

and Patrick Geddes (L. N. 42, 43). This arrangement was compared by Brandt to the remarkable symbiosis of the Algid gonidia and Fungoid hyphæ in the organisation of the Lichens, which had been recently discovered, and since he recognised the independent nature of the yellow cells, as unicellular Algæ, in all divisions of the Radiolaria, he founded for them the genus *Zooxanthella*. Geddes named them *Philozoon*, and showed experimentally that they give out oxygen under the influence of sunlight (compare § 90). The great physiological importance of the yellow cells in the metastasis of the Radiolaria, and, when they are developed in large quantities, in the economy of marine organisms in general, has recently been insisted upon by Brandt (see § 205 and L. N. 52, pp. 65–71, 86–94).

The proof that the yellow cells do not belong to the Radiolarian organism itself, but only live parasitically in it, was a necessary preliminary to the very important step which next took place in our knowledge of the organisation of the Radiolaria. This step consisted in the demonstration that the whole body of the Radiolaria, like that of all other Protista, is only a single cell. It was Richard Hertwig who in two remarkable works (L. N. 26, 33) firmly established this fundamental theorem of the unicellular nature of the Radiolaria. In his treatise on the histology of the Radiolaria (L. N. 26, 1876) he published complete investigations into the structure and development of the Sphærozoida and Thalassicollida. Since he made use of the modern methods of histological examination, and especially of staining fluids, which he was the first to apply to the study of the Radiolaria, he was able to show that no true cells (apart from the parasitic yellow cells) are to be found in their bodies, but rather that all their morphological components are to be regarded as differentiated parts of a single true cell, and in particular that the central capsule includes a genuine nucleus.

A wider foundation for this important discovery and its applicability to all divisions of this extensive class, was given by Hertwig in a second work on the organisation of the Radiolaria (L. N. 33, 1879). Among the numerous discoveries by which this work enriched the natural history of the Radiolaria must be specially mentioned the recognition of the fundamental differences exhibited by the main divisions of the class in the structure of their central capsule. Hertwig first observed that the capsular membrane is double in the PHÆODARIA but single in the other Radiolaria (§ 56); the former he named "TRIPYLEA" because he discovered in their capsular membrane a large, peculiarly constructed main opening and two small accessory openings. The NASSELLARIA, in which he found a single porous area at the basal pole of the main axis, with a cone of pseudopodia rising from it, he called on this account "MONOPYLEA"; whilst the other Radiolaria, whose capsular membrane is perforated on all sides with fine pores, were termed "PERIPYLEA." Besides the central capsule, Hertwig laid stress upon the significance of the gelatinous envelope as a constant and important constituent of the body. He also devoted attentive consideration to the morphology of the skeleton, and on the basis of certain