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Shell microstructures of Japanese modan solemyids (Bivalvia)

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Molluscan shell is composed of carbonates and traces of organic matrix, and these components make a unit of structure called shell microstructure that is classified according to the criteria such as their form and orientation. It is known that the shell microstructures are similar in the phylogenetically closed taxa (Uozumi and Suzuki, 1981).

The Solemyidae is known as chemosynthetic bivalve (Fisher, 1990; Distel, 1998; Stewart & Cavanaugh, 2006) and classified into deep sea genus *Acharax* and shallow water genus *Solemya* (Coan et al., 2000). There is no study about shell microstructures of Japanese solemyids (*Solemya pusilla*, *Solemya tagiri*, *Solemya pervernicosa*, *Acharax japonica*, *Acharax johnsoni*). In this study, we describe shell microstructures of five solemyids from Japanese waters by scanning electron microscope (SEM). *S. pusilla*, *S. tagiri* and *S. pervernicosa* possess internal ligament that is the diagnostic character of the genus *Solemya*, and *A. japonica* and *A. johnsoni* possess external one characterizing the genus *Acharax*.

As a result of the SEM observations of each shell, the outer layer of *A. johnsoni* is composed of the unknown shell microstructure. The outer layer of *A. johnsoni* is composed of blocky units of structure (approximately 10µm diameter) and units filling a gap between these blocks these consist of granular crystals (approximately 1µm diameter). These units are enclosed by complex net-like organic matrix. The inner layer of this species consist of complex crossed lamellar structure (CCL). The other four species have radially elongated simple prismatic structure (RESP; Carter, 1990) that elliptic columns are elongated in a growth direction (i.e. radially) walled by organic matter. In *A. japonica*, granular prisms are arranged in the column that branched toward the outer shell surface. *S. pervernicosa* and *S. tagiri* have S-shaped structural units that consist of granules (approximately 1µm diameter) in the outer layer. There are three sub-layers in the structural unit of RESP of *S. pusilla*: the thin layer that made of vertical acicular or granular crystals, the layer that acicular crystals are inclined to shell surface, and the layer of granular crystals. The inner layer of *A. japonica* is composed of lamellar structure and homogeneous structure. Homogeneous structure appears in the inner layer of *S. pusilla*. *S. pervernicosa* and *S. tagiri* have the same microstructure in the outer layer as described above and three layers in their shell. However, the combinations of the microstructures of the middle and inner layers are different. The middle shell layer of *S. pervernicosa* consists of CCL, and the inner layer of them was composed of irregular prismatic structure (ISP). *S. tagiri* has homogeneous structure in the middle layer, and ISP or CCL in the inner layer.

From the result of classification and observation of shell microstructure in five species, there was no consistency in two results. Our further observation of shell microstructure in other solemyid species and gene analysis may reveal this incompatibility.

Keywords: chemosynthetic bivalve, Solemyid, shell microstructure