# INSECTIVOROUS PLANTS.

**Interesting Extracts from Mr. Darwin's New Book.**

It has come to be pretty generally known of late years that there are plants which feed like animals and upon animal food. The fact is one of the most marvelous in natural history. It attracted the attention of Mr. Darwin as long ago as 1860, and led him into a series of researches and experiments which have extended over nearly fifteen years, and are recounted in his new work entitled *Insecticorous Plants*. The subject is an attractive one, and the book, though thoroughly scientific, is simply written, easily understood, and very interesting. It affords altogether the best means of gaining a knowledge of a phenomenon of nature so wonderful that no educated person will contentedly remain ignorant respecting it.

There is no longer any doubt that there are many plants which capture insects, kill them, and digest and finally absorb a portion of the animal matter in their bodies. The genera of such plants, comprising numerous species, have been studied by Mr. Darwin. Six of these belong to the small family of plants known as the Droseraceæ, which includes the North Carolinian plant commonly called Venus's flytrap, as well as the genus Drosera, in which there are probably one hundred species. This genus is most fully treated in the volume before us, of which 277 pages are devoted to one of its species alone—the Drosera rotundifolia. Its commonest representative in this part of America is the Drosera filiformis, which is described as growing in parts of New Jersey so abundantly as almost to cover the ground. Mrs. Mary H. Treat, a resident of that State, and correspondent of Mr. Darwin, by whom her observations are frequently mentioned with emphatic approval, says that this plants catches an extraordinary number of small and large insects, even butterflies.

A few of the facts observed by Mr. Darwin concerning Drosera will best show the characteristics of carnivorous plants. The prey is caught by means of the leaves of which there are from two to six, placed more or less horizontally on each stalk, half an inch and upward in length, and usually somewhat broader than they are long. Each leaf is covered with little filaments or tentacles; the shortest in the middle and the longest around the margin of the leaf. The average number of these tentacles is 192, and at the end of each is a little gland which exudes a viscid fluid that glistens in the sunshine, and has caused the plant to be called by its poetical name of sundew.

Now, when an insect lights on this poetically-named plant, the step is fatal. The viscid secretion entangles him, and the instant his feet are felt the tentacles begin to close about him. In a quarter of an hour he is dead. The tracheæ, or passages through which he breathes, have been choked by the glistening sundew, and he is closely grasped by the enfolding filaments, which curl the edges of the leaf inward so as to form a temporary stomach, wherein he may be digested.

But something additional to a stomach is requisite for the process of digestion. There must be an agent to fulfill the functions performed by the gastric juice in animals. The plant is provided with just such a substance in that viscid fluid already mentioned; which is secreted by the glands at the ends of the leaf-filaments. "The gastric juice of animals contains, as is well known, an acid and a ferment, both of which are indispensable for digestion; and so it is," says Mr. Darwin, "with Drosera." It is further remarkable that the secretion is not ordinarily acid, but only becomes so when the plant is irritated by the presence of an insect or other foreign substance upon the leaf. After the prey has been wholly or partially digested—that is, dissolved—by this botanical gastric juice, it is absorbed by the glands and passes into the system of the plant, which thus, according to the author, may be said to feed like an animal. "The absorption of animal matter from captured insects," he says, "explains how Drosera can flourish in extremely poor, peaty soil—in some cases where nothing but sphagnum moss grows, and mosses depend altogether on the atmosphere for their nourishment. Considering the nature of the soil where it grows, the supply of nitrogen would be extremely limited, or quite deficient, unless the plant had the power of obtaining this important element from captured insects." Its roots serve only to supply it with water, not with food.

Captured insects, however, do not constitute the only food which the voracious sundew will devour. Mr. Darwin offered it the white of a hard-boiled egg, roast meat, bits of fibrin, stoutin, which is a substance extracted from muscle, areolar tissue taken from a sheep, some tough cartilage cut from the end of a slightly roasted leg of mutton, splinters of bone, dentine, the enamel of teeth, gelatine, and casein as present in milk. All these substances are enfolded by the tentacles, dissolved in the secretion of the glands, and finally absorbed by the plant. The manner in which they are digested corresponds with the action upon them of the gastric juice in the higher animals. On the other hand the plant refused to digest starch, fat, oil, and several other productions, none of which, however, so far as known, are acted upon by the gastric juice of animals. "From trials made with a large number of substances, it was found that those which the secretion of Drosera dissolves completely, or partially, or not at all, are acted on in exactly the same manner by gastric juice."

