

INSECTIVOROUS PLANTS.

By MRS. BRIGHTWEN, Author of "Wild Nature Won by Kindness."

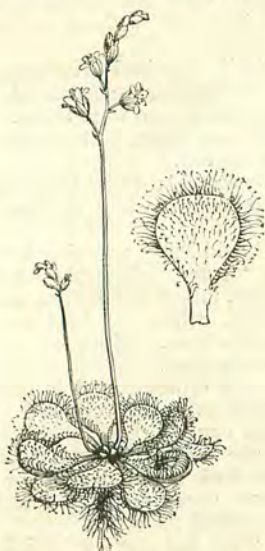
PART II.

THE statement in a previous chapter that the leaf has no power to absorb nitrogen, has to be received with certain exceptions. These exceptions are discovered in a large group of



SARRACENIA.—SIDE-SADDLE PLANT.

plants, having little or no botanical relationship, and widely separated as regards their geographical distribution and habit of growth. The term insectivorous (insect-eating) has been applied to these by eminent botanists who have studied their habits and mode of growth. We may, as a preliminary to our study, summarise the main features of these interesting plants, because I wish my readers to see in them an extension and elaboration of the various processes we have tried to investigate in plant life, and not a mere description

COMMON SUNDEW (*Drosera rotundifolia*).

of a few vegetable wonders. Rather would I point out that in studying these deviations from the ordinary type, as elsewhere, the young botanist should try to arrive at some explanation of these peculiarities, bearing always in

mind that every part of the plant is created for some special purpose. This train of thought, if brought to bear upon our botanical study, will prevent our regarding the contrivances of these insectivorous plants as mere freaks of nature, which appears to me to be a low and unworthy view to take of such delicate and wonderful structures.

Occasionally, it is true, we meet with monstrosities, in the formation of which we fail to see any hidden purpose, but even here by careful observation we shall probably be able to perceive that it is the result of some injury or the accompaniment of disease, from which plant life is no more free than animal life is.

Let us now trace the features that are common to the plants which form the subject of this chapter.

Perhaps their most interesting function is that of catching and retaining insects. This is accomplished in various ways, by viscid fluids which imprison small flies, as in the leaves of the sundew and other plants, by movements of the leaves, as in the Venus fly-trap, by a combination of both, as in the butterwort, or by special pitfalls and traps as in the pitcher plants, *Sarracenia*, *Bladderwort* and *Cephalotus*. Having caught their prey, these plants dissolve it by means of an acid secretion, the dissolved animal life is then absorbed and appropriated for the purposes of vegetable growth. Not all these processes are carried on by insect-eating plants. In some, for example, the secretion of dissolving acid is not very apparent, in others the absorbing glands are not fully developed; but briefly the above features are those possessed by this singular class of plants, and there is every reason to believe that powers of this kind are more widely spread than is usually supposed.

We will now notice a few types in detail.

The sundew (*Drosera rotundifolia*) is the pretty and poetic name of a plant which may often be found on boggy moors. It is barely an inch in height, a mere rosette of leaves shaped like a battledore, radiating from a very short root stock, and bearing, in early summer, a central flowerstalk from four to six inches high, furnished with a few tiny white flowers. The whole plant lies close to the ground, and is often embedded in bog moss, and, were it not for the crimson colour of the leaves, and their sparkling dewy effect, it would be a difficult plant to find. With the naked eye we can see that the leaves are covered with hairs, and a lens will show still more plainly that these hairs have each a club-like end bearing a gummy fluid, in appearance not unlike glycerine. These globules of fluid sparkle in the sun, hence the name of sundew, and the botanical name of *drosera*, from the Greek "*droseros*," or dewy. Leaves with glandular hairs are not rare amongst our wild plants, and if this was the only character that the sundew possessed it would not be specially noticeable. It is, however, the unusual structure and behaviour of these hairs that claims our notice. The term tentacle is a not inappropriate one to apply to these "hairs." A leaf of sundew, with all its tentacles standing out at different angles from the surface of the leaf, and each point armed with a drop of gummy fluid is an effective arrangement for catching insects. The bright glistening drops are a fatal attraction to flies, gnats, and other small insects. When they alight upon the points of the tentacles they soon find they are held prisoners. In their efforts to get free they entangle themselves more and more on the slimy points of the treacherous hairs.

