Further study of the Middle Ordovician cephalopod Holmiceras coreanicum with a revision of two Geisonoceras species from Korea

Author: YUN, CHEOLSOO

Source: Paleontological Research, 7(4) : 363-366

Published By: The Palaeontological Society of Japan

URL: https://doi.org/10.2517/prpsj.7.363

Paleontological Research, vol. 7, no. 4, pp. 363–366, December 31, 2003

SHORT NOTES

Further study of the Middle Ordovician cephalopod *Holmiceras coreanicum* with a revision of two *Geisonoceras* species from Korea

CHEOLSOO YUN

Daegu Science High School, 613 Hwanggeum-Dong, Suseong-Gu, Daegu, 706-042, Korea

Received May 10, 2002; Revised manuscript accepted September 22, 2003

Key words: ***Geisonoceras***, ***Holmiceras coreanicum***, **Jigunsan Formation, Korea, Ordovician, systematics**

Introduction

In the cephalopod fauna from the Middle Ordovician Jigunsan Formation of Korea, the most abundant fossil is the lituitid *Holmiceras coreanicum* which is composed of an early coiled portion and a sigmoidally curved later portion (Yun, 1999). However, it is rare to discover complete individual specimens because of poor preservation, like other fossil nautiloids. Previously, Kobayashi (1934) described several annulated nautiloids as different species based on fragmentary specimens. Yun (1999) has shown that these could be reassigned to *H. coreanicum*.

H. coreanicum is characterized by having prominent annulations and fine growth lines on the shell surface. These features are, however, observed in other Ordovician nautiloid cephalopods from Korea, such as *Holmiceras*, *Cycloceras*, *Geisonoceras*, *Sactorthoceras*, *Tofangoceras*, *Kogenoceras*, *Jiangshanoceras*, *Centroonoceras*, *Wennanoceras*, *Spyroceras*, and *Centrocyrtoceras*. Among species of these genera, two species belong to *Geisonoceras*, *G. hyatti* Kobayashi, 1934 and *G. abruptum* Kobayashi, 1934. Kobayashi (1934) showed that the two species are characterized by having bands or raised lines on the shell surface, as can only be seen in the longitudinal section. The genus *Geisonoceras* is known to occur commonly from the Middle Ordovician strata in Europe and North America, but is uncommon in Asia.

In this study, the taxonomic position of the two *Geisonoceras* species from Korea is reexamined on the basis of observation of the type specimens. The specimens numbered with prefix UMUT and KPE are deposited in the University Museum, the University of Tokyo, Japan and the Department of Earth Science Education, Kyungpook National University, Korea, respectively.

Systematic paleontology

Order Tarphycerida Flower in Flower and Kummel, 1950
Family Lituitidae Phillips, 1848
Genus ***Holmiceras*** Hyatt, 1894

Type species.—*Lituites praecurrens* Holm, 1891 from the Middle Silurian of Bohemia, Original designation.

Holmiceras coreanicum (Kobayashi, 1927)

Orthoceras coreanicum Kobayashi, 1927, p. 181, pl. 18, fig. 6; pl. 19, figs. 3a–c.
Orthoceras makkolense Kobayashi, 1927, p. 181, pl. 19, figs. 2a–c.
Sigmorthoceras coreanicum (Kobayashi). Kobayashi, 1934, p. 413, pl. 22, fig. 7.
Sactorthoceras makkolense (Kobayashi). Kobayashi, 1934, p. 408, pl. 15, fig. 9.
Cycloceras sp. Kobayashi, 1934, p. 421, pl. 29, figs. 12–13.
Sinuitopsis kochiriensis Kobayashi, 1934, p. 360, pl. 5, figs. 1–4.
Geisonoceras hyatti Kobayashi, 1934, p. 415, pl. 23, figs. 3–4.
Geisonoceras abruptum Kobayashi, 1934, p. 416, pl. 20, fig. 3.
aff. *Trilacinoceras* sp. Ozaki and Ogino, 1968, pl. 3, fig. 3.
Holmiceras coreanicum (Kobayashi). Yun, 1998, p. 78, figs. 1c–h; Yun, 1999, p. 68, figs. 3.1a, b, 2a, b; 4.1–4.10

Material studied.—Two type specimens UMUT PM653, UMUT PM654, 19 newly collected specimens (KPE20001-KPE20007, KPE20011, KPE20013, KPE20020, KPE20023, KPE20026-1, KPE20027, KPE20028, KPE20295, KPE20302, KPE20304, KPE20307, KPE20320) from the Middle Ordovician Jigunsan Formation, Sangdong area, Gangwondo, Korea (Yun, 1999, fig. 1).

