

to these amorphous¹ constituents, and chemical investigations as to their composition were added to the previous microscopic dissection. The purely morphological view

lated into German by a number of botanists, and edited in five volumes between 1825 and 1834 by Nees von Essenbeck. He did not collect his original ideas into any great work or propound a new system of classification as did Jussieu and De Candolle, whom he equals in scientific importance; his valuable generalisations were given occasionally in his numerous monographs. Sachs considers him more advanced than the two great rivals just named, inasmuch as he had an appreciation of questions of development which they lacked ('Gesch. d. Botanik,' p. 121). Humboldt called him "botanicorum facile princeps," and succeeded in procuring for him, through his influence with Sir Robert Peel, a pension of £200 per annum.

¹ The definition of a cell—*i. e.*, of the morphological or form-element of organised matter, as consisting of a membrane, a cell content, a nucleus, and a nucleolus—stood in contrast with Felix Dujardin's description, in 1835, of a living substance which he met with in his researches in lower animal life, and which he had called "sarcode." In the place of this name—the observation of Dujardin being little noticed—Von Mohl, after having for a time accepted the erroneous theory of Schleiden and Schwann as to cell-formation, introduced the term "protoplasma," which has been retained in science as the name of the elementary constituent of all living matter with very varying definitions, according to the different observations of animal or vegetable organisms and the increasing powers of the microscope; this having revealed structures where before only

formless, amorphous substance had been observed. The history of these fluctuations of opinions and definitions can be read both in the older histories (Sachs, Carus) and the more recent accounts. Among these numerous expositions, see especially Yves Delage, 'L'Hérédité et les grands problèmes de la Biologie,' 1895, p. 19, &c.; O. Hertwig, 'The Cell,' translated from the German by H. J. Campbell, 1895; and the most recent work by Dr Val. Häcker, 'Praxis und Theorie der Zellen und Befruchtungslehre,' Jena, 1899, p. 10, &c. The cellular theory has gained enormously in importance and in popular esteem, as has also the study of all micro-organisms, through its application to medicine and hygiene. In 1847 Rudolph Virchow founded his celebrated "cellular pathology," combining the many beginnings of the cellular theory which had been laid by others, in his famous axiom "omnis cellula e cellula." He gave up the theory of the free formation of cells, proclaimed the doctrine of the genesis of cells—even pathological ones—by cell-division, and adopted Goodsir's theory of the uninterrupted filiation of the elements of all living matter, of the autonomous cells. As in general biology, so also in cellular pathology, the last fifty years have witnessed great controversies and many special theories, one of the chief difficulties having been to combine the doctrine of the autonomy or individuality of the cells with a correct view of their filiation and connected life. In spite of these many changes and modifications, the name of Schwann still stands at the opening of every treatise on funda-