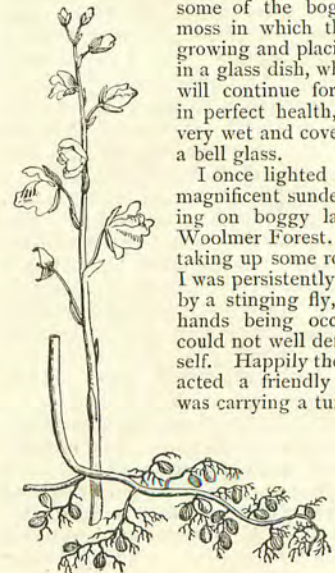
If we watch the tentacles after a fly has been caught, it will soon be seen that the hairs are bending over and closely pressing down the wretched captive. This folding over occupies four or five hours from the time the capture is made. The glands also begin to give out an

VENUS FLY-TRAP (*Dionaea muscipula*).

increased amount of gummy secretion, and this flow kills the insect by stopping up its breathing pores, so that literally it dies of suffocation. The fluid not only increases in quantity, but becomes acid, and its effect is to dissolve the insect and render it soluble, the dissolved parts are then absorbed by the glands and digested. This interesting process can be watched quite easily by carefully taking up a

few plants of sundew with some of the bogsoil and moss in which they were growing and placing them in a glass dish, where they will continue for months in perfect health, if kept very wet and covered with a bell glass.

I once lighted on some magnificent sundew growing on boggy land near Woolmer Forest. Whilst taking up some roots of it I was persistently attacked by a stinging fly, and my hands being occupied, I could not well defend myself. Happily the sundew acted a friendly part. I was carrying a tuft of it in

BLADDERWORT (*Utricularia vulgaris*).

my hand when, looking down, I saw my tormenting fly was securely caught upon its leaves. Somehow one always feels compassion for the unfortunate, and I confess I tried to rescue the captive, but the creature's wings and legs were

BUTTERWORT (*Pinguicula vulgaris*).

already so glued together by the viscid dew that it was impossible to release it, and I realised more than ever how effective the sundew is as a fly-trap.

In transplanting specimens of *drosera* great care should be taken that the leaves are untouched, else being sticky, they will cling together and lose their delicate beauty. Every few days the plants may be fed, and happily they are quite willing to accept very minute pieces of raw beef, so that flies need not be sacrificed in the cause of science. The little "beefeater" must not be fed a second time until the hairs have uncurled and the leaf has fully expanded, showing that the last meal has been digested. I have kept a large pan of sundew in great beauty for about four months in summer, and when the glass was taken off and bright sunshine lit up the jewelled leaves the effect was lovely, and a magnifying glass showed the structure of the leaves and the prismatic colouring of the dew-tipped hairs.

The Venus fly-trap is an exotic member of the insectivorous family. Its leaves are remarkably like an ordinary spring rat-trap. A glance at the drawing will show its formation. On the two lobes of the leaf are a row of stiff bristles occupying the precise position of the teeth on a rat-trap. The inner surface of the leaves is of a reddish colour, due to its being thickly covered with minute red glands; on each lobe there are three stiff hairs. If a fly alighted on the leaf and walked across its surface it would touch one of these hairs, and no matter how light the touch might be the hairs are so sensitive they would convey the signal to the hinge of the lobes, and they would instantly rise up and clasp the fly, eventually crushing it to death. Then would follow, as in the case of the sundew, the emission of acrid secretion and the absorption and digestion of the insect.