Diagnosis. — Conch sigmoidally curved with early

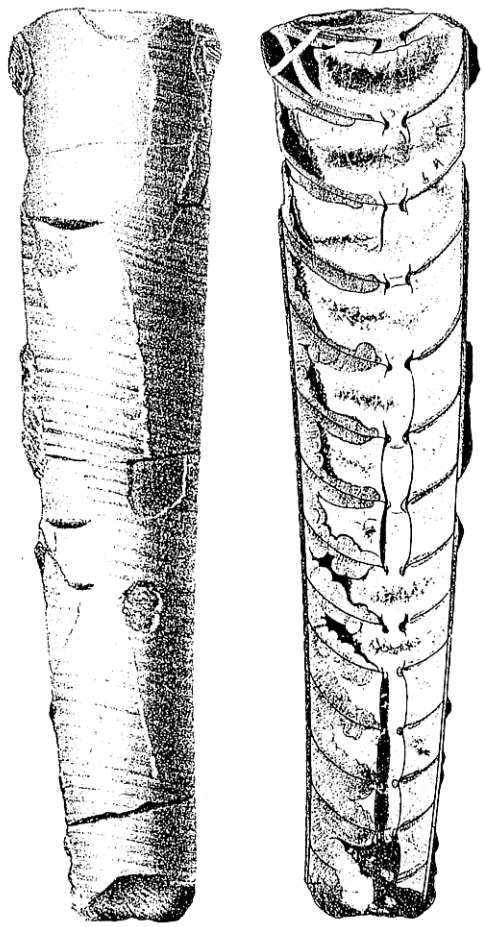

Figure 1. Type species of *Geisonoceras*, *Orthoceras rivale* (Barrande). Reproduced from Barrande (1866). × 0.8.

loosely coiled portion; body chamber long; circular in cross section; siphuncular segments somewhat expanded within camera; septal necks orthochoanitic; no cameral and annulosiphonate deposits present; surface ornamented with prominent annulations and very fine growth lines (Yun, 1999).

Description.—As given by Yun (1999).

Remarks. — This species has an orthochoanitic, subcentral siphuncle, a loosely coiled early stage, and surface ornamentation of growth banding and annulations. It is the most abundant species among the Korean Ordovician nautiloids. Several nautiloids previously reported from Korea were reassigned as synonyms of *Holmiceras coreanicum* (Yun, 1999).

Kobayashi (1934) proposed *G. hyatti* and *G. abruptum* from the Middle Ordovician Jigunsan Formation of Korea on the basis of the characteristics of growth bands on conch surface. Both species are based on the monotype, UMUT PM653 and UMUT PM654, respectively. The type species of the genus *Geisonoceras* Hyatt, 1884 is *Orthoceras rivale* Barrande, 1866 (figured pl. 209; described 1874, p. 383) from the Middle Silurian of Bohemia (Figure 1). The genus is diagnosed by the transverse lirae or broadly spaced bands which are occasionally adorally imbricated, and annulosiphonate, and have well developed cameral deposits (Sweet, 1964). The two species of *Geisonoceras* from Korea do not possess siphuncluar and cameral deposits, and they therefore cannot be placed in *Geisonoceras*.

Kobayashi (1934) stated that the two species have transverse ridges that incline more steeply backward than forward. My examination of the type specimens of *G. hyatti* and *G. abruptum*, however, shows that the inclination of the transverse ridges is almost symmetric rather than adorally imbricated (Figures 2, 3) and the asymmetrical pattern of the transverse ridges illustrated in Kobayashi (1934, pl. 20, fig. 3 and pl. 23, fig. 4) could not be observed either by the naked eye or optical microscopy.

