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A large *Shasticrioceras* (heteromorph ammonite) from the Lower Cretaceous Hanoura Formation in Tokushima Prefecture, Japan

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Abstract

A large heteromorph ammonite specimen from the Hanoura Formation in the Katsuuragawa Basin is described as *Shasticrioceras intermedium* Matsukawa and Obata, 1993 herein. The new record expands the distribution of the species within the southwestern area of Japan.

Key words: Large heteromorph ammonite, *Shasticrioceras intermedium*, Barremian, Hanoura Formation, Tokushima Prefecture, Japan

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Introduction

The heteromorph ammonoid genus *Shasticrioceras* Anderson, 1938 is one of the North Pacific elements of ammonoid fauna, and suggests a cold current indicator. Up to date, seven species, *Shasticrioceras poniente*, *S. hesperium*, *S. whitneyi* and *S. inflatum* (Anderson, 1938) and *S. patricki* (Murphy, 1975) from the West Coast of North America as topotype (Anderson, 1938), and *S. nipponicum* and *S. intermedium* from Japan as topotype (Matsumoto, 1947; Matsukawa and Obata, 1993), were described. Generally speaking, these species excluding *S. nipponicum* are large in size. Rich occurrence of small specimens of *S. nipponicum* have given an impression that Japanese *Shasticrioceras* is smaller than those of North America. Only a few large specimens of *S. patricki* from the Sanchu Cretaceous (Obata and Matsukawa, 1984; Matsukawa and Obata, 1993), *S. nipponicum* (Matsukawa and Obata, 1993) and *S. intermedium* (Matsukawa and Obata, 1993) were surely reported. They are over 110 mm in diameter, with a loosed spire. The size of specimens probably is influenced by preserved conditions.

We identified a large specimen of heteromorph ammonite named as *Shasticrioceras intermedium* occuring in the Hanoura Formation in the Katsuuragawa Basin in Shikoku, Japan (Fig. 1A, B, C). So, we describe the large specimen of *Shasticrioceras intermedium* herein.

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Geological setting

According to Matsukawa and Eto (1987), the Lower Cretaceous strata are distributed in the northern and southern belts of the Chichibu Belt. They are separated by the pre-Cetaceous formations between them. The strata in the northern and southern subbelts differ in the litho- and bio-facies. The strata of the northern subbelt can be divided into four formations, the Tatsukawa, Hanoura, Hoji and Fujikawa formations, and those in the southern subbelt into three, the Shobu, Mamidani and Nakaizu formations in ascending order (Fig. 1D).

The present specimen occurred in the Hanoura Formation at Nakagoya, Kamikatsu-cho, Tokushima Prefecture. From the occurrence of *Barremites* (*B.*) *difficilis*, *Crioceratites* (*Paracrioceras*) *asiaticum*, *Shasticrioceras nipponicum* and others, the Hanoura Formation is assigned a Barremian age.

Systematic description

The illustrated ammonoid is deposited in the Department of Environmental Sciences, Tokyo Gakugei University, Tokyo (TGUSE-MM). In general, morphological terminology follows Arkell et al. (1957), and adjectives used in the description are in accordance with the definitions of Matsumoto et al. (1988). Measured parts of specimen are exemplified by the following symbols (Matsukawa, 1988): Dn = minimum diameter of loose spire; Dx = maximum diameter of loose spire; H = whorl height in maximum diameter of loose spire; W = whorl width in maximum diameter of loose spire; W/H = ratio of whorl width and whorl height; Un = minimum umbilical gap; Ux = maximum umbilical gap.

Order: Ammonoidea von Zittel, 1884
Suborder: Ancyloceratina Wiedmann, 1966
Superfamily: Ancyloceratacеae Gill, 1871
Family: Ancyloceratidae Gill, 1871
Subfamily: Crioceratitinae Gill, 1871
Genus: *Shasticrioceras* Anderson, 1938
1976. *Shasticrioceras* sp., Obata and Ogawa, pl. 1, fig. 5.
1993. *Shasticrioceras intermedium*, Matsukawa and Obata, p. 258-261, text-fig. 5.

Material. A single specimen, TGUSE-MM 6064 (K. Ishida, Coll.), found at Nakagoya, Kamikatsu-cho, Tokushima Prefecture, from the muddy sandstone bed of the Hanoura Formation. It is external cast of shell.

Dimension (in mm; see Matsukawa, 1988 Fig. 4 for explanation of symbols used)

Specimen	Dn	Dx	H	W	W/H	Un	Ux
TGUSE-MM 6064		184.0	96.6	24.2	0.25		77.6
One volution earlier		79.1	26.2	5.2	0.20		40.4

Description. See Matsukawa and Obata (1993).

Remarks. The present specimen is almost the same size as the holotype of the present species; the former is 184 mm in diameter and the latter is 195 mm. The ribs of the adult stage of the present specimen are more sinuous than those of the holotype.

The narrow whorl of the present species is similar to that of *Shasticrioceras hesperium* Anderson (1938, p. 204-205, pl. 56, fig. 1, 2; pl. 68, fig. 3). However, the present species is characterized by rapid expansion of shell height with growth. Thus, this character differs from that of *Shasticrioceras hesperium* Anderson (1938, p. 204-205, pl. 56, fig. 1, 2; pl. 68, fig. 3), the latter being characterized by gradual expansion of shell with growth.

Occurrence. Barremian.

