SCIENTIFIC TRACTS

AND

FAMILY LYCEUM.

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VEGETABLE PHYSIOLOGY.

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PLANTS are distinguished from animals chiefly by the absence of a stomach, for the reception and assimilation of food. Not finding a constant supply of food in any one place, animals are under the necessity of roving about in quest of it, and for this reason, the Creator has furnished them with a storehouse in the stomach, wherein to lay up a stock of food, which may sustain them for a longer or shorter period, as their habits or constitution require. From the stomach, the food of animals is conducted, by a peculiar apparatus of small vessels, to the blood, and is thence circulated throughout the system.

Vegetables, on the other hand, need not to accumulate food, and therefore, have no stomach. Their food is ready prepared for their consumption, in the earth, about their roots, and consists of water, impregnated with various solid and gaseous matters. For the absorption of this, plants are furnished with a tissue, or fine net-work of very minute vessels, which pervade every part of them.

A second distinction between these two classes of beings consists in the absence of sensibility in plants. It is true that the sensitive plant closes its leaves on being touched, but this is believed to be merely an irritability, arising from physical causes; for, had the Creator endowed plants with feelings of pleasure or pain, it is to be presumed that he would have given them the faculty of seeking the one and avoiding the other. But a plant is entirely passive, fixed to one spot, and incapable of either foreseeing or avoiding the injuries to which it is daily liable, from the superior power of animals. A more remarkable instance of physical irritability is found in the sundew, *(Drosera,)* than in the sensitive plant. The lower leaves of the sundew are armed with stiff bristles, and covered with a sticky juice. When a fly or other insect alights upon these leaves, it is detained by the juice, and the leaves soon closing, hold it fast until it dies. When the struggles of the fly have ceased, the leaf uncloses, and the dead insect falls to the ground. Similar to this is the Venus's fly-trap of South Carolina, whose leaves are baited with a sweet liquid, and armed with sharp prickles. A fly, alighting on one of these plants, is instantly pierced by the closing of its spiny leaves. Singular and inexplicable as these circumstances are, they afford, in my opinion, no ground for believing that plants possess sensibility. But that plants possess somewhat that is analogous to the nervous system of animals is beyond doubt. It is known that certain poisons act upon animal life by affecting the stomach, others by attacking the nerves. Of these, the former have no effect upon vegetables, whilst the latter are fatal to them. A plant whose roots were surrounded by arsenic continued to flourish, but when watered with laurel-water, or belladonna, withered and died.

The organs of plants are:—1. The cellular system, consisting of a tissue of very minute cells, of a hexagonal form, seemingly separated from each other by thin partitions, and collectively, bearing a resemblance to the froth of beer. This is similar, in appearance, to the cellular membrane of animals, but its purposes are by no means the same. In animals, the cellular system serves to contain the fat, a substance to which there is nothing analogous in vegetables, whose cells appear to be entirely empty. 2. The vascular system, consisting of tubes open at both ends, situated internally, so as to be protected by a thick coating of the cellular integument. Some of these tubes appear to be strangulated, their coats being drawn tightly together, so as, apparently, to prevent the ascent of the fluid contained in them. These vessels are so minute, that with even the most powerful magnifiers, we are unable to ascertain their properties or structure. It has been a matter of dispute, whether the sap ascends through the vascular or through the cellular system: the received opinion, at present, among botanists, however, is, that it ascends through the interstices between the cells. 3. The tracheæ, or air vessels. These are minute, elastic, spiral tubes, called tracheæ, from their conveying air to and from the various parts of the plant. Although vegetables do not breathe, like animals, air is not less necessary to their existence than to ours.

The Root.

The roots are the organs whereby nourishment is drawn from the earth, and distributed to all parts of the plant. A vegetable, having, as I remarked above, neither mouth to masticate, nor stomach to digest its food, being also incapable of locomotion, is under the necessity of seeking nourishment on the spot to which it is fixed. Water not only forms a principal part of its food, but serves as a vehicle for the more solid substances which enter the vessels of the plant. For this purpose, there is, at the extremity of each fibre, or root, an expansion of the cellular integument, called a spongiole, or little sponge. Being very porous, it imbibes water from the moist earth, and with it, takes up the nutritive matters held in solution, and through the vessels of the roots, transmits the liquid food to the branches, leaves, blossoms and fruit. The root, while it thus nourishes the plant, also serves to fix it securely in its proper position. If the part beneath the surface of the earth do not perform this double office, it is not a root, but a subterraneous branch: for example, the wintergreen. Pull up a stalk of this, and you will bring up with it a jointed branch, sometimes of the length of three feet, and at irregular intervals, you will find upon it other stalks. This branch seems merely to connect the stalks, and to propagate the plants—having no absorbent pores, nor any power to draw nourishment from the ground. The true roots are fibrous, and situated at the base of each stalk.

All branches have in them the germs of roots, and herein rests the secret of propagating plants by means of slips. Thus, if you stick a twig of poplar or willow in moist ground, the portion buried, having its exhaling pores closed, and being also deprived of light, is incapable of putting forth branches, but the germs of the roots are, by these same circumstances, favored, and induced to shoot forth and nourish the tree. There are certain plants, as the mistletoe, which strike their absorbing fibres through the bark of trees, and thence derive nourishment, instead of drawing it from the earth; but as these fibres have no spongioles, botanists do not consider them roots.

Roots do not possess the capacity of rejecting what would prove hurtful to the plant, but absorb indifferently any food, however noxious, that may be presented, provided the particles held in solution by the water are sufficiently small to enter the pores. But, if the liquid be thick and gummy, the spongioles become clogged, and the vegetable perishes from starvation. Nature has, however, provided for the safety of her vegetable productions, by distributing plentifully throughout the soil such fluids only as are adapted to their nourishment. The only noxious liquids that ever affect them are supplied by the hand of man, either accidentally or for the sake of experiment.

Absorption does not cease immediately after death, but the vessels of the trunk having lost their vital energy, by which they were enabled to propel the sap on its destined course, the liquid remains stagnant in the roots and spongioles, and rots them. Thus the fluid which was formerly the supporter of life, becomes the instrument of putrefaction and dissolution; and the plant having performed all that nature required of it, is gradually reduced to its simple, original elements, once more to enter into the composition of new vegetables.

Of roots, the first and most common and simple is the *radix fibrosa*, or fibrous root, consisting of a bundle of fibres or threads, attached to a common head, commonly the base of the stem. Most species of grasses and annual

plants have fibrous roots. During their one summer's existence, they continue to grow, both by forming new fibres and extending the old ones, and when winter comes the whole perish. But the roots of some of our meadow grasses survive the winter, and accumulate, from year to year, to such a degree as to cover the earth with a thick, matted coat of sod or turf, which, in certain districts of the New England States, almost sets the plough at defiance.