Insect-destroying plants are numerous in the vegetable world. They may be roughly divided into three groups, although there is no strict line of demarcation between them. First, those like the Red Lychnis and others which by means of sticky hairs catch and kill small insects, an operation that so far as we know results in no special good to the plant. Then there are those like the sundew which catch, kill, and digest the insect for food, whilst the third group consists of plants which catch and kill insects, but have no digestive process. Decomposition of the captured insects takes place, but the absorption which goes on is simply that of the liquid products of decomposition, the latter process resulting

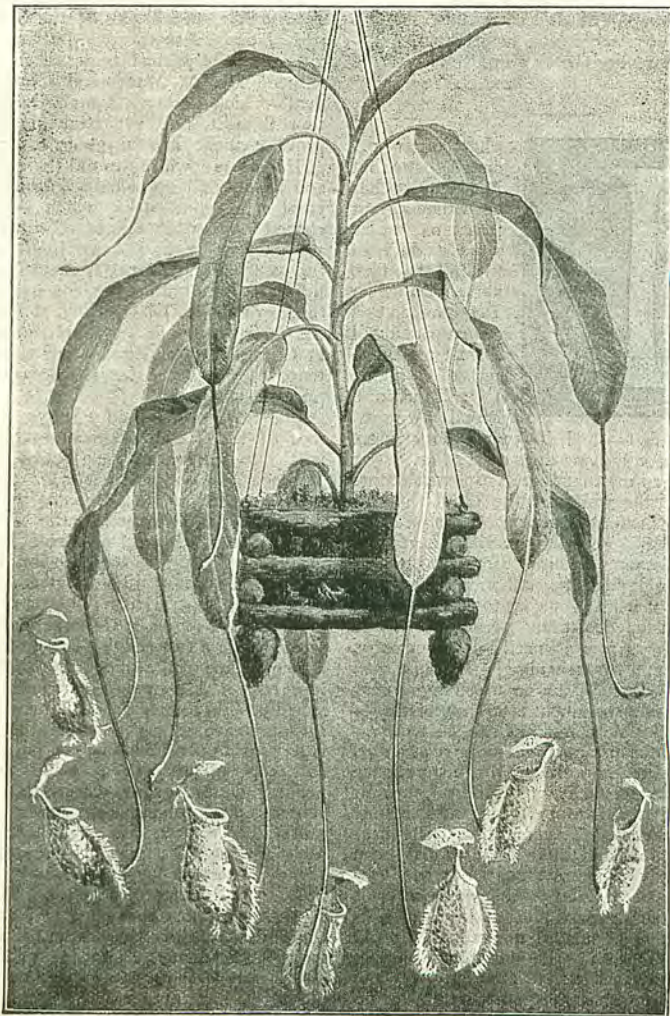
from the insects being immersed in fluid. To this latter group belong the pitcher plants (*Nepenthes*) and *Sarracenias*. These last are North American plants of peculiar structure and appearance. The leaf is folded and modified into a tunnel-shaped tube, differing in form in the various species. In all, there is a kind of cap or lid to the tube, so that rain is kept out. In one or two species the lid is so arranged that the mouth is exposed. In the bottom of these tubes there is usually a quantity of somewhat slimy fluid. The inner face of the lid and surface just inside the rim of the tube is smooth, usually of a bright shining colour, and covered with minute honey-secreting glands, a most attractive lure for insects. Below this honeyed surface the character of the sides of the tube changes completely, for down to the fluid it is covered with stiff hairs all pointing downwards. Now we see how the trap is set. The honey just inside the tube is attractive, and the insect feeding finds it very easy to descend the tube; the smooth surface offers no foothold, and the downward pointed hairs prevent it from returning, until at last the insect becomes engulfed in the pool of water at the bottom of the tube. In this fluid insects gradually accumulate, decompose, and become liquid manure.

In Georgia and North Florida these *sarracenia*s are found in the swamps in large quantities, attaining one or two feet in height, their great tubes half filled with insects, showing their value in tending to reduce the swarms



PITCHER OF NEPENTHES OR PITCHER-PLANT

of flies which abound in such localities. We can see from these characteristics of the *sarracenia* a link between the insect-eating plants which have a true digestive process and ordinary plants that obtain their food in part direct from the soil. The *sarracenia* is simply making an attempt to collect nitrogenous food by the aid of its form and sweet secretions. Thus it lures on flies and other insects to their doom, which to the plant means an increased supply of liquid manure for its nourishment.

