## BOTANY.

*Insectivorous Plants.*—M. Hochstetter argues in opposition to the opinion put forward by Darwin and adopted by many naturalists, that the insects captured by various plants serve them as nourishment. ("Württemb. naturwiss. Jahreshefte," 1878, p. 106.) He divides insecticidal plants into three categories:—1, Those which emit a tenacious fluid from various parts to which insects stick; 2, those which possess special organs (pitchers, &c.), into which insects make their way, and are either drowned in a fluid contained in the cavity or prevented from escaping by hairs or other mechanical means; and, 3, those which capture insects by means of irritable leaves or glandular hairs.

The first group, which is very numerous, has never been supposed to derive any benefit from the captured insects. This is not the case with the second, including the pitcher plants, &c., for the insects drowned in the fluid contained in the cavities presented by their peculiar organs are believed to aid in the nutrition of the plants. M. Hochstetter says that, so far as he knows, nothing has been ascertained in support of this opinion; [but it has been shown that the fluid from those pitchers exerts a digestive action upon animal substances, and contains a principle related to pepsine, although, we believe, no one has attempted to show how the products of such digestion may be absorbed by the walls of the cavity]. M. Hochstetter says that his observations on *Nepenthes*, *Sarracenia*, and *Cephalotus* show most clearly that the pitchers of those plants which contain many dead insects die off much sooner than those in which none or few are to be found.

It is in the third group that the most striking instances of supposed insectivorous plants are to be found. Of these it has been affirmed that, after insects are captured, the plants excrete an acid fluid at the points where they are in contact with their victims; that this is allied to propionic acid and even contains pepsine; and that by means of it the soft parts of the insects are digested just as if they were in the stomach of an animal.

The author notices the peculiarities of the three genera, *Drosera*, *Drosophyllum*, and *Dionæa*, upon which most of the observations in this direction have been made, and, whilst giving all credit to Mr. Darwin for his valuable investigations upon this interesting subject, urges certain objections against the view that the plants are nourished by the insects they capture. His first objection, that the leaves of plants are not organs for the reception of nourishment, does not appear to be of much weight. In the second place, he remarks that the insects captured by the leaves either dry up or putrefy; and in the latter case, according to his observations, they do not produce better vegetation, but the destruction of the leaf-tissue implicated, as he has frequently noticed both in *Dionæa* and *Nepenthes*. In *Drosera*, however, stronger growth of the neighbouring parts of the leaf, sometimes perhaps of the whole leaf, does occasionally take place. But, says M. Hochstetter, we know that whenever vegetable tissues are exposed to friction, and especially when leaves are pierced by insects, or eggs are laid in their cellular tissue, cellular growths occur; and he indicates that in *Drosera*, vesicular inflations are produced on the leaves at the points where the insects lie.

The fact that an increased secretion of fluid takes place from the glands of

the leaves, and that the contents of these glands are altered, which has been regarded as evidence of the digestion of the captured insects, is regarded by M. Hochstetter rather as a sign of injurious action, such as is produced by acids and gases noxious to the life of the plant. He refers to the injurious action of ammonia upon plants placed in a fresh hotbed with the frames closed; and considers the saccharine excretion of leaves attacked by aphides to be a morbid phenomenon analogous to the increase of the fluid excretions in the plants in question. Thirdly, he remarks that *Dionæa* cultivated under bell-glasses are much stronger and more healthy than those grown in the open and allowed to catch flies. From all this M. Hochstetter concludes that the necessity or even the usefulness of the digestion of insects by plants is still far from being incontestably proved.

*Milk of the Cow-tree.*—M. Boussingault, when at Maracay, in South America, made a rough examination of the milky fluids furnished by this celebrated tree (*Brosimum galactodendron*), which is widely distributed in tropical America. He obtained from it—

1. A fatty substance like bee's-wax, fusible at 50° C., partially saponifiable, very soluble in ether, but slightly soluble in boiling alcohol. This substance when melted and cooled resembled virgin wax, and candles were made of it.
2. An azotized substance analogous to caseum.
3. Saccharine matters.
4. Salts of potash, lime, magnesia, phosphates. The quantity of solid matter in the milk was estimated at 42 per cent.

Samples of this milky juice sent to the Paris Exhibition of the present year, gave a dried extract, 100 parts of which furnished—

| | |
|---|---|
| Wax, fatty matter | 84·10 |
| Sugar, inverted | 2·00 |
| Sugar, inversible | 1·40 |
| Gum, saccharifiable | 3·15 |
| Caseum, albumen | 4·00 |
| Ash, phosphates | 1·10 |
| Undetermined non-nitrogenous substances | 4·25 |
| | 100·00 |

Which, brought to milky juice containing 42 per cent. of solid matter, gives—

| | | |
|---|---|---|
| Wax and saponifiable matters | 35·2 | |
| Saccharine and analogous substances | 2·8 | |
| Caseum, albumen | 1·7 | 4·0 |
| Earths, alkalies, phosphates | 0·5 | |
| Undetermined substances | 1·8 | |
| Water | 58·0 | |
| | 100·0 | |

Thus in its general constitution, the milk of the cow-tree approaches cow's milk, except that it contains about three times as much solid matter; so that it is rather to cream that we must compare this vegetable milk. A cream analysed by M. Jeannier gave—