The second species is the *radix repens*, or creeping root, an incorrect term, though sanctioned by long usage; for this is nothing more than a subterraneous branch, as noticed above in the instance of the wintergreen.

The third species is the *fusiformis*, or spindle-shaped root; for instance, the radish and carrot. This root is very scantily furnished with the means of acquiring food, having only one fibre and spongiole, situated at the extremity of the root. This would seem a very inadequate means of supply, but the root being large and fleshy, receives, during the wet season, and retains, more moisture than is absolutely necessary for daily consumption, and serves as a reservoir of nourishment against a dry season. This root is found sometimes blunted, as if it had been cut or bitten off, and is then called *radix præmorsa*. The cause of this singular formation is unknown.

The fourth species is the *bulbous root*. This is another misnomer, sanctioned by custom; for the bulb is not a root, but a bud or stem, from which the leaves and the footstalk of the blossoms spring. The real roots are the fibres situated at the bottom of the bulb, which, without their aid, would not be able to draw nourishment from the soil. To this class belong the tulip, lily and onion.

The fifth species is the *tuberous root*, comprehending all plants having tubers or knots upon their subterraneous branches. The true roots, bearing the spongioles, and performing the office of collecting nourishment, are fibres situated at the base of the stem. The tubers are merely reservoirs of nourishment for the plant. The potato is the most remarkable of this class. The stems, subterraneous branches and roots perish in autumn, but the tubers survive, and become the parents of new plants in the ensuing year. It is remarkable that this plant propagates by means both of the tubers and the seeds formed above ground, from the blossoms. There are several plants, natives of moist places, which, when removed to a dry soil, where they are exposed to the vicissitudes of drought and moisture, acquire tubers, as a resource against a dry season.

Of this class, the orchis deserves notice, on account of its singular growth. The plant sprouts from between two lobes or tubers, one of which dies with the stem in autumn. In the ensuing spring, a new tuber is formed on the opposite side of the survivor, and the new stem springs from between these. Thus the plant is annually changing its position.

The most remarkable of all plants, with respect to its roots, is the banian tree of the East Indies. Having attained a certain height and age, this tree lets down fibres or roots from the lower branches, which, in time, reach the earth, and bury their points. Spongioles are formed, moisture is imbibed and sent up the root for the nourishment and further extension of the branches, which continue in this manner to let down roots, as they increase in length, until a single tree is multiplied into a forest. There is a tree of this kind called the Cubeer Burr, which covers an entire island of half a mile in length.

This tendency to send roots in search of moisture is not confined to the banian, though in all other trees it is the consequence of accidental circumstances. A tree is mentioned by Lord Kaimes which, when too large to find sufficient nourishment in the earth on the ruined wall upon which it grew, sent down a root to the earth at a distance of twelve feet.

Passing along the eastern branch of the Susquehanna, where the slopes of the mountains, which advance to the very water's edge, presented to the eye nought besides a vast pile of rocky fragments heaped in the wildest confusion, I have been filled with surprise by seeing large and thrifty trees growing, apparently from the dry, loose rocks, where not a particle of soil was visible. How did they maintain their erect position? How were they nourished, where there seemed to be neither earth nor moisture? These questions were solved by the mattock of the canal-digger. When the works were commenced along the banks of this river, the rocks had to be removed in many places, and I then observed that the roots of the trees had descended along the face of the rocks towards the earth, in some instances, to a distance of ten or twelve feet, before they could plant their spongioles in the soil. At the bottom of the crevices, between the rocks, was found a deposite of rich, black vegetable mould. In their descent, the roots had locked themselves in a hundred complicated folds, about the immense blocks of stone beneath them, covering them with a strong, irregular network, which effectually secured the tree against the fury of the tempests.

The experiment has been successfully made, of burying the branches of a young tree, and raising the roots into the air. The top of the tree is bent down, and the branches are covered with earth. A portion of the root is, at the same time, disinterred, and exposed to the air. The following year, the remaining roots are raised, and the tree gradually lifted to an erect position. In this situation the branches cease to grow, but put forth roots, whilst the roots send out branches. It is, however, an error to suppose that the roots are converted into branches, for they bear neither leaves nor blossoms, and retain their external appearance of roots. The leaves and blossoms are produced by the branches which spring from the roots. At the same time, the buried branches do not acquire spongioles, nor absorb moisture; but the germs of roots with which the branches, in common with every other part of the tree, are furnished, now sprout, and afford nourishment to the plant.

The Stem.

The stem of the plant is that part through which nourishment is conveyed from the roots to the branches, leaves, &c. In general, the stem rises above the ground, but there are instances where it is subterraneous, as the fern, tulip and onion. These stems, as I before remarked, are usually termed roots, but as they perform none of the offices of roots, and as the leaves and footstalks of the blossoms spring immediately from them, they are, in fact stems. Most of the bulbous plants are natives of the temperate and cold climates, and, when transferred to a tropical region, lose their distinctive character; the bulb is no longer needed to protect the bud from the cold, and the entire stem is developed. To convince yourself that the bulb is not really a root, place the plant in a vessel of water, but so as to leave the fibres at the bottom of the bulb dry; the plant dies as surely and as speedily as if there were no moisture near it. But place your plant in such a manner that the fibres alone touch the water, and your plant will flourish. In this way, hyacinths are commonly made to blossom in a parlor window, during the winter.

A stem not naturally subterraneous may be made so by art or by accident. Of this we have a very striking instance in the willow grass of Switzerland, where entire meadows covered with willow leaves may be seen. These meadows can exist only at the foot of a mountain, which annually sends down a portion of earth upon the plain below, and the phenomenon is produced in the following manner:—A sprig of willow shoots up, and during the first winter of its life, is buried under the earth washed from the mountain. The plant being checked in its lateral growth, and the sap which should have been expended in producing foliage, being forced to seek some outlet, lends its force to the stem, and two branches are produced. These are, in their turn, buried, and, under the operation of a continually acting cause, send out each two branches. In this manner the tree continues to grow, bearing no foliage, except at the extremity of the branches. That such is the origin of these singular meadows, has been ascertained by digging. In proportion as the excavation descended, the branches decreased in number and increased in bulk, until the single original stem, and finally the root, was attained.

There is a point at the junction of the stem with the root, called the neck of the tree. If the tree be cut off at or below this, its vital powers are gone, but if it be cut

above the neck, the part remaining will send forth new branches.

