

Recently Karl Brandt has given a very detailed and fully illustrated account of the sporification of the Polycyttaria (L. N. 52, pp. 145-178). I have also had the opportunity during my sojourn in the Canary Islands (1866), in the Mediterranean at Corfu (1877), and Portofino (1880), as well as in Ceylon (1881), of observing the development of flagellate zoospores from the central capsule of individuals of all four legions: among the SPUMELLARIA in certain Colloidea, Beloidea, Sphæroidea, and Discoidea, among the ACANTHARIA in several Acanthometra and Acanthophracta, among the NASSELLARIA in individuals belonging to the Stephoidea, Plectoidea, and Cyrtoida, and among the PHÆODARIA in one Castanellid. In most zoospores I could distinctly observe only a single long flagellum; sometimes, however, two or even three appeared to be present, but the determination of their number is very difficult.

216. *Alternation of Generations.*—A peculiar form of reproduction, which may be designated “alternation of generations,” appears to occur generally in the Polycyttaria, but has not yet been observed in the Monocyttaria. All Collozoidea, Sphærozoidea, and Collosphærida which have hitherto been carefully and completely examined with respect to their development, are distinguished by the production of two different kinds of swarm-spores, isospores and anisospores. The *Isospores* (or monogonous spores) correspond to the ordinary asexual zoospores of the Monocyttaria (§ 215); they possess a homogeneous, doubly refracting nucleus of uniform constitution and develop asexually, without copulation. The *Anisospores* (or amphigonous spores), on the other hand, are sexually differentiated and possess a heterogeneous, singly refracting nucleus of twofold constitution; they may therefore be distinguished as female macrospores and male microspores. The *Macrospores* (or gynospores, comparable with the female macrogonidia of many Cryptogams) are larger, less numerous, and possess larger nuclei, which are less easily stained, and have a fine filiform trabecular network. On the other hand the *Microspores* (or androspores, comparable with the male microgonidia) are much smaller and more numerous, and are distinguished by their smaller nuclei, which have thicker tuberculæ and become stained more intensely. The gynospores and androspores are developed in the Collozoidea and Sphærozoidea in the same individual, but not in the Collosphærida. It is very probable that these two forms of anisospores copulate with each other after their exit from the central capsule and thus produce a new cell by the simplest mode of sexual reproduction. But, since the same Polycyttaria, which produce these anisospores, at other times give rise to ordinary or asexual isospores, it is further possible that these two forms of reproduction alternate with each other, and that the Polycyttaria thus pass through a true alternation of generations. This has not yet been observed in the Monocyttaria, and hence these latter seem to bear to the Polycyttaria a relation similar to that in which the sexless solitary Flagellata (*Astasiaea*) stand to the sexual social Flagellata (*Volvocinea*). In the two analogous cases the sexual differentiation may be regarded as a consequence of the social life in the gelatinous colonies.