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A new species of *Hartungia* (Gastropoda: Janthinidae) from late Miocene of Japan

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Abstract

A new species of a fossil janthinid gastropod is described hirein on the basis of specimens obtained from the upper Miocene formations of Miyazaki Prefecture and Chiba Prefecture, Japan. As the result of this study, it is confirmed that this is a new species, Hartungia elegans, and its occurrence shows a warm oceanic current (the Kuroshio current) strongly flowed along the Pacific coast of Japan during the late Miocene (planktonic foraminiferal Zone N.17).

Key words: *Hartungia,* new species, Mollusca, Gastropoda, upper Miocene, Tano Formation, Senhata Formation, warm oceanic current

Introduction

Tomida and Itoigawa (1986) described *Hartungia* sp. from the upper Miocene Senhata Formation, Miura Group, at Motona, Kyonan-cho, Awa-gun, Chiba Prefecture. Thereafter Nakamura *et al.* (1999) listed and illustrated *Hartungia* sp. from the upper Miocene Tano Formation, Miyazaki Group, at Tano, Miyazaki-gun, Miyazaki Prefecture (Figs. 1a, b). However, as the result of this study, it is confirmed that this is a new species under the name of *Hartungia elegans*. *Hartungia* is a fossil genus whose geological range is restricted to the period lasting from the late Miocene to the earliest Pleistocene. It has been hitherto reported from Japan (Tomida and Itoigawa, 1982, 1984, 1986, 1989; Tomida, 1989, 1996; Noda *et al*., 1995; Nobuhara *et al*., 1995; Ozawa *et al*., 1998), Australia (Tate, 1893; Ludbrook, 1978; Beu and Maxwell, 1990), New Zealand (Bartrum, 1919; Marwick, 1926; Ludbrook, 1978; Beu and Maxwell, 1990), Morocco (Chavan, 1951), and Santa Maria Island (Bronn, 1861). This gastropod genus belongs to the Family Janthinidae. *Janthina* has a world-wide distribution and drifts on warm ocean currents, and it is driven ashore to the Japanese coasts. Therefore the occurrence of janthinid fossils shows the strong warm oceanic current at the past time.

Systematics

Order Heterogastropoda
Family Janthinidae
Genus *Hartungia* Bronn, 1861
Type species: *Hartungia typica* Bronn, 1861.

Hartungia elegans n. sp.
(Figs. 2.1a-e, 2.2a-e)

1986 *Hartungia* sp., Tomida and Itoigawa, p. 117.
1989 *Hartungia* sp., Tomida, p. 96.
1997 *Hartungia* sp., Tomida and Nakamura, p. 78.
1999 *Hartungia* sp. A, Nakamura *et al*., pl. 2, figs. 17a, b.

Diagnosis : This is characterized by having thin and lower turbiniformed shell with rather thick and faint spiral ribs and fine axial riblets, and with shallow sinus situated at the basal lip of apertural margin, extending to spiral ridge around columella.

Materials : An almost complete adult shell (ESN2687: Holotype: Figs. 2.1a-e), was obtained from the upper Miocene Tano Forma tion, Miyazaki Group (planktonic foraminiferal Zone N.17), at Tano, Miyazaki-gun, Miyazaki Prefecture (131 °16 ′44 ″E, 31 °51 ′8 ″N). Another slightly crushed adult shell (MFM111029: Paratype: Figs. 2. 2a-e),

