in children which generally owe their origin to such acidities.

Testaceous, in zoology, is synonymous with testacea.

The vast mountains of calcareous earth which

occur in different parts of the world, owe their origin, in general, it is supposed, to the destruction of marine testaceous animals, which in long process of time formed these extensive and accumulated heaps; Fourcroy, in his Chemical Elements, has given a beautiful account of this process of nature, to which we refer.—See Dr. John Thomson's edition, part iii. chap. 7, sect. 1.

According to our navigators, there are in the Southern Ocean perpendicular coralline rocks, formed entirely of sea-shells, which are of such magnitude as to render the navigation of those seas extremely dangerous. The shells of some of the testaceous animals in the South Sea are of a vast size. The kemo shell on the coast of Sumatra is frequently found three or four feet in diameter, and as white as ivory. See Marsden's History of the Island of Sumatra, page 10.

It may be remarked that, while testaceous shells are formed with carbonate of lime, the shells of crustaceous animals and the shells of bird's eggs contain also a portion of phosphate of lime. Its use in the former is not known; but the design of nature in furnishing the shells of eggs with phosphoric acid is very apparent. The body of the egg contains neither phosphoric acid nor lime; it was necessary, therefore, that nature should provide means of furnishing both these substances, which it does at the expense of the shell; which becomes thinner and thinner during the whole time of incubation, till the living embryon hath appropriated a sufficient quantity for the formation of its bones. Part of the albumen combines with the shell for this purpose, and another portion forms feathers.

One thousand parts of egg-shells are composed of—

Carbonate of lime .	896
Phosphate of lime .	57
Gluten and moisture .	47
	1000

If fowls are kept in a state of confinement, where they cannot get at any calcareous earth, they lay their eggs without shells.

TES'TAMENT, *n.s.* } Fr. *testament*; Lat
TESTAMEN'TARY, *adj.* } *testamentum*. A will; any writing directing the disposal of the possessions of a man deceased: given by, or contained in, a will.

He bringeth arguments from the love which always the testator bore him, imagining that these, or the like proofs, will convict a *testament* to have that in it which other men can no where by reading find.
Hooker.

All the temporal lands, which men devout
By *testament* have given to the church,
Would they strip from us. *Shakspeare. Henry V.*

How many *testamentary* charities have been defeated by the negligence or fraud of executors; by the suppression of a will: the subornation of witnesses, or the corrupt sentence of a judge!
Atterbury.

He ordained by his last *testament*, that his Æneid should be burnt. *Id.*

TESTAMENT, or LAST WILL, according to the old Roman lawyers, is, voluntatis nostræ justa sententia, de eo quod quis post mortem suam fieri velit; which may be thus rendered in English, 'the legal declaration of a man's intentions, which he wills to be performed after his death.' It is called sententia, to denote the circumspection and prudence with which it is supposed to be made; it is voluntatis nostræ sententia, because its efficacy depends on its declaring the testator's intention, whence in English it is emphatically styled his will; it is justa sententia; that is, drawn, attested, and published, with all due solemnities and forms of law: it is de eo quod quis post mortem suam fieri velit, because a testament is of no force till after the death of the testator. These testaments are divided into two sorts; written, and verbal or nuncupative, being declared by the testator in extremis, before a sufficient number of witnesses, and afterwards reduced to writing. But as nuncupative wills and codicils (which were formerly more in use than at present when the art of writing is become more general) are liable to great impositions, and may occasion many perjuries, the statute of frauds, 29 Car. II. c. 3, enacts, 1. That no written will shall be revoked or altered by a subsequent nuncupative one, except the same be in the lifetime of the testator reduced to writing, and read over to him, and approved; and unless the same be proved to have been so done by the oaths of three witnesses at the least, who, by statute 4 and 5 Anne, c. 16, must be such as are admissible upon trials at common law. 2. That no nuncupative will shall in anywise be good, where the estate bequeathed exceeds £30 unless proved by three such witnesses, present at the making thereof (the Roman law requiring seven), and unless they, or some of them, were specially required to bear witness thereto by the testator himself; and unless it was made in his last sickness, in his own habitation or dwelling-house, or where he had been previously resident ten days at the least, except he be surprised with sickness on a journey, or from home, and dies without returning to his dwelling. 3. That no nuncupative shall be proved by the witnesses after six months from the making, unless it were put in writing within six days. Nor shall it be proved till fourteen days after the death of the testator, nor till process has first issued to call in the widow, or next of kin, to contest it if they think proper. As to written wills, they need not any witness of their publication. We speak not here of devises of lands, which are entirely another thing, a conveyance by statute, unknown to the feodal or common law, and not under the same jurisdiction as personal estates. But a testament of chattels, written in the testator's own hand, though it has neither his name nor seal to it, nor witnesses present at its publication, is good; provided sufficient proof can be had that it is his hand-writing; and, though written in another man's hand, and never signed by the testator, yet if proved to be according to his instructions, and approved by him, it hath been held a good testament of the personal estate. No testament is of any effect till after the death of the testator; Nam Omne testamentum morte consummatum est, et voluntas testatoris est ambulatoria usque ad mortem. And therefore, if there be many testaments, the last will overthrows all the former; but the republication of a former will revokes