PITCHER-PLANT (*Nepenthes Rafflesiana*).

Between the two types of insectivorous plants and ordinary plants there are endless varieties. The largest known species of "fly-catcher" is the *Roridula dentata* of South Africa, which attains a height of six feet, with leaves similar to the sundew in character. So efficient are these leaves in catching flies that the Boers hang up branches in their rooms as fly-traps.

The smallest insect-eating plant is probably the bladderwort (*Utricularia vulgaris*), a rootless water-plant, with minute bladders on small thread-like leaves. The bladders only open inwards, so that when an insect pushes against the opening or valve it easily enters and cannot get out again. The bladder contains water, but the insect quickly consumes the oxygen in it and consequently dies, and when decayed its substance is absorbed by glands on the inner surface of the bladder.

Perhaps the most attractive of the group of plants we are considering is the pitcher-plant, or *Nepenthes*. It grows commonly in Borneo and Ceylon. The pitcher is a direct development of the midrib of the leaf. It varies in size from the little thimble-like pitcher of *Nepenthes gracilis* to the large jug-like receptacles of *Nepenthes sedeni* and others, each capable of holding nearly a pint of fluid.

The pitchers are furnished with a lid overhanging the mouth of the receptacle. This is kept open by a thick rim. This rim and the under surface of the lid both secrete a sweet fluid which is attractive to insects, and from the rim and opening of the mouth a smooth surface directs the ill-fated flies to the sweet sticky fluid always found at the bottom of the pitcher, out of which they rarely come alive.

Another of our native plants exhibiting these insectivorous habits is the butterwort (*Pinguicula*). Like the sundew, it is a mere rosette of radical leaves, having upturned margins and a very succulent pellucid appearance. These leaves are covered with glands, which exude a viscid kind of fluid like that on the tentacles of the sundew. This natural birdlime catches and holds small flies, midges, and other tiny flying creatures, as well as crawling insects. The presence of these insects on the leaf appears to stimulate it to further secretion, which must of course lessen the chances of the insects' escape, and as a further barrier to prevent its creeping away, the edges of the leaf begin slowly to curve inwards, so that the caught insect is imprisoned in the folds of the leaf. The acid secretion which now exudes from the glands soon dissolves all the nitrogenous and soft parts of

the insect which are taken up by the absorptive glands of the leaf. There are many other plants, of which I have not space to make mention, although they are full of interest, as owing to their curious structure it is probable that insectivorous habits might also be ascribed to them. The field of study is a wide one, and throws much light upon the physiology of plants, as well as the relationship between the plant and animal world. I would suggest to my young readers as a practical means of knowing more of this subject, to try and grow for themselves the sundew, *Pinguicula* and *Sarracenia*.

The two first can be found, as I have already said, on boggy moors in England, and the latter plant can be obtained from any florist. All can be successfully grown in a greenhouse or garden frame, and studying their growth and habits in this way will teach the young botanist far more agreeably than learning only from books.

At Kew there is always a fine collection of these insectivorous plants to be seen in vigorous growth, whilst at the South Kensington Natural History Museum (Botanical Department) there are some highly interesting cases illustrating the life history of these remarkable plants.

HELP FOR DEAF GIRLS.

Do the work that's nearest
Though 'tis dull at whiles,
Helping, when you meet them,
Lame dogs over stiles."

Charles Kingsley.



It has often occurred to me that Mr. Kingsley has embodied a great part of "the whole duty of man" in the verse with which I commence this paper, which will I trust appeal to girls of all ranks, to "all sorts and conditions of

girls," in fact—to help—when they meet them—some very lame dogs over stiles.