That the stem seems occasionally to retain the vital principle after the root has perished, would appear from the following case. I set a root-grafted apple tree of three year's growth, in my garden, in the month of November. In the ensuing spring it put forth a few sickly leaves, which fell very early, and the next season, the tree exhibited no signs of life. Some time in June, having occasion for a pole to support a flowering vine, I cut off my dead apple tree near the surface of the earth, leaving a stump of two or three inches in length, and stuck the stem in the earth near the vine. In a short time, a bunch of healthy looking leaves sprouted from this stem, near the ground, and grew to the size usually attained by the apple leaf. I examined the root, but it appeared to be dead, and, in fact, never gave any indication of vitality. It will naturally be presumed that I was anxious for the preservation of so great a curiosity, that I might watch its fate during the following spring and summer, but the tree was unfortunately pulled up in October, by a careless servant.

Modern botanists have divided stems into two classes; the endogenous, or monocotyledons, which grow internally, and exogenous, or dicotyledons, growing externally. The seed of the former class, in germinating, is converted into a single thick leaf, supplying nourishment to the young plant until it has struck roots strong enough to support it; the latter class comprehends all those the seeds of which, in germinating, divide, and form two thick leaves.

Of endogenous plants, we have few or none in the middle or northern states rising to the dignity of a tree. The Indian corn is the largest of our plants of this class, and will serve to illustrate the manner of growth of endogenous plants. When the seed germinates, a root is sent downwards, and a minute stem, enclosed in a leaf, springs upwards. In a few days, a second leaf, within the former, makes its appearance, forcing the other outwards, and enlarging it laterally; and these are succeeded by a third and a fourth leaf, still within the former ones; and thus the process continues, until the whole number of leaves which the plant is destined to bear have been formed. All these spring from the top of the infant stem, which continues increasing in thickness, but not in height, as long as any leaves remain to be put forth. When all the leaves are formed, the outer coat of the stem begins to harden, and only then increases in height. Having attained the circumference of maturity, the stem begins to shoot upwards, each joint bearing with it a leaf. In this class, wheat, rye and all our grasses are included.

In tropical climates, this forms the most numerous class of vegetables, and includes the sugar cane, the yucca, and a majority of the forest trees. The stems of all endogenous trees are cylindrical, that is, of an equal thickness throughout, and not tapering as they ascend, like the exogenous trees of our climate. The reader has doubtless observed this peculiarity in the stems of the palm and cocoa trees, which form such conspicuous objects in a drawing of an oriental landscape. The seeds of these trees germinate exactly like our Indian corn, the stem scarcely rising above the surface of the ground, before it has attained the full diameter contemplated by nature. When that period has arrived, the crown of leaves surmounting the short stem gradually falls, and a new joint shoots up from the centre of the first, and continues growing until it has attained the size of the first, when a third joint springs up in like manner. In this mode the tree continues to ascend, as long as its native vigor remains. These trees, like our Indian corn, have no bark, the hardness and density of the external coat of wood being a sufficient guard against the effects of the weather. Unlike the exogenous class, the wood of these trees is found to be softer in proportion as the axe approaches the heart of the stem.

The structure of exogenous trees is much more complicated than that of the class we have just been speaking of. The stem consists of two parts, viz., wood and bark. The wood consists, firstly, of pith, a soft spongy substance, of a cylindrical form, occupying the centre of the stem. This does not grow with the wood, but remains always the same in quantity, though the hardening of the wood

compresses it into a very small compass, insomuch that in certain aged trees, it can scarcely be distinguished from the wood.

The quantity of pith is by no means the same in all trees; the elder, for instance, containing nearly as much pith as wood. In the majority of trees, the pith is elongated with the branches and stems, but in some cases, for instance, the jessamine, where it is of a coarse and loose texture, it is torn asunder by the growth of the stem which contains it, but this does not happen till it has fulfilled its office of nourishing the young wood, during the first period of its existence. In autumn the pith becomes dry, and the layer of wood is perfected by the descent of the cambium. In the following year a new layer is formed, which is lined with a layer of cellular tissue, which may be considered the pith of that layer. These cellular coats not only line the several layers of wood, but seem to be so interwoven with their texture as to give the appearance of rays on the surface of the wood, when cut transversely. In some trees they are scarcely discernible, but in others, such as the wild cherry and plane tree, they are clearly visible. In the root of the carrot, they are, perhaps, more distinctly marked than in any other plant. These fibres or rays are not continuous, but, owing to their numbers and minuteness, it is impossible to discover the termination of one year's growth, and the commencement of that of the next year.

The white oak, the Spanish oak, and the black oak exhibit a radiated surface, but this is owing to a circumstance which it may not be amiss to mention more particularly. In splitting those woods through the centre, there will be found several spots, some of them two inches in diameter, appearing like thin, highly polished plates of ligneous matter, lying on the surface of the cloven wood. It appears as if there had been a cleft in the wood, which was filled with a woody deposite. On one side, these plates adhere very firmly to the wood, while on the other, they appear entirely detached from it. Being much harder and more durable than the wood by which they are enclosed, they may be picked perfectly sound from a fallen and rotten log. They are less numerous in the black oak than in the white oak, but in the Spanish oak they are very numerous. In all these, they are less numerous near the root than at the upper part of the stem and larger branches. In trees of a diameter under eight inches they are not frequently found. A cooper, whom I questioned on this subject, informed me that he had occasionally worked staves taken from large white oaks, which were entirely free from the *mirrors*, as he termed them; these cases, however, were, he added, very rare. Whether these mirrors are occasioned by minute clefts in the tree I will not take upon me to decide, but I incline to the opinion that they are, for on examining the bottom of a cleft made with an axe, in a standing white oak sapling, I found the mirrors there, and in no other part of the tree.

During the first year of the infant plant, the layer of wood surrounding the pith grows freely; but the second year produces a second layer, by which the first is surrounded, and so compressed as to be incapable of any further increase in thickness, but is forced to spend its vigor in an upward direction. It accordingly shoots up, and increases the height of the stem, whilst the second layer increases its thickness. During the third year another layer is formed, by the pressure of which the second layer is forced upward, and soon overtops and confines the first layer. In the fourth year another layer is formed, and the third, in its turn, overtops the second layer, and thus the growth proceeds as long as the tree lives. It is thus the exogenous tree acquires its tapering form, the layers decreasing in number as the stem rises. In process of time, these layers become so hardened by the external pressure as to yield no longer; they assume a dark color, and then constitute what is properly called *wood*. Previously to this period, they bear the name of *alburnum*, white wood, or sap wood. The length of time required to bring the alburnum to maturity is not the same in all trees, some requiring no more than five years, while others require not less than fifty. These annual layers are easily to be distinguished by the cellular tissues lying between them, and the age of a tree or the date of a survey may be ascertained by these means, as is well known to surveyors, who use trees for landmarks. The age of endogenous trees cannot be thus ascertained, the layers not being sufficiently distinct. The rings annually formed by the leaves are resorted to for this purpose, but this cannot with much certainty be relied on, for in aged trees the rings are obliterated near the foot of the tree.

