ORGANOGRAPHY, OR VEGETABLE ANATOMY.

Muscles are the chief instruments of voluntary motion in men and animals, and popular comprehension has hardly recognized, as yet, the fact of plant organization being an exact analogue to that of human beings. This has been generally supposed to be merely a speculation or theory among the learned or imaginative, and plants considered as rooted or fixed to one place, while the question of movement has been overlooked simply because plants do not rove about. It cannot be denied that the power to move may be exercised in different modes and directions, while the instruments may be essentially identical. In the human body movement is perpetual, and by no means limited to the act of walking. Life itself is movement, and the contrary, in figurative speech, is always understood to be an equivalent for death.

The flux and reflux of currents in the growth and development of plant life are continual, and readily admitted by the most superficial observer; but the instruments or organs by which spontaneous movements are made are not ordinarily admitted as even existing. Muscular contraction is to be found in those fibers of the footstalks of leaves, which act in closing their upper surfaces together, or bending them downward; within the claws of petals, and divisions of the calyx, when exerted for the purpose of opening or closing the corollas or calyxes of the florescence. They act also as resistants to external irritation or internal sensations of discomfort in the plant individual, making efforts to prevent or remove sensations which annoy, or to encourage those which are necessary and agreeable. They act under the stimulus of light, turning the upper side of the leaf to the point most favorable for receiving that stimulus. The Abbé Tessier ("Hist. de l'Académie Royal, ann. 1783") exposed a variety of plants, in a cavern, to different quantities of light, and demonstrated satisfactorily that the contraction or elongation of muscular action in plants, or, in other words, their elasticity, was sensibly affected by the presence or absence of light.

Instances of muscular dilatation and contraction abound, and to the observant eye are very evident. To quote from an Italian writer: "If the top of the floret (chondrilla) be touched (which has five stamens surrounding one pistil), all the filaments which support the cylindrical anther will contract themselves, and, by raising or depressing the anther, the whole pollen will be collected on the stigma; and if one filament be touched after it is separated from the floret, it will be found to contract like the muscular fibers of animal bodies."

Plants are known to change the direction of their roots or trunks, as, for instance, where a plant has been inverted intentionally, or placed root uppermost, the root makes an effort to curve downward, and the stem upward, until it regains its natural and proper direction. Acted upon by the air, sun, and light, the muscles direct the upward course of the stems; and acted upon by the moist warm vapors in the ground, they also determine the direction of the roots. While in some species the muscles are robust and powerful, in others they are extremely delicate and minute, but none the less fitted to be instruments for fulfilling the will of the individual plant, the same as the muscles of a man obey the mandates of his active brain.

A plant named *Upata* or *Sanar* is found in Senegal, with roots which rise vertically a foot above the surface of the earth. With the aid of their muscular fibers plants are enabled to forsake a poor soil and reach a better one. They frequently succeed in reaching to newly formed ditches and canals, where they can obtain a more abundant supply of moisture. Roots and branches are known to surmount almost insuperable obstacles in order to gain their end, that is, to supply their necessities. A branch has been known to leave its normal direction parallel to the soil, and to overtop an obstruction, with the evident purpose of attaining a more favorable exposure to the sun, air, and light. Roots penetrate into hard soils, through stone walls, and even into rocks by bursting them. By means of muscular elasticity numerous flowers leave their perpendicular direction, and, with the purpose of exposing their faces to the sun, follow his diurnal course by looking towards the east in the morning, the south at noon, and the west at evening. Moisture and dryness are both necessary conditions for the action of muscular fiber. The existence of these fibers was incontrovertibly established by the observations of La Hirè, Hales, and Bonnet.

