

PLANT MIND.

III.

VOLUNTARY MOTION BY PLANTS.

The *Hedysarum gyrans*, called *Chundali birrum* by the natives, is one of the best specimens of vegetable movement. A particular account of this remarkable plant is to be found in a paper on vegetable motions in the "Histoire de l'Académie des Sciences," by M. Broussonet, Ann. 1784, p. 609. Its leaves are in continual motion; some rising and others falling, and others whirling circularly by twisting their stems, even when the air is quite still and warm. The ten stamens act both as umbrellas and fans to the pistil, and by their perpetual movement seem to be as necessary to the plant as perpetual respiration is to animal life. All sleep is acknowledged to be a suspension of voluntary motion, and the various actions of opening and closing their petals and foliage seem to be the result of a voluntary power or spontaneous movement, and there are many instances of movements of the parts of vegetables to which no epithet is more appropriate than "acts of volition." In the *Marchantia polymorpha*, a yellow wool proceeds from the flower-bearing anthers, moves spontaneously within, and drops its dust-like atoms. The *Collinsonia* has two stamens and one pistil. The stamens are widely divergent, and the pistil bends to one and after a time to the other. It may be that the preference of contact is directed by an unerring instinct to the ripest anther, or the anther whose pollen has first matured.

Another instance of well concerted and voluntary movement is illustrated in the *Gloriosa superba*, with six stamens and one pistil. Three of the stamens mature before the others, and the pistil bends at nearly a right angle so as to insert its stigma among them. As these decline the other three stamens bend over and approach the pistil.

In the *Spartium scoparium*, or common broom, the stamens are in two sets, one rising a quarter of an inch above the other. The lower ones arrive at maturity before the upper ones, but the stigma is produced among the upper or immature stamens; when the pistil bursts open the keel-leaf or hood of the flower, it bends itself round in an instant, and inserts its stigma among the lower or mature stamens. In a few days, the pistil having increased in length, the stigma arrives again among the upper and more recently matured stamens.

In the *Fritillaria persica* the six stamens are of equal length, with the anthers at a distance from the pistil; the first approach to the pistil is made by three alternate stamens or males, the other three make no advances until these decline.

In the *Lithrum salicaria*, a beautiful red flower growing on the banks of rivers, having twelve stamens and only one pistil, six of the stamens mature before the other six, and surround the pistil some time before the other six rise up to supply their places. The *Alova*, *Lychnis*, *Saxifraga*, and several others have two sets of stamens of different ages. Ten stamens in the *Kalmia* are placed around the pistil like the radii of a wheel, with each anther concealed in a niche of the corolla, being thus protected from excessive cold or moisture; these anthers rise separately from their niches, approach the pistil for a time, and then recede to their former situations. The *Amaryllis formosissima* affords another beautiful example of that operation of the living principle residing in plants, and cognizable only in its effects. The pistil is of much greater length than the stamens. To counteract this apparent disadvantage both pistil and stamens decline downward, thus giving the fructifying pollen an opportunity of falling upon the stigma. To secure this effect the corolla is lacerated, and the lowest division, with the two next lowest ones, are closely wrapped about the style and filaments, binding them down, and much lower to the horizon than usual in other flowers of this genus.

Another instance of an exertion of the sensorium, or spirit of animation in plants, may be found in the *Hemerocallis flava*, where the long pistil is often bent somewhat like the capital letter N, with design to shorten it, and thus bringing the stigma among the anthers, that it may receive the fertilizing pollen powder.

Voluntary movement in plants is by no means confined to the purposes of reproduction, but purposes of conceal-

ment, protection, and preservation are frequently manifested; as, for instance, in the *Dodecatheon* of Linnæus, *Meadia*, or American cowslip, the pistil is much longer than the stamens, and the bend of the flower stalks enables the stigma to receive the fecundating dust of the anthers. The petals are turned back to prevent rain or dew from washing off this dust prematurely, at the same time exposing it to light and air. When the seeds are formed the flower stalks are erected, and thus the seeds are kept from falling out. Indeed the conservation of offspring is one great end, never overlooked in this wonderful department of animated nature.

Finally, we instance the *Cyclamen*, or shewbread. When the seeds are ripe the stalk of the flower gradually twists itself spirally downward until it touches the ground, and, forcibly penetrating the earth, lodges its seeds, where they receive nutriment from the parent root, for they are not found to thrive in any other situation. The subterranean trefoil, *Trifolium subterraneum*, also buries its seeds; and there is another, *Trifolium globosum*, which has a curious mode of concealing its seeds. The lower florets only are

June, 1877. One severe example made of the owners of a boiler of this kind would do more to stop boiler explosions than any number of fine spun theories on the occult causes of such disasters. Boilers in the vast majority of cases explode because they are too weak to stand the pressure they carry, and for that some one ought to be always rigidly held responsible.