The intervals between the crests of annulations are comparable with those of other species of *Homiceras* as well as *Cycloceras* and *Kogenoceras*. As shown in Figure 4, the annulation intervals in the type specimens of the two *Geisonoceras* species from Korea are nearly identical with those of *H. coreanicum*. Additionally, the two *Geisonoceras* species and *H. coreanicum* commonly have annulation intervals even narrower than those of *Cycloceras* and *Kogenoceras*, both with strong annulations. Consequently, *G. hyatti* and *G. abruptum* are regarded as synonymous with *H. coreanicum* in the following features: no annulosiphonate and cameral deposits in the phragmocone and narrowly spaced symmetrical annulations in both sides of conch. Without exception, *H. coreanicum* has fine growth lines and relatively strong annulations on the conch surface (see Yun, 1999, fig. 4.10). Also, its conch surface on the ventral side has prominently lobed growth lines and ridges in the juvenile stage (see Yun, 1999, fig. 4.2, 4.10).

Acknowledgements

The author is grateful to Kazushige Tanabe of the Department of Earth and Planetary Science, University of Tokyo for help in collecting fossil specimens and valuable suggestions, and Takeo Ichikawa of the University Museum of the University of Tokyo for access to the UMUT specimens examined. I am indebted to Seong-Young Yang of the Department of Earth Science Education, Kyungpook National University in Korea for his kind advice and encouragement. Special thanks are due to Royal H. Mapes of the Department of Geological Sciences, Ohio University for his critical review.

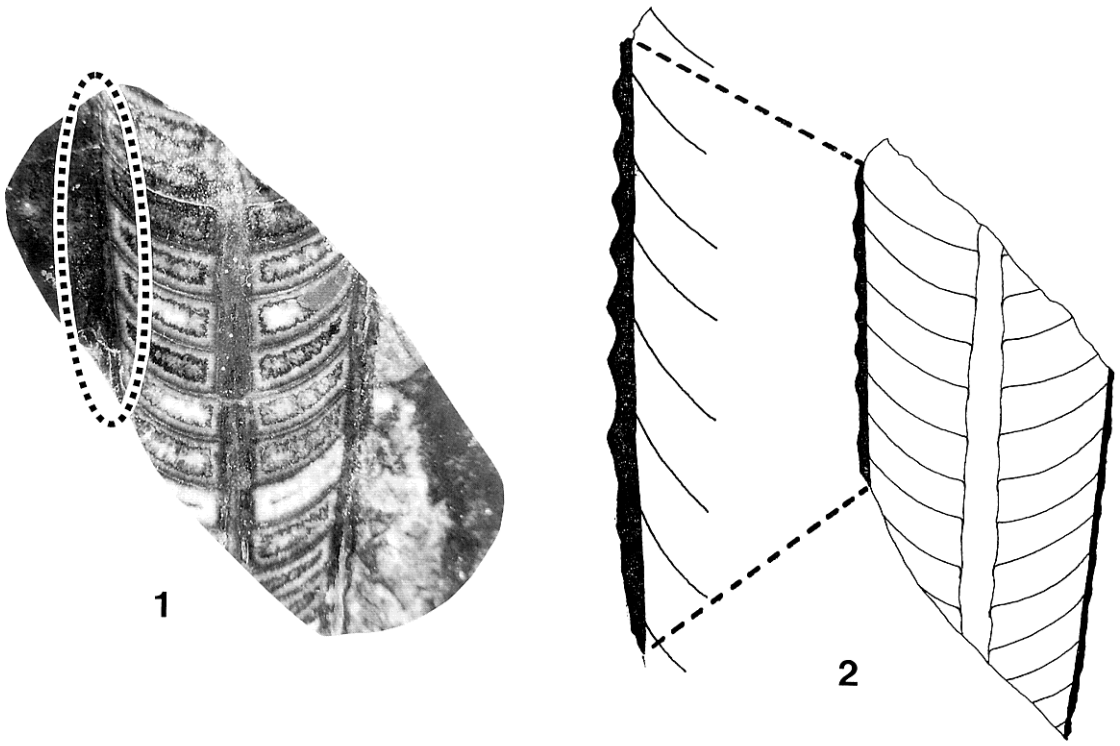

Figure 2. Details of annulation represented on the longitudinal section. **1**. *Geisonoceras abruptum* Kobayashi, UMUT PM654, × 1.5. **2**. Diagrammatic section of internal structure and surface ornamentation, showing the nearly symmetrical annulations, × 1.5.

