here of Thomas's orchestral performances, and declaring that "New York has had the exquisite music of the most perfect band in the world lavished upon its dull, coarse ear in vain," indignation is smothered in surprise. But the accusation is so worded, however, that, if the asserted fact fall to the ground, the rest is a very good but unintended compliment to us. What authority has this critic for saying that the "exquisite music of the most perfect band in the world" has been lavished upon our "dull, coarse ear" ("dull, coarse ear" is good and Bostonian) in vain? The fact is—but perhaps our amiable critic does not care for facts that uncomfortably jostle his theories—that this "exquisite music" of Mr. Thomas's band has not lacked a full and remunerative following during this and all preceding summers. We say remunerative rather than appreciative, because evidently, with our "dull, coarse ears," it must be our money and not our tastes to which Mr. Thomas's success is to be attributed. However, there is something in employing our money in good directions, whatever may be the motive; and hence our Boston friend, in conceding that we have in New York "the most perfect band in the world," has only to discover that Mr. Thomas's success will keep him in our midst, to see how the facts give us praise, despite the efforts of our defamer.

Literary.

THE most surprising of recent discoveries in natural history is unquestionably that of plants which possess the power not only to catch and destroy animal prey, but to digest and absorb its nutritive elements by a process analogous in all respects to that which goes on in the human stomach. Several monographs on the subject have appeared both in this country and in England during the past year or two, and we in our science department, as well as the scientific journals, have made the leading facts familiar to the public, but Mr. Darwin's "Insectivorous Plants"* is the first systematic and authoritative exposition of the matter, and, as is customary with that author, it is thorough and exhaustive.

The greater portion of Mr. Darwin's observations are devoted to the *Drosera rotundiflora*, popularly called "sun-dew," which grows wild in many parts of England, and which belongs to the family of *Droseraceæ*, which includes upward of one hundred species, ranging in the Old Word from the arctic regions to Southern India, the Cape of Good Hope, Madagascar, and Australia, and in the New World from Canada to Tierra del Fuego. His attention was first drawn to it in the summer of 1860 by finding how large a number of insects were caught by its leaves on a heath in Sussex, and, believing that this could hardly be attributable to accident, he forthwith began an elaborate series of experiments, the results of which are given in detail in the present work. "These results have proved highly remarkable, the more important ones being — first, the extraordinary sensitiveness of the glands to slight pressure and to minute doses of certain nitrogenous fluids, as shown in 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 afterward absorbing them; thirdly, the changes which take place within the cells of the tentacles when the glands are excited in various ways."

The plant has been frequently described in the various scientific journals, but it may be well, before proceeding further, to refresh the reader's memory with a description of it. It bears from two or three to five or six leaves, generally extended more or less horizontally, but sometimes standing vertically upward. The leaves are commonly a little broader than long. The whole upper surface is covered with gland-bearing filaments, or "tentacles," as Mr. Darwin calls them, from their manner of acting. The glands were counted on thirty-one leaves, and the average number to a leaf was one hundred and ninety-two; the greatest number being two hundred and sixty, and the least one hundred and thirty. Each gland is surrounded by large drops of an extremely viscid secretion, which, glittering in the sun, have given rise to the plant's poetical name of the "sun-dew." A tentacle consists of a thin, straight, hair-like pedicel, carrying a gland on the summit. The tentacles on the central part of the leaf are short and stand upright, and their pedicels are green. Toward the margin they become longer and longer, and more inclined outward, with their pedicels of a purple color. Those on the extreme margin project in the same plane with the leaf, or more commonly are considerably reflexed. A few tentacles spring from the base of the footstalk, and these are the longest of all, being sometimes nearly one-fourth of an inch in length. The glands, with the exception of those borne by the extreme marginal tentacles, are oval, and of nearly uniform size, viz., about $\frac{1}{500}$ of an inch in length. They have the power of absorption, besides that of secretion; and they are extremely sensitive to various stimulants, namely, repeated touches, the pressure of minute particles, the absorption of animal matter and of various fluids, heat, and galvanic action. Insects furnish the chief nutriment of the plant (the roots being very poorly developed), and these are captured by means of the viscid fluid surrounding the glands. As soon as even the smallest insect is thus entangled, the tentacles bend slowly inward from all directions and carry it to the centre of the leaf, where it is digested and absorbed; after which, the tentacles reëxpand very slowly, being then ready for further prey. The chemical changes which take place in the plant during this entire process are most remarkable, and are described by Mr. Darwin with great minuteness of detail; but we can only find room for the paragraph (summarizing his numerous experiments) in which he proves that the leaves "are capable of true digestion, and that the glands absorb the digested matter:"