New Inventions.

Mr. R. B. Sanderson, of Bridgewater, Pa., has patented a handy combination of Hanging Shelves, in which the shelves are supported by brackets adjustably secured to slotted hangers by clamp screws, so that the shelves may be arranged at any desired interval. The upright hangers are provided with pronged hooks at the top, by which the apparatus may be conveniently suspended from crossbars, staples, window casings, etc.

An improved Rocking Chair, of that class in which the seat swings by curved rockers on straight rails of a base frame, has been patented by Mr. George Roeder, of New York city. The arrangement of the springs and stop devices is simple and original.

A non-poisonous Sheep Wash, composed of specified proportions of tobacco, potash, turpentine and tar, diluted with water, has been patented by Messrs. A. and R. Scott and C. A. Skene, of Wamego, Tex.

Mr. Jessup Whitehead, of Central City, Col., has patented a Pastry Table, which, by the use of cold water and ice, serves for making and keeping confectioners' puff paste, and which may be used with hot water for raising dough. The table is hollow, with hollow side and rear walls, and has below it hollow shelves inclosed by a cupboard having marble or metallic sides. Hot or cold water is introduced, as desired, by pipe connections.

An improved Tool Handle, invented by Mr. J. E. Parrish, of Centerville, La., is provided with a rubber tip, suitably secured, to prevent battering when a mallet is used.

Mr. J. B. Harrison, of Cincinnati, Ohio, has invented an improved Ash Pan for Locomotives, intended to provide a convenient means for dumping the cinders and ashes, to facilitate cleaning the fire, to prevent choking of the draught, and burning of the grate bars, and to admit of instantaneous extinction of the fire when the pumps fail to work and the water in the boiler gets too low. The bottom of the pan is a series of slats pivoted at their ends and connected together, to be operated for closing and opening by a rod, like window blinds, and surrounded by a perforated water pipe for cooling the ashes before emptying and extinguishing the fire when the coals are dropped from the fire grate.

Mr. Luther Read, of New York city, has designed a Centerboard for Vessels, which is constructed with the object of preventing jamming when the board strikes bottom. The board is pivoted in the case at its forward lower end, and is raised by a chain attached to a lever and shackle behind a projection upon its lower rear corner. The chain runs over a sheave in the lower part of the case, so as to give it a direct draught, and is kept out of the way of the board by a separating partition.

Mr. Henry Groth, of New York city, has invented an ingenious Toy Carriage, which is so constructed that the uncoiling of the driving spring rewinds the cord by which the mechanism is wound up, ready to be again operated.

An improved Match Safe, the invention of Mr. G. R. Taylor, of Cranston, R. I., is arranged so as to ignite the match as it is forced out of the safe. One side of the box is made sufficiently thin to admit only one match at a time, and a follower drives this match out, a serrated spring in the cover igniting the latter as it emerges.

Mr. A. F. Pfeifer, of Newark, N. J., has patented an improved device for Adjusting Transoms, in which a hand rod, which may be locked by side pins into a recessed guide socket, operates a system of lever mechanism in an original manner.

Mr. Edward Hagerty, of New York city, has invented an improved metallic Cap for Glass Syringes, which is spirally threaded so as to be screwed into a cork, has a guide tube for the piston rod, and is provided with overlapping flanges which protect the edges of the glass barrel.



GLORIOSA SUPERBA.



HEDYSARUM GYRANS.



MEADIA.



AMARYLLIS FORMOSISSIMA.

fertile and have corols; the upper florets wither into a kind of wool, which, forming a head, completely conceals the fertile calyxes.

Animals are supposed to possess higher animation and greater sensibility than plants, but plant sensibility can be proved to be quite as exquisite and the animation as ceaseless in its operation, if only studied with care and diligence, and our coarser vision aided by the new forms of construction which are daily increasing the value of microscopic investigation, and revealing more and more facts relative to animating forces in the wide domain of the vegetable world.

R. C. K.

Quite to be Expected.

A boiler explosion recently occurred on board the Hudson river steamboat Magenta, whereby four persons were killed and several severely injured. Investigation has shown that an excessive steam pressure was being carried in a boiler badly corroded, the iron being in some places barely as thick as a knife blade. The generator was last inspected in

A device for Twisting Yarn into Hanks has been patented by Messrs. B. S. and A. Jennings, of Sullivan, Ill. The twisting rod, which is contained in a box, has a hook for the hank at one end, and is attached at the other end to a weighted cord. As it is drawn through the box it is caused to rotate by means of a fixed spiral guide, and the number of rotations is regulated by an adjustable stop pin.

