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Some ammonoids from the Barremian and probable Albian of the Choshi Peninsula, Japan

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Abstract

A new species of *Eogaudryceras* (*Eotetragonites*) is proposed and *Holcophylloceras* sp. is described from the Barremian Kimigahama Formation, Choshi Group. *Tetragonites* (*T.*) sp. has been collected from the Miocene Naarai Formation, Chiba Prefecture and is a derived fossil from probable Albian strata. Thus, the chart of ammonoid occurrences from the lithostratigraphical succession is newly revised.

Key words: *Eogaudryceras* (*Eotetragonites*) *antiquum*, *Holcophylloceras* sp., *Tetragonites* (*T.*) sp., Choshi Group, Japan

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Introduction

Biozonation of Lower Cretaceous deposits in Japan is based mainly on ammonoids; previous authors have compared these zones with equivalent schemes employed in western Europe, North America, and other regions.

As far as the present knowledge is concerned (Shimizu, 1931; Obata and Matsukawa, 2007, 2009; Matsukawa, 1987), fifteen Barremian, fifteen Aptian, and three Albian ammonoid species have been described from the Lower Cretaceous of the Choshi Peninsula, Chiba Prefecture, Japan. In this paper, we propose a new specific name for *Eogaudryceras* (*Eotetragonites*) aff. *raspaili* Breistroffer

described previously from the Barremian Kimigahama Formation. Furthermore, we provide a new description of *Holcophylloceras* sp. from the Barremian Kimigahama Formation of the Choshi Group, as well as probable Albian *Tetragonites* (*Tetragonites*) sp., derived fossil from the Miocene Naarai Formation.

Depository

Specimens with the prefix TGUSE-MM are deposited in the Department of Environmental Sciences, Tokyo Gakugei University, while those with the prefix NSM-PM are deposited in the Department of Geology and Paleontology,

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National Museum of Nature and Science, Tokyo.

Holcophylloceras sp.

Note on stratigraphy

The stratigraphic sequence in the studied area of the Choshi Peninsula is summarized in Figure 1. The Cretaceous Choshi Group crops out along the eastern coastline of the Choshi Peninsula, Chiba Prefecture. The geological map of the area is shown in Figure 2 with the locality points that yielded the ammonoids described in this paper. The Choshi Group comprises clastic rocks almost 935 m in total thickness, and is subdivisible lithologically into five units, as shown in Figure 1. As to the detailed lithofacies and age determination, refer to the description of each formation in Obata and Matsukawa (2009, p. 254–256).

Systematic description

- Class Cephalopoda Zittel, 1884
- Order Ammonoidea Zittel, 1884
- Suborder Phylloceratina Arkell, 1950
- Superfamily Phyllocerataceae Zittel, 1884
- Family Phylloceratidae Zittel, 1884
- Subfamily Phylloceratinae Zittel, 1884
- Genus *Holcophylloceras* Spath, 1927

Fig. 3A-D

Synonymy.

2007 *Eogaudryceras* (*Eotetragonites*) aff. *raspaili* Breistroffer: Obata and Matsukawa, p. 366, fig. 5, Z1–4 only.

Material. TGUSE-MM5006 from locality 7307, Isejigaura, middle mudstone member of Kimigahama Formation, Choshi Group (S. Hagiwara Coll.).

Dimensions (in mm except for U/D and W/H). Specimen TGUSE-MM5006: D, 12.9; U, 1.5(?); U/D, 0.12 (?); H, 7.4 (?); W, 5.2 (?), W/H=0.70 (?)

Description. Shell very small, width of umbilicus narrow. Whorl fairly compressed, involution about a half. Whorl-section roughly ellipsoidal. Periodic sigmoidal constrictions are sharp on internal cast. Surface nearly smooth but distinctly costate on the upper ventral area above 10 mm in diameter. Costae gradually decrease in strength along the flank, showing prorsiradial orientation.

