

## LITERATURE.

**Darwin's New Work, on Insectivorous Plants.**

**Object-Lessons in Zoology---Memoirs of John Quinoy Adams.**

**Archery in Great Britain---The Corporation of London Library.**

**Scientific Notes---The Manatee---Tall Tortoises---"Flower of the Holy Ghost."**

## LITERATURE.

### FLESH-EATING PLANTS.

**INSECTIVOROUS PLANTS.** By CHARLES DARWIN, M. A., F. R. S., etc. With Illustrations. 12mo., pp. 462. New York: D. Appleton & Co. Price, \$1.

The interesting fact that certain species of plants are in the habit of capturing insects for the evident purpose of feeding upon them, has long been known to naturalists; and a considerable literature, embodying the results of manifold and wide-spread observations, has accumulated upon the subject. The most extended treatise that has yet appeared is this from Mr. Darwin, an investigator of whom it is well known that when he once undertakes the solution of a problem in science, never leaves it until it has been tested by an exhaustive series of experiments sustained with marvelous patience and ingenuity. Mr. Darwin entered upon the study of insectivorous plants in 1800, and with the help of his two sons, George and Francis, and of various other experts in science, he has amassed in the fifteen subsequent years an amount of fresh and curious data sufficient to fill the present portly duodecimo.

His observations have been mainly given to the *Droseraceæ*, a natural order of plants comprising six known genera, viz.: *Drosera*, *Dionæa*, *Drosophyllum*, *Noridula*, *Byblis*, and *Alarocanda*. All the members of this family capture insects and consume them. Of the six genera into which the family is divided, the *Drosera* has, in the words of Mr. Darwin, "been incomparably the most successful in the battle of life." It includes about 100 species, "which range in the Old World from the Arctic regions to Southern India, to the Cape of Good Hope, Madagascar, and Australia; and in the New World from Canada to Terra del Fuego." Mr. Darwin has recorded observations upon but seven species of the *Drosera*, by far the greater part of his study having been given to the *D. rotundifolia*.

This little plant is in point of size an insignificant member of the vegetable kingdom. Its flesh-eating habits have elevated it to so much importance among naturalists, that it will be apt to disappoint those hitherto unacquainted with the plant to find that half-a-dozen full-grown specimens would have abundant room to flourish in a lump of earth only as big as the palm of one's hand. The largest leaves will not average above a third of an inch in diameter. Each plant has from two to six leaves, springing directly from the root, and generally lying nearly flat with faces looking upward. The upper surface of the leaves is covered with fine hairs or tentacles, each bearing on its tip a gland that is surrounded with large drops of an extremely viscid secretion. A single leaf bears from 100 to 200 tentacles and their beads of sparkling fluid that never dries have acquired for the plant the common name of sun-dew. The plant grows in damp soil and inhabits both the New and Old World. It is found in abundance a few miles from Chicago, at Pine Station and Miller's, on the Southern Michigan and Baltimore & Ohio Railroads.

The wonder about this minute plant is that its leaves are veritable traps, attracting insects by their odor, or by the promise of nectar, which their glistening, dew-like drops hold out for the purpose of securing food, without which the plant cannot thrive. The roots of this, as of all insectivorous plant, are poorly developed, and incapable of deriving enough nourishment from the soil to sustain its life. Thus, as Darwin remarks: "A plant of *Drosera*, with the edges of its leaves curled inward, so as to form a temporary stomach, with the glands of the closely-inflexed tentacles pouring forth their acid secretion, which dissolves animal matter, afterwards to be absorbed, may be said to feed like an animal. But, differently from an animal, it drinks by means of its roots; and it must drink largely, so as to retain many drops of viscid fluid round the glands, sometimes as many as 200, exposed during the whole day to a glaring sun."

