INSECTIVOROUS PLANTS.[1]

MARY TREAT.

THERE are many seemingly strange things in nature, but perhaps none more remarkable than the fact that some plants kill and consume small animals, thus reversing the order of nature's laws, or as we have been taught to look upon her laws.

The most common of these plants are the Sundews or *Droseras.* There is scarcely a swamp in any part of our country, either North or South, which does not contain one or more species of these interesting plants. The leaves of the different species are covered with hair-like glands or, more properly, tentacles surmounted with glands, which exude a clear, viscid fluid that glistens in the sunshine like tiny drops of dew, from which the plants take the name of Sundew.

The Round-leaved Sundew *(Drosera rotundifolia)* is more often found in the Northern States than

[1] The first experiments on the digestion of animal substances by plants were made by Kanby on Dionaea (1865) and by Mrs. Treat on Drosera (1871). In 1875, Darwin published "Insectivorous Plants."

either of the other species. Its leaves are arranged in a rosette and lie flat on the ground, or on the moss among which they often grow. Some of these little plants have a rosy, pink hue, and look wonderfully attractive as they sparkle in the sunshine. No doubt the glistening brightness lures many little thirsty insects to the cool-looking, dewy leaves. But no sooner does one touch a leaf than it finds itself held by the deceptive, sticky fluid, and the more it struggles to become free, the more it is entangled. As it stretches and reaches out to get away, it only comes more and more in contact with other bristling filaments, until finally it has no power to move, and the remaining filaments which it did not reach are all soon curved and bent toward the poor captive, which is quickly bathed in the slimy secretion, and dies within ten or twenty minutes after it is caught. This secretion dissolves or digests all the soft parts of the little victim which are absorbed by the plant, while the shelly, indigestible parts remain on the leaf until it becomes dry, when the particles are blown off. As soon as the insect is disposed of, the tentacles resume their erect position and the glands again begin to secrete the sticky dew *in* readiness for more prey.

The illustration of the Sundew (Fig. 48) represents two leaves magnified about three times. One leaf has all the tentacles in the normal position, while the other has a part bent over some small creature.

Why *Drosera* consumes insects is easier asked

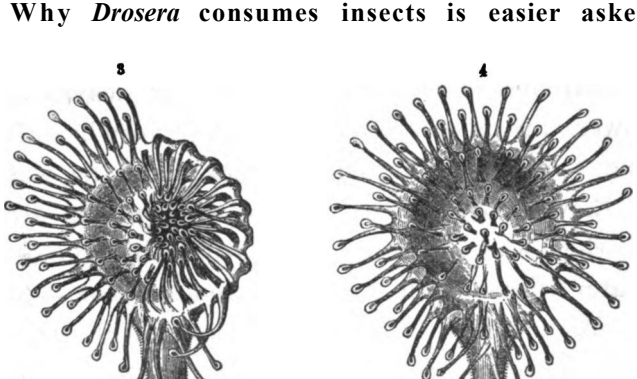

FIG. 48. LEAVES OF SUNDEW (Drosera). (Magnified).

than answered. The plants live in water, or in very moist places, where the roots can imbibe or drink so as to supply the viscid secretion that it may capture its prey. And this Round-leaved Sundew grows mostly among sphagnum moss where it is almost impossible for it to obtain the usual plant-food or nitrogenous matter except as it gets

it from the insects which it entraps and consumes. But this cannot be said of the Long-leaved Sundew *(D. longifolia)* which grows in black, muddy ponds and bogs.

The latter sometimes grows in water from ten to twelve inches in depth, and the roots are imbedded in the black mud beneath. But the caudex, or rhizoma, is prolonged so that the leaves and flowers are above the water. And very beautiful they look when they stand thickly on the water as they sometimes do. Other water-plants grow in the same shallow pond with this Sundew. Water-lilies—both *Nymphcea* and *Nuphar*—and the Water-shield *(Brasenia peltata),* and the pretty little Floating-heart *(Limnanthemum lacunosum),* all of which require an abundance of nitrogenous food, and would not grow in the pond unless they could obtain it. And yet this Long-leaved Sundew which grows with them is a most expert fly-catcher, and, although it cannot be said that it is necessary for this plant to capture insects for food, it entraps them all the same. Sometimes large flies and small butterflies and moths are caught and the leaves roll entirely around them. They roll from the apex to the base, holding their prey until all the soft parts are absorbed, when

they unfold and let the wings and legs and other indigestible portions fall off.