The bark of exogenous trees vegetates from within, and may thus be considered endogenous. The new, soft layers grow internally, lying next to the wood, and annually forcing the older ones outwards. As the old layers are forced out, they harden and crack, and in process of time, fall off in scales; some trees, as the pitch pine and yellow pine, scaling off much more rapidly than others. It is this growth of the bark which causes the ruggedness of the oak, and the shaggy, ragged appearance of some of our hickories. There are certain species of trees whose bark is so elastic as to retain its softness and smoothness for several years. Such is the cork oak of Spain, whose bark is peeled off every seventh year, and forms the article called cork, which we see applied to so great a variety of purposes. The bark of the plane tree, on the other hand, is so hard as to be entirely incapable of expansion: it splits and falls from the tree at the end of each season. In the outer coat of the bark of the cherry tree and the birch, the fibres of the bark are disposed circularly around the trunk and branches, and cannot be peeled off in vertical strips, as that of most other trees. Being elastic, it extends as the tree increases in thickness, until, having reached a certain point beyond which it is incapable of further distension, it bursts, and falls piecemeal from the tree. The bark below then assumes a rugged appearance. This annual new layer of bark is called the cuticle, and is externally of a green color. It extends not only over the trunk, but covers the branches and leaves. The hard outer coats are called the epidermis.

An inscription made on the bark of a tree is soon effaced by the annual scaling off; but if the cuticle be penetrated, the inscription is covered by the annual layers of wood, and preserved. Thus an inscription was discovered in a very aged tree at Cape Verde, in 1798, which had been made three hundred years before.

As the layers of wood grow with great regularity, the texture of the wood might be supposed to be straight and even, but this is not always the case; for the sap being, from some unknown cause, occasionally interrupted in its ascent, accumulates at the place where it meets the interruption, distends the vessels, and thus forms a magazine of nutriment, which gives birth to a shoot. But it happens frequently, that before the germ has acquired sufficient strength to force its way through the wood and bark, it is inclosed and overpowered by new layers of wood, and forms a knot. To knots thus formed, mahogany and other cabinet woods owe their beautiful clouds, waves and streaks. If the germ succeed in forcing its way through the wood and bark, it becomes a branch. Whence these shoots or branches originate, is unknown, but it is probable that latent germs exist in every part of the branches and stems of trees, which only need an accumulation of sap to make them shoot out in the shape of branches.

The sap ascends chiefly through the alburnum. This was ascertained by an experiment productive of curious and singularly beautiful results. The root of a plant having been immersed, for some days, in water colored with carmine, the bark of the stem was peeled off, when it was observed that the water had ascended through the alburnum, especially the latest layers, in straight lines, but when any obstacle was encountered, it had moved obliquely, and had even spread laterally.

[TO BE CONCLUDED IN OUR NEXT.]

MUSIC.

STYLE.

SINGING, as an art, has reached, perhaps, as high perfection as it is capable of attaining, yet, strange to say, is very imperfectly understood, as a science, in England. If we are asked how on why this is so, we shall reply, because literature has yet lent but small help to music; because its higher principles have never been analyzed, examined and demonstrated; because the technical points of the education of vocalists, and their necessary acquaintance with language, their cultivation of personal grace, and study of the usages of the stage, occupy so much time, and imperatively demand such vast labor; because the English, having no musical school of their own, are compelled to erect the superstructure of their national performances upon foreign foundations. The Italians possess the entrances and passages to organic perfection in singing; yet, so soon as the elements of instruction which we borrow from them, terminate—so soon as our students attain to the production of pure tone, the *messa de voce*, as they term it, or that power which enables the singer to modify the quantity of tone at will, by the most gradual increase or diminution—so soon as the shake, execution, and general facility are attained—the practical application of these several powers and graces to the purposes of expression, differs as widely as the feelings, the habits, the manners of Italy differ from those of England. Hence, we have a mixed, instead of a pure style. The understanding becomes gradually more high-bred and confused, and we have devotees to English, and devotees to Italian notions of musical expression. The lovers of Italian delicacy, sweetness, lubricity and voluptuousness, are abused without measure by the admirers of the expressive elocution, energy, strength and magnificence which appertain to the great masters of English vocal music; while the latter class as unrelentingly stigmatize the stern pertinacity of their (*propatria*) opponents.

Style, in singing, equally as in the other fine arts, has reference to the objects upon which it is employed, and it is to be esteemed according to the intellectual faculties to which it is addressed. Sir Joshua Reynolds was satisfied, in painting, with two capital distinctions, *great* and *ornamental*. If, in singing, we are content with these genera, or if we accept the more common divisions of the *sublime* and *beautiful*, species will, nevertheless, be found to multiply in each: but this much may be said generally, that we ought to class the exciting causes agreeably to their effects, so that a composition is to be held sublime or beautiful, according to the images which it raises; it is to be considered as belonging to the great or the ornamental style, according to the class of sensibilities and perceptions to which it is addressed.

Thus we come directly to the characteristics of style as well as of manner, and we cannot do better than assist ourselves here by quoting the words of a celebrated writer, who appears to have treated this matter with a philosophical regard to the principles which guide and govern the operations of the human mind.

'It is scarcely possible,' says he, 'completely to describe in what the great style consists. In a singer, it asks a combination of all the faculties of the mind, and graces of execution, which address themselves to, and command the higher feelings of our nature. The elements of this style are power, pure tone and a varied expression, an entire command of manner, correct taste and perfect simplicity, or in other words, that genuine sensibility, and that intellectual dignity, which enable us to embody, in their finest forms, the conceptions of the poet and the composer, and to employ, in the best manner, the powers of nature and of the art. The difficulty of reaching this degree of eminence, combining with other causes, has originated a style intended to supply the place of the great style. This we may term the ornamental style. It consists in the substitution of light, graceful, florid and surprising passages of execution, for the pure, dignified and impassioned notes which compose the melody of songs in the great style. However improbable it may appear at the first glance, a close examination will convince us, that the most difficult *graces*, as they are called, are more easily acquired than the chaste and austere elements of the great style. Ornaments, well performed, are apt to seduce our senses by their seeming difficulty of execution, and we are led away by novelty and by surprise at what we, perhaps, never conceived practicable. The emotion rises with the rank of the performer; we give credit for more value than there really is, and take it upon the trust of his personal reputation. The judgment is thus silenced, while the ear is filled with new, agreeable and unexpected sounds. But we are influenced only by an emotion of surprise,—the affections are never engaged. To satisfy ourselves that these ornaments are more easy of acquisition than the great style, we have only to recollect that they are attained by mere repetition, by a vast number of acts, and imply no mental exertion whatever. The great style is, therefore, relatively to the ornamental, what the productions of reasoning and imagination are to the agile exertions of the body. That such is the principle, is clearly shown by the title which the Italians have given to this species of performance:—*aria d'agilitata*.