Remarks. TGUSE-MM5006 is a small example but shows nearly similar features with *Holcophylloceras mediterraneum* (Neumayer) (Arkell and Wright, 1957, L. 189, fig. 220, 5a–c) and *H. guettardi* (Raspail) (Orbigny, 1841, p. 169–171, pl. 53, figs. 1–3) in width of umbilicus, compression of whorl, involution of whorl, and nature of costae and sigmoidal

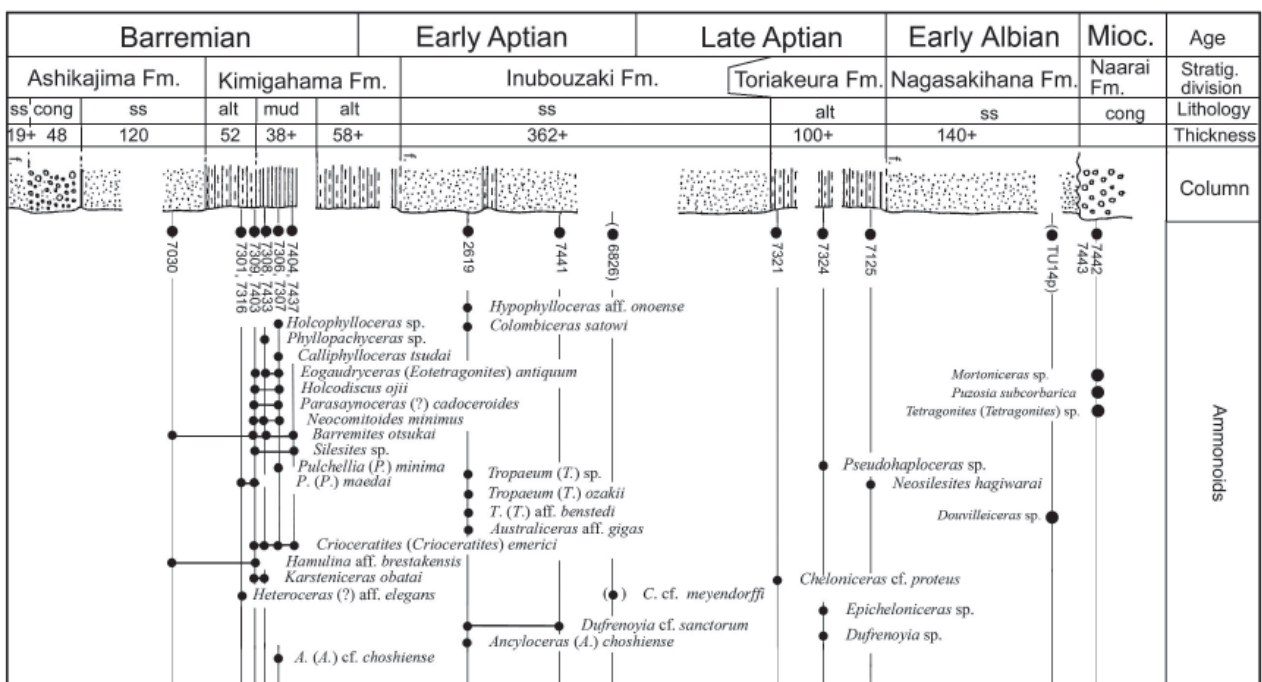


Figure 1. Stratigraphic distribution of ammonoids in the Choshi Group in Chiba Prefecture (Revised from Obata and Matsukawa, 2007, 2009).

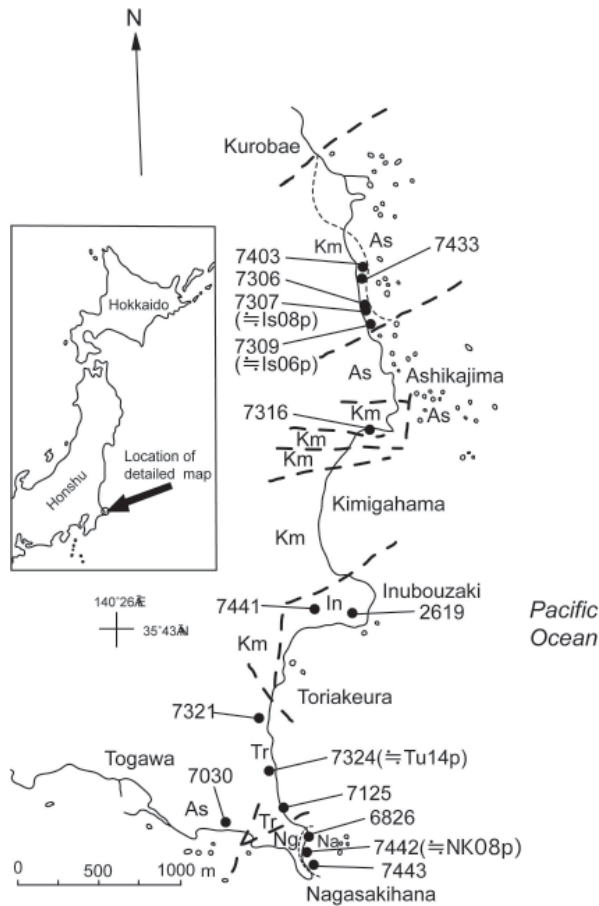


Figure 2. Ammonoids were collected from the Lower Cretaceous Choshi Group and also as derived fossils from the Miocene Naarai Formation (revised from Obata and Matsukawa, 2007, 2009). Na: Naarai Formation, Ng: Nagasakihana Formation, Tr: Toriakeura Formation, In: Inubouzaki Formation, Km: Kimigahama Formation, As: Ashikajima Formation.