one of a later date and establishes the first again. Regularly, every person hath full power and liberty to make a will that is not under some special prohibition by law or custom; which prohibitions are principally upon three accounts; for want of sufficient discretion; for want of sufficient liberty and free-will; and on account of criminal conduct. 1. In the first species are to be reckoned infants, under the age of fourteen if males, and twelve if females; which is the rule of the civil law. Madmen, or otherwise non compotes, idiots or natural fools, persons grown childish by reason of old age or distemper, such as have their senses besotted with drunkenness. 2. Such persons as are intestable for want of liberty or freedom of will, by the civil law, are of various kinds; as prisoners, captives, and the like. But the law of England does not make such persons absolutely intestable; but only leaves it to the discretion of the court to judge, upon the consideration of their particular circumstances of duress, whether or no such persons could be supposed to have liberum animum testandi. A married woman is not only utterly incapable of devising lands, being excepted out of the statute of wills, 34 and 35 Hen. VIII. c. 5, but also she is incapable of making a testament of chattels, without the licence of her husband. The queen-sort is an exception to this general rule; for she may dispose of her chattels by will, without the consent of her lord; and any feme-couvert may make her will of goods which are in her possession in auter droit, as executrix or administratrix; for these can never be the property of her husband; and if she has any pin-money, or separate maintenance, it is said she may dispose of her savings thereout by testament, without the control of her husband. But if a feme-sole make her will, and afterwards marries, such subsequent marriage is esteemed a revocation in law, and entirely vacates the will. 3. Persons incapable of making testaments on account of their criminal conduct are, in the first place, all traitors and felons, from the time of conviction; for then their goods and chattels are no longer at their own disposal, but forfeited to the king. Neither can a felo de se make a will of goods and chattels, for they are forfeited by the act and manner of his death; but he may make a devise of his lands, for they are not subject to any forfeiture. Outlaws also, though it be but for debt, are incapable of making a will so long as the outlawry subsists; for their goods and chattels are forfeited during that time. As for persons guilty of other crimes, short of felony, who are by the civil law precluded from making testaments (as usurers, libellers, and others of a worse stamp), at the common law their testaments may be good. And, in general, the rule is, and has been so at least ever since Glanvil's time, quod libera sit cujusque ultima voluntas. Testaments may be avoided three ways: 1. If made by a person laboring under any of the incapacities before-mentioned; 2. By making another testament of a later date; and, 3. By cancelling or revoking it. For though I make a last will and testament irrevocable in the strongest words, yet I am at liberty to revoke it.

TES'TATE, *adj.* } Lat. *testatus.* Having
TESTA'TOR, *n. s.* } made a will: he or she who
TESTA'TRIX. } makes a will.

He bringeth arguments from the love or goodwill which always the *testator* bore him. *Hooker.*

The same is the case of a *testator* giving a legacy by kindness, or by promise and common right. *Taylor.*

By the canon law, the bishop had the lawful distribution of the goods of persons dying *testate* and intestate. *Ayliffe.*

TES'TER, *n. s.* Fr. *teste*, a head; this coin probably being distinguished by the head stamped upon it. A sixpence; the cover of a bed.

Come manage me your cavalier: hold, there is a *tester* for thee. *Shakspeare. Henry IV.*

A crown goes for sixty pence, a shilling for twelve pence, and a *tester* for six pence. *Locke.*

Those who bore bulwarks on their backs,
And guarded nations from attacks,
Now practise every pliant gesture,
Op'ning their trunk for every *tester.*
Swift's Miscellany.

Young man, your days can ne'er be long,
In flower of age you perish for a song:
Plums and directors, Shylock and his wife,
Will club their *testers* now to take thy life. *Pope.*

TESTER, TESTON, the name of a coin struck in France by Louis XII., in 1513, and in Scotland in the time of Francis II., and Mary queen of Scotland, so called from the head of the king, which was engraved upon it. The silver it contained was eleven deniers eighteen grains, its weight seven deniers 11¼ grains, and its value ten sols. The coinage of it was prohibited by Henry III. in 1575, when the value of it was augmented to fourteen sols six deniers. The teston or tester among us was rated at 12*d.* in the reign of Henry VIII., and afterwards reduced to 6*d.*

TESTES, in anatomy, the testicles. See TESTICLE, and ANATOMY.

TES'TICLE, *n. s.* Lat. *testiculus.* Stone.

That a beaver, to escape the hunter, bites off his *testicles* or stones, is a tenet very ancient. *Browne's Vulgar Errours.*

The more certain sign from the pains reaching to the groins and *testicles.* *Wiseman's Surgery.*

TES'TIFY, *v. n.* & *v. a.* } Lat. *testificor.* To
TESTIFICA'TION, *n. s.* } witness; prove; give evidence: give evidence on a point: the noun substantive corresponding.

One witness shall not *testify* against any, to cause him to die. *Numb.* xxxv. 30.

Jesus needed not that any should *testify* of man; for he knew what was in man. *John* ii. 25.

We speak that we do know, and *testify* that we have seen; and ye receive not our witness. *Id.* iii. 11.

When together we have all received those heavenly mysteries wherein Christ imparteth himself unto us, and giveth visible *testification* of our blessed communion with him, we should, in hatred of all heresies, factions, and schisms, declare openly ourselves united. *Hooker.*

The' event was dire,
As this place *testifies.* *Milton's Paradise Lost.*

She appeals to their closets, to their books of devotion, to *testify* what care she has taken to establish her children in a life of solid piety and devotion. *Law*

In places solemnly dedicated for that purpose, is a more direct service and *testification* of our homage to God. *South.*

TES'TIMONY, *n. s.* & *v. a.* Lat. *testimonium.* Evidence given; proof by witness; public or open attestation: to witness.