'It follows then, that the manner of a singer must very much depend upon the style which he adopts, and his choice must necessarily be guided by the talents with which nature has fitted him; but since cultivation can do so much for the mere voice, perhaps the range of a performer must be determined, rather by the faculties of the mind than by any power or facility of execution; these being but secondary considerations.'

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[Furnished for the Tracts and Lyceum.]

ECLIPSES OF THE PLANETS AND OTHER HEAVENLY BODIES.

Eclipses occur among the planets and their satellites, as often as between the moon and the earth. Jupiter has four moons or satellites, Saturn seven, and Herschel six.

Eclipses are occurring among the moons of Jupiter almost every day. The importance of these in practical astronomy is great. By their means, the velocity with which light travels was discovered. The passage of light seems to be instantaneous; indeed, from the most distant visible objects on earth, no time can be perceived to have elapsed during the passage. But the time is perceptible, at such vast distances as the heavenly bodies are from each other. The orbit of the earth lies within that of Jupiter, and is about 180,000,000 miles in diameter. The exact time of the occurrence of any eclipse among the satellites of Jupiter is predicted with as great accuracy as that of a solar or lunar eclipse, on the earth. But it was observed that when the earth was farthest from Jupiter, the eclipses took place sixteen minutes later, according to the calculation, than they did when the earth was nearest to that planet. Now the earth may be at a distance equal to the diameter of its orbit, or 180,000,000 miles, farther from any point in the orbit of Jupiter at one time than at another. This difference of sixteen minutes, then, not being assignable to any other cause, is attributed to the delay of the light in coming so much greater distance. Light, then, travels 180,000,000 miles in sixteen minutes, or at the rate of about 200,000 miles per second.

The eclipses of Jupiter are important for another reason. They are a means of finding longitude. Were the difference of time by the clock, at any particular instant, known, between any two places, the longitude may be known; for the difference of one hour in time corresponds to fifteen degrees of longitude. Tables, then, are made, of the time when every eclipse of the moons of Jupiter happens, at some well known place—generally the chief meridian, from which longitude is reckoned. The observer, at sea, witnessing an eclipse of some one of Jupiter's satellites, notes the time, by his watch, at which the immersion of the satellite in the shadow of Jupiter commences. By looking in his tables, he finds the time of the immersion at London, or Washington. The difference of this from his own time will show his longitude. Peculiar circumstances, however, prevent the employment of this

method of finding longitude at sea, generally. Good chronometers, which may be relied on for preserving the time, both for the place whence the vessel sails, and for the place where she is, are still wanted. Great prizes have been, from time to time, offered and awarded, by the British Government, for improvements in the construction of chronometers, and a great degree of perfection has been attained.

The planets also eclipse each other—that is, they pass between each other and the sun. From their great distance apart, however, the shadows do not reach from the one to the other, and no darkness is produced. These eclipses are called transits. The planet is seen passing over the sun like a black spot, its size being diminutive, compared with the immense globe of the sun. The planets can only be eclipsed by those whose orbits are within their own, as these only can come between them and the sun. Mercury and Venus are the only planets whose transits are observed at the earth. Those of Mercury occur not unfrequently, but those of Venus are of very rare occurrence. These furnish the only correct method of obtaining the sun's parallax, or of discovering the true distance of the sun from the earth. The process is a difficult one, and quite beyond the limits of this short article. Suffice it to say, that by the last transit, which occurred in 1769, the sun's mean distance was ascertained to be about 95,000,000 miles, and this is believed to be not far from the truth. An opportunity of verifying this observation by another transit will not, however, occur for a long time. Mercury is too near the sun for its transits to be very useful, as less is known concerning its motions, on account of its proximity to that luminary.

The moon passes frequently between us and the fixed stars and planets, and hides them from our sight. This is called an occultation. The occultations of the principal stars are noticed in nautical, and sometimes in other almanacs.

Thus we see that every movement of the planetary bodies comes under the eye of the astronomer, who follows even the comet, to the verge, as it were, of the known creation. He derives a lesson from each star, and reaps rich harvests of instruction from each shining world.

O. S.

CUTTLE FISH.

We have been asked a question, by a cultivator of natural history, something about this singularly organized creature, termed a fish, but which might, with equal propriety, be classed among Hottentots. In Boston Harbor and the neighboring shores, only one species, to our knowledge, has been discovered, but with a hope of aiding the gentleman for whom this note is designed, the editor subjoins all the genera and species at present received by distinctly scientific writers. Although it may prove to be a dry document to the general reader, it will convey some general notion of the outrageously barricadoed condition of the natural sciences, which a man is absolutely obliged to take by assault, before he understands the ideas of the learned upon any common subject which has once been under their necromantic *surveillance*.

Sepia, (cuttle fish,) GEN;—*Vermes*, *Mollusca*, CLASS AND ORDER.—The generic character is as follows:—the belly is fleshy, the breast in a sheath, with a tubular aperture at its base: it has eight arms, beset with numerous warts or suckers, and in most species, two pedunculated tentacula: the head short, eyes prominent, and mouth resembling a parrot's bill.

There are eight species known to naturalists, five of which are found in the Atlantic Ocean.

1. *Octopus*,—body without tail,—in the Indian seas, its arms grow eight fathoms long, and the Indians are obliged to defend themselves from it with a hatchet. It is characterized by a short body, rounded behind; arms taper to a point. It is phosphorescent when opened.

2. *Officinalis*,—body without tail or appendage, and surrounded by a margin; has two tentacula; is preyed upon by whales; eels eat off the arms; squirts an inky fluid: it is extensively eaten; fluid made into a rich gravy. The body of this species is ovate, eight of the arms are short and pointed; the two tentacula are four times as long as the others; tips broad, and furnished with numerous suckers.

3. *Unguiculata*,—body without tail or appendage: arms furnished with hooks, which are retractile, like a cat's claws.