constrictions, although the suture is not known in detail.

Occurrence. Barremian (Kimigahama Formation) of Isejigaura (Chiba Prefecture).

Suborder: Lytoceratina Hyatt, 1889

Superfamily: Tetragnostaceae Hyatt, 1900

Family: Gaudryceratidae Spath, 1927

Genus *Eogaudryceras* Spath, 1927

Subgenus *Eogaudryceras* (*Eotetragonites*) Breistroffer, 1947

Remarks. Wright (1957) recognized the genera *Eogaudryceras* and *Eotetragonites* in the Subfamily Gaudryceratinae Spath, 1927 (Family Tetragnostidae, Hyatt, 1900; Superfamily Lytocerataceae Neumayr, 1875). Wright et al. (1996) revised this assignment, however, and included *Eotetragonites* as a subgenus of *Eogaudryceras* along with subgenus *Eogaudryceras*. We follow this classification.

Eogaudryceras (*Eotetragonites*) *antiquum* sp. nov.

Fig. 3E–F, G–J, N–P, Q–T, U–V, W–Y, Z_{1–3}, AA_{1–2}

Synonymy.

2007 *Eogaudryceras* (*Eotetragonites*) aff. *raspaili* Breistroffer; Obata and Matsukawa, p. 366, figs. 4L, M, 5L, W, X, Y, 6I, J, P, non 5Z_{1–4}.

2009 *Eogaudryceras* (*Eotetragonites*) aff. *raspaili* Breistroffer; Obata and Matsukawa, p. 257, fig. 5N–Q.

Derivation of name. Among eotetragonitid species, the new form is probably representative of the oldest known occurrence.

Types. Holotype is NSM–PM 17328 from locality Is06p (Coll. T. Oji) (≈Obata et al., 1982, loc. 7309), Isejigaura, Kimigahama Formation, Barremian; paratypes are TGUSE–MM5003 (T. Asada Coll.), and TGUSE–MM6003 (S. Hagiwara Coll.), partly eroded, from locality 7307 (Isejigaura); TGUSE–MM5004 (S. Hagiwara coll.), slightly deformed, from locality 7433 (Isejigaura); TGUSE–MM5005 (S. Hagiwara Coll.), TGUSE–MM5029 (S. Hagiwara Coll.), and TGUSE–MM6002 (S. Hagiwara Coll.) from locality 7306 (Isejigaura); NSM–PM6799 (S. Hagiwara Coll.), partly destroyed, locality 7403 (Isejigaura).

Diagnosis. Eotetragonitid with several constrictions per whorl, with more compressed whorl section than other eotetragonitids at later growth stage (ca. 50 mm in diameter).

Dimensions. See Obata and Matsukawa, 2007, p. 366 and Obata and Matsukawa, 2009, p. 257.

Descriptive remarks. Obata and Matsukawa (2007, p. 369) for a comparison of Japanese species with some of the foreign species of *Eogaudryceras* (*Eotetragonites*): In the younger growth stage the Choshi specimens show nearly subangular (e.g. NSM–PM17328) or rectangular (e.g. NSM–PM6799) whorl-section similar to that of *E. (Eotetragonites) raspaili* Breistroffer from the Upper Aptian of France (Kilian, 1913, pl. 11, fig. 3). They are also smooth or finely striate in contrast to the French species, and exhibit a lesser number of strong constrictions that project gently forwards over venter.