From the size of the plant it may be judged that it captures only tiny prey. Flies are its most frequent victims. The largest insect that Darwin ever saw entrapped by it was a small butterfly (*Caenonympha pamphilus*), but a large living dragon-fly has been found by another observer firmly clasped by two leaves that united their powers to hold and strangle him. In places where the *Drosera* is common the number of insects which it slaughters must be enormous. "I gathered by chance a dozen plants," says Darwin, "bearing fifty-six fully expanded leaves, and on thirty-one of these dead insects or remains of them adhered. . . . On one plant all six leaves had caught their prey; and on several plants very many leaves had caught more than a single insect. On one large leaf I found the remains of thirteen distinct insects."

The leaf captures insects that alight upon it, first by means of the viscous fluid that instantly glues their organs of motion, after which it holds them by the tentacles that slowly curve in and clasp the prisoners on every side. The glands on the tentacles are so exquisitely sensitive that the excessively delicate feet of the smallest gnat coming in contact with the fluid surrounding them excite them to action. Mr. Darwin ascertained by experiment that a particle of human hair weighing 1-35714 of a grain placed on a gland caused the tentacle bearing it to inflect towards the centre of the leaf, while less than the millimouth of a grain of phosphate of ammonia absorbed by a gland produced the same effect. According to Dr. Nitschke, insects are usually killed in about fifteen minutes after alighting on a leaf, owing to their trachea being filled by the viscid secretion which the glands pour out in fresh supplies upon irritation.

This secretion was proved by Darwin to be similar in nature to the gastric juice discharged by the stomach of animals. Under his observation it completely dissolved albumen, muscle, fibrin, areolar tissue, cartilage, the fibrous basis of bone, gelatin, chondrin, casein in the state in which it exists in milk and gluten which had been subjected to weak hydrochloric acid. He also demonstrated without a doubt that the animal substances dissolved by this secretion are absorbed by the glands, and form the chief part of the sustenance of the plant. Some nourishment is probably derived by the *Drosera* from the carbonic acid in the atmosphere, and also from vegetable substances, as from living seeds and pollen, which, when falling upon the leaves, are digested and assimilated the same as insects.

Mr. Darwin has recorded his experiments upon the *Drosera* with the same care and minuteness that he has executed them, and the account occupies three-fourths of his volume. In summing up the evidence contained in his discoveries he presents some speculations with regard to the manner in which the genera of the *Droseraceæ* gradually acquired their remarkable powers of digesting and absorbing animal matter by the action of their glands, and by which in some cases they gained the added power of movement. By comparing the structure of the leaves, their degree of complication, and their rudimentary parts in the six genera, he conceives that their common parent form had leaves that were "almost certainly linear, perhaps divided, and bore on their upper and lower surfaces glands which had the power of secreting and absorbing. Some of these glands were mounted on pedicels, and others were almost sessile; the latter secreting only when stimulated by the absorption of animal matter."

*Drosera* is the only genus of the *Droseraceæ* that is gaining in the great struggle for existence, the five other groups being in a declining condition. The *Drosera* has, as we have said, 100 species scattered all over the world, whereas the *Drosophyllum* has but one species, limited to Portugal and Morocco; the *Aldrovanda*, three species or varieties, ranging from Central Europe to Bougal and Australia; the *Horridula* and *Byblis*, each have two species, the former confined to the western parts of the Cape of Good Hope, and the latter to Australia; and finally, the *Dionæa*, has but one species, limited to one district in North

Carolina. Of this last interesting plant, commonly called the Venus fly-trap, Darwin says: "It is a strange fact that *Dionaea*, which is one of the most beautifully-adapted plants in the vegetable kingdom, should apparently be on the high-road to extinction."

Mr. Darwin has embraced in his study of insectivorous plants four genera of the order *Lentibulaceae*. The three species of the *Pinguicula* (butter-wort) which were examined, he found to possess the power of digesting and absorbing animal matter. He also determined that many species of the *Utricularia* (bladder-wort), and of the kindred genera *Gesneria* and *Polypompholyx* capture aquatic or terrestrial insects and absorb the products of their decay.

In the perusal of Mr. Darwin's volume, the reader will not only gain an intelligent idea of all that is now known to the structure, movements, constitution, and habits of the insectivorous plants that come under the author's observation, but he will gain an equally impressive conception of the years of slow, cautious, and untiring study by which the naturalist arrives at the true history of the organic and inorganic world.

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