of the frustules increase by reason of the process of fission. Dr Pfitzer[1] of Bonn, by denying the possibility of such growth, was induced to imagine the theory of the existence of auxospores, and to believe that these constituted the only real reproduction of Diatoms by a sexual process. According to this observer, after the frustules had, in the succession of divisions, reached the smallest dimensions compatible with the species, the contents of the small frustules escaped and united with each other so as to form one or two sporangia. Within these one or two sporangial frustules called auxospores appeared, and by their larger dimensions brought the Diatom to the beginning of another series of new graduated forms. But such a theory, taken in a general sense, and assumed as the process of reproduction common to all genera of Diatoms, is fundamentally false, because it rests on the gratuitous supposition that the diatomaceous walls are incapable of any increase in size. That such an increase, however, does take place has been proved by the Rev. Professor W. Smith in his classic Synopsis of the British Diatomaceæ (plate lii. fig. 335), where some sporangial frustules of *Orthosira dickieii* are represented in which it is evident that the siliceous walls increase with the growth of the contents. It is also to be noted in this connection that the distinguished Hugo von Mohl maintains that the cytoderm of a Diatom is not entirely inorganic, but only an organic membrane which is impregnated with silex, it having been already shown that silica is sometimes substituted for carbon in the formation of cellulose.

Again, if during the process of duplication an expansion of the cell wall did not take place, a hundred frustules of a Fragilarian filament would exhibit some difference in their longitudinal diameter. But no such difference is observable. Moreover, as it is impossible to understand the formation of the two new dividing walls in the centre of the parent cell in all their minute details unless it be admitted that the new frustules are stereotyped upon the old ones, it follows that such a process cannot be verified except in the genera in which the two valves of the frustule are perfectly identical in a symmetrical position. It is to be remarked that fissiparous division has not yet been observed in a single case to form an exception to the above rule.

Finally, against the theory which regards the sporangial frustule as destined to initiate a new descending series, Dr Wallich[2] remarks that that frustule, instead of being, as heretofore assumed, the primary or parent frustule of a new and vigorous generation, constitutes in reality the expiring phase in the life of an old one. Professor H. L. Smith seems to be of the same opinion, for, considering the possibility of *Stauroneis phœnicenteron*, Ehrenb., being a sporangial form of *Stauroneis gracilis*, Ehrenb., he points out that it is only an abnormal and transient form from which the *Stauroneis gracilis*, differing from it so much as it does, could never originate.

[1] Untersuchungen über den Bau und Entwickelung der Bacillarien (Diatomaceen), Bonn, 1871.

[2] On the Relation between the Development, Reproduction, and Markings of the Diatomaceæ, *Month. Micr. Journ.*, vol. xvii. p. 61, 1877.