The proof of every thing must be by the *testimony* of such as the parties produce. *Spenser.*

If I bring you sufficient *testimony*, my ten thousand ducats are mine. *Shakspeare. Cymbeline.*

Let him be but *testimonied* in his own bringings forth, and he shall appear a scholar, a statesman, and a soldier. *Shakspeare.*

To quote a modern Dutchman, where I may use a classic author, is as if I were to justify my reputation, and neglect all persons of note and quality that know me, and bring the *testimonial* of the scullion in the kitchen. *Selden.*

We maintain the uniform *testimony* and tradition of the primitive church. *White.*

Evidence is said to arise from *testimony*, when we depend upon the credit and relation of others for the truth or falsehood of any thing. *Wilkins.*

By his prescript a sanctuary is framed,
An ark; and in the ark his *testimony*;
The records of his covenant. *Milton.*

Thou for the *testimony* of truth hast born
Universal reproach. *Id.*

I could not answer it to the world, if I gave not your lordship my *testimony* of being the best husband. *Dryden.*

It is possible to have such *testimonials* of divine authority as may be sufficient to convince the more reasonable part of mankind, and pray what is wanting in the testimonies of Jesus Christ? *Burnet's Theory of the Earth.*

A clerk does not exhibit to the bishop letters missive or *testimonial*, testifying his good behaviour. *Ayliffe.*

Hospitable people entertain all the idle vagrant reports, and send them out with passports and *testimonials*, and will have them pass for legitimate. *Government of the Tongue.*

TESTUDO, the tortoise, in zoology, a genus belonging to the class of amphibia, and order of reptilia. The body has a tail, and is defended with a bony or coriaceous covering. The mouth has naked mandibles without teeth. There are thirty-three species, of which

Testudo Midas, the common sea turtle, is the most remarkable. It is found in the island of Ascension and other places in the South Sea. The shell is so very strong that it can carry more than 600 lbs. on its back, or as many men as can stand on it loaded. It digs round holes in the sand, in which it lays a vast number of eggs yearly, to the amount of 1000, it is said. It broods on them during the night. Its flesh is of a greenish color, makes excellent food, and is the favorite dish of sailors as well as of epicures. It lives on cuttle and shell fish, and grows to a prodigious size, some having been found to weigh 480 lbs. The Americans find so good account in catching turtle, that they have made themselves very expert at it; they watch them from their nests on shore, in moon-light nights; and, before they reach the sea, turn them on their backs, and leave them till morning; when they are sure to find them, since they are utterly unable to recover their former posture; at other times they hunt them in boats, with a peculiar kind of spear, striking them with it through the shell; and, as there is a cord fastened to the spear they are taken much in the same manner as the whales.

Testudo, in antiquity, was particularly used among the poets, &c., for the ancient lyre; because it was originally made by its inventor Mercury, of the back or hollow of the testudo aquatica, or sea tortoise, which he accidentally found on the banks of the river Nile. See Lyre.

Testudo, in the military art of the ancients, was a kind of cover or screen which the soldiers, e. gr. a whole company, made themselves of their bucklers, by holding them up over their heads, and standing close to each other.

Testudo was also a kind of large wooden tower which moved on several wheels, and was covered with bullock hides, serving to shelter the soldiers when they approached the walls to mine them, or batter them with rams. It was called testudo, from the strength of its roof, which covered the workmen as the shell does the tortoise.

TES'TY, *adj.* } Fr. *testie*; Ital. *testurdo.*
Tes'tiness. *n. s.* } Fretful; peevish: the noun substantive corresponding.

Must I stand and crouch under your *testy* humour? *Shakspeare.*

King Pyrrhus cured his splenetick
And *testy* courtiers with a kick. *Hudibras*

Testiness is a disposition or aptness to be angry. *Locke.*

In all thy humours, whether grave or mellow,
Thou'rt such a touchy, *testy*, pleasing fellow;
Hast so much wit, and mirth, and spleen about thee,
There is no living with thee, nor without thee. *Addison.*

TETANUS, a dreadful spasmodic disorder, in which the whole body becomes rigid and inflexible. It most commonly proves mortal. See Medicine.

TETBURY, a market-town in the county of Gloucester, and on the verge of the county of Wilts. It once boasted of a good trade in the woollen manufactory, which has of late years declined materially; indeed the place is rendered uncommonly dull, in consequence of the desertion of trade. The town is much esteemed for the salubrity of its air, and richness of its soil; the streets are capacious and clean, and the houses principally built of small stone, covered with mortar. The church, which was rebuilt in 1781, is a rich and beautiful specimen of modern Gothic architecture. There is a spacious market-house and a convenient town hall. The Bristol Avon river takes its rise in this parish, which it leaves immediately, and passing by Brokenborough, Malmesbury, Chippenham, Bradford, and Bath, (where it becomes navigable), runs to Bristol, and thence on to the spacious bosom of the channel. The town is governed by the feoffees and a bailiff, who is chosen annually. Market day is Wednesday. Fairs Ash Wednesday, and 22d of July, for cattle, sheep, and horses; Wednesday before old Lady day, Wednesday before old Michaelmas, and Wednesday after, for hiring servants. Population 2734.

TET'CHY, *adj.* Ital. *testaccio.* Froward; peevish: or a corruption of testy or touchy, perhaps.

A grievous burthen was thy birth to me,
Tetchy and wayward was thy infancy.
Shakspeare. Richard III.

A silly schoolboy, coming to say my lesson to the world, that peevish and *techy* master. *Graunt.*

TETE A TETE, *n. s.* Fr. *tête à tête.* Cheek by jowl.

Long before the squire and dame
Are *tête à tête.* *Prior.*

Deluded mortals, whom the great
Chuse for companions *tête à tête;*
Who at their dinners, en famille,
Get leave to sit whene'er you will.
Swift's Miscellanies.

TETH'ER, *n. s.* See TEDDER. A string by which horses are held from pasturing too wide.

Hamlet is young,
And with a larger *tether* he may walk
Than may be given you. *Shakspeare.*

Fame and censure with a *tether,*
By fate, are always linked together.
Swift's Miscellanies.

Imagination has no limits; but where it is confined we find the shortness of our *tethers.* *Swift.*

TETHYS, in the mythology, the greatest of all the sea goddesses, the daughter of Coelus or Uranus, and Terra, and the wife of Oceanus, and mother of the river gods, the sea nymphs, &c.

TETHYS, in entomology, a genus of insects belonging to the class of vermes, and order of mollusca. The body is oblong, fleshy, and without feet; the mouth consists of a cylindrical proboscis under the duplicature of a lip; and there are two foramina at the left side of the neck. The species are two, both inhabitants of the ocean.