4. *Hexapus*,—the body has a tail, with four or five joints in it; six arms: body half a foot long; has minute suckers for holding on.

5. *Media*,—body long and slender, cylindrical; tail finned and pointed; has two long arms; body ends in a point, with a membrane on each side, commencing about the middle of the body.

6. *Loligo*,—from nine to twelve inches long; color reddish brown, with two long tentacula; eyes blue; bone of the back lance-shaped and transparent; body sub-cylindrical, subulate, and furnished with a flattish, sharp edged rhombic membrane at the tail, on each side. Found all over the ocean.

7. *Sepiola*,—two rounded wings or processes behind: found in the Mediterranean and Atlantic seas, and is very small. Body short, rounded behind, with a round membrane or fin at the lower extremities. It has two long arms.

8. *Tunicata*,—body entirely inclosed in a black pellucid membrane, with two semicircular wings behind; body very large, weighs 150 pounds; good food; found in the Pacific.

THE MOOSE.

Pennant, Forster, Buffon, and, indeed, all the European naturalists, are positive that our moose is the elk. 'The name,' says Pennant, 'is derived from *musu*, which, in the Algonquin language, signifies that animal. The English used to call it the black moose, to distinguish it from the stag, which they named the gray moose. The French call it *orignal.*' On comparing the animals called moose and elk, *in this country*, we find, at once, a specific difference in their size, their color, their horns and their residence, and a great difference in every other respect, except their being of the genus cervus. We are then certain, that the moose is not the animal denominated by us the elk; but the question still remains open, whether the moose is not the elk, or *Cervus alces*, of Europe, described by Linnæus as having palmate horns, with short or no beams, and caruncolate throat. They certainly assimilate in many respects.

Another question still remains for decision; whether the animal which we call elk is the elk of Europe. Charlevoix says, that the Canadian stag is precisely the same as that of France; and Buffon says that it is only a variety of the European stag or hart—that it differs from it in length of horn only, and in the direction of the antlers, which is sometimes not straight, as in the common stag, but turned backward, so that the end of each points to the stem of the horns.

Catesby gives the following account of these animals, which appears to be very judicious and correct. 'The moose or elk, *alce maxima Americana nigra*, is a native of New England and the more northern parts of North America, and is rarely seen south of latitude forty, and consequently, never in Carolina. He is six feet high, about the size of a middle sized ox. The male has palmated horns, not unlike those of the German elk, but differs in having branched brow antlers. The stag of America resembles the European red deer, in the color, shape and form of the horn, though it is a much larger animal, and of a stronger make; his horns are not palmated, but round, a pair of which weighs upwards of thirty pounds. They usually accompany buffaloes, with whom they range, in droves, in the upper and remote parts of Carolina, where, as well as in our other colonies, they are improperly called elks. The French, in America, call this beast the Canadian stag. In New England, it is called the gray moose, to distinguish it from the black moose.

Pike saw plenty of these animals on the Mississippi; sometimes the distance was four feet between the horns, and one hundred and fifty of them were frequently in a flock. Pennant says that stags abound in the mountainous southern tract of Siberia, where they grow to a size far superior to what is known in Europe. The height of a grown hind is four feet nine inches and a half, its length eight feet, that of its head, one foot eight inches and a half.

A SWALLOW AT SEA.

No doubt our correspondent possesses many other curious observations, illustrative of interesting points in natural history, and he would greatly oblige us by communicating them to the Scientific Tracts.

To the Editor of the Tracts and Lyceum.

Dear Sir,

A COMMUNICATION on 'Swallows,' in the number of your Scientific Tracts for Sept. 15, reminded me of a curious incident that occurred in April last, during my passage from Europe, which I transmit to you, hoping that, however trivial, it will contribute its mite towards promoting the grand object of your publication.

SUNDAY, APRIL 6, 1834.—At noon, the passengers were considerably excited by the appearance of a common barn swallow, which was hovering about the ship, in search of a resting place. It appeared to be very much fatigued with flying, and was easily captured. In a few minutes after its capture, it expired, probably through hunger and fatigue, as it was very lean and emaciated.

At the time, I concluded that it was a deserter from some migratory flock, and the communication in your paper tends to confirm my opinion; but where it came from, and whither it was migrating, are questions that I am, at present, unable to solve, unless it was driven from its course by the easterly winds that had prevailed for some days previous, on its passage from the Azores to the north of Europe. At that time, our latitude was 45° 30′ north; longitude, 30° 45′ west of Greenwich, and the nearest land was Corvo, one of the Azores, or Western Islands, distant about 345 miles, in a southerly direction.

If the above extract from my Journal and remarks will be of any service to you, they are at your disposal.

Yours, &c., Y. D.

MIGRATION OF BIRDS.

The secret departure of many species of birds has introduced much fable into ornithology. It is time that the submersion of swallows, and the fascination of serpents, should be banished from our natural, and the Welch nations of Indians from our civil, history. In the midst of winter, when occasional mild weather occurs, birds that were supposed to have left the country suddenly reappear. This has induced a belief that many of them remain in a torpid state during the winter, in the fissures of rocks or in hollow trees; all these indications ought to be carefully watched. Buffon says, that of three hundred species of quadrupeds, and one thousand five hundred species of birds, man has selected but nineteen or twenty, and that only nine species of birds have been domesticated. He is greatly mistaken in the number of species, although he is nearly right in other respects. The list of useful domestic birds may be greatly increased. The Canada goose and the turkey, it is believed, have been added by America. The black duck, brant, wood duck and prairie hen have, in many instances, been tamed; and why might not teal and grouse be also domesticated? Our stock of domestic fowl might also be increased by the Peruvian hen, and the hoco or curasso of South America, which is about the size of a turkey; the flesh of both is much esteemed: and why might not our useful wild birds be augmented by importing from Europe the red legged partridge and the pheasant? It is supposed that pheasants were brought

into Europe by the Argonauts, one thousand two hundred and fifty years before the christian era, from the banks of the Phasis, a river in Colchis, in Asia Minor.

HEAT.

