

A new species of *Nebularia* (Gastropoda, Mollusca) from the Miocene Katsuta Group in Okayama Prefecture, southwestern Japan

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Abstract

A Miocene gastropod *Nebularia nishimotoi* is newly described from the Yoshino Formation of the Katsuta Group at Niida, Tsuyama City, Okayama Prefecture. This new species is closely allied to *Nebularia chrysostoma* Broderip living in Amami Island to far south areas. It is an indicator of a tropical water.

Key words: *Nebularia nishimotoi*, Miocene, Yoshino Formation, Katsuta Group, paleoecology

Introduction

Genus *Nebularia* was established by Swainson on the basis of *Mitra (Nebularia) contracta*. Five species in this genus have been reported from the Japanese Cenozoic; they are *N. inquinata* (Reeve) from the Pleistocene Narita Formation, Chiba Prefecture (Aoki and Baba, 1983), *N. sigilata* (Azuma) from the Pleistocene Semata Formation, Chiba Prefecture (Aoki and Baba, 1984), *N. yatsuoensis* (Tsuda) from the Miocene Kurosedani Formation, Toyama Prefecture (Tsuda, 1959), *Mitra (Nebularia) aff. chrysostoma* Broderip from the Pliocene Naha Formation, Okinawa Prefecture (MacNeil, 1960) and *Mitra (Nebularia) cf. hanlayana* (Dunker) from the Pliocene Takanabe Formation, Miyazaki Group (Shuto, 1962).

From the Miocene Yoshino Formation of the Katsuta Group at Niida, Tsuyama City, Okayama Prefecture, Taguchi (1983a, b, 1990, 1992) and Oyama et al. (1995) described *Perna oyamai*, *Tellinella osafunei*, *Nippnarca japonica*, *Terebralia shibatai*, *Batillaria narusei*, *Siphonalia fujiwarai*, *Vepricardium* (s. s.) *okamotoi* and *Nipponaphera taguchii* as new to science. A new species in the genus *Nebularia* was found at the same locality.

This species occurs in association with the *Tellinella-Perna-Vepricardium-Vicaryella* assemblage (Taguchi, 2002), which indicates muddy bottoms at depth of about 20m in the tropical condition (Taguchi, 2002).

Systematics

Family Mitridae Swainson, 1831

Subfamily Mitrinae, 1831

Genus *Nebularia* Swainson, 1840

Type species: *Mitra (Nebularia) contracta* Swainson, 1820.

Nebularia nishimotoi Taguchi et Kawase sp. nov.

(Figs. 1, 2)

Diagnosis: Fusiform in shape, with spiral cords. Siphonal canal moderately open, nearly straight.

Description: Shell medium in size, fusiform. Whorls about 6, with about 2 nuclear whorls. The first nuclear whorl smooth, periphery rounded, spiral cords seem to appear second protoconch, much narrower than their interspaces. The penultimate whorl with 7 spiral cords and the body whorl with 20 to 22 spiral cords. The body whorl large, about 7/10 of the shell length. Suture shallow. Outer lip is deformed and broken. Inner lip is lacking columellar fold. Siphonal canal moderately open. Fasciole covered with thin smooth callus. Columella moderately long, nearly straight. Umbilicus closed.

Dimensions (in mm)	number of whorls
Holotype (MFM20105)	6
Paratype (MFM20106)	6

Height	Maximum diameter	Apical angle
44.3	ca 22.6	ca 20
51.5 +	ca 26.7	-

Material: This species is represented by two deformed and broken specimens, but their shell surface sculpture is well preserved. The specimens are satisfactory as type material.

Comparisons and affinities: This new species is closely allied to *Nebularia chrysostoma* Broderip living Amami Island and far south areas, but it has a larger number of spiral cords and a smaller apical angle and broader outer lip. *Mitra (Nebularia)* aff. *chrysostoma* Broderip reported by MacNeil (1960) from the Pliocene Naha Formation, Okinawa Prefecture is another allied species, but it differs from this new species in its smaller apical angle, larger number of spiral cords and straighter columella.

Etymology: This species name is dedicated late Mr. Hiroyuki Nishimoto who gave many suggestions on fossil and recent *Nebularia* to us.

Type locality: Niida, Tsuyama City, Okayama Prefecture. The Yoshino Formation of the Katsuta Group (Taguchi, 1990, Figs. 1, 2) .

Paleoecological significance: This species occurs associated with the *Tellinella-Perna-Vepriocardium-Vicaryella* assemblage which indicates muddy substrata at depth of about 20m in the tropical sea (Taguchi, 2002). *N. chrysostoma* Broderip is distributed in Amami Island and far south. The water temperature range in which it lives is concordant with that which the assemblage indicates for its habitat (Taguchi, 2002).

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2a



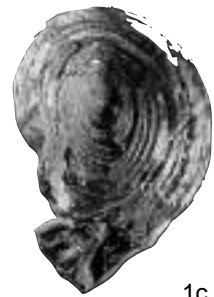
2b



1a



1b



1c

Figs. 1a-c. *Nebularia nishimotoi* n. sp. holotype, MFM20105; Miocene Yoshino Formation of the Katsuta Group at Niida, Tsuyama City, Okayama Prefecture. a, b, $\times 1.5$; c, $\times 1.8$. Figs. 2a, b. *Nebularia nishimotoi* n. sp. paratype, MFM20106; Miocene Yoshino Formation of the Katsuta Group at Niida, Tsuyama City, Okayama Prefecture. a, b, $\times 1.8$.