INSECTIVOROUS PLANTS.

That small flying creatures of various kinds are occasionally caught by trap-like plants, and in some cases actually absorbed by a process closely resembling animal digestion, has long been understood; but perhaps the general reader will be somewhat surprised at learning that the noted naturalist, Mr. CHARLES DARWIN, has made the *modus operandi* of these proceedings the subject of investigations so minute and so prolonged, that he fills a good-sized book with a succinct statement of the results. This book, "INSECTIVOROUS PLANTS"—has just been republished for American readers by Messrs. D. Appleton & Co. of New-York, in the same handsome style as their widely circulated reprints of many other English scientific works, and it will be found interesting and valuable, both for the remarkable experiments it relates, and as an incitement and a guide for those disposed to undertake similar researches for themselves. We are tempted to make an extract or two, from the less technical portions of the work, and begin with the author's account of the commencement of his studies in this direction:

During the summer of 1860, I was surprised by finding how large a number of insects were caught by the leaves of the common sun-dew (*Drosera rotundifolia*) on a heath in Sussex. I had heard that insects were thus caught, but knew nothing farther on the subject. I gathered by chance a dozen plants, bearing fifty-six fully expanded leaves, and on thirty-one of these dead insects or remnants of them adhered; and, no doubt, many more would have been caught afterwards by these same leaves, and still more by those as yet not expanded. On one plant 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 13 distinct insects. Flies (Diptera) are captured much oftener than other insects. The largest kind which I have seen caught was a small butterfly (*Cœnonympha pamphilus*); but the Rev. H. M. Wilkinson informs me that he found a large living dragon-fly with its body firmly held by two leaves. As this plant is extremly common in some districts, the number of insects thus annually slaughtered must be prodigious. Many plants cause the death of insects, for instance the sticky buds of the horse-chestnut (*Æsculus hippocastanum*), without thereby receiving, as far as we can perceive, any advantage; but it was soon evident that Drosera was excellently adapted for the special purpose of catching insects, so that the subject seemed well worthy of investigation.

The results have proved highly remarkable; the more important ones being—firstly, the extraordinary sensitiveness of the glands to slight pressure and to minute doses of certain nitrogenous fluids, as shown by the movements of the so-called hairs or tentacles; secondly, the power possessed by the leaves of rendering soluble or digesting nitrogenous substances, and of afterwards absorbing them; thirdly, the changes which take place within the cells of the tentacles, when the glands are excited in various ways.

The springing of the trap when a luckless insect alights upon the platform, takes place as follows:

If a small organic or inorganic object be placed on the glands in the centre of a leaf, these transmit a motor impulse to the marginal tentacles. The nearer ones are first affected and slowly bend towards the centre, and then those farther off, until at last all become closely inflected over the object. This takes place in from one hour to four or five or more hours. The difference in the time required depends on many circumstances; namely, on the size of the object and on its nature, that is, whether it contains soluble matter of the proper kind; on the vigor and age of the leaf; whether it has lately been in action; and according to Nitschke, on the temperature of the day, as likewise seemed to me to be the case. A living insect is a more efficient object than a dead one, as in struggling it presses against the glands of many tentacles. An insect, such as a fly, with thin integuments, through which animal matter in solution can readily pass into the surrounding dense secretion, is more efficient in causing prolonged inflection than an insect with a thick coat, such as a beetle. The inflection of the tentacles takes place indifferently in the light and darkness; and the plant

is not subject to any nocturnal movement of so-called sleep.

The prey once captured, the plant proceeds to devour and assimilate it—thus:

It is a remarkable fact that when an object, such as a bit of meat or an insect, is placed on the disc of a leaf, as soon as the surrounding tentacles become considerably inflected, their glands pour forth an increased amount of secretion. I ascertained this by selecting leaves with equal sized drops on the two sides, and by placing bits of meat on one side of the disc; and as soon as the tentacles on this side became much inflected, but before the glands touched the meat, the drops of secretion became larger. This was repeatedly observed, but a record was kept of only thirteen cases, in nine of which increased secretion was plainly observed; the four failures being due either to the leaves being rather torpid or to the bits of meat being too small to cause much inflection. We must therefore conclude that the central glands, when strongly excited, transmit some influence to the glands of the circumferential tentacles, causing them to secrete more copiously.

It is a still more important fact (as we shall see more fully when we treat of the digestive power of the secretion) that when the tentacles become inflected, owing to the central glands having been stimulated mechanically, or by contact with animal matter, the secretion not only increases in quantity, but changes its nature and becomes acid; and this occurs before the glands have touched the object on the centre of the leaf. This acid is of a different nature from that contained in the tissue of the leaves. As long as the tentacles remain closely inflected, the glands continue to secrete, and the secretion is acid; so that, if neutralized by carbonate of soda, it again becomes acid after a few hours. I have observed the same leaf with the tentacles closely inflected over rather indigestible substances, such as chemically prepared casein, pouring forth acid secretion for eight successive days, and over bits of bone for ten successive days.

And this is Mr. Darwin's idea of the part in the economy of nature which is played by the exercise of this remarkably animal-like function on the part of vegetable organisms:

The absorption of animal matter from captured insects 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. 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. It appears that the roots serve only to imbibe water; though no doubt, they would absorb nutritious matter if present in the soil. A plant of Drosera, with the edges of its leaves curled inwards, so as to form a temporary stomach, with the glands of the closely inflected 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 260, exposed during the whole day to a glaring sun.