First record of a Cretaceous cheilostome bryozoan from Hokkaido, Japan

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Abstract

A small collection of recrystallised, encrusting colonies of a single species from the Mikasa Formation represents the first record of cheilostome (malacostegan or anascan) bryozoans of Lower–Middle Cenomanian age from Hokkaido, Japan.

Keywords: Cretaceous; Cenomanian; Hokkaido; Bryozoans

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1. Introduction

Cheilostome bryozoans are locally abundant in Upper Cretaceous deposits, having been described from numerous localities, in particular in Europe. They are also known from the USA, Argentina, South Africa, Madagascar, Saudi Arabia and Oman, Central Asia, India, and New Zealand (for details, see Voigt, 1972, 1981; Taylor and Badve, 1994; Horowitz, 1998). However, we are unaware of any records from China or, indeed, the whole of southeastern Asia. There is just one previous record of Cretaceous bryozoans from Japan, that of an anascan cheilostome of uncertain affinities, *Dysnoetocella*? *voigti* Nishizawa and Sakagami, 1997 of Campanian age (Izumi Group) from Shikoku.

Research on fossil bryozoans in Japan has focused mainly on Late Palaeozoic (Carboniferous-Permian) and Neogene (Miocene-Pleistocene) assemblages, as summarised in Sakakura (1935), Sakagami (1961, 1976), Hayami (1975), and Sakagami et al. (1980). With regard to Mesozoic occurrences, there are a number of papers on Triassic species (see e.g., Sakagami, 1972; Sakagami and Sakai, 1979). Of note is that Sakagami (1976, p. 30) observed that, 'occurrences of the Jurassic and Cretaceous bryozoans are known [in Japan] without any paleontological studies as yet'.

In central Hokkaido, a continuous Aptian-Campanian marine succession is well exposed (Takashima et al., 2004); we seached for bryozoans in an outcrop near Mikasa (43°14'43'' N, 141°59'50'' E) (Fig. 1) that exposes strata assigned to the Tb Member of the Mikasa Formation (Fig. 2), middle Yezo Group (Matsuno et al., 1964;

Hirano et al., 1992). This member comprises hummocky, cross-stratified, fine-grained sandstones and bioturbated sandy siltstones with frequent intercalations of *Pterotrigonia* shell beds, and is considered to have formed in an inner- to outer-shelf setting (Hirano et al., 1992). Typically Early-Middle Cenomanian ammonites, such as *Mantelliceras japonicum* and *Calycoceras orientale*, occur within this member (Ando, 1991; Matsumoto et al., 1991; see Fig. 2).

Here we document the first record of a cheilostome bryozoan of Early–Middle Cenomanian age from this section in Hokkaido; the previous record of cheilostome colonies concerned material of Campanian age from Shikoku (Nishizawa and Sakagami, 1997). The efforts of four people working for three hours screening rubble of Mikasa Formation strata resulted in thirteen completely recrystallised colony fragments of a single bryozoan species, preserved in rocks containing abundant bivalve shells. All specimens are now housed in the Fossil Invertebrate Collection, Paleontology Department, Natural Sciences Museum, Hokkaido University (Sapporo), under registration numbers UHR32534A–M.

All of the colonies are found to encrust the convex outer surface of smooth valves of species of the trigoniid bivalve genus *Pterotrigonia*. In some cases, only the lower side of the colony is visible, the bryozoan itself remaining on a concave cast left by the molluscan valve. The few colonies that show vertical walls are strongly abraded. The zooidal walls are preserved in white calcite, whereas the zooidal cavities are completely filled with cemented, dark greenish-grey sandy siltstone.

Colonies are encrusting, unilaminar, multiserial, more-or-less circular or oval, and even in outline (Fig. 3A). The largest colony fragment available measures 19 x 17 mm; zooids are arranged in a quincuncial pattern, hexagonal to oval in shape (Fig.

3B–D), widest in the centre, and 0.48–0.67 mm (0.56 ± 0.05 mm) in length, by 0.25–0.43 (0.32 ± 0.04 mm) in width (mean ± SD; N = 30). The frontal zooidal surface has not been observed; it is worn away in some specimens and embedded in the sediment in others. Large distal basal pore chambers (Fig. 3D) are recognisable in a few instances, and smaller distolateral pore chambers are also present. Early growth stages are evident in two colonies (Fig. 3A). In the absence of any data on the frontal zooidal wall, the bryozoan species described may either represent a malacostegan (suborder Malacostegina, superfamily Membraniporoidea) or an anascan cheilostome (suborder Neocheilostomina, infraorder Flustrina). Poor preservation of the colonies does not allow a more precise identification, and additional sampling is necessary to clarify the taxonomic position of the species.

This new find of fossil bryozoans in Hokkaido substantiates Sakagami's (1976) view that there should be a more extensive record of Cretaceous cheilostomes in Japan, and also encourages future field work in the area in order to document more material and gain a better understanding of bryozoan biogeography and evolution.

