BOTANY

Plants That Devour Animals

None Are Man-Eaters, But Many That Gobble Up Insects May Be Found From Remote Lands to Our Own Dooryards

By DR. FRANK THONE

WHEN AN ANIMAL bites a plant, that is hardly to be rated as news. Animals are doing that all the time: cows and caterpillars, mice and men; they'd die very soon if they didn't.

But when a plant bites an animal, reversing the traditional relations of devourer and devoured, there may be an interesting story in it. There are, indeed, a great many interesting stories that might be told of plants that eat animals, in spite of the fact that there are not many such plants, and that the most widespread and sensational of such stories aren't so.

Some of these carnivorous vegetables live in the tropics, or in those strange remote lands "down under," Australia and South Africa. But there are many of them almost in our own dooryards, which any of us can see at the expense of a longer or shorter auto trip. A longer or shorter trip brings us to them, but we may have to risk a pair of wet feet to make their close acquaintance. For some of them live in the water, and the rest, without exception, live in bogs.

That is the secret of the strange bloodthirsty habits of these plants—bog water. Bog water is acid, and for some reason not yet well understood acid water prevents plant roots from getting the nitrogen which all plants must have.

Now, one of the principal constituents of animal flesh is this same nitrogen. It is primarily to get it that we ourselves eat meat and eggs and cheese, and it is to get nitrogen that some of the nitrogen-starved plants of bogs and acid ponds have developed their weird uncanny ability to capture and digest insects and other creeping and swimming things.

Many scientists, including the famous Charles Darwin, have given these plants their attention. The latest effort has been on the part of Prof. F. E. Lloyd of McGill University in Montreal, who recently summed up all the modern advances in our knowledge of carnivorous plants.

In his survey of the world for plants that eat animals, Prof. Lloyd found some 440 species, belonging to sixteen genera and grouped into five plant families.

Prof. Lloyd classified all carnivorous plants into two main groups, passive traps and active traps. The passive traps catch their prey either by secreting sticky substances that act like fly-paper or by arranging pits into which the insects tumble and cannot get out of again. There are three types of active traps: plants that add aggressive movement to the fly-paper arrangement of the first type of passive traps, plants that snap shut on their prey like steel-traps, and plants that cage their prey like mouse-traps.

Of the first of these five kinds of insect traps there are no examples easily reached in this country; and they are in any case the least interesting of the insect traps.

Pitcher-Plants Pitfalls

The second type, however, the pitfall trap, is exceedingly common in some parts of the United States and Canada; and it is, moreover, the largest and most conspicuous of all the carnivorous plants. Plants belonging to this class are mostly to be found in the various genera of pitcher-plants. Pitcher-plants grow abundantly in bogs and other acid habitats.

The most striking thing about them, even to the casual observer, is the structure of their leaves. These are hollowed into graceful vase-shaped "pitchers," with a projecting flap down one side to take the place of the handle. The northern pitcher-plants are mostly purple-colored, while the slenderer species that grows on wet parts of the sandy coastal plain of the South has pitchers of a yellowish green.

Either kind, however, is sure perdition to any insect that gets in. On the upstanding "lip" of the pitcher, and again around a zone within, there are multitudes of down-pointing bristles, against which no insect could possibly climb. Below that is an area without bristles, but too smooth for frantic insect feet to clutch. Below this again, near the bottom of the pitcher, is another bristle-set zone. Is it any wonder that no insect that once begins the descent to this Avernus ever retraces its luckless steps?

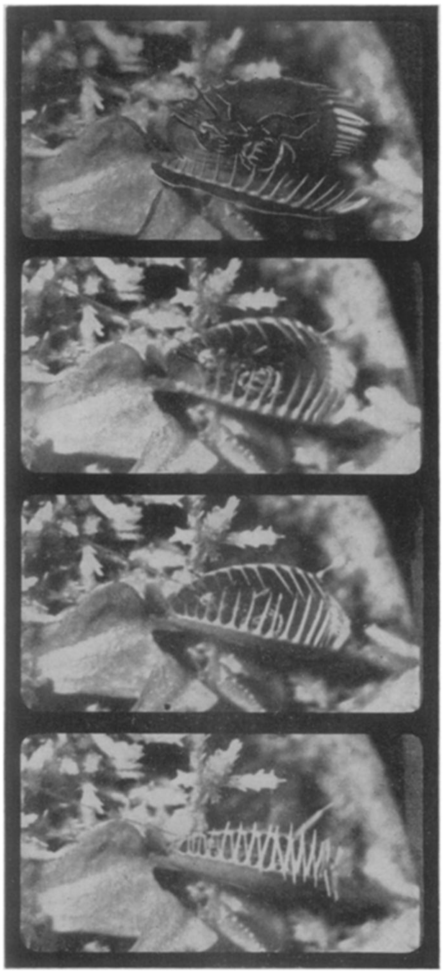
To make the trap the more attractive, near the rim are many glands that secrete nectar, like that of a flower, a stuff of which insects are notoriously fond.

More sinister is the purpose of other glands, found abundantly farther down the pitcher. They secrete a ferment or enzyme which digests flesh just as the pepsin of our own stomachs does. In fact, all the carnivorous plants which have been closely investigated have glands of this character somewhere on their trap surfaces, usually where they will discharge their secretion near the body of a victim. And most of them also have thin places in their surface tissues, through which the digested proteins, reduced to liquid form, can be absorbed.

