

The analysis of periostracum on Ammonoid shells from Cretaceous Yezo Group

*Hideharu Kohno¹, Haruyoshi Maeda¹

1. Kyushu University

Molluscs are animals belonging to the phylum Mollusca in the taxonomic class of creature. Its features are (1) the body is bilaterally symmetric, (2) the mantle (membrane covering the internal organs) is maintained, and (3) the calcium carbonate shell is formed. Among them, the shells of molluscs that form shells are covered with an organic film called periostracum. Its thickness and fine shape differ depending on the species.

The periostracum surface of modern bivalves (e.g. Unionidae, Lternulidae) has been shown to retain microprojections, and the microprojections on the periostracum itself help protect the shell from friction between the water stream and the shell. It is suggested that it is possible. In addition, molluscan periostracum is known to contain pigments (mainly melanin, carotenoids, tetrapyrrole) and to exhibit various colors. Heretofore, it has been considered that the color of the periostracum is a complex one that varies greatly depending on the side chain of the pigment compound and the type of binding protein. However, recent spectroscopic studies suggest that the structure of the polyenes that make up the carotenoids can determine the color. The color and color band of the periostracum formed by polyenes play important ecological roles, such as identifying the same species and camouflaging the predator's eyes.

On the other hand, organic periostracum is easily decomposed and hardly remain in fossils. However, a closer examination reveals that even the fossil of Ammonoids may still have periostracum. For example, *Owenites* cf. *koeneni* from the Triassic has a dark color band on the periostracum. This band is considered to be the original pattern when it was alive because (1) it had a radial pattern and (2) the pattern was interrupted at the damaged part of the shell. Color bands and shells are also known from *Protexanites*, *Tetragonites*, and *Gaudryceras* from the Cretaceous Yezo Group. However, its substance (function, color of the time when Ammonoid alive, etc.) has not yet been clarified because it was difficult to extract the pigment. In this study, we clarify substance of the periostracum preserved in Ammonoid shells from the Cretaceous Yezo Group.

To clarify the substance of the periostracum, *Gaudryceras*, which is known to have a large number from the upper Albian to Maastrichtian and known to have a better periostracum quality of preservation than other individuals, was selected. The surface and cross-section microstructure of periostracum were observed by SEM. Observation of the surface confirmed a clear structural difference between the shell and the periostracum that was presumed to coat on it. The former has a structure in which the crystals constituting the shell are layered. The latter had many microprojections (1-5 μm in diameter) as seen in the shells of modern bivalves.

Keywords: Ammonoid, Periostracum, Gaudryceras