

become united by connecting threads, the circulation of the granules may proceed quite irregularly in the network thus formed. The rapidity and character of the extracapsular currents are subject to great variations.

The different forms of extracapsular sarcode currents have been already very fully described in my Monograph (L. N. 16, pp. 89-126), and in my critical essay on the sarcode body of the Rhizopoda (L. N. 19, p. 357, Taf. XXVI.).

210. *Secretion*.—Under the name *secretions*, in the strict sense, all the skeletal formations of the Radiolaria may be included. They may be divided according to their chemical composition into three different groups: pure silica in the SPUMELLARIA and NASSELLARIA, a silicate of carbon in the PHÆODARIA, and acanthin in the ACANTHARIA (compare § 102). It may indeed be assumed that these skeletons arise directly by a chemical metamorphosis (silicification, acanthinosis, &c.) of the pseudopodia and protoplasmic network; and this view seems especially justified in the case of the Astroid skeleton of the ACANTHARIA (§ 114), the Spongoid skeleton of the SPUMELLARIA (§ 126), the Plectoid skeleton of the NASSELLARIA (§ 125), the Cannoid skeleton of the PHÆODARIA (§ 127), and several other types. On closer investigation, however, it appears yet more probable that the skeleton does not arise by direct chemical metamorphosis of the protoplasm, but by secretion from it; for when the dissolved skeletal material (silica, acanthin) passes from the fluid into the solid state, it does not appear as imbedded in the plasma, but as deposited from it. However, it must be borne in mind that a hard line of demarcation can scarcely, if at all, be drawn between these two processes. In the ACANTHARIA the intracapsular sarcode is the original organ of secretion of the skeleton; in the other three legions, on the other hand, the extracapsulum performs this function (§§ 106, 107). In addition to the skeleton, we may regard as secretions (or excretions) the intracapsular crystals (§ 75) and concretions (§ 75A), and perhaps certain pigment-bodies (§§ 74, 88); and further, the calymma (§ 82) may be considered to be a gelatinous secretion of the central capsule, and perhaps also the capsule-membrane, in so far as it represents only a secondary excretory product of the unicellular organism.

211. *Adaptation*.—The innumerable and very various adaptive phenomena which we meet with in the morphology of the Radiolaria, and especially in that of their skeleton, are like other phenomena of the same kind, to be ultimately referred to altered nutritional relations. These may be caused directly either by the influence of external conditions of existence (nutrition, light, temperature, &c.), or by the proper activity of the unicellular organism (use or disuse of its organs, &c.), or, finally, by the combined action of both causes in the struggle for existence. In very many cases the cause to which the origin of a particular form of Radiolaria is due may be directly perceived or at least guessed at with considerable probability; thus, for example, the lattice-shells