TETRACERA, in botany, a genus of plants belonging to the class of polyandria, and order of tetragynia, and in the natural system ranging under the doubtful. The calyx is hexaphyllous, and the capsules four. There is only one species, viz. T. volubilis.

TETRADYNAMIA (τεσσαρες, four, and δυναμις, power), four powers; the fifteenth class of Linnæus's sexual system, consisting of plants with hermaphrodite flowers having six stamina, four of which are long, and two short; it corresponds to the siliquosæ of Ray, and cruciformes of Tournefort. All the species are distinguished by cruciform flowers. It comprehends two orders, gymnospermia, those plants which have naked seeds, being four in number; (except phryma which is monospermous); and angiospermia, which contains those plants the seeds of which are enclosed in a capsule. See BOTANY, Index.

TETRAEDRON, or TETRAHEDRON, in geometry, is one of the five platonic or regular bodies or solids, comprehended under four equilateral and equal triangles. Or it is a triangular pyramid of four equal and equilateral faces.

TETRAGON, in astrology, denotes an aspect of two planets with regard to the earth, when they are distant from each other a fourth part of a circle, or 90°. The tetragon is expressed by the character □, and is otherwise called a square or quartile aspect.

TETRAGON, in geometry, a quadrangle, or a figure having four angles. Such as a square, a parallelogram, a rhombus, and a trapezium. It sometimes also means peculiarly a square.

TETRAG'ONAL, *adj.* Gr. τετραγωνος. Four square.

From the beginning of the disease, reckoning on unto the seventh day, the moon will be in a *tetragonal* or quadrate aspect, that is, four signs removed from that wherein the disease began; in the fourteenth day it will be in an opposite aspect, and at the end of the third septenary *tetragonal* again.
Browne's Vulgar Errours.

TETRAGONIA, in botany, a genus of plants belonging to the class of icosandria, and order of monogynia; and in the natural system ranging under the thirteenth order, succulentæ. The calyx is divided into three, four, or five parts. There is no corolla; the drupæ is beneath, and the nut three or eight-celled. There are seven species; the puticosa, decumbens, herbacea, echinata, expansa, crystallina, and japonica.

TETRAGRAMMATON (τετραγραμματον, a denomination given by the Greeks to the Hebrew name of God יהוה, Jehova, because in the Hebrew it consists of four letters.

TETRAGYNIA, (τεσσαρες, four, and γυνη, a woman), the name of an order in the fourth, fifth, sixth, eighth, and thirteenth classes in the sexual system; consisting of plants which, to the classic character, whatever it is, add the circumstance of having four styles or female organs. Herb paris and grass of Parnassus furnish examples. See BOTANY.

TETRANDRIA (τεσσαρες, four, and ανηρ, a man or husband), the name of the fourth class in Linnæus's sexual system, consisting of plants with hermaphrodite flowers, which have four stamina or male organs that are of equal length. In this last circumstance consists the main difference, according to Linnæus, between the plants of the class in question and those of the fourteenth class didynamia, in which the four stamina are of unequal length, two of them being long, and two short. The orders of this numerous class are three, founded upon the number of styles or female organs. Scabious, teazel, barren wort, the starry plants of Ray, and the greater number of genera in this class, have one style; dodder and hypecoum have two; holly and a few others have four.

TETRAO, in ornithology, a genus of birds belonging to the order of gallinæ, and thus characterised by Linnæus: there is a spot near the eyes naked or papillose, or covered, though more rarely with feathers. Gmelin has enumerated about sixty-six species. The genus tetrao comprehended both the grous partridge and quail; but Dr. Latham, with great judgment and propriety, has made two genera of them, under the names of tetrao, comprehending the grous; and perdix, comprehending the partridge and quail. See PERDIX. Dr. Latham thus distinguishes the genus tetrao: the bill is like a crooked cone, with a naked scarlet skin above each eye, and the feet feathered to the toes. He reckons twenty species. The four following are found in Britain:—

1. T. lagopus, the white game, or ptarmigan, is fifteen inches in length, and weighs nineteen ounces. Its plumage is of a pale brown or ash

color, elegantly crossed or mottled with small dusky spots and minute bars; the head and neck with broad bars of black, rust color, and white: the belly and wings are white, but the shafts of the greater quill-feathers black. In the male the gray color predominates, except on the head and neck, where there is a great mixture of red, with bars of white. The females and young birds have a great deal of rust color in them. The tail consists of sixteen feathers; the two middle of which are ash colored, mottled with black, and tipped with white; the two next black, slightly marked with white at their ends, the rest wholly black; the feathers incumbent on the tail are white, and almost entirely cover it. Ptarmigans are found in these kingdoms only on the summits of the highest hills of the Highlands of Scotland, of the Hebrides, and Orkneys; and a few still inhabit the lofty hills near Keswick in Cumberland, as well as the mountains of Wales. They live amidst the rocks, perching on the gray stones, the general color of the strata in those exalted situations. They are very silly birds; so tame as to bear driving like poultry; and, if provoked to rise, take very short flights, making a great circuit like pigeons. Like the grouse, they keep in small packs; but never, like those birds, take shelter in the heath, but beneath loose stones. To the taste they scarcely differ from a grouse. These birds are called by Pliny lagopi, their feet being clothed with feathers to the claws, as the hare's are with fur: the nails are long, broad, and hollow. The first circumstance guards them from the rigor of the winter; the latter enables them to form a lodge among the snow, where they lie in heaps to protect themselves from the cold. The feet of the grouse are clothed in the same manner; but those of the last two species here described, which perch upon trees, are naked, the legs only, being feathered, not being in want of such a protection.