In the later growth stage, the Choshi specimens (e.g. TGUSE–MM5004) show rather rectangular whorl-section, similar with that of *E. (Eotetragonites) wintunium* (Anderson) from the Upper Aptian of northern California (Murphy, 1967, pl. 3, fig. 5–6), at nearly the same growth-stage, but are more compressed than that species (see Obata and Matsukawa,

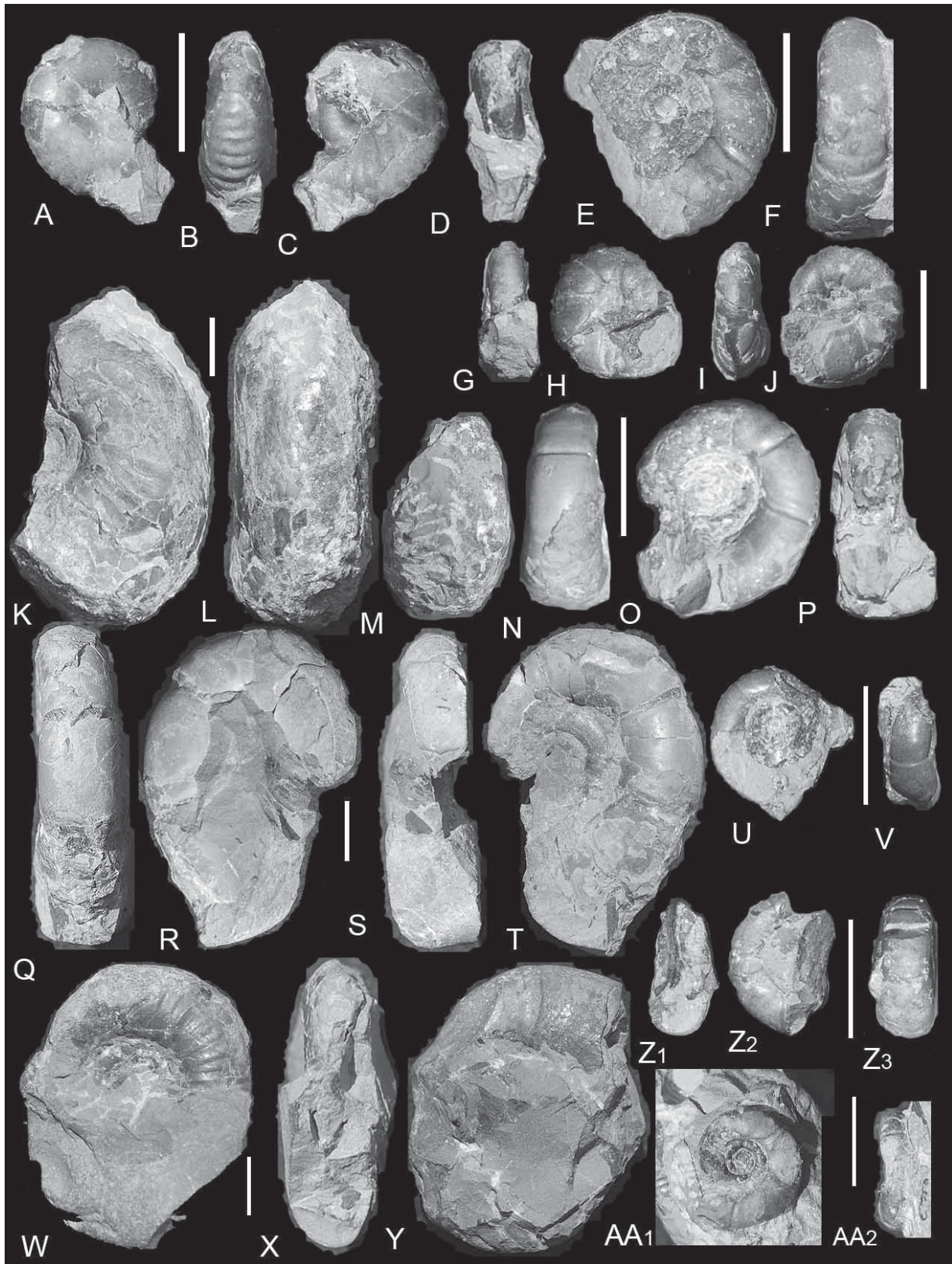


Figure 3. A–D, *Holcophylloceras* sp., TGUSE-MM5006 from loc. 7307; E–F, *Eogaudryceras* (*Eotetragonites*) *antiquum* sp. nov., NSM-PM6799 from loc. 7403; G–J, *Eogaudryceras* (*Eotetragonites*) *antiquum* sp. nov., TGUSE-MM6002 from loc. 7306; K–M, *Tetragonites* (*Tetragonites*) sp., NSM-PM6908 from loc. 7442; N–P, *Eogaudryceras* (*Eotetragonites*) *antiquum* sp. nov., NSM-PM17328 (holotype) from loc. Is06p (\approx loc. 7309) (Coll. T. Oji); Q–T, *Eogaudryceras* (*Eotetragonites*) *antiquum* sp. nov., TGUSE-MM5004 from loc. 7433; U–V, *Eogaudryceras* (*Eotetragonites*) *antiquum* sp. nov., TGUSE-MM5029 from loc. 7306; W–Y, *Eogaudryceras* (*Eotetragonites*) *antiquum* sp. nov., TGUSE-MM5003 from loc. 7307; Z_{1–3}, *Eogaudryceras* (*Eotetragonites*) *antiquum* sp. nov., TGUSE-MM6003 from loc. 7307; AA_{1–2}, *Eogaudryceras* (*Eotetragonites*) *antiquum* sp. nov., TGUSE-MM5005 from loc. 7306. Scale bars show 1 cm.

2007, p. 366). The Japanese species exhibits fewer constrictions per whorl than does the Californian species, and costa in front of the constrictions are distinguished from the other costae are more pronounced (e.g. TGUSE-MM5004). Suture line of the former has asymmetrically bifid saddles (TGUSE-MM5004). As an example of the contemporaneous Barremian species, comparison with *Eogaudryceras* (*Eogaudryceras*) *numidum* (Coquand) including the lectotype, shows significant differences. In the younger growth stage of the Japanese specimens (D=11–17 mm), the whorl-sections are less rounded than those of the lectotype (D=28mm) of *E. (E.) numidum* from Algeria (Sayn, 1890, pl. 1, fig. 3a, b) and show several strong constrictions per whorl on the smooth or finely striate lateral view, while the constrictions are weak or absent in the latter, although the Algerian lectotype is almost twice as large as the Japanese specimens. In the later growth stage