But the most beautiful and curious species is the Thread-leaved Sundew (*D.filiformis*). Its leaves are erect, and from six to twelve inches in length—simply thread-like and covered with tentacles and glands from base to tip. It grows from a little bulb usually in pure white sand in springy places so that the sand is gently overflowed with water. I do not know of any other plant more attractive than this. It looks so fresh and clean and sparkling in the pure sand and water. The viscid dew makes it look as if covered with little gems of various hues. The flower-scape is a trifle longer than the leaves, and bears charming rose-purple flowers an inch or more across.

Hosts of insects are lured by the brightness of the plants, which they no sooner touch than they are held captive. And here we can see that it looks as if the plants needed them for food, growing as they do in sand and water. This species kills and consumes much larger insects than either of the others. Great dragon-flies, butterflies, and moths, as well as two-winged flies, are caught and killed.

The long leaves, standing erect and thickly to-

gether, hold and bind the victims much more effectually than the other species. The larger the insect the more leaves it reaches and draws around itself, until it is soon bathed in the sticky secretion which closes the trachea or air-tubes, when it speedily dies.

Like the other species, it absorbs the nutritious parts and lets the rest fall at the base of the plant, where we can find a good share of the remains of the prey it has slaughtered, especially of the larger insects. Probably this *debris* is something of a fertilizer and helps to nourish the plant.

I have observed two additional species of Sundew in Florida: *D. capillaris,* which grows in boggy ponds, and bears pale, rose-colored flowers, and *D. brevifolia,* — a pretty little plant with rather large white flowers, — found in the damp Pine-barrens. Both of these plants have the same fly-catching habits. There is still another species, the Slender Sundew *(D. linearis),* with which I am not familiar. This grows about the shores of Lake Superior. These are all of the Sundews, so far as I know, in our country.

The Venus's Flytrap *(Dioncea muscipula)* is one of the most singular and wonderful plants in the world. It belongs to the Sundew family. But,

while quite different from these plants, it is more nearly related to them than to any others, so that botanists, not knowing what else to do with it,

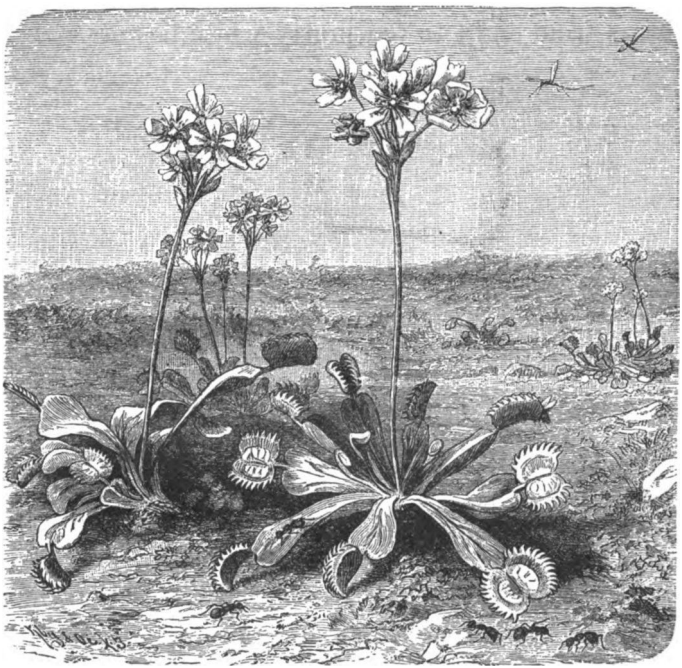

FIG. 49. VENUS'S FLYTRAP (Dionaea muscipula). ("Pflanzenleben.")

have placed it here. It is found only in the eastern part of North Carolina and in the adjacent parts of South Carolina. It grows in sandy bogs in the low Pine-barrens. The illustration (Fig. 49),

although reduced in size, shows how singular it is. The curious leaves are all at the base of the plant close to the ground. The flower-scape arises from the centre, is about a foot in height, and bears from eight to ten pretty white flowers.