"The gastric juice of animals contains, as is well known, an acid and a ferment, both of which are indispensable for digestion, and so it is with the secretion of Drosera. When the stomach of an animal is mechanically irritated, it secretes an acid, and when particles of glass or other such objects were placed on the glands of Drosera, the secretion, and that of the surrounding and untouched glands, was increased in quantity and became acid. But, according to Schiff, the stomach of an animal does not secrete its proper ferment, pepsine, until certain substances, which he calls *peptogenes*, are absorbed; and it appears from my experiments that some matter must be absorbed by the glands of Drosera before they secrete their proper ferment. That the secretion does contain a ferment which acts only in the presence of an acid or solid animal matter, was clearly proved by adding minute doses of an alkali, which entirely arrested the process of digestion, this immediately recommencing as soon as the alkali was neutralized by a little weak hydrochloric acid. From trials made with a large number of substances, it was found that those which the secretion of Drosera dissolved completely, or partially, or not at all, are acted on in exactly the same manner by gastric juice. We may therefore conclude that the ferment of Drosera is closely analogous to, or identical with, the pepsine of animals."

That a plant and an animal should pour forth the same, or nearly the same, complex secretion, adapted for the same purpose of digestion, is a new and surely a wonderful fact in physiology; and even more wonderful is the structure of the plant, by which, in the absence of a nervous system, so complicated a process is accomplished. Perhaps the most striking feature of this structure is the extreme sensitiveness of the glands to pressure. Says Mr. Darwin on this point:

"It is an extraordinary fact that a little bit of soft thread, $\frac{1}{1000}$ of an inch in length, and weighing $\frac{1}{4360}$ of a grain, or of a human hair, $\frac{1}{300}$ of an inch in length, and weighing only $\frac{1}{1730}$ of a grain, or particles of precipitated chalk, after resting for a short time on a gland, should induce some change in its cells, exciting them to transmit a motor impulse throughout the whole pedicel, consisting of about twenty cells, to near its base, causing this part to bend, and the tentacle to sweep through an angle of above 180°. That the contents of the cells of the glands, and afterward those of the pedicels, are affected in a plainly visible manner by the pressure of minute particles, we shall have abundant evidence when we treat of the aggregation of protoplasm. But the case is much more striking than as yet stated; for the particles are supported by the viscid and dense secretion; nevertheless, even smaller ones than those of which the measurements have been given, when brought by an insensibly slow movement, through the means above specified, into contact with the surface of a gland, act on it, and the tentacle bends. The pressure exerted by the particle of hair, weighing only $\frac{1}{1730}$ of a grain, and supported by a dense fluid, must have been inconceivably slight. We may conjecture that it could hardly have equaled the millionth of a grain; and we shall hereafter see that far less than the millionth of a grain of phosphate of ammonia in solution, when absorbed by a gland, acts

* Insectivorous Plants. By Charles Darwin, M.A., F.R.S. With Illustrations. New York: D. Appleton & Co.

on it and induces movement. A bit of hair, $\frac{1}{25}$ of an inch in length, and therefore much larger than those used in the above experiments, was not perceived when placed on my tongue; and it is extremely doubtful whether any nerve in the human body, even if in an inflamed condition, would be in any way affected by such a particle supported in a dense fluid, and slowly brought into contact with the nerve. Yet the cells of the glands of Drosera are thus excited to transmit a motor impulse to a distant point, inducing movement. It appears to me that hardly any more remarkable fact than this has been observed in the vegetable kingdom."

Among the other insect-eating plants described by Mr. Darwin, the most remarkable is the *Dionœa*, a small plant which grows only in a limited district of North Carolina, and which catches its prey by the quick closing together of its double-lobed leaf when touched. It is not possible, however, for us to follow the author further in his interesting observations; but must content ourselves with recommending the book to all lovers of natural history. We recommend it especially to those who are inclined to distrust Mr. Darwin as a biologist, for scarcely any of his works illustrates so conspicuously the tireless industry with which he accumulates facts, and the extreme care with which he guards his conclusions.