Concluding remarks. A large heteromorph ammonite specimen from the Hanoura Formation in the Katsuuragawa Basin is identified as *Shasticrioceras intermedium* Matsukawa and Obata, 1993. This is one of the members of the Japanese Barremian ammonite fauna, and is also one of the members of the North Pacific elements of the ammonoid fauna. The species indicates a cold current indicator (Matsukawa and Obata, 1993). The species was originally reported from the Barremian Arida Formation in southwest Japan. The species was originally reported from the Barremian Arida Formation in southwest Japan. Its distribution is now expanded further to the southwest, where it may also have been influenced by cold water.

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Fig. 1. Ammonite locality of the Katsuuragawa Basin, Tokushima Prefecture, Shikoku, Japan. A: Map showing the Katsuuragawa Basin in east Shikoku, B: Map showing the Lower Cretaceous distribution in the Katsuuragawa Basin, C: Ammonite locality # 4052 and route of geological columnar section # 19 on the Geological map. Geological map cited from Matsukawa and Eto (1987), D: Geological columnar section #19. The columnar section #19 is referred from Matsukawa and Eto (1987).

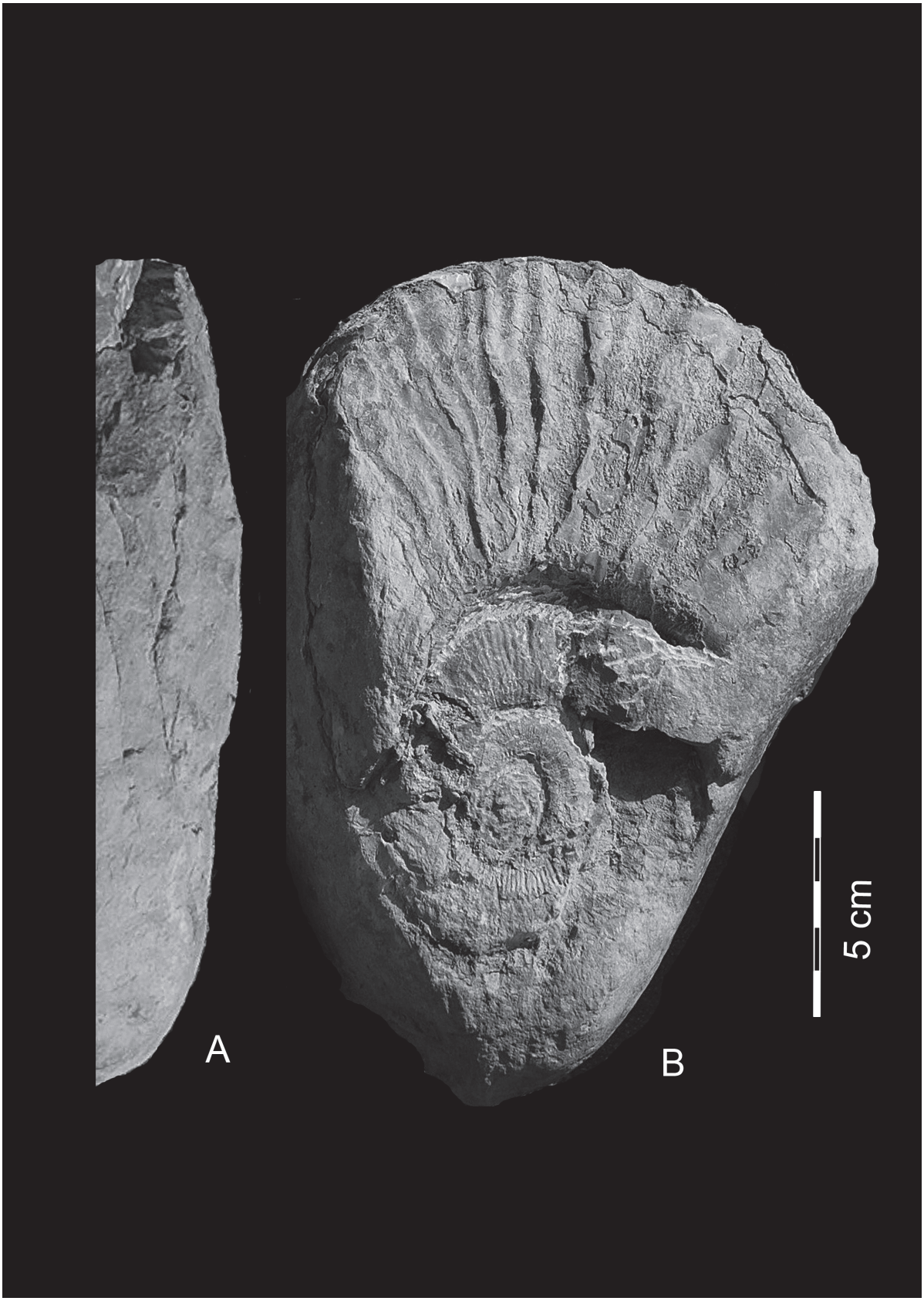

Fig. 2. *Shasticrioceras intermedium*, TGUSE-MM 6064, from locality 4052. A: frontal view, B: lateral view.

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徳島県の下部白亜系の羽ノ浦層から産出した大型の *Shasticrioceras*（異常巻きアンモナイト）

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要　旨

徳島県の勝浦川盆地に分布する下部白亜系の羽ノ浦層から大型の異常巻きアンモナイトが産出し，*Shasticrioceras intermedium* Matsukawa and Obata, 1993として記載された．この種は，これまで和歌山県の有田層から産出が報告されており，この記載により，この種のさらに西南域への分布の拡大が確認された．また，*Shasticrioceras*属は北米西海岸の寒流影響下の地域に分布するので，白亜紀前期の日本への寒流の影響は徳島県にも及んでいたことを示す

キーワード: 下部白亜系，羽ノ浦層，大型異常巻きアンモナイト，*Shasticrioceras intermedium*