

Sclerites of Solenogastres: their formation and crystal organization

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Solenogastres are small-sized, elongate, cylindrical, worm-like molluscs, which have small calcified sclerites (spicules, spines and scales) embedded in their cuticle. They develop a ventral furrow with a short, rudimentary foot. The latter distinguish them from the Caudofoveata that have a completely reduced foot. Regarding the secretion of the sclerites by the mantle epithelium, two main hypotheses have been proposed: 1) an intracellular origin from a single cell of the hypodermis or 2) from a cell membrane invagination of the epithelial cells. Previous studies indicated that the mineral composition of the sclerites is aragonite.

We have studied by optical and electron microscopy (TEM) the formation of the sclerites in *Rhopalomenia aglaopheniae* (Kowalevsky & Marion, 1887); *Privotia sopita* (Pruvot, 1891); *Dorymenia sarsii* (Koren & Danielssen, 1877) and *Anamenia gorgonophila* (Kowalevsky, 1880). In addition, we have analyzed by Electron-Backscatter-Diffraction (EBSD) and Field Emission Scanning Electron Microscopy (FESEM), the crystallographic arrangement of the aragonite of the sclerites of *Dorymenia sarsii*, *Anamenia gorgonophila* and *Simrothiella margaritacea* (Koren & Danielssen, 1877).

Our results point to an intracellular origin of the spicules, which start to form inside a cellular vacuole of the epithelial cells, without any connection to the cellular membrane. Only when the spicules grow and before entering the cuticle, they break the cell membrane. Regarding the crystallographic arrangement of aragonite crystals, the spicules from the studied species are single crystalline, with the aragonite c-axis oriented parallel to the spicule morphological axis.

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