There are pitcher-plants in other parts of the world, some of them most strange in their structure. Oddest of all, possibly, is the East Indian species known as *Nepenthes,* which has a cluster of sword-shaped leaves running out into slender tendrils, and bearing the pitchers on the ends of these tendrils! The whole thing has the look of an artist's drawing of a completely impossible plant, made real as though to prove that nothing is impossible.

Even more widespread than the pitcher-plants are the sundews. They grow on wet soil almost all over the world, wherever the chemical reaction is acid enough. But we are not nearly so likely to notice them, because most of them are quite tiny plants—seldom more than a couple of inches across the whole rosette of their tiny leaves, or more than that high to the top of their little spire of flowers. But they make up in numbers for what they lack in individual size, for in many places they fairly carpet the ground.

Their leaves are either round or paddle-shaped, and each leaf has a fringe of projecting little fingers around its edge, and similar fingers all over its surface. Each of these tiny fingers ends in a gland that secretes a sticky stuff that holds any gnat or other tiny insect that touches it as tanglefoot fly-paper holds a fly. But the action of the sundew trap



THE FLYTRAP CLOSES

is not the merely passive action of fly-paper. When one or more of its sticky-tipped fingers catches an insect, the insect naturally struggles. Then other fingers in the neighborhood, stimulated by the movement, slowly bend in its direction, and each sets its sticky tip on the luckless victim, pinning him yet more firmly. Half the fingers of a sundew leaf may thus take part in holding an insect, while the other half reach out hopefully for other prey. In some species the whole leaf may curl over, enwrapping the capture.

Bug Becomes Butterwort

A more primitive leaf of the same general character is that of the butterwort, or *Pinguicula,* also a widely distributed carnivorous plant. This is a much larger plant, reaching the size of a small dandelion or violet cluster. Its leaves are thickish, narrowly triangular affairs, without the sundew's fingers, but with a sticky, glossy surface all over their upper side, and with inrolled edges. When a butterwort leaf catches an insect, these edges tend to roll inward yet more closely, preventing escape. In the meantime the digestive glands get to work, and soon the bug is butterwort.

Perhaps the most famous of all the carnivorous plants is the one with the narrowest geographical range. This is the Venus' flytrap, which is found only in a limited area of the coastal plain of the Carolinas, principally around the city of Wilmington, N. C. The leaves of this plant are perfect counterparts of the steel-traps used by fur trappers of the North. Each is divided at its outer end into a pair of semicircular, bristle-edged flaps that hinge along the midrib and can close together in as little time as half a second. Each of these flaps has three bristles on its surface, which are the triggers of the trap.

When an insect alights on a leaf, or a caterpillar crawls up along the stem, it cannot avoid touching these trigger-bristles. When it touches the first one, nothing happens. But a second or so later it touches another. The two stimuli, following one on the other within a stated time, trip the internal mechanism, whatever it may be, and the two halves fly together. The bristles on the outer edges interlock like the teeth of an alligator, so that there is no chance for even a small insect to crawl out. And then the two halves of the leaf, at first concave with a little space between them, press together tightly, squeezing the life out of the victim if it be but a small one, or if large at least bringing it to death the sooner through useless exhausting struggles. And again the digestive glands pour out their corroding juices.

Most numerous of all the carnivorous plants are the bladderworts, or *Utricularias.* Unlike all the other plants so far mentioned, the bladderwort catches its prey under water, and hence depends less on insects than on small swimming crustacea, which are tiny relatives of lobsters and shrimps, on miute worms, on insect larvae that live in the water and on other small swimmers of that general ilk.

The bladderworts have the most elaborate trap mechanism employed by any of the carnivorous plants. Many scientists have spent much time trying to puzzle out just how it works, but it remained for Prof. Lloyd himself to find out by his own researches the whole secret of its ingenious and complicated mechanism.

Bladderworts grow either in very wet, boggy soil or actually floating in the water. Above water they have leaves and really attractive flowers, usually yellow. All is sweet and serene there; their piracy is all submarine.

Below water they have stalks bearing finely branched, leaflike organs. Distributed over these are many tiny green round or oval bladders, flattened on one side, and usually with projecting branched thread-like processes. These latter may serve to guide the swimming prey to the fatal door that is on the flattened side.

That door was long the riddle of scientists, each of whom contributed his discovery, or sometimes just his guess, towards the final solution of its mechanism. The door consists of a more or less semicircular piece of plant tissue, fastened by its flat side to the top edge of the opening. Its free edge rests against a bolster or cushion within, which is lubricated by a mucilaginous secretion.

Weatherstrip Seal

It is sealed on the outside by a sort of weatherstrip of thin plant skin material, which keeps the outside water from any chance of entering. The discovery of this weatherstrip and its function was the contribution of Prof. Lloyd.

The door is set on a kind of trigger-latch arrangement, which keeps it closed unless the outer end of the trigger is pressed by something outside, but lets it swing clear of the inner bolster when the proper touch comes.

The whole bladder is under tension, that is, by a special excretory arrangement within it enough water has been removed so that the pressure inside is less than the pressure outside. If therefore anything jars the door open the least crack, the outside pressure will push it in violently, as a windstorm blows in a house-door. And anything outside it will be pushed in too, just as a fugitive from a storm is blown into the house along with the door.

That is exactly what happens when some small swimming beastie trips the trigger-latch. The door pops inward, the water swirls in, carrying the little victim with it. By the time he can get his bearings again and attempt escape, the door is already closed. Then the excretion of water begins again, and soon the trap is under tension once more and set for pulling in the next victim that touches the fatal trigger-latch.

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