A new Brake for light vehicles, invented by Mr. C. H. Weiss, of Eckley, Pa., consists of a friction strap surrounding the inside hub band, and prevented from turning by an arm attached to the axle. It is operated by a lever, which draws the ends of the strap together so as to clamp the hub band.

A folding and otherwise adjustable Ironing Table has been devised by Mr. M. S. Prescott, of Otisville, Mich. It is strongly braced, and furnishes a support for large articles which would otherwise touch the floor.

Mr. J. M. Castillo, of New York city, has invented a convenient Hat Hanger, designed for suspending a hat from the back of an opera chair, or in similar positions. It may be folded into small compass and carried in the pocket.

An improvement in Wagon Box Fastenings has been made by Mr. C. G. Conkling, of Hopewell, Pa. The object is to furnish a means of quickly taking apart or putting together the sides, bottom, and ends of a wagon body, so that it may readily be adapted to the nature of the material to be carried, and the invention consists in hinging straps or stirrups to the bottom bars, and locking them by eccentric levers carried by the side boards.

An improved mode of Securing Vehicle Wheels to their Axles has been patented by Mr. F. C. Lee, of Ridgefield, Conn. The outer end of the hub is closed, and upon its inner cylindrical end a ring groove is formed, in which fit adjustable keys carried by projections of the axle and held in place by an annular open spring band. The hub can be readily released by springing the band open, when it is desired to oil the bearings, or for other purposes.

SOME SEASONABLE HINTS ON PLANT CULTIVATION.

In order to obtain good plants, especially those for the vegetable garden, it is absolutely essential to raise them from seed, for those offered for sale in the markets are grown for sale and are neither healthy nor robust. If, however, there are no facilities for seed propagation and the purchase of plants becomes unavoidable, the following instructions will be found valuable:

THE SHAPE OF GOOD PLANTS.

Select those that have short, robust stems, for a long or slender stem indicates that the plants have been rapidly forced by artificial heat, or were grown too close together, in which case the sides and undergrowth have been excluded from the light and air, and the plants have, as it were, stretched their necks in their efforts to reach the light. If a plant has a small amount of root in proportion to the foliage it is weakly from having been forced too quickly or under too great a heat. The more root, the stronger and the greater the growing capacity of the plant. If the leaves are of a yellow cast it may occur from an unhealthy condition caused, in all probability, from having been but recently taken from the hotbed or forcing house, from having been taken from the plant bed too long, and, in some cases, from there being insects or grubs at the roots. If the roots are very short it shows that they have been carelessly taken from the beds and the rootlets have been broken off. A short or stubby root is always detrimental to the plant, while if the root is long and fibrous it is of little consequence if the foliage is small or short, providing that it has a deep green, vigorous appearance.

HOW TO PLANT THE SEED.

The beds to receive seed should be composed of a light, loamy or peaty soil, prepared when comparatively dry, and finely pulverized. The bed should be raked level and smooth, the seed being sown not too thickly and covered to a shallow depth. Large sized seeds should have nearly half an inch of covering, while fine seeds require an eighth of an inch only, and very fine ones still less. The soil should be flattened about them sufficiently to close the earth without making it very compact, and the bed should be lightly watered immediately after the seeds are planted.

WATERING THE SEED.

A common error is the giving of water in too great a quantity, and in too large drops. The soil requires to be kept moist but not wet, or the seeds are apt to rot. It must be remembered that the seed has to force its way through the soil, and that the latter will readily give way to the pressure when moist, but not when caked hard and dry. A little water often applied through a fine rose spout or sprinkler is the most advantageous.

THE TEMPERATURE.

If the temperature is too great the seed will propagate quickly and shoot up, in an aspidling condition, above the surface of the soil. The stems will appear whitish and partly transparent; the growth of the foliage will be excessive in proportion to that of the root; the plants will be weak and comparatively valueless. If kept too cold they will appear yellowish and stunted, many will die, and the remainder will become old without attaining vigor. The best temperature ranges between 45° and 50° Fah., and in order to maintain this as near as possible the plants should be watered, at this time of the year, in the morning. The plants should not be placed in a position in which the light comes in from one side only, or they will stretch themselves in that direction.

TRANSPLANTING.