2. T. Scoticus, the red game, or moor-fowl, is peculiar to the British islands. The male weighs about nineteen ounces; and is in length fifteen inches and a half. The bill is black: the irides hazel colored. The throat is red. The plumage on the head and neck is of a light tawny red; each feather is marked with several transverse bars of black. The back and scapular feathers are of a deeper red; and on the middle of each feather is a large black spot; the breast and belly are of a dull purplish brown, crossed with numerous narrow dusky lines; the quill-feathers are dusky; the tail consists of sixteen feathers of an equal length, all of them (except the four middlemost) are black, and the middle feathers are barred with red; the thighs are of a pale red, barred obscurely with black; the legs and feet clothed to the very claws with thick soft white feathers. The claws are whitish, very broad and strong. The female weighs only fifteen ounces. The colors in general are duller than those of the male; the breast and belly are spotted with white; and the tips of some of the coverts of the wings are of the same color. These birds pair in the spring, and lay from six to ten eggs. The young brood follow the hen the whole summer; in the winter they join in flocks of forty or fifty, and become remarkably shy and wild; they always keep on the tops of the hills, are scarcely ever found on the sides, and never descend into the valleys. Their food is the mountain berries and the tops of the heaths. See SHOOTING.

3. T. tetrix, black grouse, or black cock, like the woodcock, is fond of woody and mountainous situations; feeding on bilberries and other mountain fruits, and in the winter on the tops of the heath. In the summer they frequently descend from the hills to feed on corn. They never pair: but in the spring the male gets upon some eminence, crows and claps his wings; on which signal all the females within hearing resort to him. The hen lays seldom above six or seven eggs. When the female is obliged, during the time of incubation, to leave her eggs in quest of food, she covers them up so artfully with moss or dry leaves that it is very difficult to discover them. On this occasion she is extremely tame and tranquil, however wild and timorous at other times. She often keeps to her nest, though strangers attempt to drag her away. As soon as the young ones are hatched, they are seen running with extreme agility after the mother, though sometimes they are not entirely disengaged from the shell. The hen leads them forward for the first time into the woods, to show them ant's eggs and the wild mountain berries, which, while young, are their only food. As they grow older their appetites grow stronger, and they then feed upon the tops of the heather and the cones of the pine tree. In this manner they soon come to perfection. An old black cock is in length twenty-two inches, and weighs nearly four pounds. The bill is dusky; and the plumage of the whole body black, glossed over the neck and rump with a shining blue. The coverts of the wings are of a dusky brown; the inner coverts white; the thighs and legs are covered with dark brown feathers; the toes resemble those of the former species. The tail consists of sixteen black feathers, and is much forked; the exterior feathers bend greatly outwards, and their ends seem as if cut off. The female weighs only two pounds; and its length is one foot six inches. The head and neck are marked with alternate bars of dull red and black; the breast with dusky black and white, but the last predominates. The back, coverts of the wings, and tail, are of the same color as the neck, but the red is deeper. The tail is slightly forked; it consists of eighteen feathers variegated with red and black. The feathers under the tail are white, marked with a few bars of black and orange. This bird hatches its young late in the summer. It lays from six to eight eggs, of a dull yellowish white color, marked with numbers of very small ferruginous specks; and towards the smaller end with some blotches of the same hue.

4. T. urogallus, the woodcock, inhabits woody and mountainous countries; in particular, forests of pines, birch trees, and junipers; feeding on the tops of the former and berries of the latter; the first often infects the flesh with such a taste as to render it scarcely eatable. In the spring it calls the females to its haunts with a loud and shrill voice; and is at that time so very inatten-

tive to its safety as to be very easily shot. It stands perched on a tree, and descends to the females on their first appearance. They lay from eight to sixteen eggs; eight at the first and more as they advance in age. These birds are common in Scandinavia, Germany, France, and several parts of the Alps. They are found in no other part of Great Britain but the Highlands of Scotland, and are very rare even in those parts. They are there called capercalzie, auer-calzie, and in the old law books caperkally; the last signifying the horse of the woods: this species being, in comparison of others of the genus, pre-eminently large. The length of the male is two feet nine inches; its weight sometimes fourteen pounds. The female is much less, the length being only twenty-six inches. The sexes differ also greatly in colors. The bill of the male is of a pale yellow; the head, neck, and back, are elegantly marked with slender lines of gray and black running transversely. The upper part of the breast is of a rich glossy green; the rest of the breast and the belly black, mixed with some white feathers; the sides are marked like the neck; the coverts of the wings crossed with undulated lines of black and reddish brown; the exterior webs of the greater quill-feathers are black: the tail consists of eighteen feathers, the middle of which is the longest; these are black, marked on each side with a few white spots. The legs are very strong, and covered with brown feathers; the edges of the toes are pectinated. Of the female the bill is dusky; the throat red; the head, neck, and back, are marked with transverse bars of red and black; the breast has some white spots on it, and the lower part is of a plain orange color; the belly is barred with pale orange and black; the tips of the feathers are white. The tail is of a deep rust color, barred with black, tipped with white, and consists of sixteen feathers. See SHOOTING.

TETRAPET'ALOUS, *adj.* Gr. τεσσαρες and πεταλον. Such flowers as consist of four leaves round the style.

All the *tetrapetalous* siliquose plants are alkalescent. *Arbuthnot.*

TETRAPODOLOGY (τετραπος, and λογος) that branch of zoology which treats of quadrupeds, in the Linnæan system called mammalia.

TETRAPOLIS, an ancient name of Antioch in Syria, because it contained four cities.

TE'TRARCH, *n. s.* Fr. *tetrarque;* Lat. *tetrarcha;* Gr. τετραρχης. A Roman governor of the fourth part of a province.

All the earth,
Her kings and *tetrarchs*, are their tributaries:
People and nations pay them hourly stipends.
Ben Jonson.

A TETRARCH is a prince who holds and governs a fourth part of a kingdom. Such originally was the import of the title tetrarch; but it was afterwards applied to any petty king or sovereign; and became synonymous with ethnarch.

TETRASTICK, *n. s.* Gr. τετραστιχος. An epigram or stanza of four verses.

The *tetrastick* obliged Spenser to extend his sense to the length of four lines, which would have been more closely confined in the couplet. *Pope.*

TETRASTYLE, in the ancient architecture, a building, and particularly a temple, with four columns in its front.