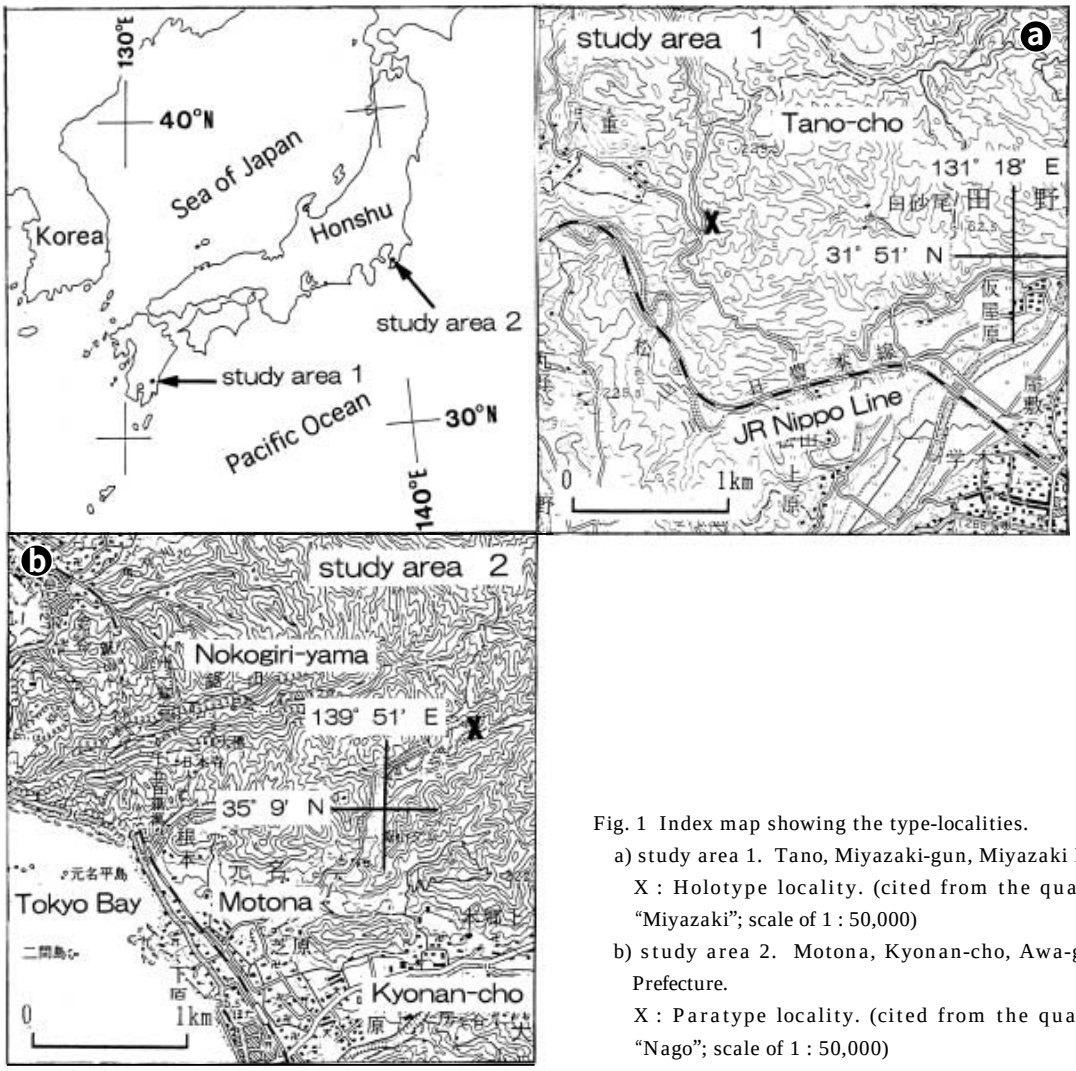


Fig. 1 Index map showing the type-localities.
a) study area 1. Tano, Miyazaki-gun, Miyazaki Prefecture. X : Holotype locality. (cited from the quadrangle of "Miyazaki"; scale of 1 : 50,000)
b) study area 2. Motona, Kyonan-cho, Awa-gun, Chiba Prefecture. X : Paratype locality. (cited from the quadrangle of "Nago"; scale of 1 : 50,000)

was obtained from the upper Miocene Senhata Formation, Toyo-oka Subgroup, Miura Group (Zone N.17), at Motona, Kyonan-cho, Awa-gun, Chiba Prefecture (139 °51 ′20 ″E, 35 °9 ′20 ″N).

Description: Shell thin, moderately sized in this genus, dextral and lower turbiniformed. Spire very low and rapidly growing. Coiling about 3-4 in number. Body whorl depressed and wider than high. Suture rather deep and impressed. Ornaments: younger spires with smooth surface and last two spires with axial riblets and spiral ribs. Axial riblets dense and crenulated on the spiral ribs of the lower half of whorl. Spiral ribs total 16-17 in number, alternated with narrow and wider ribs on the upper half of whorl near suture; low and rounded ribs equal to interspaces on the lower half of whorl. Sinus shallow, situated on basal lip and continued to one blunt spiral ridge around columella. Base inflated. Columella quasi straight. Aperture broad.

Measurements: Maximum diameter 29.8 mm, minimum diameter 17.4 mm, height 19.1 mm, apertural height 18.2 mm (Holotype : ESN2687); Maximum diameter 33.0 mm, minimum diameter 21.0 mm (Paratype: MFM111029).