Change of direction is conspicuous in the altered aspect of plants at night, and under excess of moisture, particularly evident in compound or pinnated leaves. The winged leaves of the leguminous tribe, acted upon by the heat of the sun, rise vertically and form a right angle with the common footstalk, the lobes or lesser leaves clinging together by their upper surface. Simple leaves, as in Indian mallow (*Urena*), when exposed to the sun, become concave. Winged leaves, in a close, moist, and cloudy atmosphere, may be found extended along the common footstalk; and after the sun sets, they hang vertically downward, closed together by the lower surface, like the leaves of a book. If there is an odd lobe at the extremity, it folds upon itself until it reaches the first pair of leaves in its neighborhood. The simple leaves of bastard and fever-few are good examples. In trefoil, lucerne, and lotus they unite by their extremities, and form a cavity of protection from the chill of the night season. According to M. Duhamel, this muscular motion is, in sensitive

VENUS'S FLY TRAP.

plants, evinced in the two forms of natural and artificial; warm vapors causing the one, and external agencies, such as touching or shaking, causing the other. The muscular motion of the sensitive plants is laid open to our inspection, and is an instance of extreme contractile force. At the lightest touch of the hand they move, close their leaves, and bend their branches, until a sympathetic agitation extends throughout a whole savanna; a sight which charmed and astonished the Spaniards who penetrated the American Isthmus in 1548, who gave them the expressive appellation of *dormideras*.

The sensitive plant of Senegal, called by the negroes *guerikar*, or "good day," has been frequently described. When it is touched, or even bowed to, it inclines its stem and turns its leaves as though in polite response to a salutation. The *Dionœa muscipula* (Venus's fly trap) is another familiar instance, to be found in marshy soils in North America. The leaves are massed in rosettes around the floral stem, and spread out upon the soil. These have at their extremities a sort of reddish appendage, hollowed into two large lobes, attached to the main leaf by the mid vein only. The edges of these foliated lobes are garnished with hairs, and their surface bristles with little points, constantly covered with a viscous liquor which attracts insects, particularly flies, which are dissolved by matter secreted in the plant, or, as we might with propriety suggest, digested, and affording nutrition to the plant. As the fly struggles, the leaves contract, and the insect is either suffocated or bled to death upon the bristling points of the leaf.

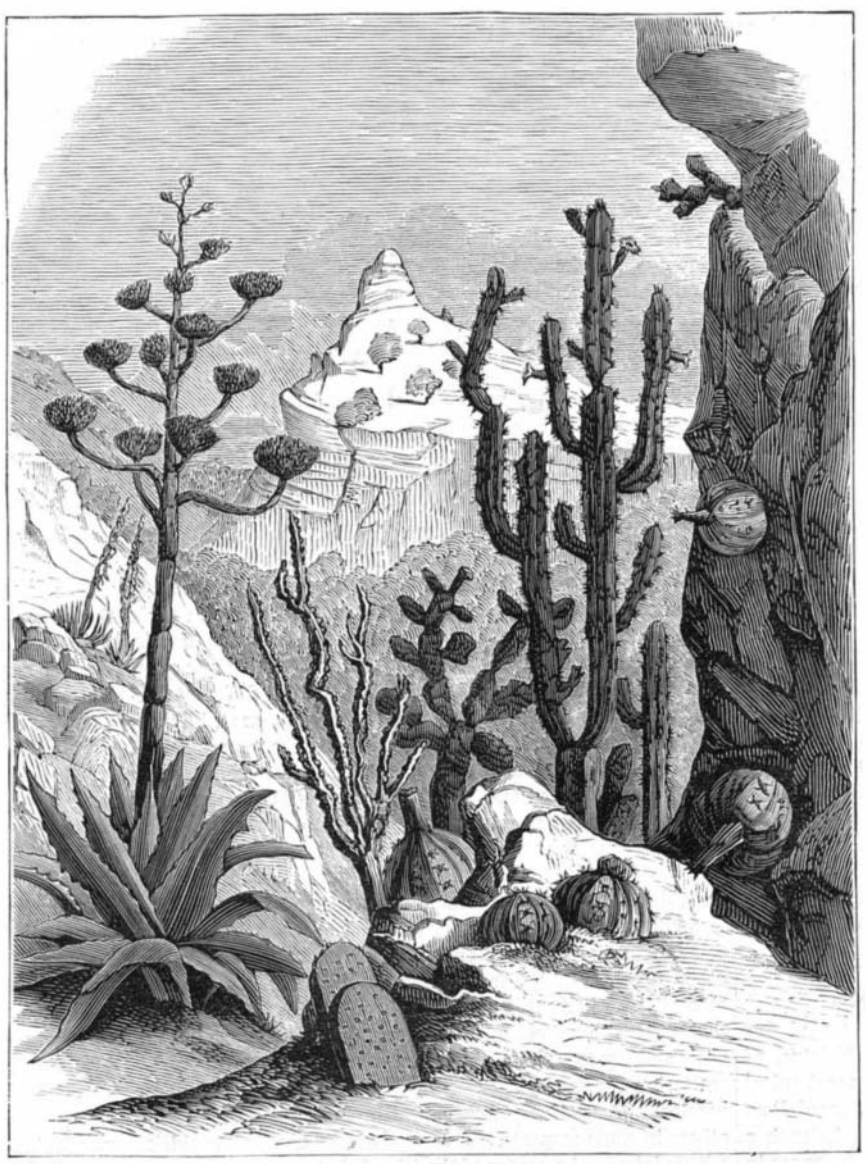
The true sensitive plants of South America are described by M. de Martius in his "Travels in Brazil," as closing their leaves by an agitated muscular movement when even a horse galloped over distant ground, and equally startled by the approaching step of a man. The animation of an extended group of these sensitives in that tropical climate must carry with it to the mind of the beholder a curious sensation of awakened conviction in regard to the intensity of animation, which is less prominent, though, as we believe, no less actual in the vegetable lives of colder climates. The burning sun and luxuriant growths of Brazil, for instance, reveal a movement and an expression, which, seen for the first time, convey a freshness of conception which equals an added power of vision, and is not readily forgotten, but ever after colors all conceptions in regard to vegetable beings, as organized harmoniously, with complete organs for the execution of equally complete functions.

