REVIEWS.

The Power of Movement in Plants. By CHAS. DARWIN, LL.D., F.R.S., assisted by FRANCIS DARWIN. London: John Murray, 1880.

THAT, under certain circumstances, such plants as the Mimosa sensitiva, the Venus' fly-trap, the Drosera or Sun-dew, &c., exhibit active movements, has long been a familiar fact. It will be news, however, to the reader who has not made botany a special study, that plants are all, more or less, in motion; and that certain classes of movement are common to all of them. "The most widely-prevalent movement," say the authors of the work now before us, "is essentially of the same nature as that of the stem of a climbing plant, which bends successively to all points of the compass, so that the tip revolves." To this form of motion our authors have given the name of "circumnutation"; and in a volume extending over nearly 600 pages, record the results of an enormous number of experiments, undertaken to unravel its mode of operation in the production of the successive phenomena of growth in a plant. What diverse effects may be traced to this curious movement will be seen when we enumerate among them: the passage of the radicles downward, and the stems of seedlings upwards, through the earth; the great sweeps made by the stems of twining plants and the tendrils of other climbers; the so-called "sleep" of many plants; the movements of various organs towards the light; and the position ultimately assumed by the young leaves and other organs. The mode of observation adopted was most ingenious. "Plants growing in pots," we are told, were protected wholly from the light, or had the light admitted from above, or on one side, as the case might require, and were covered above by a large horizontal sheet of glass, and with another vertical sheet on one side. A glass filament, not thicker than a horsehair, and from a quarter to three-quarters of an inch in length, was affixed to the part to be observed, by means of shellac dissolved in alcohol. . . . To the end of the glass filament an excessively minute bead of black sealing-wax was cemented, below or behind which a bit of card with a black dot was fixed to a stick driven into the ground. . . . The bead and the dot on the card were viewed through the horizontal or vertical glass plate (accord-

ing to the position of the object), and when one exactly covered the other a dot was made on the glass plate with a sharp-pointed stick dipped in thick Indian-ink. Other dots were made at short intervals of time, and these were afterwards joined by straight lines." It will suffice to mention, without describing, another mode of observation, in which two paper triangles were fixed to the glass filament, one at each end. The volume is profusely illustrated with reproductions of the very remarkable figures thus described by various parts of growing plants; a full description of the experiment of which it is the visible record being appended to each diagram. Incidentally, many curious observations are recorded. Among them is that of the sensitiveness of the tip—and the tip only—of the radicle, or rootlet of a seedling; which bends away from any obstacle, and, in fact, selects, as it were, its own path. It is hardly an exaggeration to say," remark the Messrs. Darwin, "that the tip of the radicle thus endowed, and having the power of directing the movements of the adjoining parts, acts like the brain of one of the lower animals: the brain being seated within the anterior end of the body, receiving impressions from the sense-organs, and directing the several movements." For actual details of the authors' researches, and of the conclusions which they draw from them, we must refer the reader to the work itself. No one interested in physiological botany can afford to dispense with its perusal.