TETRICAL, *adj.* } Fr. *tetrique;* Lat. *tetricus.* Froward; perverse; sour.
TETRI'COUS. }

In this the *tetrical* bassa finding him to excel, gave him as a rare gift to Solyman.
Knolles's History of the Turks.

TETRODON, in ichthyology, a genus of fishes arranged by Linnæus under the class of amphibia, and order of nantes; but placed by Gmelin under the class of pisces, and order of branchiostegi. The jaws are bony, stretched out, and cloven at the point; the aperture of the gills is linear; the body is muricated beneath, and there are no ventral fins. There are thirteen species; of which the most remarkable is T. lineatus, called by Mr. Hasselquist fahaka, which is the Egyptian and Arabic name. It has of late been found in the Nile about Cairo, but was never known in former times. It is said to grow to a prodigious size. When just caught it pricks the skin if it is taken in the bare hands, and produces small pustules in the same manner as nettles. The flesh is poisonous. Mr. Foster confirms the account of the poisonous nature of a species of tetrodon in his account of New Caledonia.

TET'TER, *n. s.* Sax. ȝetep. A scab; a scurf; a ringworm.

A most instant *tetter* barked about,
Most lazar like, with vile and loathsome crust,
All my smooth body. *Shakspeare. Hamlet.*

A scabby *tetter* on their pelts will stick. *Dryden.*

TETUAN, a sea-port of Morocco, in the province of El Garb, on the Mediterranean, within the Straits of Gibraltar. A branch of the Atlas, passing through the province of Tedla, comes within a few miles of the town. The environs are planted with vineyards and gardens, and the oranges are reckoned very superior. Several European consuls and merchants were settled here till 1770, when an Englishman having shot a Moor the emperor banished all Europeans, and would no longer permit any to reside there. A considerable communication, however, is maintained with Gibraltar, whence ships often repair, when the wind is unfavorable for making Tangiers; and our fleets, entering the Mediterranean, often water and victual in the bay. Thirty miles south-east of Tangiers.

TETZEL, or TESTZEL (John), a monk of the sixteenth century, whose honest bigotry may be classed among the proximate causes of the Reformation. He was born at Piern upon the Elbe, and, having taken the habit of St. Dominick, received a commission from the archbishop of Mayence, to preach up the indulgences of Leo X. The extravagant power and virtue which he attributed to his commodities, declaring that they were sufficient to procure impunity for a sinner, though he had even violated the mother of God herself! first roused the indignation of Luther, and drew upon him those attacks which were at length transferred from the effect to the cause, and diverted from combating the absurdities themselves to exposing the corruption of the system by which they were sanctioned. The eyes of the

papal government were at length, when too late, opened to the mischief which Tetzel had occasioned, and he received so severe a rebuke from the legate that he is said to have died of a broken heart in 1519.

TEUCER, the son of Scamander by Ida the founder and first king of Phrygia, from whom his subjects were called Teucri. Dardanus married his daughter Batca, and succeeded him.—Virg. Æn. iii. 108.

Teucer, a son of Telamon and brother of Ajax. He built a town in the isle of Cyprus, which he called Salamis from his birth-place.

TEUCRI, a name given the Trojans from Teucer their first king.

TEUCRIUM, germander, in botany, a genus of plants belonging to the class of didynamia, and order of gymnospermia; and in the natural system ranging under the forty-second order, verticillatæ. The corolla has no upper lip, is divided into two parts beyond the base, and is divaricated where the stamina issue out. There are thirty species; of which three are natives of Great Britain, viz.

1. T. chamædrys, the smaller creeping germander, has fibrous, very creeping, spreading roots; many four cornered, very branchy, trailing stalks, nearly a foot long; oval, cuneiform, cut, crenated leaves on short foot-stalks; and reddish flowers, growing almost in a verticillus, on whorls, round the stalk, three on each peduncle; appearing in June and July.

2. T. scocodonia, wood sage, or germander, is distinguished by leaves which are heart-shaped, serrated, and petiolated; by racemi, which are lateral and ranged in one row; and by an erect stem. The flowers are straw-colored, and the filaments red. The plant has a bitter taste, and smells like hops with a little mixture of garlic. It is used in brewing in the isle of Jersey instead of hops.

3. T. scordium, the common water germander, has creeping perennial roots, sending up many square, procumbent, or trailing stalks, branching diffusely; oblong, indented, serrated, close-sitting, opposite leaves; and small reddish flowers, generally two together, from the sides of the stalks and branches, in July and August. This plant was formerly considered as medicinal, but has now fallen into disuse. It grows naturally in marshy places, in the isle of Ely and other parts of England, and most parts of Europe; and is sometimes admitted into gardens, in moist places, for variety, and as a medicinal plant.

TEURART, an ancient town of Africa, in Fez, seated on a mountain, near the river Za; it was anciently a very important city.

TEUTHIS, in ichthyology, a genus of fishes belonging to the order of abdominales. The head is somewhat truncated on the fore part; the branchil membrane has five rays; the teeth equal, rigid near each other, forming a regular series. There are two species, viz. 1. T. hepatus; and 2. T. Java.

TEUTHRAS, king of Mysia. See Telephus.

TEUTOBOCHUS, a gigantic king of the Teutones.

TEUTONES, or Teutoni, an ancient people, always by historians joined with the Cimbri; both seated, according to Mela, beyond the Elbe, on the Sinus Codanus, or Baltic; and there, it is supposed, lay the country of the Teutones, now Ditmarsh; diversity of dialects producing the different terms Teut, Tut, Dit, Tid, and Thod, which in the ancient German language signified people. Of these Teutones Virgil is to be understood in the epithet Teutonicus, an appellation which more lately came to be applied to the Germans in general, and later still the appellation Alemanni.

