

Additional materials of *Turbo (Batillus) priscus* Ozawa and Tomida, 1996, from the Late Neogene of central Japan*

*We present our condolences to the late Mr. Hiroyuki Nishimoto

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Abstract

A well-preserved shell and an operculum of *Turbo (Batillus) priscus* Ozawa and Tomida, 1996, were obtained from the lowermost Pliocene Osozawa Member of the Shizukawa Group, at Osozawa, Nakatomi-cho, Minamikoma-gun, Yamanashi Prefecture. These specimens provide us the detailed diagnostic characteristics of the species. Spines of the present species occur suddenly on the strong spiral ribs at about one thirds of the ultimate whorl surface near the aperture; i.e., the first row of spines is situated at shoulder, the second row at the periphery, the third row at the basal periphery, and the fourth row of the short spines on a weak spiral rib of the base. The mode of development of spines gives us an idea that the present species had lived on the rocky bottom in an open sea.

Key words: *Batillus priscus*, Lowermost Pliocene, Osozawa Formation, Yamanashi Prefecture

Introduction

The Upper Neogene Akebono Formation of the Shizukawa Group (Akiyama, 1957) is distributed in Osozawa, Nakatomi-cho, Minamikoma-gun, Yamanashi Prefecture. After the construction of the dam in 2000 in the valley in Osozawa, the abundant molluscan fossils were obtained from the Osozawa Member of the Akebono Formation. Authors found a completely preserved shell and an operculum which are identified with *Turbo (Batillus) priscus* Ozawa &

Tomida, 1996. The purpose of this report is to give more detailed diagnostic characters for the species.

Systematics

Family Turbinidae

Genus *Turbo* Linnaeus, 1758

Subgenus *Batillus* Schumacher, 1817

Type species: *Turbo cornutus* Lightfoot, 1786.

Turbo (Batillus) priscus Ozawa and Tomida, 1996
(Figs. 2-1a-c, 2-2a-c)

1973 *Turbo (Batillus)* aff. *cornutus* Gmelin, sensu Shikama, p. 197, pl. 1, figs 12, 13.

1996 *Turbo (Batillus) priscus* Ozawa and Tomida, p. 282, fig. 1, pl. 1, figs 1-9, pl. 2, fig. 8.

1999 *Turbo (Batillus) priscus* Ozawa and Tomida, sensu Nakamura, Ozawa and Nobuhara, pl. 2, figs 18a, b.

Materials: A complete submature shell (MFM 112148: figs. 2-1a-c) and an operculum (MFM 112149: figs. 2-2a-c) were examined. They were obtained from the lowermost Pliocene Osozawa Member of the Akebono Formation, Shizukawa Group (Zone N.18), at Osozawa, Nakatomi-cho, Minamikoma-gun, Yamanashi Prefecture (138°25'35"E,

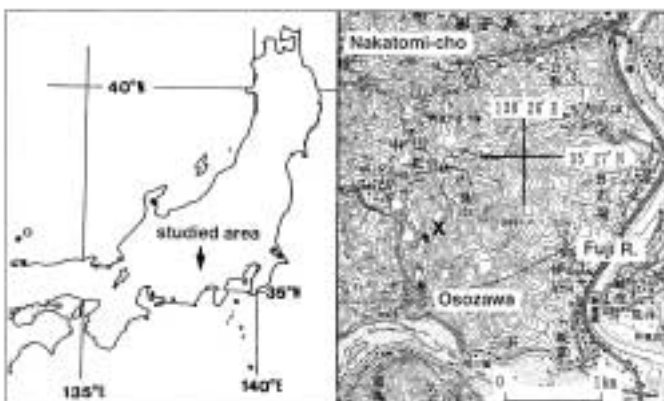


Fig. 1. Map showing the fossil locality. ×: Fossil locality (Osozawa, Nakatomi-cho, Minamikoma-gun, Yamanashi Prefecture).

35°26'44"N). The shell is slightly deformed laterally and the operculum slightly lacked anteriorly.

Original description: See Ozawa and Tomida (1996), p. 281-285.

Descriptive remarks: From the morphological characteristics described below, the present specimens are identified with *Turbo (Batillus) priscus* Ozawa and Tomida, 1996, which has been reported from the uppermost Miocene to

the lowermost Pliocene of the southwestern Japan.