If heat, says Dr. Williamson, came in direct rays from the sun, it would follow that the quantity of heat on the surface of every planet would be inversely as the square of its distance from the sun, according to a former opinion. But experiments without number prove that such opinion is unfounded. Although light comes from the sun, and light has the power of exciting heat, it is clear that heat does not come from the sun. The experiment is conclusive in all warm climates, and in every climate where there are high mountains. At the foot of the Andes, near the equator, the inhabitants suffer by the heat of eighty or ninety degrees. Let them ascend the mountain, and before they have arisen two miles, they find themselves in the region of perpetual snow. How should this happen? They are surely nearer the sun on the mountain than upon the plain, and they are subjected to more of his rays; therefore, according to the alleged rule, they should be warmer; but they are, in fact, much colder, because they are in a thinner, or a lighter atmosphere. The issue is the same in all cases where the experiment has been made. On the Peak of Teneriffe, the traveller arrives at the region of frost at the very same height, or under the same weight of the atmosphere, that he finds it upon the Andes. If he could rise but two miles farther, it is not to be questioned that he would, in so thin an atmosphere, perish by the want of heat. Hence we infer that the degree of heat, in every planet, is according to the weight of its atmosphere, compared with its distance from the sun. We also infer that the inhabitants of the several planets cannot enjoy the same degree of heat, unless the weight of their atmosphere be increased according to their several distances from the sun.

ORIGINAL MISCELLANY.

Loring's Globes.—It is time that somebody, who can exert more influence than ourselves, should spread abroad a knowledge of the very excellent and scientifically accurate globes which are manufactured in Boston, by Mr. Josiah Loring. For beauty of workmanship, they have never been excelled, and as it regards the progress of discovery, either on terra firma or in the heavens, no other globes, in this country or Europe, compare with them; for Mr. Loring, like an untiring philosopher, no sooner understands the fact that a star in the firmament, or an isle in the ocean, has been carefully surveyed, than he at once exhibits them on his splendid spheres. Thus they are continually improving, from day to day, instead of remaining *in statu quo*, exhibiting errors which most of the manufacturers of these almost indispensible instruments offer no promise of correcting.

We admire Mr. Loring's perseverance, for he neither appears ambitious to attract attention, nor does he complain for want of customers. Conscious of the real value of his globes, and enjoying the entire confidence of gentlemen whose science enables them to appreciate the service he is doing, the work goes on, as regularly and systematically as though the statute law of the land imperatively obliged every school committee within its jurisdiction to provide a pair of Loring's globes, which were it so, would be a positive blessing to our children.

We have neither been fee'd for puffing, nor do we expect any one's thanks for the remarks which have been made recommendatory of the Boston globes. Simply as admirers of the article, we praise the workmanship; as well-wishers to the progress of education, we strongly recommend them to all classes of seminaries. The missionaries, in ordering them for their foreign stations, have exhibited a good and discriminating judgment, as there are none superior. Loring's globes, on account of their perfect accuracy, are gaining character in distant lands, and it will be disgraceful to the country, since they have a reputation abroad, if they are not liberally patronized at home.

Those mounted on stands, carrying the horizontal zodiac about on a level with a common parlor table, are superb for private library rooms. Strangers visiting this city, who are interested in the progress of useful knowledge, should by no means omit visiting the establishment to which we have been endeavoring to draw their attention.

Telegraph Science.—The increasing utility of this very interesting science has become a subject of considerable notoriety. From an authenticated statement of the annual reports of the establishment at the observatory on Central wharf, in this city, the following results are communicated for the information of its numerous patrons.

Vessels telegraphed from	1824 to 1825,	799
"	1825 to 1826,	897
"	1826 to 1827,	923
"	1827 to 1828,	1010
"	1828 to 1829,	1309
"	1829 to 1830,	1435
"	1830 to 1831,	1583
"	1831 to 1832,	1809
"	1832 to 1833,	1856
"	1833 to 1834,	1922
Total number announced by telegraph,		13,543

We understand that during the above period, fifteen hundred sail of vessels, including the government vessels of war and the revenue cutters, have adopted the use of the telegraph flags.

Food.—By the experiments of Dr. Beaumont, it has been satisfactorily proved that from whatever is introduced into the stomach, the same article is invariably elaborated, whether animal or vegetable, tough or tender, it matters not; the result is the same, under all circumstances, when the digestive process is properly carried on. In the vicinity of Hudson's Bay, one of the exploring party, in those inhospitable regions, says he visited a cabin, one evening, when the inmates were at supper, which consisted of raw flesh of seals, fat, birds and entrails, which constituted a delicious meal. A young girl, the belle of the tribe, was sitting by, biting the inside of a seal to pieces, and distributing the bits to her companions. Train oil, particularly when rancid, is a delicious article, being both meat and drink for Greenlanders. Yet, it is worthy of remembrance, the chyme, the nutritious fluid which nourishes the body, is always the same, whether elaborated from putrid aliments or the most savory viands.

THE BLACK DEATH.—This great pestilence of the fourteenth century swept away, in four years, a fourth of the entire population of Europe. Indications of some dreadful calamity preceded the destroying malady, for more than fifteen years. Parching droughts were followed by torrents of rain, unprecedented since the flood. Four hundred thousand were drowned in the capital of Kingsai, by the sudden rise of the rivers Kaing and Hoai. The mountain of Tsincheou was washed from its very foundations, and left vast chasms in the earth. One year after, 1334, the neighborhood of Canton was inundated, while in Tche, after an unexampled drought, a plague arose, which swept off, with irresistible force, about five millions of people. When the black death reached England, both the air and the water were so saturated with something destructive to animal life, that fishes died in the rivers, and five thousand cattle died in one pasture. It maintained its empire from 1347 to 1350, with unabated fury.

NUDITY FAVORABLE TO PHYSICAL DEVELOPEMENT.—On the authority of a celebrated writer, it is asserted that in those climates in which nudity is not incompatible with health, the exposure of the whole surface of the body to light is highly favorable to the regular conformation and developement of the body. This observation has been abundantly confirmed by Humboldt, in his voyage to the equinoctial regions. Deformity, and deviations from exact proportions and symmetry, are extemely rare in those races possessing dark skins, and particularly so in those who wear little or no clothing. He regards the influence of light upon the skin of as much real importance to the healthful condition of the individual, as wholesome air in the lungs. How far this conclusion is warranted by facts, future philosophers will probably determine.

SCHOOLS IN SIBERIA.—Lancasterian schools were established in Siberia, by the late emperor Alexander, which are still well sustained. One thousand boys were taught in them, at the last accounts.

RUINS OF ARAXES.—It was in this very ancient city, then in the meridian of its architectural splendor, and the pride of Persia, that Alexander and his Greeks sung and danced and revelled. At the present moment, the massive ruins only faintly express its former grandeur and magnificence. Martyn, the missionary, the last visiter whose remarks we have consulted, says, 'I saw no appearance of grand design anywhere. The chapiters of the columns were almost as long as the shafts, though they are not so represented in Niebuhr's plate; and the mean little passages into the square court, or room, or whatever else it was, make it very evident that the taste of the Orientals was the same, three thousand years ago, that it is now.'