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Captions

Fig. 1. Locality map of the study area, where the Mikasa Group of south-central Hokkaido is exposed.

Fig. 2. Composite column of the Cretaceous sequence in the section studied, showing lithology and ranges of age-diagnostic macrofossil taxa (ammonoids, inoceramid bivalves), modified from Ando (1991), Matsumoto et al. (1991), and Hirano et al. (1992). Abbreviation HCS: hummocky, cross-stratified.

Fig. 3. A, General view of specimen UHR32534H, the black arrow indicating the ancestrular zone; B-D, colony fragments (specimens UHR32534B, UHR32534C, and UHR32534A, respectively) shown at different magnifications; white arrows in D indicate distal basal pore chambers. Scale bars represent 1 mm (A–C) and 100 μm (D).

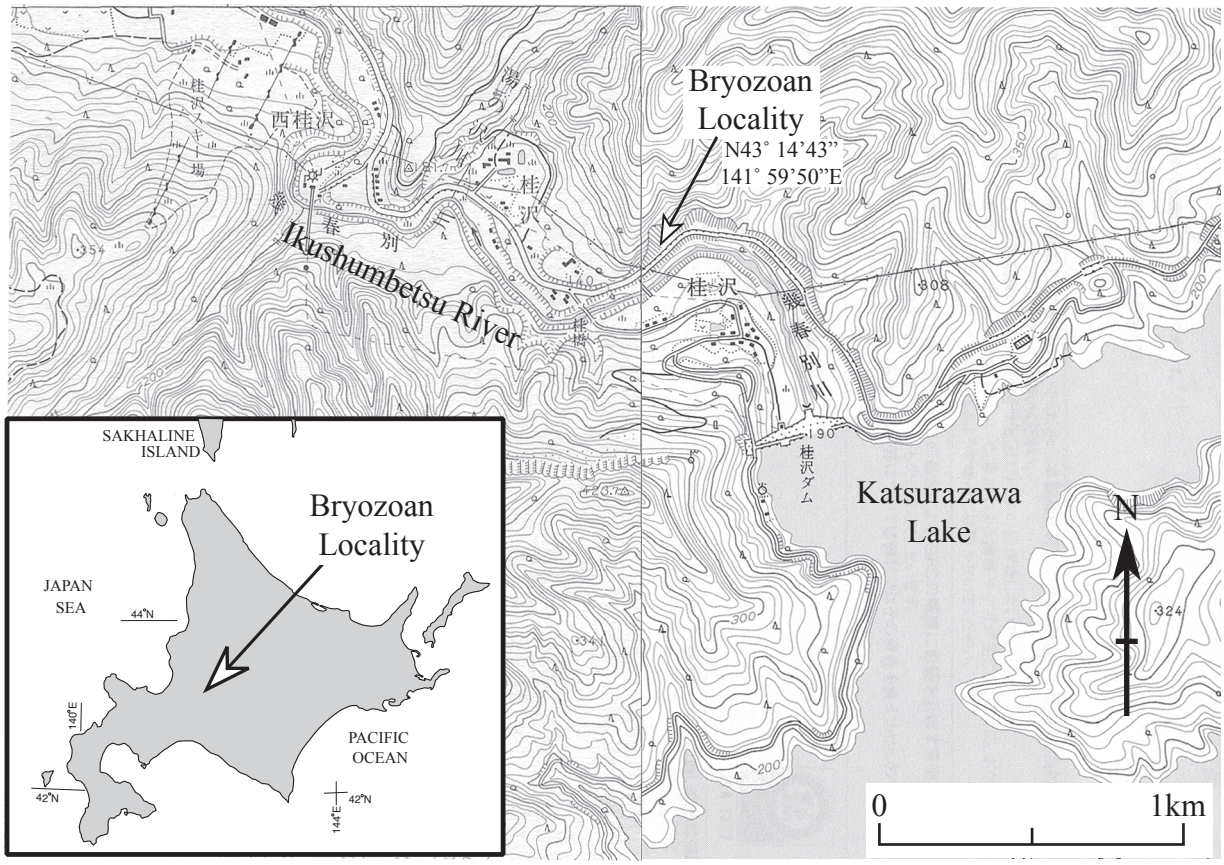

Figure 1; OSTROVSKY et al.

