

valves are usually equal, but in a portion of the Concharida they present constant differences. In this family the two valves are attached to each other by their free edges, just as in the bivalved Mollusca and Diatoms; and these edges may either be smooth (Conchasmida, Pl. 123, figs. 1-6), or dentate (Conchopsida, Pls. 124, 125); the valvular connection of the latter is sometimes strengthened by a special ligament which unites the two valves at the aboral pole (Pl. 123, figs. 8, 9). The form of the valve is sometimes hemispherical, sometimes boat-shaped, with a sagittal keel.

129. *Medullary and Cortical Shells*.—In all Radiolaria whose skeleton consists of a double shell or of two concentric lattice-shells united by radial bars, an inner medullary shell (testa medullaris) and an outer cortical shell (testa corticalis) may be distinguished (see note A, below). The medullary shell is usually to be regarded as a primary, the cortical as a secondary structure. Such double shells occur among the SPUMELLARIA in the Dyosphærida (Pls. 19, 20), as well as in many Prunoidæa (Pls. 39, 40), Discoidæa (Pls. 33, 34), and Larcoidæa (Pls. 9, 10); among the ACANTHARIA only in the family Phractopeltida (Pl. 133); among the NASSELLARIA only in very few Cyrtoidæa (e.g., *Periarachnium*, Pl. 55, fig. 11), and finally among the PHÆODARIA in the Cannosphærida (Pl. 112) as well as in part of the Cœlodendrida (Pl. 121) and Cœlographida (Pls. 127, 128). In most cases (if not always?) the cortical shell arises by the growth of radial spines from the surface of the medullary shell; these become united at equal distances from the centre by transverse apophyses, the surface of the secondary calymma furnishing the basis for their secretion (§ 85). Nevertheless, it seems that in many Sphærellaria the formation of the whole cortical shell proceeds simultaneously (at a definite dictyotic period) like that of the primary medullary shell (see note B). Whilst in the PHÆODARIA, ACANTHARIA, and NASSELLARIA, at most two concentric shells are formed, in many SPUMELLARIA their number increases continuously with additional growth; in many Sphærellaria it rises to four, eight, or even more, as well as in many Discoidæa (if the concentric, peripherally disposed rings of chambers be regarded as incomplete flattened shells). In these cases either only the innermost primary lattice-shell is to be styled "medullary shell," or at most the two innermost (inner and outer medullary shells), all the others being cortical.

A. The distinction between medullary and cortical shells was originally based in my Monograph (1862, p. 50) upon the topographical relation of the lattice-shells to the central capsule, inasmuch as I regarded all intracapsular shells as medullary, all extracapsular as cortical. Hertwig, however (1879, p. 122), rightly pointed out that this distinction is unpractical, "because the same lattice-shell in the same species may lie within or without the central capsule, according to the size of the latter." He proposes, therefore, to restrict the term medullary shell to the innermost, and to call all the others cortical; a course which seems justified by the special significance of the primary innermost lattice-shell ("as the point of origin of the radial spines"). But in most Sphærellaria which form three or more concentric shells, the two innermost, which lie near together within the