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Autor: Oberling, J.J.
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In the complex-lamellar group, the ectostracum and sometimes the upper mesostracum may be fibrillar. The mesostracum, especially its lower portion, and the endostracum often tend to become homogeneous. The endostracum in some cases tends to be prismatic or radial crossed-lamellar.

The exact phylogenetic significance of these structural groups is as yet uncertain. It is theoretically possible that shells of very different origins may have acquired a more or less similar structure through convergence. This appears not to be the case for the nacro-prismatic and foliated groups, and for the heterodonts in the complex-lamellar group; if DOUVILLÉ's phylogenies (as shown in DAVIES, p. 127) are valid, however, it would appear that complex-lamellar structure may have been acquired by other pelecypod groups independently from that of the heterodonts (e.g., also by the Dreissenidae, Arcacea, Myacea, Adesmacea).

Some previous attempts at classifying pelecypods by shell structure are:

HATCHETT (1799) divided sea-shells into porcellaneous and nacreous types, although his inclusion of oysters in the latter category would seem to indicate a broader usage of this term than that of most later authors. This division was accepted by GRAY (1833) and emphasized by DOUVILLÉ (1912).

CARPENTER (1844) and CAYEUX (1915) failed to classify pelecypods on the basis of shell structure, but listed the types of structure they observed.

ROSE's (1858) mineralogical classification distinguishes between purely calcitic shells, those with both calcite and aragonite, and those composed entirely of aragonite.

BOGGILD (1930) pointed out that almost all of the anisomyaria are partly or totally calcitic and almost all isomyaria are aragonitic and that the shell structure of these two major groups is almost entirely distinct.

Comparison of Pelecypoda with other Mollusca

The three calcareous palliostracal layers of the pelecypods are usually rather clearly recognizable in the other classes of mollusks (fig. 3 A—E).

The layer distribution in uncoiled or little coiled gastropod genera such as *Haliotis* appears to represent the simplest possible arrangement of the calcareous layers of the palliostracum, with all three present and

one above the other (fig. 3 A). As the «Archetype Mollusk» had a similar shape it seems likely that this may also represent the primitive arrangement for mollusks as a whole. The structure of *Neopilina* (GRASSÉ, p. 1791) confirms this hypothesis. In coiled gastropods, the ectostracum is absent on the dorsal side of the whorl, where it contacts the preceding whorl.

The cephalopods (fig. 3 B) have modified the hypothetical primitive shell layer arrangement but little. The principal change is that the endostracum is not solid but split up into a series of plates (the septa) separated by air-filled spaces (the camerae). This is a result of intermittent secretion and outward movement of the animal within the shell. The siphuncular structures may represent further modifications of the endostracal pattern. In coiled exogastric shells, moreover, the ectostracum is as in coiled gastropods largely absent from the dorsal portion of the whorl. It may finally be remarked that the «annulus layer» of *Nautilus* and other cephalopods is a pallial myostracum.

The layer arrangement of the scaphopod shell has likewise undergone little modification from that of the hypothetical primitive arrangement. The principal difference consists of the formation of the apical opening (termed anal orifice) which increases in size by successive truncation of the shell during growth of the animal, so that all three major layers are exposed on its apical-marginal region (fig. 3 C).

The modification of pelecypod shell layer arrangement from that of primitive mollusks results from the bilobate mantle (fig. 3 E). Instead of one center of secretion there are two and each valve's layering arrangement resembles that in primitive gastropods. In the hinge region, however, the ectostracum is limited to the apical region and the hypertrophied mesostracum tends to form a «secondary margin».

In the chitons, the shell layer arrangement departs most from the presumed primitive condition, and any homology between the layers of the chitons and those of other mollusks is obscure. The tegmentum is here tentatively regarded as equivalent to the ectostracum, and the articulamentum seems to include equivalents of both mesostracum and endostracum (fig. 3 D). «Layer e» of BOGGILD (1930, p. 297) appears to be the endostracum and is composed of very regular crossed-lamellae, while «layers b, c and d» (id. p. 297) may represent the mesostracum.