The minuteness of the pressure on the leaf which suffices to produce the enfolding movement or inflection of the filaments or tentacles is most wonderful. The following is an illustration:

"A little bit of thin human hair, 8-1000th of an inch in length and weighing only 1.78 740th of a grain, though largely supported by the dense secretion, suffices to induce movement. It is not probable that the pressure in this case could have amounted to that from the millionth of a grain. Even similar particles cause a slight movement, as could be seen through a lens. Larger particles than those of which the measurement have been given cause no sensation when placed on the tongue, one of the most sensitive parts of the human body."

The next paragraph shows the perfect adaptation of the plant to its surroundings:

"Movement ensues if a gland is momentarily touched three or four times; but if touched only once or twice, though with considerable force and with a hard object, the tentacle does not bend. The plant is thus saved from much useless movement, as during a high wind the glands can hardly escape being occasionally brushed by the leaves of surrounding plants. Though insensible to a single touch, they are exquisitely sensitive, as first stated, to the slightest pressure, if prolonged for a few seconds; and this capacity is manifestly of service to the plant in capturing small insects. Even gnats, if they rest on the glands with their delicate feet, are quickly and securely embraced. The glands are insensible to the weight and repeated blows of heavy rain, and the plants are thus likewise saved from much useless movement."

A plant in some respects even more remarkable then the sundew is Venus's fly-trap (*Dionœa muscipula*) already mentioned, which Mr. Darwin says, from the rapidity and force of its movements, is one of the most wonderful in the world. The leaf, an inch or more in length, coasists of two lobes, placed at somewhat less than right angles to one another. The position of the lobes may be roughly likened to a person's hands placed together so as to drink out of them at a brook or spring. From the upper surface of each of these lobes—corresponding to the inside of each hand in the illustration we have supposed—project three filaments. When touched by an insect these sensitive projections do not themselves move independently, like the tentacles of Drosera, but they cause the lobes to close over the creature with astonishing quickness, and so tightly that the outline of the captive, if he is large enough, can be distinctly seen on the exterior of the leaf. The lobes are covered with glands, which possess powers of digestion and absorption similar to those of Drosera. This interesting plant grows only in the eastern part of North Carolina, where it is confined to damp localities.

To the same family belongs the genus Aldrovanda, which also has bi-lobed leaves, furnished with long-jointed sensitive hairs, causing the lobes to close when touched. The glands which stud the surface of the leaf exude a true digestive fluid, and subsequently absorb the digested mass. The plant is chiefly noteworthy as being purely aquatic. It is a miniature Venus's fly-trap, according to the author, is wholly destitute of roots, and floats freely in the water, feeding largely upon aquatic insects and minute crustaceans.

The volume ends with an account of a very curious genus of plants known as Utricularia, most species of which are also aquatic. Each leaf bifurcates so frequently as to present from twenty to thirty points, and near its base bears two or three little translucent green bladders, filled, or nearly filled, with water. The length of one of these bladders is about a tenth of an inch. It is furnished with an aperture affording ingress, but not egress, and being in fact a trap-door to catch insects, which enter it and die, since they cannot escape. It is impossible to doubt, says Mr. Darwin, that the plant has been specially adapted for securing prey. Nevertheless he satisfied himself that it cannot, like Drosera and the other plants already mentioned, truly digest the animals which it habitually captures.

Mr. Darwin finds it difficult to conjecture what attraction makes insects so ready a prey to plants. In the case of Drosera he thinks the odor may be influential, but he attempts no explanation of the attractiveness of Venus' flytrap, which captures prodigious numbers of insects; and as to Utricularia, he merely suggests that the animals enter the trap in search of food or protection. Overflowing as the volume is with facts, the frequent avowals of want of knowledge which it contains, coming from the greatest of living naturalists, show how much is yet to be learned of the highly-interesting subject of which it treats.

No strictly scientific or technical education is necessary in order to understand the book, though to be appreciated it must be read carefully. We shall be surprised if it does not promote botanical study in this country.—*New York Sun.*