The object of transplanting is to check the growth of the foliage and promote that of the root, and this is best done while the plants are young, so that, when they are finally planted out, there will be sufficient root to support a vigorous upper growth. As soon as the plants are well above the surface of the soil they should be thinned out; that is, the weaker ones should be removed, so that those left may have free access to the air and not be crowded. In thinning out, leave the shortest and strongest plants, keeping them as nearly as possible an equal distance apart and with a small space between the leaves of one plant and those of the next. As soon as the plants have six visible leaves the first transplanting (called the pricking out) should be performed. First the seed bed should be watered, and about an hour afterwards the plants should be removed to another bed, prepared of rich, light soil. In removing the plants from the old bed it is of great consequence to preserve the rootlets, and to this end a three or four pronged fork should be employed, lifting the plants gently and handling them carefully, planting them nearly up to the leaves in the new bed, placing them three or four inches apart, and pressing the earth very lightly about them, and finally lightly sprinkling them with water. The bed in which they are transplanted should be prepared rather dry, and if out of doors just before a shower of rain is the best time. Plants that have been thus transplanted not only grow to greater perfection, but are more hardy and will stand a protracted drought much better.

SELECTING DOUBLE SEED FROM SINGLE PLANTS.

Not many florists even are aware of the manner of selecting from plants having single flowers seed that will produce plants having double flowers. If we closely examine the bloom upon single wall flowers or single stocks we shall find here and there a bloom that has one more leaf in it than the ordinary bloom, and the presence of this extra leaf is an infallible sign that the seed produced from that bloom will produce a plant bearing double blooms. To mark the seed a short piece of scarlet silk is loosely tied upon the stem of the extra leaved flowers, or where the different plants have differed colored blossoms the color of the silk may denote the color of the flower also.

The Northeast Passage.

After the lapse of more than two centuries the discovery of a northeast passage from Europe to China is again about to be attempted, this time by Sweden, and though in the present state of geographical knowledge no one now expects to find a trade route to the East, still an undertaking of this nature is sure to excite a lively interest among seafaring nations, and more especially in England, the country which first sought to solve the problem. Professor Nordenskjöld, a well known Arctic explorer, to whom the suggestion and scheme of the intended exhibition are due, has already, in 1875 and again in 1876, passed east of Novya Zemlya to the further shore of the Kara Sea, where close to the eighty-first parallel of east longitude, and to a headland marked Effremoffstone Point on the English Admiralty chart, he found a good anchorage, and named it Deckson's Haven. This harbor lies considerably to the eastward of the furthest point previously reached by English or Dutch navigators, but as it is in Professor Nordenskjöld's opinion easily attainable before the end of August, in ordinary seasons, it ought, he thinks, to be regarded as a fresh point of departure for any future voyage of discovery; and, therefore, in reporting on the results achieved by former expeditions, he had confined his attention to those whose work lay east of the river Yenesei. Of expeditions from Western Siberia the first descended the Yenesei in a small vessel transported from Tobolsk. In 1738 and the following year the expedition stopped short while yet in the estuary of the river, and in 1740, when at last it passed fairly outside the Yenesei, its leader did not venture further north than latitude 75° 15', but on September 2 thought it prudent to turn back and seek winter quarters. In 1842, after an interval of more than a hundred years, a Russian named Tjeluschin, in command of a sledge party, followed the west coast of Taimoor peninsula until, in latitude 77° 34', he reached Cape Northeast, or, as it is sometimes called, Cape Tjeluschin, the extreme point of the Asiatic mainland in that direction. In May, the date of Tjeluschin's discovery, the sea, as might be expected, was completely frozen, but in the following year, when Nuddendorf, traveling overland, arrived on August 25 at Taimoor Bay, in latitude 75° 40', he could see nothing but open water to the northward, and reported upon the authority of one Fonim, said to have spent a winter there, that the ice breaks up in the first half of August, and is then, under the influence of prevailing winds, driven so far from the shore that it becomes barely visible from the high ground.

Between Cape Northeast and the mouth of the River Lena our knowledge of the coast is derived from the reports of Russian surveying expeditions sent out from Yakutsk. In 1735 Proutschischeff, a lieutenant in the Russian navy, starting from that town, descended the Lena for more than 800 miles, passed out to sea by its eastern mouth, and, after sailing westward round the delta, wintered in Olensk Bay, in latitude 72° 54'. Next year, on August 5, when the ice broke up, he started afresh, and continued his voyage until September 1, when in latitude 77° 29', quite close to Cape Northeast, he met ice, and turned back. In 1739 another expedition, under the command of Lieutenant Laptew, also of the Russian navy, left the Lena on August 1, and on

September 2 was turned back by ice at Cape Thaddeus, some fifty miles from Cape Northeast.

