

DARWIN'S NEWEST WORK.

THE POWER OF MOVEMENT IN PLANTS. By CHARLES DARWIN, LL. D., F. R. S., assisted by FRANCIS DARWIN. New-York: D. APPLETON & Co. 1881.

In some one of the writings of Marcius there is the following statement: "That whereby man differs from the lower animals is but small; the majority of people cast it away, while superior men preserve it." With the "Origin of Species" Mr. Darwin began that deliberate series of studies whose object is to show the solidarity of all life upon the earth; in this his latest work he investigates the title of plants to a sentient existence, and shows how nearly the obscure movements which characterize them can be likened to the movements of animals low in the scale of being. Always sober in statement, never pushing theory far in advance, corroborating at once such theories as he puts forth by the proofs ascertained either by his own experiments or those of equally trustworthy observers in like provinces of natural research, Dr. Darwin is not merely the model scientist of the age, but one of the greatest men of the century. The present work will not create any especial excitement, because the novelty of the general cause which he has made his own, and to which his name has been given, has worn off. It is also a fact that other workers have preceded and accompanied him in the same paths. But the investigations are, nevertheless, of the highest importance to our ideas of the evolution of life upon the earth—of greater importance, unless we are much mistaken, than the late studies upon plants which appear to seize and absorb into their tissues the fluids of insects.

The object of the work is to describe and connect together several large classes of movement common to almost all plants. The most widely prevalent movement 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. This movement has been called by Sachs "revolving nutation," but Dr. Darwin uses the terms *circumnutation* and *circumnutate*. His briefer description of the movement is as follows: If we observe a circumnutating stem which happens to be bent, we will say toward the north, it will be found gradually to bend more and more easterly, until it faces the east; and so onward to the south, then to the west and back again to the north. If the movement had been quite regular, the apex would have described a circle, or rather, as the stem is always growing upward, a circular spiral. But it generally describes irregular elliptical or oval figures. Dr. Darwin now shows that apparently every growing part of every plant is continually circumnutating, though often on a small scale. Even the stems of seedlings before they have broken through the ground, as well as their buried radicles, circumnutate, as far as the pressure of the surrounding earth permits. In this universal movement Dr. Darwin finds the origin for the acquirement of the most diversified movements, according to the requirements of the plants. Thus the great sweeps made by the stems of twining plants and by the tendrils of other climbers result from a mere increase in the amplitude of the ordinary movement of circumnutation. The position which leaves and other organs ultimately assume is acquired by the circumnutating movement being increased in some one direction. The leaves of various plants are said to sleep at night, and it will be seen that their blades then assume a vertical position through modified circumnutation in order to protect their upper surfaces from being chilled through radiation. The movements of various organs to the light, which are so general throughout the vegetable kingdom, and occasionally from the light, or transversely with respect to it, are all modified forms of circumnutation; as again are the equally prevalent movements of stems, &c., toward the zenith, and of roots toward the centre of the earth. Perhaps the passage which will give the clearest idea of the gist of the book is that in the last chapter in which Dr. Darwin says: If we look at a great acacia tree we may feel assured that every one of the innumerable growing shoots is constantly describing small ellipses, as is each petiole, sub-petiole, and leaflet. The leaflets, as well as the ordinary leaves, generally move up and down in nearly the same vertical plane, so that they describe very narrow ellipses. The flower peduncles are likewise continually circumnutating. If we could look beneath the ground, and our eyes had the power of a microscope, we should see the tip of each rootlet endeavoring to sweep small ellipses or circles as far as the pressure of the surrounding earth permitted. All this astonishing amount of movement has been going on year after year, since the time when, as a seedling, the tree first emerged from the ground.

The method by which the different parts of seedlings and leaflets were made to register their movements are ingenious, and for this only a reference to the volume will suffice. One observation is placed beside another after the slowly cumulative method of Darwin, and a review of the whole is made to show that no important family of plants has been omitted. This is, of course, in order to extend the argument from the observations over the entirety of the vegetable kingdom. One of the most curious chapters, and that which explains phenomena that any one who looks about him in the country must have marveled at, is that on the sleep of leaves.