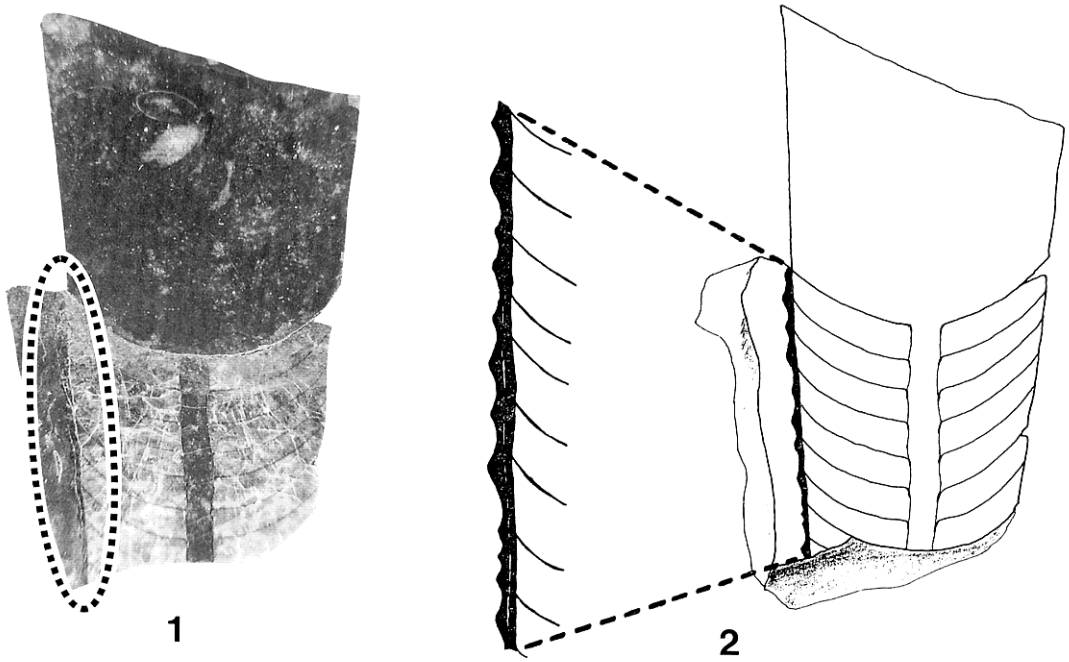

Figure 3. Details of annulation represented on the longitudinal section. **1**. *Geisonoceras hyatti* Kobayashi, UMUT PM653, × 1.5. **2**. Diagrammatic section of internal structure and surface ornamentation, showing the nearly symmetrical annulations, × 1.5.

