Shell structure of chemosynthetic bivalve, Conchocele bisecta

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Conchocele bisecta (Thyasiridae, Bivalvia) is a popular member of chemosynthetic community, living in interface between anaerobic and aerobic environments. *C. bisecta* bears symbiotic sulfur-oxidizing bacteria in their gill tissue (Imhoff et al., 2003). It's shell is larger than other Thyasiridae, so is useful to examine shell microstructual and geochemical studies. We reveal the shell structure and stable oxygen and carbon isotope compositions of *C. bisecta* of two Holocene dead specimens: one collected at 400-450m in depth in the Gulf of Patience, Okhotsk Sea (cw-1) and the other collected at 100-120m in depth off Wakkanai, northernmost Hokkaido (cwk3-1). Specimen cwk3-1 (1000 years ago) was preserved in a carbonate concretion with greatly depleted ^{13}C (Majima et al., 2000).

The shell structure is descrived, based on SEM observation, acetate peel methods, and XRD analysis. *Conchocele* shells has the outer, middle, inner layer, and myostracum. The XRD data of two specimens show that all layers consist of aragonaite. The outer layer shows highly varied microstructures: homogeneous and three types of spherulitic structure (spherulitic, planar spherulitic, and spherulitic prismatic structures). The homogeneous and spherulitic structures of the outer layer repeatedly alternate. The middle layer are divided into the outer (cone complex crossed lamellar structure) and inner part (crossed lamellar structure) with transitional boundary. The inner layer consist of two types of sublayers: one being the cone complex crossed lamellar structure and the other being of irregular prismatic and fine complex structures. The pallial and adductor myostracum are composed of irregular prismatic structure.

The oxygen and carbon isotope ratios were measured from the outer layer of the cw-1 specimen along the axis of maximum growth (distance from umbo to ventral margin: 0-110mm). The results reveal two cycles with high-amplitude ($d^{18}O$: 3.8 to 4.5 per mill vs. PDB and $d^{13}C$: -3.1 to 1.2 per mill) in the earlier growth stage (0-70mm), and five cycles with low-amplitude ($d^{18}O$: 3.6 to 4.1 per mill and $d^{13}C$: -2.5 to -0.1 per mill) in the later growth stage (70-115mm). Disturbance rings observed in the outer shell surface are coincide with the positions strongly depleted ^{13}C and ^{18}O and spherulitic structure of the outer layer.

References

Imhoff, J.F., Sahling, H., Suling J., Kath, T., 2003. 16S rDNA-based phylogeny of sulphur-oxidising bacterial endosymbionts in marine bivalves from cold-seep habitats. Mar. Ecol. Prog. Ser., vol.249, p.39-51.

Majima, R., Katou, K., Wada, K., Miyauchi, T., 2000. Chemoautorophic assemblages colected from off Wakkanai. Kaiyo Monthly Special Issue, vol.20, 146-154 (in Japanese, title translated).