It seems to me that there is so much more sympathy in the world for the blind than for the deaf, or deaf-mute person. Many a kind-hearted girl will cheerfully sacrifice her time, or pet amusement in order to read to, teach, or otherwise lighten the affliction of a blind *protégée*; but would it occur to the same girl that a deaf or deaf-mute person was in as much, perhaps more need of sympathy, encouragement, or teaching? I think not. Blindness is an affliction so much more easy to understand, so much more interesting—a blind person does not seem to be so completely cut off from human intercourse as a deaf one—it requires more courage and patience to get at the personality of the deaf; but for this very reason it is more important that they should be reached. The condition and education of the deaf and of deaf-mutes has been making steady progress throughout the Victorian era, and, thanks to the warm interest shown by our beloved Queen in their welfare, has of late made marvellously rapid strides, but there is still much to be done, much in which individual girls all over the world, if they would here and there take up the work, would be invaluable aids to the organised associations.

There is a penny monthly magazine entitled *Ephphatha*, the organ of the British Deaf and Dumb Association, published in the interests of the deaf under the able editorship of Mr. A. Macdonald Cuttall—himself deaf—which deserves a much larger circulation than it has yet attained; this would prove a most helpful guide to any hearing girls who are willing to aid their deaf sisters, and it gives all up to date information of the great and good work which is so quietly carried on by the efforts of all the various associations up and down the country, and the work of the Royal Association in aid of the deaf and dumb carried on by its chaplain, the Reverend F. W. G. Gilby, at St. Saviour's, the special church for the deaf and dumb in Oxford Street, London, of the very existence of which the larger proportion of the public is unaware.

It is proposed to hold a congress under the roof of the Royal Association this August, partly to celebrate the Queen's Diamond Jubilee. In order to attend this, friends and benefactors of the deaf and dumb will gather from America, the Continent of Europe, and all parts of Great Britain, and matters affecting the cause and its various works and needs will be discussed.

It is also hoped that a fund may be raised to afford a day's outing to the poor deaf and dumb, which will be to them a pleasant and lasting remembrance of the celebration of the Queen's long reign. A Diamond Jubilee Shilling Pension Fund, in connection with the wider organisation, is also set on foot, the object of which is to provide pensions for aged and infirm deaf and dumb of both sexes. Funds are urgently needed effectually to carry out all these schemes, and contributions towards them are gratefully received either by the Rev. F. W. G. Gilby, St. Saviour's Parsonage, 419, Oxford Street, or by the secretary, Mr. James Muir, 65, Northgate, Blackburn, Lancashire. It is however to associates and members of the Girl's Friendly Society that I hope most strongly to appeal by means of this paper. There are already many deaf, or deaf-mute members, but there might be many more if willing hearts and hands were forthcoming, not only to help those who have already

joined the society over, what appear to be very formidable stiles, but to seek out others and encourage them to obtain aid for themselves by becoming members. Again, members who know of deaf or deaf-mute girls might inform their associates.

Mrs. Ware, the wife of the Bishop of Barrow-in-Furness, who has the cause and welfare of the deaf and dumb so much at heart, describes so beautifully and lucidly the "meaning and reason" of the G. F. S. for all girls that I cannot do better than quote her own words from a recently-issued pamphlet, "A word to deaf girls about the Girls' Friendly Society."

"It is for girls of all kinds, girls at home of all ranks, girls in work-rooms, shops and warehouses, girls in laundries or in service; it is for girls who are strong and in good health, and for girls who are delicate or invalids. It is for girls who are blind or deaf and dumb. It is for girls of all kinds, with one condition, namely that all who join must always have borne a virtuous character.

"It is *friendly*. Friendship is one of God's best gifts to us in this world; there is much loneliness, sadness and sorrow, much sin and temptation, and we all feel we want a friend. Some girls have to leave their homes, and some are orphans and have no homes to leave. Some are put in places of difficulty, and hardly know what it is right to do; all these and many more want a wise kind friend, and our society tries to provide a friend for every English girl wherever she may happen to be.

"It is a *society*—a number of persons joined together; the older women who belong to it are called Associates, girls and young women are called Members. They are all joined to each other by prayer, sympathy, and love. The associates, who are doing the same work for the love of God, are united to each other and to the members, and the members are also united to each other and to their associates. They must all feel friendly together, and must try how they may best help each other. The elder must help the younger, the wiser must help the ignorant, the richer must help the poorer; they must all encourage each other in doing right, in loving Jesus Christ their Saviour, and in loving others for His sake."