NEW BOOKS.

INSECTIVOROUS PLANTS. By CHARLES DARWIN. [London: Murray.]

In the first sentence of his new book Mr. Darwin tells us that his observations on plants which deliberately capture insects and use them as food were begun in 1860, so that no critic can truly say that his results are hastily published. Still less can it be said, after the basis of his conclusions has been pursued, that these latter have been hastily drawn. There is no living naturalist but Mr. Darwin about whom it can be said that he is at once the most patient and painstaking of observers, and has the power of making the most widespread generalisations. The present book is an instance of these powers; for, on the one hand, he has shown by the most perfect experimentalisation that a dose of a salt such as phosphate of ammonia, usually considered almost inert in itself, no larger than one thirty-millionth part of a grain, produces a very perceptible influence on a digesting leaf; whilst, on the other, he shows conclusively that in these plants we find a strong bond of union between the animal and vegetable kingdoms. These two facts will support two forms of heresy. The first may very fairly be used by the homœopathic doctors, as a caution against the indiscriminate criticism of the allopaths; and the second, of course, supports the heretics who believe in the law of evolution.

The greater part of Mr. Darwin's labours has been expended on a quaint and rather common little English plant, popularly known as sundew, and which is to be found in abundance in many marshy spots round Birmingham. Any, therefore, who are curious enough to see his results for themselves, may do so readily enough, for most of the experiments may easily be carried on under a bell-glass. It would be impossible here to indicate what all of them are; but a few of the most remarkable results may just be referred to, and their importance indicated.

Thus the fact that certain plants are provided with fly-traps, long known to be the case with Venus's fly-trap, has not only been extended to many others, but it has been ascertained that the catching is not capricious, but purposive and discriminative; and that the processes by which it is accomplished are almost as complicated as those we put in excercise for our own nutrition.

In the case of the sundew the trap seems to be baited by a fluid which tempts the flies to destruction. Before they reach it the fluid is not acid, but as soon as the leaf becomes conscious of the presence of food of a proper kind its fluid becomes acid, and there is poured out a secretion closely resembling the gastric juice of our own stomachs. The acid is not the same, but the uses of the two—proprionic in the case of the sundew, and hydrochloric in the human animal—are identical. The secretion of both contains a ferment, pepsin in the human stomach, and a substance closely resembling it, discovered, and named Droserin, by Mr. Lawson Tait.

Of the Vertebrata, the class of Edentata may be selected as those which the sundew most closely resembles in its digestive functions. Taking the case of the great ant-eater, we may briefly compare the two apparently incomparable creatures—a savage bear and an apparently gentle, but quite as savage a little plant.

The ant-bear is provided with a long extensile tongue, which is coated with viscid saliva, and which he inserts amongst the crowds of ants in a hill, conveying those adhering to it directly into his stomach. The prey of the sundew comes to it, and, alighting on one of the two hundred little tongues covered with viscid saliva which surround each leaf, it is conveyed slowly, by the bending of the tongues, into the stomach—that is, the centre of the leaf. There it is attacked by gastric juice, dissolved, the products absorbed, and the refuse discarded, exactly as is done by the apparently more complex gastric apparatus of the ant-eater. In a moral aspect the sundew is the more objectionable of the two creatures, by reason that it looks so innocent.

Even in the matter of volition the ant-eater seems to be superior to the sundew only in degree and not in fact, for the little plant indicates powers of discrimination which human beings, endowed with so-called reason, do not always show. Thus, a fragment of hair or glass placed in the glands excites the movements which convey the food to the stomach, but the fraud is soon found out, and the process is stopped; and even when food can be given in two forms, one of which is very useful, and the other not so much so, the plant will indicate the difference in its appreciation of the two. Thus, boiled cabbage is far more digestible than raw cabbage; and if the two be tried on the leaf of a sundew it will be found to close over the first eagerly, but not over the second. The gastric juice of the sundew is not secreted till the plant is sure that the food it has swallowed can be digested, just as is the case with ourselves. If we cannot digest food we have taken into our stomachs we have to reject it. So does the sundew, but it is not made uneasy by the process, as we are.

The diet of our little plant may be very varied, and its powers of digestion are far less limited than ours. Thus, it not only can digest cartilage and bone, substances which usually defy human gastric fluid, but Mr. Darwin has succeeded in getting it to digest the enamel of teeth, the hardest animal substance known.

There are certain substances which are very useful for the human economy when given in conjunction with other articles of diet, but which given alone do not afford any nutriment whatever, no matter in what quantity the animal is fed upon them. One of these is gelatine, the animal matter of bone, and the chief constituent of soups and jellies. When given in a chemically pure condition to the sundew it is refused, but when mixed with a little albumen, as in isinglass, it is gratefully digested and absorbed. The same may be said of casein and other animal products. This is one of the most astonishing facts in Mr. Darwin's book, and establishes the identity of digestion by animals and plants beyond dispute, though there are some differences in detail, due to slight differences between the two ferments engaged.

Another astounding fact is that if one grain of phosphate of ammonia be dissolved in a thirty-one gallon cask of distilled water, every drop of that solution will be found to have an effect on the plant. Sundews evidently believe in homœopathic doses of medicine.

The leaves unquestionably show signs of being provided with tissue in which rests the power of discriminating between what is useful and what is not, and of conducting movements governed by the results registered. But this is really only a definition of a nervous system, and though Mr. Darwin has proved beyond doubt that this power rests in the general tissue of the leaf and not in any special arrangement, this does not in any way warrant us in denying consciousness of a kind, however limited, to the plant. We can only indicate consciousness when we find an impression registered invariably by some complex results; and, like everything else in nature, consciousness varies greatly in degree, but not in fact. When sulphuric acid is added to baryta water an inevitable result is registered—by what mechanism we do not know, but it is perfectly simple. But when a piece of raw meat is placed in the leaf of a healthy sundew inevitable results follow, which are very complicated. Thus, if the meat be placed upon one gland only, that gland is not affected alone. All those which, by past and hereditary experience, the plant knows are able to reach the meat bend simultaneously with the one on which the meat is placed. Now, this is identical with the phenomena which we call reflex action, and no amount of scholastic verbiage will conceal the identity. The presence of meat in the leaf causes the glands to secrete, just as the presence of the same meat in our own stomachs would cause our gastric juice to be secreted. For the purposes of our movements our nerve currents are specialised in certain tissues which we call nerves. These are needed because our movements are complicated and various. But the movements of the sundew are limited to simple flexion and extension; therefore, there is no need to specialise any tissue for the nerve current, just as in the return current of a telegraphic message the whole substance of the earth is made to do the work, but for the exact message a line of copper tissue must be specialised. This conclusion is rendered exact by Dr. Burdon Sanderson's discovery that the laws of the electrical disturbance in the leaf of Venus's fly-trap are identical with those of human muscle and nerve.

The whole thing is very humiliating to human vanity, and will be, therefore, strongly objected to. But that will make the conclusions none the less trustworthy.