Comparison: The present new species resembles *Hartungia pehuensis* (Marwick, 1926), the upper Miocene species from Okoke Road, North Taranaki, New Zealand, in having a very low spire and a very rapidly growing last whorl. However, it is distinguished from *H.pehuensis* by its more depressed body whorl, and thinner and alternated spiral ribs on the upper half of whorl. This new species differs from *Hartungia typica* Bronn, 1861, the Pliocene species known from Japan, Australia, New Zealand and Azores Islands, in having a lower spire, a more depressed body whorl and a more rapidly growing last whorl. This is also

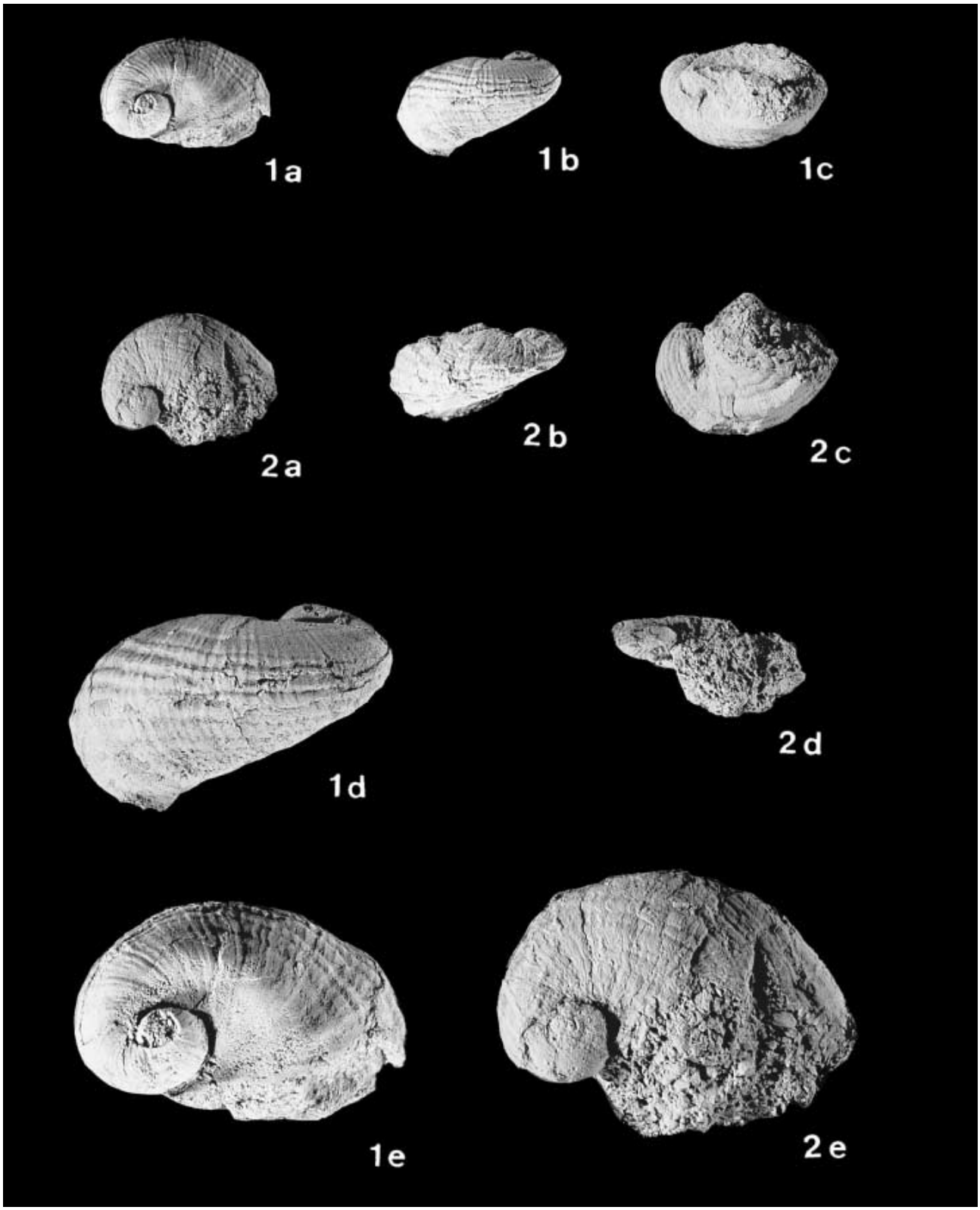


Fig. 2. *Hartungia elegans* n. sp. (All figures in whitening). Figs. 1a-e. a) apical view, × 1; b) adoral view, × 1; c) basal view, × 1; d) adoral view enlarged, × 2; e) apical view enlarged, × 2, (natural mould), ESN2687 (Holotype: upper Miocene: Tano, Miyazaki-gun, Miyazaki Prefecture). Figs. 2a-e. a) apical view, × 1; b) adoral view, × 1; c) basal view, × 1; d) apertural view, × 1; e) apical view enlarged, × 2, MFM111029 (Paratype: upper Miocene: Motona, Kyonan-cho, Awa-gun, Chiba Prefecture).