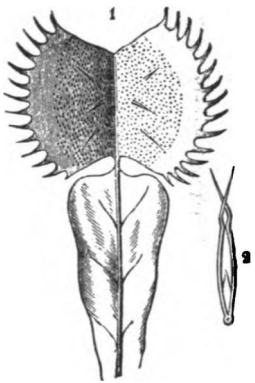

FIG. 50.

1. Outspread Leaf of Venus's Flytrap. 2. Section through a Closed Leaf. (" Pflanzenleben.")

This novel Flytrap has no sticky secretion, like the Sundews, with which to capture prey, but instead of this its leaves are converted into traps something like a steel trap. The midrib or central vein, which is thick and strong, divides the leaf into two lobes, each of which is furnished with three very sensitive, short hairs or filaments, as may be seen in the illustration of the single leaf (Fig. 50).

If either of these filaments is touched, the two lobes fly together instantly, and the stout bristles on the edge of the leaf interlock after the fashion of a steel trap.

Now when an unwary insect alights on a leaf-trap, which nature has set, it is sure to touch one or more of the sensitive filaments and is caught, and unless it is large and strong it cannot escape. Strong beetles and the stronger flies will force their way out between the bristles, but the weaker ones are held as if in a vice, and are soon enveloped in a slimy secretion, which at once begins to exude from the inner surface of the trap, and after several days digests all of the soft parts, when the leaf slowly opens, and, if it is still healthy, is now ready for another victim.

In my experiments, I have found that the Sundews digest their prey more quickly than the *Dioncea.* But I have worked with only cultivated plants; it may be different with those growing in their native bogs, which I hope some of my young readers may be able to investigate.

The Pitcher-plant *(Sarracenia purpurea)* (Fig. 51) is another remarkable Flytrap quite common in bogs from New England to Florida. It is a

handsome plant; both its leaf and flower are curious and beautiful.

On large plants the leaves are from six to eight

FIG, 51. PITCHER-PLANT (Sarracenia purpurea). ("Pflanzenleben.")

inches in length, and the flower-scape is a foot or more in height, bearing at the top a single, large, dark, purple flower. The singular fiddle-shaped

petals are arched over the expanded umbrella-shaped style in a strange manner. The leaves grow in the form of fanciful pitchers, and hold water and usually many drowned insects.

I have observed this species closely, but have never been able to find what it is that attracts so many insects into the pitchers. I am satisfied, however, from repeated experiments, that there is something. I have large, strong plants growing in an artificial bog near the house, where I can conduct experiments at my leisure. When the new leaves have fully expanded, I set bottles (which have about the same breadth of mouth as the leaves, and will hold about the same amount) partly filled with clear water by the side of some of the plants, and these bottles do not capture any insects. Other bottles of the same capacity, partly filled with sweetened water and set near the leaves, invariably captured as many insects as the leaf-pitchers, and yet I could not detect any luring bait about these leaves; but the insects must find something or they would not enter into them any more than they would into the bottles of clear water.

There is a Pitcher-plant *(S. variolaris)* which grows in the South, that has a tempting bait ex-

tending from the base of the leaf to the top, and this is another reason I have for thinking that our Northern species must have some similar contrivance — but in a lesser degree — to lure insects into its cups.

The leaves of this Southern species are straight tubes, somewhat trumpet-shaped, standing erect, and are from twelve to fifteen inches in length. A hood or arch covers the top so that it is almost impossible for water to enter them. The flowers are yellow, but shaped like our purple ones. It captures great numbers of insects, which are attracted by the sweet, sugary secretion which extends along the entire length of the leaf and around the upper edge of the opening or mouth of the tube. As far as I have observed, the insects which partake of this secretion always go inside of the tube or pitcher and never return.

There is a difference of opinion among observers with regard to the action of the sweet secretion on the insects which partake of it. I have given my observations and experiments quite fully in "Home Studies in Nature," [1] and have no reason to modify in the least my views as therein stated.

[1] "Home Studies in Nature." By Mary Treat. Harper & Brothers. 1871.

And here is a good field for the young observer to make careful experiments, in order to settle the question with regard to the action of this secretion on the various insects which feed on it, and to determine why they do not get out of the pitchers.