A PROFITABLE GARDEN.—There is a garden called Shah Chiragh, in the neighborhood of Shiraz, in Persia, in which is the tomb of the brother of an imam, who was suddenly killed on that spot, at which famous miracles are said to be wrought, every Ramazan. The mootuwulli, or proprietor, in whose family the property has been for many ages, finds its supposed sanctity worth, to him, nine thousand dollars a year. To keep a proper degree of zeal alive in the people, he tutors a man for the business, who, for a few months before Ramazan, appears miserably sick, but on that day, there being but one in the whole year on which cures are effected, touches the soil of the garden, and stoutly cries to Ali for help, and then instantly recovers.

PRIZE ESSAY.—The Harvean Society has given out the following subject for a prize essay, for 1835:—*The influence of atmospheric pressure on the animal economy.* The prize to be won is a silver medal, with suitable inscriptions, or a quarto copy of the works of Dr. Harvey. The manuscript must be sent to William Moncrief, M. D., No. 7, York Place, or Richard Heric, No. 8, George Square, London, so as to be received by the first day of January next. Each dissertation must necessarily be accompanied by a sealed letter, containing the name and address of the writer, inscribed on the back with a motto, which motto must also be prefixed to the manuscript to which it belongs. There are many of our correspondents who might, with considerable prospect of success, send on an essay very seasonably.

Mice.—Naturalists assure us that mice cannot live on the Asiatic side of the Ural mountains. Capt. Cochrane, who travelled on foot from St. Petersburg into Asia, over that formidable ridge of barren rocks, piled almost to the skies, says that the sable is never found in Asia. He further observes that the oak will only flourish on the European side. At Ekatherinebourg, that intrepid pedestrian visited a gold mine, into which he made an entrance by being let down in a basket to the depth of one hundred and sixty feet. He says that four thousand pounds of the earth brought from the bottom, will scarcely yield, when washed, the value of one guinea.

Love of Science.—A distinguished English missionary, located in India, has such an ardent love of botany, (though it would seem, from the volumes of learned translations he has made, that he had no time for any other employment,) that his garden is enriched with every plant and tree that can be made to grow in India. It is still more remarkable, that he can readily call each one by its appropriate technical name. His house is fitted up with shelves, on which are plants, minerals, shells, and groups of cages filled with lively birds.

Mahomedan Months.—In chronology and history, as well as in all public documents, the Mahomedans use months of thirty and twenty-nine days alternately, making the year thus to consist of 354 days. Eleven times in thirty years, one day is added to the last month, making 355 days, therefore, in that particular year. In common reckoning, the year is purely lunar, consisting of twelve months, each one commencing with the appearance of the new moon, without any intercalation, to bring the commencement of each year to the same season.

Purification of Wine.—Plaster of paris *(gypsum)* is excellent for rendering thick, turbid wine clear and pure from foreign matter. This method of clarifying wines was well known to the Greeks and Romans, who always put it into new wine, where it was suffered to remain some time. It improves the flavor too; and this fact they understood. Put a small quantity of the gypsum flour into each bottle, and having shaken it a little, set it away till the liquor is needed for use.

Worms in the Blood.—Dr. Bushman, a respectable surgeon of the Dumfries Dispensary, has published a remarkable account of a boy under his immediate care, eight years old, whom he bled, in consequence of a severe pain in the head; and in the blood taken from the patient's arm, *fifteen worms* were discovered. They varied from half an inch to eight lines in length. The body was articulated, and had seven joints. It was the opinion of Mr. Rhind, a naturalist, that they corresponded, in color, size and structure, to the *Tipula oleracea*, which is found in ditch or river water.

Tenacity of Life.—Edwards, a celebrated experimental physiologist of France, not long since, deprived two Salamanders of their hearts, and then placed them in water of the same temperature, which had been deprived of air by boiling, and two others in air. One of the former died in eight hours, the other in nine, while those in the open air lived from twenty-four to twenty-six hours. By repetition, the same results were presented, by which he infers that air, in comparison with water, has a superior vivifying influence upon the system of these animals, independently of its action by means of circulation and respiration.

Hybernating Animals.—The bat, hedgehog, dormouse, and marmot possess all the characteristics of the mammalia, and are only distinguished from others by their hybernation, during which they are converted, for a time, into cold blooded animals, because their temperature is scarcely higher than that of the atmosphere. Their breathing is irregular, and at long intervals, and no sort of nourishment is taken for several months. A curious field still remains unexplored, relative to the philosophy of this miraculous peculiarity of these particular animals.

Loss of Memory from Gin.—A very sensible writer in a foreign journal relates that his power of memory was partially destroyed by the use of gin, and that he recovered that important faculty, simply by leaving off his drams. He has the good sense to say further, and he is a physician, that he has scarcely any confidence in any preparation of alcohol. With us, we could tell the gentleman, alcohol is considered a positive poison, never to be touched.

CRYSTALLINE LENSES.—Sir David Brewster, a very distinguished writer on the science of optics, is desirous of procuring crystalline lenses, or, in other words, magnifying glasses, of the eyes of American animals. Put the entire eye into a well corked and sealed bottle of spirit, or take the lens from the globe, and throw it, for a few minutes only, into boiling water. When taken out, dry it and wrap it in paper, writing upon it the name of the animal to which it belonged.

SILVER MINES OF BARNAOULE.—These are located on the confines of China, near the boundary between China and that country. There are thirty-two mines, wrought by eighty-two thousand persons, divided into three parties, so that the operations are never suspended, night or day. The wages are very trifling. The whole of the silver is transported to St. Petersburg, for coining, and other purposes of the government.

COALFIELD STEMS —This term is applied to vegetable remains found in coal beds. H. T. M. Witham Esq., of Edinburgh, is pursuing an interesting series of experiments upon these preserved vegetables, and will feel greatly indebted to gentlemen in this country, who will forward to his address, any such specimens, found either in bituminous or anthracite coal mines of the United States.

FROGS.—On exposing frogs to the temperature of 0° cent. 32° Fahr., in humid air, in order to suppress perspiration by evaporation, they lost by transudation, in different experiments, the thirtieth part of their weight. Transudation is more abundant in these reptiles than in man, though the latter may be placed in circumstances much more favorable.

CONSUMPTION.—Although Dr. Rush declared that consumption was wholly unknown to the American Indians, the famous Red Jacket, in an interview with a medical gentleman, near Buffalo, in 1823, gave the particulars of no less than seventeen cases of pulmonary consumption among his relatives, including *ten* or *eleven* of his own children, who died of that insidious disease.