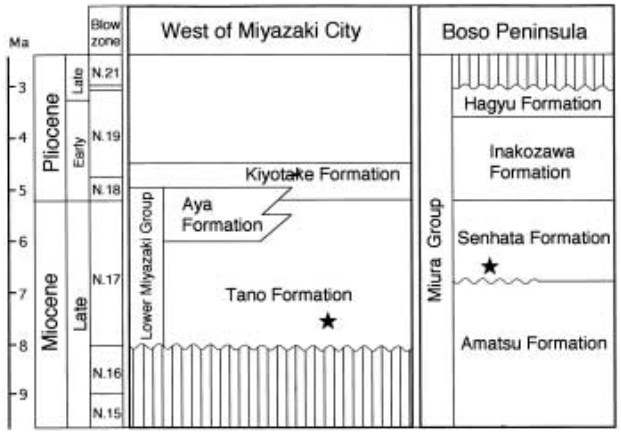


Fig. 3. Upper Neogene sequences and stratigraphic positions of *Hartungia elegans* n. sp. localities in Japan.
★: fossil occurrence

distinguished from the following known species, *H. chouberti* Chavan, 1951, *H. chavani* Ludbrook, 1978, and *H. japonica* (Tomida and Itoigawa, 1982), by having a lower spire, a more depressed body whorl, a more rapidly growing last whorl, and thinner and 16-17 spiral ribs which are alternated with narrow and wider ribs on the upper half of whorl.

Remarks: This shows the lowermost occurrence of *Hartungia* fossil in Japan and also in the world. According to Shuto (1961) and Nakamura *et al.* (1999), the Holotype specimen obtained from the late Miocene Tano Formtaion of the Miyazaki Group, was accompanied by the warm water molluscan fossils, such as *Trochus* sp., *Turbo* (*Batillus*) *priscus* Ozawa and Tomida, *Conus* spp., *Amussiopecten iitomiensis* (Otuka), *Chlamys miurensis* (Yokoyama), *Clementia papyracea* (Gray), and *Paphia exilis* Shuto. The Paratype specimen (Tomida, 1989) obtained from the upper Miocene Senhata Formation of the Miura Group, was accompanied by the tropical and subtropical molluscs belonging to the Zushi Fauna (Ozawa and Tomida, 1992), such as *Bolma virgata* (Ozaki), *Cypraea* (*Mauritia*) cf. *histrio* Gmelin, *Cypraea* (*Zoila*) *itoigawai* Tomida, *Charonia sauliae* (Reeve), *Bursa* (*Bufonariella*) *ranelloides* (Reeve), *Oliva oliva* (Linnaeus), *Conus* (*Lithoconus*) cf. *litteratus* (Linnaeus), *Conus* spp., *Amussiopecten akiyamae* Masuda, *Miyagipecten matsumoriensis* Masuda, *Chlamys miurensis* (Yokoyama), *Pretostrea imbricata* (Lamarck), *Dysmea occidens* (Gmelin), and *Paphia exilis* Shuto.

Discussion

A few indications of tropical and subtropical conditions in Japan have been reported until a recent date. Ozawa and Tomida (1992) reported the existence of tropical and subtropical marine climates during the late Miocene to the early Pliocene in mid-to southwestern Japan, on the basis of the presence of tropical and subtropical molluscan assemblage. The warm climates in the late Miocene of Japan correspond to the Climatic Optimum 3 (ca. 7.5-6.5 Ma) of Barron and Baldauf (1990). In the eustatic curves of the late Neogene presented by Malmgren and Berggren (1987), one of peaks indicating major rises in global sea level is shown at ca. 6.8 Ma (Zone N.17). As already mentioned, *Hartungia* belongs to the Janthinidae, a group of pelagic gastropod which floats at the surface of tropical oceans of the world and drifts on warm ocean currents. Therefore it can be considered to be indicator of the existence of a strong warm oceanic current. This fact supports the idea that the warm oceanic current strongly flowed along the Pacific coast of Japan, at the time of the late Miocene (Zone N.17).

From this report, it may be inferred that *Hartungia elegans* n. sp. lived in the northwestern Pacific Ocean, whereas *Hartungia pehuensis* Marwick lived in the southwestern Pacific Ocean, during the late Miocene.

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