Akihiko SUZUKI*: A beach cobbles bearing trace fossils of Caulostrepsis washed ashore on Morai coast in Ishikari City, Hokkaido

Introduction  Caulostrepsis is a pouch-shaped boring in a U-bend gallery formed by a polychaete boring in hard substrates (Bromley 1978; Taylor and Wilson 1989; Suzuki 2006). The systematics of this ichnotaxon has been extensively revised and several ichnospecies have been recognized (Bromley and D’Alessandro 1983; Pickerill et al. 1998, 2002).

In June 2012, a beach cobbles bearing the ichnogenus Caulostrepsis was discovered on the Morai coast near Ishikari City, Hokkaido. In this paper, I briefly describe the characteristics and the paleoecological significance of Caulostrepsis and associated molluscan fossils. In addition, the relationship between Caulostrepsis ichnofossils and the characteristics of the paleoenvironment is considered.

Materials and methods  Abundant molluscan fossils were discovered in the Morai Formation in a coastal cliff at Morai, Ishikari City, in central Hokkaido (Fig. 1). The Morai Formation consists of alternating beds of hard shale and mudstone with many calcareous concretions, and has been assigned to the Late Miocene based on diatom fossils (Kakimi 1958).

Calcareous concretions associated with flotsam that had washed ashore were collected on 12 June 2012 (Fig. 2A). The cobbles bearing the trace fossil was identified based on comparisons with ichnological literature (Bromley and D’Alessandro 1983; Bromley 1994). Geological characteristics, such as the paleoenvironment and taphonomy, were inferred based on previous studies (Bromley and D’Alessandro 1983; Pickerill et al. 1998, 2002).

Fig.1  Map showing the location of the Morai coast in Ishikari City, Hokkaido.
X: Sample locality.

Fig.2  Caulostrepsis isp. washed up on Morai coast.
A. A cobbles bearing Caulostrepsis isp.
B. Close-up of Caulostrepsis isp.
Results and discussion  The cobble specimen that washed up on the Morai coast measured $72.2 \times 65.3 \times 60.4$ mm (Fig. 2A). The cobble was a dark-grey calcareous concretion including a Giant Clefuclam (Conchocele bisecta), a Buccinid gastropod, and shell fragments. Many pouch-shaped borings were observed on the inner surface of the Buccinid gastropod, one of which was examined in detail (Fig. 2B). Smooth, horizontal, U-bend gallery with individual limbs separated by distinct and well-developed structureless central vane, the latter narrowing aperturally. Limb width consistently ca. 1 mm, maximum vane width 3 mm, gradually diminishing aperturally with an overall length of 10 mm. Apertural openings absent. These descriptions follow the morphological terminology of Bromley and D’Alessandro (1983). The borings described here were identified as belonging to the ichnotaxon Caulostrepsis isp.

On this coast, numerous calcareous concretions containing Conchocele bisecta and Calypptogena pacifica in association with Acharax tokunagai are washed ashore (Suzuki et al. 2014). The species composition of these assemblages is similar to that of modern cold seep communities from Monterey Bay, California (Barry et al. 1996). Based upon the depth range of extant species overlap, a fossil cold seep community may have existed on the lower shelf at Morai (Suzuki et al. 2014).

Further, the abundance of cold seep community fossils appears to be closely related to an extant cold seep community in the deep-sea area off Morai (Barry et al. 1996). Thus, the presence of mollusc fossils, the high density of the Caulostrepsis, and the sediments associated with the Caulostrepsis are all considered to indicate the presence of a cold seep on the lower shelf during the Middle Miocene (Suzuki et al. 2014).

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References

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