East of the Lena, where the coast trends gradually to the southward, there is evidence of a regular coasting traffic carried on in the sixteenth century between the mouths of the different rivers, and between the mainland and the Lisikov islands. Of the voyages made at this early period little is now known. There is, however, a map dated St. Petersburg, 1758, on which the route is marked as *anciennement fort fréquentée*, and we have also the record of some legal proceedings arising out of a dispute as to the discovery of a walrus bank on the east coast of Kamtchatka. Thus we learn that of seven small vessels which left the river Kolyma on July 1, 1648, one, that commanded by a Cossack named Deschnew, passed through the straits since called after Behring, and in October arrived at Anadyr. Again, between 1735-40, Russian explorers attempted to find their way from the Lena eastwards, and though none of them reached Behring Straits they followed the coast as far as Cape Baranown, east of the river Kolyma.

Of attempts to sail westward from Behring Straits the most successful was that of the American expedition of 1855, under the command of Captain Rodgers, which reached the 170th parallel of east longitude, while Cook in 1778 stopped short at the 180th, and Behring in 1729 got no further than the 172d parallel of west longitude.

The Russian adventurers who bit by bit surveyed so great a length of unknown coast line had at their disposal none but country craft, dependent upon oars or a leading wind, and equally unable to live in a seaway or to resist the slightest pressure by ice. Moreover, as such vessels could afford their crews no sufficient shelter from the rigor of an Arctic winter their commanders were greatly hampered by the necessity under which they lay of securing a return to the nearest settlement before navigation should become impeded; the further, therefore, they advanced from home, the earlier they had to begin their retreat, and thus they seem to have always relinquished their object at the very beginning of September, just as the time was approaching when, as we have since learned, those seas are least encumbered by ice. Professor Nordenskjöld, therefore, while he acknowledged the courage and hardihood of the crews, and the tenacity of purpose displayed by their leaders, thinks nevertheless that their sufferings and frequent failure ought not to discourage Swedish sailors serving on board a roomy steamship, properly strengthened for Arctic work, and fully supplied with provisions and other necessaries, in case she should be compelled to winter in the ice.

Out of a fund raised by private subscription Professor Nordenskjöld has purchased the steamship Vega, and proposes, in a petition for assistance from the Swedish Admiralty, lately presented to the King, that, after being fitted out and supplied with coals and provisions at the expense of the government, she should be manned by volunteers from the navy under the command of their own officers. Besides her crew of 19 men and officers, it is intended that she should carry a surgeon, and by way of scientific staff Professor Nordenskjöld and three assistants. Leaving Gothenburg in July, she will call at a port in the north of Norway to ship four harpooners and to fill up with coal, and will thence sail direct for Deckson's Haven, where she is expected to arrive before the end of August.

The immense body of warmer water from lower latitudes poured into the Kara Sea by the Obi and the Yenesei forms a strong current which, according to Professor Nordenskjöld, is, off their mouths, deflected by the diurnal rotation of the earth and made to flow along the coast in a northeasterly direction. Starting from Deckson's Haven in September, when this warm current has had time to exercise its full effect upon the coast ice, Professor Nordenskjöld hopes to find, at all events, a lane of open water which will enable him to double Cape Northeast, and should he succeed in doing so without any great delay, he thinks that the expedition may reach Behring Straits before the end of the season. Should it prove impossible to pass round Cape Northeast until very late in autumn, or should the distance thence to Behring Straits render such a step necessary, the expedition, by wintering near the mouth of one of the larger rivers, would probably find some opportunity of communicating with home overland, and the ship would be in a position to complete her voyage in the course of the following summer, and return home by way of the Suez Canal.

Among the advantages which it is hoped may be derived from the proposed expedition, Professor Nordenskjöld, after referring to the happy results of fostering a spirit of enterprise in the English navy, lays especial weight upon the value of the observations which the scientific staff will be in a position to make, and points out the great benefit which will be secured to Siberia, and in a scarcely less degree to the world at large, should it prove possible, as in the case of the North Atlantic and the Yenesei, to discover a practicable summer route from the Pacific by way of Behring Straits to the Lena, one of the great navigable rivers which afford the chief means of internal communication throughout the vast extent of Central Asia.

THREE remarkable steps in scientific progress and discovery have been made within the past few months: The reduction of the telephone to practical use on telegraph lines; the discovery of the phonograph, by which the sounds of the human voice are mechanically recorded and redelivered; the liquefaction of hydrogen and oxygen gases by pressure and cold.