

MORPHOLOGICAL DIVERSITY OF THE JAWS OF CRETACEOUS AMMONOIDEA

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Jaws (beaks) and radula are occasionally preserved within the body chambers of ammonoids whose exact taxonomic relationships are known. Based on such *in situ* material, ammonoid jaws from 26 Late Paleozoic and Mesozoic genera have been classified into four morphotypes: normal (coleoid), anaptychus, aptychus, and rhynchaptychus types (Lehmann, 1990; Tanabe and Fukuda, 1999). However, a question still remains with respect to these morphotypes, because of the presence of an intermediate form. Furthermore, one must consider the degree of taphonomic loss in actual fossils prior to morphotypic classification.

We have reexamined and compared the jaw morphologies of 18 Cretaceous genera in the suborders Phylloceratina, Lytoceratina, Ammonitina, and Ancyloceratina, relying upon well-preserved specimens from the Northwestern Pacific Province (Hokkaido and Sakhalin) and the U. S. Western Interior Province, in addition to previously published material. Our results show that the upper jaws of these genera exhibit little morphological variation. They consist of horny reduced outer and large paired inner lamellae, both of which are united in the anterior portion forming a sharp rostral tip. These features are quite different from those of the upper jaws of extant coleoids and *Nautilus*, both of which have a continuous inner lamella. A thin anterior calcitic layer covers the horny lamellae of the upper jaws of *Aconeceras* (Ammonitina, Haplocerataceae) and *Scalarites* (Ancyloceratina, Turrilitaceae). The upper jaws of *Gaudryceras* and *Tetragonites* described by Tanabe et al. (1980) and Kanie (1982) are probably deformed lower jaws. Thus, the upper jaws of these genera are still unknown.

In contrast to the morphological conservatism of the upper jaws, the lower jaws of Cretaceous ammonoids exhibit remarkable taxonomic variation in their relative size, overall morphology, and the degree of development of the outer calcitic layer. The lower jaws of Phylloceratina and Lytoceratina are characterized by a well-developed univalved outer chitinous lamella with an anterior calcified rostral tip, which appears to be effective for a scavenging-predatory mode of feeding, as in the jaws of *Nautilus*. Those of the other 15 genera may fall into either aptychus- or anaptychus-types, but this classification has no biological meaning because of the presence of an intermediate form between them. The lower jaws of Acanthocerataceae, Hoplitaceae, Scaphitaceae, and Turrilitaceae all possess a widely open, large outer horny lamella with a median depression ("hinge") covered by a thin bivalved calcitic plate. These jaws may have been specialized for feeding on various kinds of microorganisms and could be accommodated within a buccal mass by bending the flexible chitinous outer lamella.

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