of the Japanese specimens (D=40–49 mm), the whorl-sections is rather subrectangular and fairly compressed (W/H=0.8), while that of the French specimen (D=45 mm) (Murphy, 1967, pl. 5, figs. 1, 2) shows a rounded but rather convergent whorl-section and almost as high as wide. The constrictions are strong in the Japanese specimens and the costae in front of the constrictions are more distinguished than the other costae (TGUSE-MM5003), while they are weak in the French specimen.

Occurrence. Barremian (Kimigahama Formation), Choshi Peninsula, Chiba Prefecture.

Family Tetragonitidae Hyatt, 1900

Subfamily Tetragonitinae Hyatt, 1900

Genus *Tetragonites* Kossmat, 1895

Tetragonites (*Tetragonites*) sp.

Fig. 3K–M

Material. NSM-PM6908, a deformed, small fragment, from loc. 7442 of Obata et al. (1975), Nagasakihana (Coll. H. Tsuda, Dec. 1974), Choshi Peninsula.

Dimensions (in mm except for U/D and W/H). Specimen NSM-PM6908: D, 63.2 (?); U, 13.1 (?); U/D, 0.21 (?); H, 23.0 (?); W, 22.5 (?); W/H, 0.98 (?).

Description. Shell fairly small (D=63 mm), width of umbilicus fairly narrow (U/D=0.21). It seems to be moderately evolute, although the exact measurements are

unknown due to poor preservation. The whorl is nearly as high as wide, showing nearly flat flank, low and steeply inclined umbilical wall, and rounded venter. Shell nearly smooth, but oblique and weak prorsiradiate constrictions are discernible. Siphonal ridge seems to be absent on venter. Suture with several auxiliary saddles but details unknown.

Remarks. Wright et al. (1996) revised Wright (1957) in recognizing the subgenera *Tetragonites* (Upper Aptian – Maastrichtian) and *Carinites* (Middle Cenomanian) within the genus *Tetragonites*. Our material seems to belong to *T. (Tetragonites)*.

Occurrence. Basal conglomerate of the Miocene Naarai Formation, derived fossil.

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銚子半島の白亜紀 Barremian とおそらく Albian を示すアンモナイト

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環境科学分野

要 旨

銚子層群の Barremian 君ヶ浜層から得た2種のアンモナイトを *Eogaudryceras (Eotetragonites) antiquum* と *Holcophylloceras* sp. として記載した。また、中新世の名洗層に誘導化石として含まれていたアンモナイトを *Tetragonites (T.)* sp. として記載した。この古生物学的記載に基づき銚子層群のアンモナイトの生層序分布を改訂した。

キーワード: エオゴードリセラス, ホルコフィロセラス, テトラゴニテス, 銚子層群, 名洗層