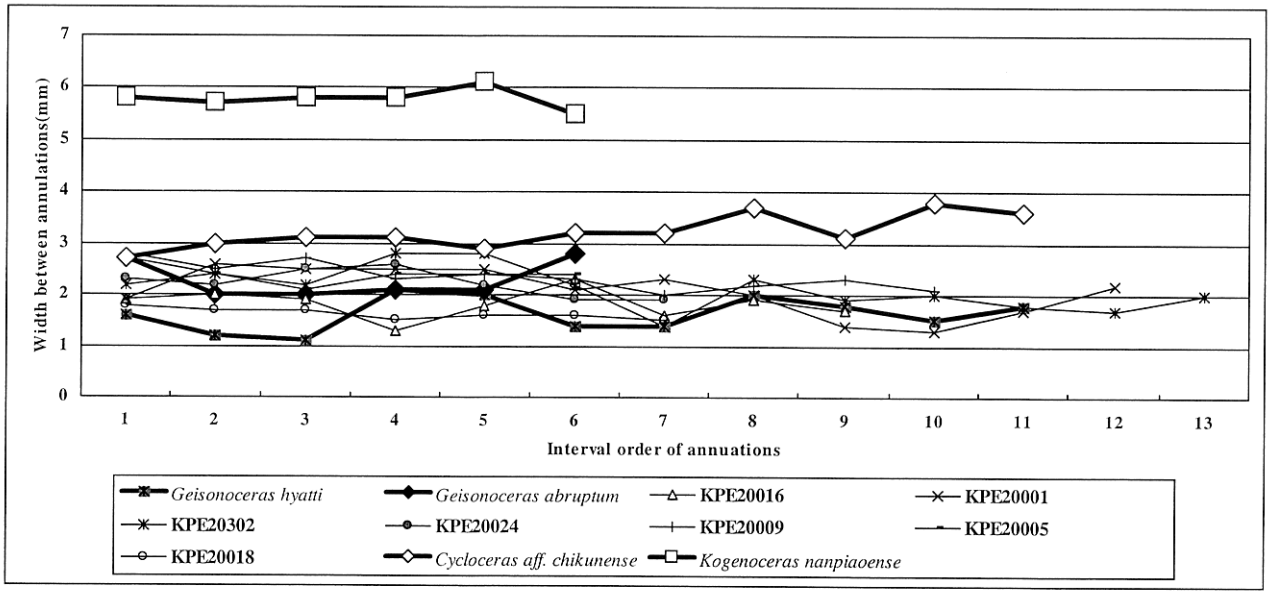

Figure 4. Comparison of annulation intervals in several nautiloids with annulations. The specimens belonging to *Geisonoceras* and *Holmiceras* commonly have even narrower intervals than those of *Cycloceras* and *Kogenoceras*, both with strong annulations. The specimens with prefix KPE are all *Holmiceras coreanicum* (Kobayashi).

References

Barrande, J., 1866: *Système Silurien du centre de la Bohême, Partie 1, Recherches Paléontologiques. Vol. 2, Classe des Mollusques, Ordre des Céphalopodes*, pls. 108–244.

Flower, R.H. and Kummel, B.Jr., 1950: A classification of the Nautiloidea. *Journal of Paleontology*, vol. 24, no. 5, p. 604–616.

Holm, G., 1891: Om mynningen hos Lituites Breyn. Geologiska Föreningens I Stockholm Förhandlingar, vol. 13, no. 7, p. 736–774.

Hyatt, A., 1894: Phylogeny of an acquired characteristic. *Proceedings of the American Philosophical Society*, vol. 32, no. 143, p. 349–647.

Kobayashi, T., 1927: Ordovician fossils from Corea and South Manchuria. *Japanese Journal of Geology and Geography*, vol. 5, no. 4, p. 173–212.

Kobayashi, T., 1934: The Cambro-Ordovician formations and faunas of South Chosen. Palaeontology. Part. I, Middle Ordovician faunas. *Journal of the Faculty of Science, University of Tokyo, Section II*, vol. 3, part 8, p. 329–519.

Ozaki, K. and Ogino, S., 1968: On the macrofauna from the Jigunsan Shale in the Jangseong area, Kangweondo, Korea. *In*, Aramaki, H. and Yamaguchi, T. *eds., Report of Geological Expeditionary Party in Kangweondo, Korea*, p. 21–38, pls. 1–7. Geological Society of Yokohama, Yokohama. (*in Japanese*)

Phillips, J., 1848: The Malvern Hills, compared with the Palaeozoic districts of Abberley, Woolhope, May Hill, Tortworth and Usk. *Geological Survey of Great Britain, Memoir, Pt. 1*, vol. 2, p. 246–250.

Sweet, W.C., 1964: Nautiloidea-Orthocerida, Mollusca 3. *In*, Moore, R.C. *ed., Treatise on Invertebrate Paleontology, Part K*, p. 216–261, Geological Society of America and University of Kansas Press, Lawrence.

Yun, C.S., 1998: First discovery of *Holmiceras* from the Jigunsan Formation of Korea. Abstracts with Programs, the 1998 Annual Meeting of the Palaeontological Society of Japan (Jan. 30–Feb. 1, 1998, Odawara), p. 78.

Yun, C.S., 1999: Three Ordovician cephalopods from the Jigunsan Formation of Korea. *Paleontological Research*, vol. 3, no. 2, p. 65–81.