R. C. K.

MEXICAN FLORA.

Our engraving shows some of the prominent types of the flora of the hotter and drier portions of Mexico. At the left is an agave, a genus of the order *Amaryllidaceæ*, or American aloes, the common species of which is known in Mexico as *mescal*. From its sap, obtained by incisions in the stem, a fermented liquor, called *pulque*, is made, which, when distilled, forms the *vino mescal*, or common cactus brandy. It is a popular error that the plants or trees belonging to this genus require a century to arrive at maturity, when the flower is put forth, to remain dormant, so far as efflorescence is concerned, for another full century. In hot climates, otherwise favorable to development, maturity is reached sometimes in ten years; but in colder countries a much longer period is required, thus affording some justification for the popular belief.

Several varieties of cactus are also shown in the engraving. In the foreground are specimens of the *C. opuntia*, or prickly pear, and of the *C. melocactus*, the great melon thistle or "Turk's cap," as it is sometimes called, one of the most remarkable members of the family. The large cactus in the background is the *C. cochinillifer*, which forms the chief nourishment of the cochineal insect.



AGAVE, CACTUS, AND MELOCACTUS.

New Inventions.

Mr. N. Overfield, of Rockaway Beach, N.Y., has contrived a Portable Bathing House made of canvas stretched on a frame so constructed as to be readily taken down and adjusted in compact form for removal or storage. The arrangement for ventilation is efficient.

Mr. H. D. Cress, of Cromwell, Ind., has invented a simple Draught Equalizer, consisting of a draught bar, to the ends of which the outer traces are hooked, the inner traces connecting with a chain which passes over a pulley carried by a plate secured to the middle of the draught bar. The whole is securely braced.

Mr. A. Dittrich, of St. Luke's, England, has patented a spring-acted Umbrella Tip Cup, capable of being readily applied to the umbrella stick, and without requiring detachment of any portion of the frame.

An improved Heating Stove, invented by Mr. F. J. Gould, of Sidney, Ohio, is of the double magazine, base-burning type, and is intended for burning soft coal. In the old styles of double magazine stoves the gas generated in the inner magazine had no other escape but the top of the stove, so as to vitiate the air; this is prevented by an arrangement of draught holes of the outer magazine. Other advantages are claimed.

Mr. G. W. Gomber, of Hazleton, Pa., has patented an improved Bottle Stopper, which is operated on the same general plan as the De Quillfeldt stopper, but made compound, with a different hanging of the eccentric lever, and with new details intended to give increased durability.

A convenient Clasp for Pocket Books, patented by Mr. Louis Prahar, of New York city, is so constructed that it may be put together after being plated, without danger of marring the plating, and which, it is claimed, cannot be detached accidentally.