Spire moderately high and composed of five rounded teleoconch whorls that are separated by moderately impressed sutures. Shoulder slightly angled and situated above mid-whorl. Protoconch smooth, and consists of about 1.5 whorls. The first two teleoconch whorls ornamented with raised and rounded spiral cords and interstitial threads which are finely scaled. The succeeding two

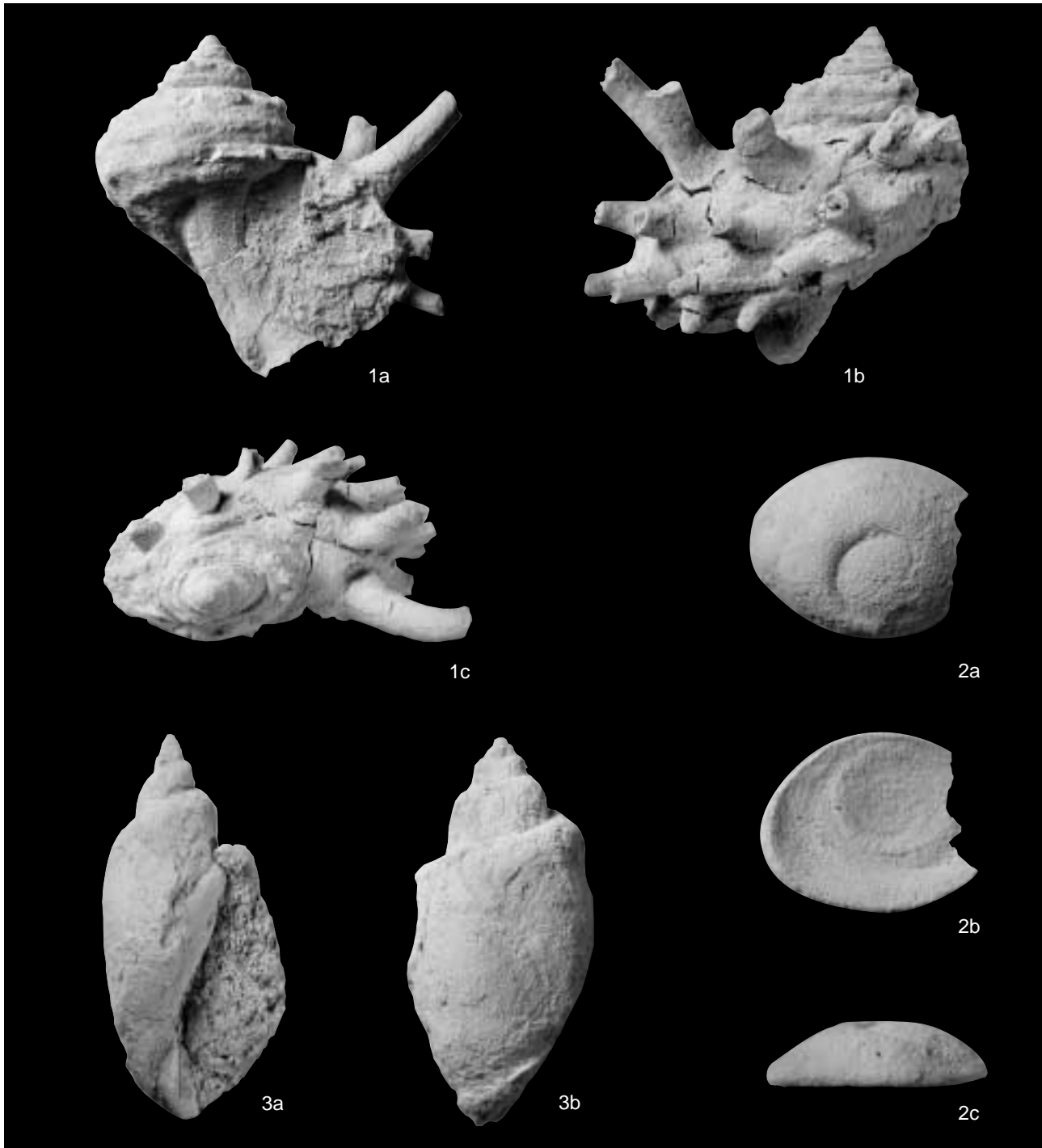


Fig. 2. 1, 2. *Turbo (Batillus) priscus* Ozawa and Tomida, 1996, 1 a) apertural view; b) adoral view; c) apical view, $\times 1$, (MFM112148), 2 a) outer view; b) inner view; c) lateral view, $\times 1$, (MFM112149), from the lowermost Pliocene Osozawa Member of the Akebono Formation, at Osozawa, Nakatomi-cho, Minamikoma-gun, Yamanashi Prefecture. 3. *Babylonia elata* (Makiyama), 3 a) apertural view; b) adoral view, $\times 1$, (MFM112150), from the lowermost Pliocene Osozawa Member of the Akebono Formation, at Osozawa, Nakatomi-cho, Minamikoma-gun, Yamanashi Prefecture. (All figures in natural size)

whorls ornamented with distinct primary spiral cords, weak secondary spiral cords and interstitial threads. The first row of spines occurred at shoulder, the second row at the periphery, and the third row at the basal periphery, and the fourth row of the short spines on a weak spiral rib of the base. Spines positioned on the shoulder, strongest and prominent obliquely. Base sculptured with two or three rows of short spines. Whorls sculptured with fine scaly axial threads. Aperture large and nearly circular. Umbilicus anomphalous. Columella projected anteriorly and flattened broadly at the ventral side. Operculum slightly ovate, convex on the outside, and flat inside. Surface of operculum sculptured with fine granules and with a more coarsely granulose central hump encircled by a spiral rib. *Turbo (Batillus) priscus* is easily distinguishable from the living *Turbo (Batillus) cornutus* [Lightfoot, 1786] in having an operculum with different sculptures.