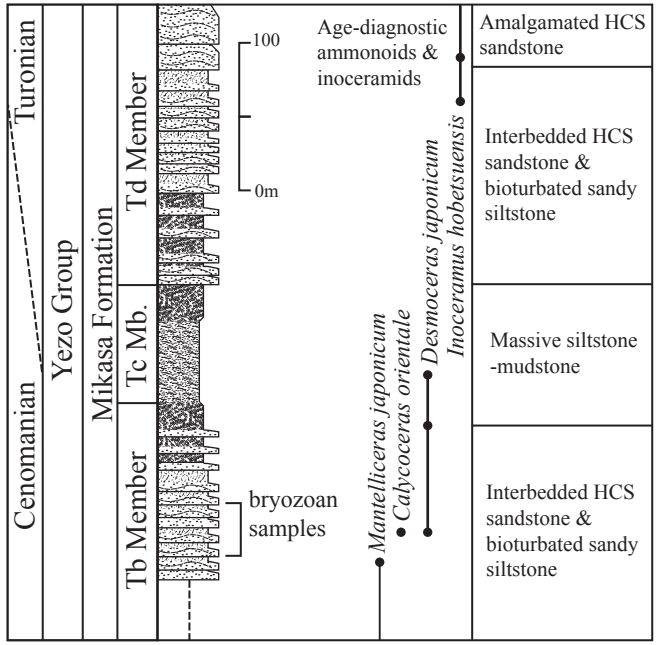

Figure 2; OSTROVSKY et al.

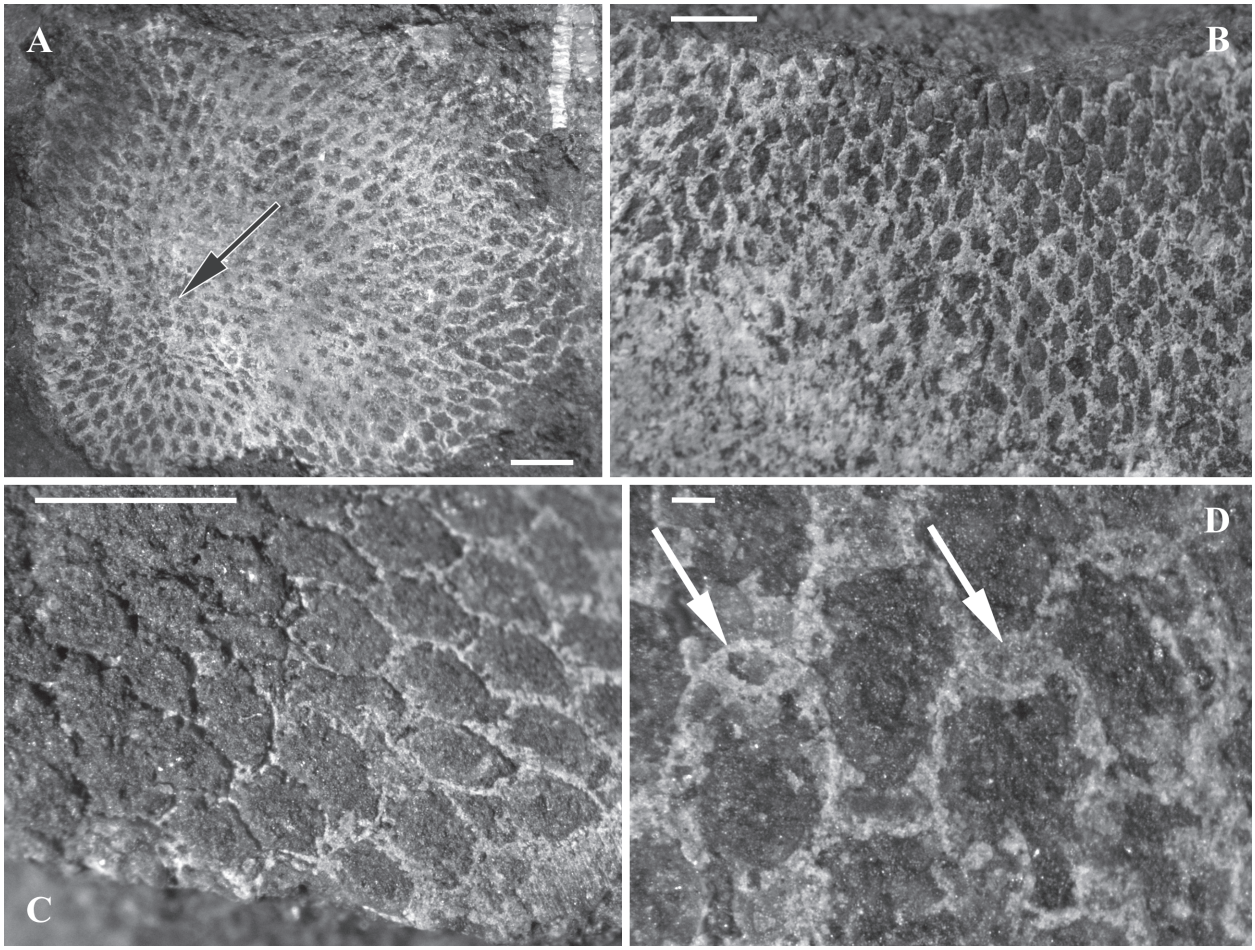

Figure 3; OSTROVSKY et al.