The TEUTONIC Language is supposed to have been the language of the ancient Germans, and hence is reckoned amongst the mother tongues. See Philology.

Teutonic Order, an order of military knights, established towards the close of the twelfth century, in the Holy Land, where, after the death of Barbarossa, the Germans behaved with so much bravery, that Henry king of Jerusalem, the patriarch, and several other princes, determined to reward their valor by instituting the order. They had at first the title of the knights of St. George, and afterwards were called Equites Mariani, or knights of St. Mary. Among their other obligations it was required that every knight should be of noble parentage; that the order should defend the Christian religion and the Holy Land; that they should exercise hospitality towards the Christians in general, but particularly those of their own country; and that they should with all their power endeavour to propagate and extend the Christian faith and the religion of Jesus. In 1190, having become rich by donations from the superstitious, they elected their first grand master, Henry Walpot, a German, who had distinguished himself by his zeal and valor. In 1191 pope Celestine III. confirmed their privileges already granted, giving them the title of the Teutonic knights of the hospital of St. Mary the Virgin. By the conditions of this bull they vowed perpetual continence, obedience, and poverty; obligations which it may well be imagined were not very strictly kept. See Poland, and Prussia.

TEW'EL, *n. s.* Fr. *tuyau* or *tuyal*. Defined below.

In the back of the forge, against the fire-place, is fixed a thick iron plate, and a taper pipe in it about five inches long, called a *tewel*, or *tewel* iron, which comes through the back of the forge; into this *tewel* is placed the bellows. *Moxon.*

TEWIT, in ornithology. See Tringa.

TEWKESBURY, a market town and borough of England, in the county of Gloucester, situated on the eastern bank of the Avon, near its confluence with the Severn. The access to the town is by several commodious bridges. That over the Avon is a stone structure of considerable length. The town is large, handsome, and populous. It consists mostly of three principal streets, with several lanes and alleys branching off, which are mostly well paved and lighted. The houses in the town are chiefly built of brick, but the old habitations with projecting stones, and pyramidal roofs, have been mostly pulled down. The act for paving and lighting the streets was obtained in 1786; and, from that period, a growing spirit of improvement has diffused itself among the inhabitants. Of the

public buildings the principal is the Abbey church, almost the only remains of the ancient monastery. This structure displays an interesting example of early Norman architecture, combined with specimens of other kinds. It is built in the cathedral form, and consists of a nave, choir, transept, and central tower, with the addition of several chapels. The nave and choir are separated from the aisles by eighteen massive columns sustaining the roof, and four substantial piers which support the tower. The arches above the columns in the nave and over the piers are plain and semicircular, but those of the choir are pointed. Above the crown of the former arches runs a triforium, opening into the nave by a series of double round headed arches, two over each arch. The roof of the nave is ornamented with groins springing from crocket heads over each pillar; and at the intersections are various angels and other figures, playing on different musical instruments. At the west end is a large window, with a pointed arch, which appears to have been introduced within a semicircular arch in 1656. The aisles are lighted with pointed arched windows. These were probably altered to that shape about the beginning of the fourteenth century. In 1796 this was again altered, fitted up with new pews, and otherwise improved, at an expense of £2000. The effect of this portion of the fabric is singularly beautiful. The east end is hexagonal, and is separated from the aisles by six massive short columns, which support pointed arches. Beneath these are some large monuments, and over the arches are windows filled with painted glass. On the south side of the altar are three stone stalls, part of which displays some elegant carving. The ceiling is adorned with a profusion of tracery, and at each intersection is a carved flower or knot of foliage. Branching out from the north and south aisles of the choir are five or six small private chapels or oratorios, containing the tombs or ashes of their respective founders. The Lady chapel is entirely destroyed; but a large arch, through which it was entered from the church, is still seen on the outside. The cloisters were on the south side of the nave, and some fragments of them still remain. The tower is lofty, and, according to the abbey chronicles, was once terminated by a wooden spire, which fell on Easter day 1559: the most remarkable specimens of its architecture are three tiers of arcades; in the upper part the arches of the middlemost tier are intersected. The whole length of the church is 300 feet, of the transept 120. The breadth of the choir and side aisles is seventy feet; of the west front 100. The height from the area to the roof is 120 feet; the height of the tower is 152 feet. The monuments in Tewkesbury church have attracted the attention of various antiquaries. Between two of the pillars on the north side of the choir is an elegant and light chapel of stone, erected by abbot Parker in 1097, over the tomb of Robert Fitz-Hamon, who was slain at Falaise, in Normandy, in 1107, and originally buried in the chapter-house, whence his bones were removed by abbot Robert in 1241. On the north side of the altar is a monument of the most delicate sculpture and beautiful proportions, in four stages of open arched work, with a tomb beneath, surrounded by an embattled border, and the sides ornamented alternately with single and double arches. This splended monument appears to have been erected to the memory of Hugh le Despencer, and his wife Elizabeth, daughter of William Montacute earl of Salisbury. Other elegant monuments we have not room to particularise. Tewkesbury abbey was founded in the year 715, by two Saxon brothers, Dodo and Odo, who were then dukes of great opulence and high consideration in the kingdom of Mercia, and the first lords of the manor here. Besides the church, Tewkesbury contains meeting-houses for Independents, Quakers, Baptists, and Methodists. The town-hall is a handsome building. The old town hall, or Tolsey, originally served as a market place; but, after that building was removed, twenty persons entered into an agreement with the corporation to erect the present market-house, in consideration of a grant of the profits of the stalls, &c., for ninety-nine years. The curious old structure which had for centuries been used as the borough jail was originally the companile or bell tower annexed to the abbey: this was pulled down in 1817, and a most substantial and elegant school, for the education of children on the national or Bell's system, erected in its place. The new jail is a neat and suitable building, situate at the top of the High-street The house of industry is singularly spacious and commodious, and situate on Holme hill, near the entrance of the town from Gloucester. The charitable institutions in the town are a free grammar school, endowed charity school, schools on the national and Lancasterian plans, a great number of alms-houses, a dispensary, a lying-in charity, and numerous other benevolent associations. Tewkesbury had once a considerable share in the clothing business, but this trade has long since declined. It was likewise noted for its mustard. At present the chief manufacture carried on in the town is that of stocking framework knitting, particularly in cotton. A considerable trade is also carried on in malting, and the making of nails. Tewkesbury was incorporated by a charter granted by queen Elizabeth, and confirmed by James I.; but, in the reign of James II., the corporate officers surrendered their seal to that monarch, who in his second year re-incorporated them by the names of the mayor, alderman, and common council. The revolution which immediately followed prevented the charter from being carried into effect, and the town remained in a state of uncertainty as to its government till the thirteenth of William III., when it was settled in the present form. By this, the government of the town is vested in two bailiffs and four justices, annually chosen, and a recorder. The corporate body consists of twenty-four principal burgesses, and the same number of assistants; but, as each principal burgess holds also the office of assistant, the members of the corporation are now uniformly confined to twenty-four persons, instead of forty-eight as formerly. The town sends two members to parliament, the privilege of which was obtained from James I. in 1609. The right of election

