

since the spines of the different zones bear apophyses of different shapes. Sometimes the four equatorial spines are stouter than the sixteen other spines, and often the eight tropical spines are somewhat different in form from the eight polar and from the four equatorial spines. The length of all twenty spines is commonly equal. Their form is usually more or less compressed, two-edged (as in *Zygacantha*), more rarely cylindrical (as in *Acanthometron*), or somewhat quadrangular (but not truly prismatic); therefore the transverse section of the spines is commonly elliptical or lanceolate, rarely circular or rhombic, never square; this seems to indicate their origin from *Zygacantha*. As in all ACANTHARIA, the spines consist of acanthin, not of silex. Their central ends are either perfectly grown together, and form a single star of acanthin, or the triangular faces of their small pyramidal bases are supported one upon another, without true concrescence.

The apophyses of the radial spines, by which the two concentric spherical shells are formed, seem to be constantly four on each spine, two being opposite in each shell. The proximal pair of opposite apophyses, forming the inner or medullary shell, is constantly much smaller than the distal pair composing the outer or cortical shell (Pl. 133, fig. 5). The proximal pair corresponds probably to the two primary apophyses of the Diporaspida (*Phractaspis*, *Dorataspis*, &c.), whilst the distal pair corresponds to the free apophyses of *Orophaspis* (Pl. 133, fig. 6). Therefore the Phractopeltida may be derived phylogenetically from the Diporaspida (not from the Tessaraspida). In the common ancestral genus of this family, *Phractopelta*, the free part of the radial spines (outside the outer shell) is quite simple, without free apophyses; in all other genera of the family that free part of the spines (either in all twenty spines or only in some of them) bears a third pair of lateral apophyses; these may be either simple or branched or even latticed; but the outer apophyses (of the third rank) remain constantly free, and a third lattice-shell is never formed by union of their edges (Pl. 133, figs. 2-4).

The inner lattice-shell of the Phractopeltida, or their "medullary shell," is constantly very small (commonly 0.03 to 0.05 mm. in diameter, rarely more). Its structure is difficult to make out; in the unbroken shell it is concealed by the dense network of the outer shell; in the broken shell it is commonly destroyed. Usually the pores of the inner shell are very small, circular or subcircular, scarcely as broad as the small separating bars. In the majority of Phractopeltida their number seems to be about forty, being probably the forty primary aspinal pores of the Diporaspida; in some species this number seems to be exceeded, so that perhaps some sutural pores may exist between the aspinal pores; but commonly the twenty plates composing the inner shell (each with two aspinal pores) seem to grow together perfectly by their meeting edges, so that there are no sutural pores between them. Evident sutures were not recognisable in the inner shell of any Phractopeltida.