Species of *Turbo (Batillus)* exhibit a marked inter and intra-populational variation in shell sculptures, ranging from spineless individuals to the individuals with very strong spines. It is said that this variation is caused by the difference of wave agency under which the individuals live at the habitat between the inner sea and the open sea. In general, the individuals with stronger spines tend to occur in the habitat in an open sea coasts where strong waves are prevailing. The mode of development of the spines of the present specimen gives us an idea that the present individual had lived on the rocky bottom of an open sea.

Measurements: Maximum diameter 52.4 mm, minimum diameter 27.4 mm, height 59.2 mm, aperture height 38.3 mm (MFM 112148); maximum diameter 35.2+ mm, minimum diameter 30.1 mm, maximum thickness 9.6 mm (MFM 112149).

Remarks on the molluscan fauna: These specimens were accompanied by the tropical and subtropical mollusks belonging to the Zushi Fauna (Ozawa and Tomida, 1992), such as *Peretrochus* sp., *Calliostoma* cf. *formosense* (E. A. Smith), *Ethalia maxima* (Shuto), *Chlorostoma narusei* Shibata, *Astraea tyosiensis* Ozaki, *Turbo (Lunatica) robustus* Tomida & Ozawa, *Bolma virgata* (Ozaki), *Xenophora chinensis* (Philippi), *Cypraea* spp., *Neptunea kuroshio* Oyama, *Conus* spp., *Anadara (Tosarca) tosaensis* Noda, *Glycymeris albolineata* (Lischke), *Glycymeris osozawaensis* Kanno, *Amussiopecten iitomiensis* (Otuka), *Chlamys miurensis* (Yokoyama), *Cryptopecten vesiculosus* (Dunker), *Megacardita panda* (Yokoyama), *Meiocardia tetragona* (Adams & Reeve), *Nipponocrassatella takanabensis*

(Shuto), *Paphia exilis* Shuto, *Callista chinensis* (Holten), *Pholadomya pacifica* Dall, and so on (Tomida, 1996). The Zushi Fauna is mainly composed of warm water mollusks as listed above, and is accompanied by the forerunners of the Kakegawa Fauna, such as *Babylonia elata* (Makiyama), *Anadara (Tosarca) tosaensis* Noda, *Glycymeris albolineata* (Lischke), *Megacardita panda* (Yokoyama), as mentioned by Ozawa and Tomida (1992). In this paper we report the first occurrence of *Babylonia elata* (Makiyama) from the Osozawa Member, as shown on Figs. 2-3a, b.

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