is possessed by the freemen and freeholders. It was at Tewkesbury that the last battle was fought between the adherents of the houses of York and Lancaster, which it is well known proved fatal to the latter. The field on which it was fought is still called the bloody meadow, and is situated about half a mile from the town. In the civil wars, in the reign of Charles I., Tewkesbury was the scene of many severe contests. Markets on Wednesday and Saturday, and various annual fairs. Ten miles north of Gloucester, and 102 W. N. W. of London.

TEW'TAW, *v. a.* Formed from tew by reduplication. To beat; to break.

The method and way of watering, pilling, breaking, and *tewtawing* of hemp and flax, is a particular business. *Mortimer.*

TEXAS, a tract of country in North America, claimed by the United States as a part of Louisiana, and by Spain as a part of the Internal provinces, included in the intendency of San Luis Potosi. It is bounded north by Red River, east by the state of Louisiana, south by the gulf of Mexico, and west by the del Norte; containing upwards of 100,000 square miles. There are some scattering Spanish presidios in this country, yet it is for the most part a wilderness. The population was estimated in 1807 at 7000. The interior towards Red River is barren, but the part towards the gulf of Mexico resembles the southern part of Louisiana.

TEXEL, an island of the Netherlands, at the entrance of the Zuyder Zee, separated from North Holland by the narrow channel called the Mars-diep. Its form is oblong, twelve miles in length, and about six in breadth, and it is secured from the sea by strong dikes. The soil is well fitted for sheep pasture, and it has long been noted for its cheese. Besides the town of Texel, it contains six villages, and has in all about 5000 inhabitants. It has a large and secure harbour, with a fort which commands the entrance; it has likewise a commodious roadstead on the east. It was in the neighbourhood of the Texel that admiral Blake defeated the Dutch under Van Tromp, in 1653: in 1673 another battle was fought near this, between the Dutch and the combined fleets of England and France, with doubtful success; a result far different from that of an encounter near the Texel in the end of August 1799, between the British and Dutch fleets, when the latter, disaffected to the republican government, surrendered after a slight resistance.

TEXT, *n. s.* / TEXT'MAN, *n. s.* / TEXT'UARY, *adj.* & *n. s.* } Fr. *texte;* Latin *textus.* That on which a comment is written; a sentence of scripture: textman and textuary mean one versed in texts: textuary also means contained in the text; or serving as a text.

In religion
What errour, but some sober brow
Will bless it, and approve it with a *text?*
Shakspeare.

Some prime articles of faith are not delivered in a literal or catechistical form of speech, but are collected and concluded by argumentation out of sentences of scripture, and by comparing of sundry *texts* with one another, *White.*

Men's daily occasions require the doing of a thousand things, which it would puzzle the best *textman* readily to bethink himself of a sentence in the Bible, clear enough to satisfy a scrupulous conscience of the lawfulness of. *Sanderson.*

He extends the exclusion unto twenty days, which in the *textuary* sense is fully accomplished in one. *Browne.*

I see no ground why this reason should be *textuary* to ours, or that God intended him an universal headship. *Glanville.*

We expect your next
Should be no comment, but a *text,*
To tell how modern beasts are vext. *Waller.*

His mind he should fortify with some few *texts,* which are home and apposite to his case. *South.*

TEX'TURE, *n. s.* / TEX'TILE, *adj.* / TEX'TRINE. } Lat. *textus.* The act or manner of weaving; a web or thing woven; particular combination of parts: the adjective corresponding.

The placing of the tangible parts in length or transverse, as in the warp and woof of *textiles.* *Bacon's Natural History.*

The materials of them were not from any herb, as other *textiles,* but from a stone called amiantus. *Wilkins.*

Spirits——
Nor in their liquid *texture* mortal wound
Receive, no more than can the fluid air. *Milton.*

Under state of richest *texture* spread. *Id.*

Skins, although a natural habit unto all before the invention of *texture,* were something more unto Adam. *Browne.*

It is a wonderful artifice, how newly hatched maggots, not the parent animal, because she emits no web, nor hath any *textrine* art, can convolve the stubborn leaf, and bind it with the thread it weaves from its body. *Derham.*

A veil of richest *texture* wrought she wears. *Pope.*

Others, far in the grassy dale,
Their humble *texture* weave. *Thomson's Spring.*

TEXTURE properly denotes the arrangement and cohesion of several slender bodies or threads interwoven or entangled among each other, as in the webs of spiders, or in the cloths, stuffs, &c. Texture is also used in speaking of any union or constituent particles of a concrete body, whether by weaving, hooking, knitting, tying, chaining, indenting, intruding, compressing, attracting, or any other way. In which sense we say, a close compact texture, a lax porous texture, a regular or irregular texture, &c.

END OF VOL. XXI.

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