

that of the Echinidæ. Among the new genera of the Diadematidæ, the spines of *Micropyga* are found to be closely allied in structure to those of *Astropyga*, but with a comparatively larger central foramen and a greater number of calcareous wedges (Pl. XXXIX. fig. 1); while a section across the swollen tip of a spine of the actinal surface (Pl. XXXIX. fig. 2) shows that the solid wedges are reduced to a mere sheath with an inner ring of closely-packed cells arranged in radiating lines, with a dense reticulated central pith.

In *Aspidodiadema* we find indicated, by the structure of the spines as well as by the structure of the test, the affinities of the genus with the Cidaridæ. We find the outer row of calcareous wedges characteristic of the Diadematidæ (Pl. XXXVIII. figs. 17-19), with the coarse reticulation of the contents of the shaft as in *Porocidaris* and *Salenia*, and the pith of the central part formed of large and coarse reticulations.

Mackintosh¹ has already given the structural features of the spines of *Asthenosoma*. The structure of the spines of *Phormosoma* (Pl. XXXVIII. fig. 4; Pl. XXXIX. figs. 3-9) agrees in the main with that of *Asthenosoma*. These show close affinity on the one side to the Diadematidæ (Pl. XXXVIII. figs. 1, 2, 4, 5, 6; Pl. XXXIX. fig. 6), and on the other to the Arbaciadæ, in the large irregular reticulation characteristic of the interior of the shaft (Pl. XXXIX. figs. 3-7).

Mackintosh has also figured the same open reticulation in the central part of the shaft of the spine of *Echinothrix*, and has called attention in that genus to the variable character of the solid calcareous wedges forming the outer sheath of the spines (compare Pl. XXXIX. figs. 3, 4, and 6). Among the Echinidæ, even this structure of the interior of the shaft is still found in *Pseudoboletia* (Pl. XXXIX. fig. 11), and it also exists among the Clypeastroids in spines either with or without a central cavity (Pl. XXXVIII. figs. 21, 22; Pl. XXXIX. fig. 19). In fact the spines of the genera of the Clypeastridæ, which I have thus far examined, *Encope*, *Mellita*, and *Clypeaster* (Pl. XXXVIII. figs. 19-22), are interesting from the decided affinities they show to the Echinidæ in the small number of the solid wedges of which they are composed, and in their great resemblance to the monocyclic types of structure of the Triplechinidæ, only that in the Clypeastridæ the shafts are foraminated. In the Petalosticha a similar large foramen exists in the majority of the genera (see Pls. XXXVIII., XXXIX.), and with the exception of the genera *Hemiaster*, *Argopatus*, and *Rhynchopygus*, in which the wedges resemble more those of the Clypeastroids, we find that the outer ring of large wedges is generally made up of triangular pieces with a rounded apex towards the inner foramen; these wedges are few in number, in some of the genera not more than nine (Pl. XXXIX. figs. 12, 28, 30, 34, 36). This appears to be the general structure of the spines of the Pourtalesidæ, and the allied genera, while in the Spatangoids proper, such as *Lovenia*, *Breynia*, *Eupatus*, and the Ananchytid-like *Homolampas* and *Linopneustes*, the outer ring is made up of a

¹ Trans. Roy. Irish Acad., xxv., 1875.