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# Notes on three Marine Molluscs from the Northern Mariana Islands, Micronesia

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**Abstract** We examined molluscan specimens collected from the northern Mariana Islands, deposited in the collection of the University of Guam Marine Laboratory. *Notoacmea schrenckii boninensis* Asakura and Nishihama, hitherto known only from the Ogasawaras, was collected from Asuncion and Maug Islands in the northern Marianas. *Cellana toreuma* (Reeve) var. was collected from Anatahan, Guguan, Pagan, Asuncion, Maug, and Uracas. *Nodilittorina* sp., a highly abundant species in the splash and high intertidal zones of the Ogasawaras, was collected from Anatahan, Guguan, Pagan, Asuncion and Maug Islands. The taxonomic status of these species is discussed.

**Key words :** northern Marianas, gastropods, *Notoacmea, Cellana, Nodilittorina.*

The northern Mariana Islands are located in the western Pacific between 15°N and 21°N, and form the southern part of a large archipelago, which extends northward through the Iwo (Volcano), Ogasawara (Bonin) and Izu Islands to the Kanto area of central Honshu, Japan.

The molluscs of the northern Marianas have already been studied by Eldredge *et al.* (1977) and Vermeij *et al.* (1983). However, they presented only a list of collected specimens without any description, and thus it is impossible to examine them taxonomically in detail.

The senior author had a chance to examine molluscan specimens, deposited at the University of Guam Marine Laboratory UOGML, which had been collected from the northern Mariana Islands. The junior author carried out taxonomic analysis of the specimen based on examination of photographs. This paper presents taxonomic notes on specimens of three gastropod species, which revealed a close relationship of molluscan fauna between the Ogasawaras and the northern Marianas. The following abbreviations are used in this paper; UG: registration code of UOGML, NM: the islands of the northern Marianas, B: the islands of the Ogasawaras, L: shell length, W: shell width, H: shell height, D: shell diameter.

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## *Notoacmea schrenckii boninensis* Asakura and Nishihama

*Notoacmea schrenckii boninensis* Asakura and Nishihama, 1987. Venus 46, 186-189.

Materials examined: 6 specimens; UG1-863, Asuncion (NM), July 1975, 16.0 mm(L)-12.1 mm (W) (Fig. 1); UG1-852, Maug (NM), July 1975, 14.6 mm(L)-11.8 mm(W) (Fig. 2); UG1-925, Maug (east coast of West Island), Jan. 1975, 15.3 mm(L)-12.1 mm(W) (Fig. 3). Besides these, one more individuals in UG1-863, -852, -925, respectively, were examined without size measurement. All of these are labeled "*Patella*" sp. 4.

The shell is round in outline with a smooth margin, low in height, with a dark greyish-green surface color with radially scattered lines and V-shaped patterns of dark coloration. The apex is located more anteriorly and the shell is less depressed and wider than that of *N. s. schrenckii.*

These characteristics well agree with those of *N. s. boninensis,* which has been hitherto known only from the Ogasawaras, being first recorded from Chichijima (B) by Asakura and Nishihama (1987) and then also collected from Hahajima (B) in 1989 (Asakura unpubl.). Thus, this subspecies is newly recorded from the northern

Marianas.

Vermeij *et al.* (1983) listed *Notoacmea* cf. *schrenckii* (Lischke) from Anatahan, Guguan, Pagan, Asuncion, and Maug Islands (NM). We examined the specimens from Asuncion and Maug, and found that all of them are *N. s. boninensis.*

### *Cellana toreuma* (Reeve) var.

*Patella toreuma* Reeve, 1855, Conch. Iconica, pl.27, Figs. 69a-c.

*Cellana toreuma* (Reeve), Oyama and Takemura, 1959, The molluscan shells, 3, *Cellana*, pl.2, Figs. 6-8.

*Cellana toreuma* (Reeve), Powell, 1973, Indo-Pacific Mollusca 3 (15), pl.138, Figs. 1-8 (Fig. 6, specimens from Anatahan Is., NM)

*Cellana toreuma*, Nakamura, 1986, Seibutu-Daizukan, Kairui, p. 37 (photo).

Materials examined: 24 specimes; UG1-4538, Pagan (NM), March 1981, 32.0 mm(L)-27.1 mm(W) (Fig. 6), 35.1 mm(L)-28.4 mm(w) (Fig. 7) (Name on the label is *Cellana* cf. *toreuma*); UG1-947, Asuncion (NM), January 1975, 32.9 mm(L)-25.8 mm(W) (Fig. 8) (Name on the label is *Patella* sp.1); Besides these, 21 more individuals (no registration number) were examined without size measurement.

Eldredge *et al.* (1977) and Vermeij *et al.* (1983) recorded *Cellana toreuma* from Anatahan, Guguan, Pagan, Asuncion, Maug, and Uracas (NM), but no description of them was given. We found some shell variations among them, not seen in Powell (1973)'s revision of *C. toreuma.*

The specimen shown in Fig. 6 has a short, tall, and thick shell with numerous narrow and clear radial ribs on the surface, and the shell margin is irregular due to projection of these ribs. The apex is not eroded, and situated between the center and anterior third. The specimens in Figs. 7 and 8 have a flat and thin shell with a smooth or weak radially ribbed surface. The shell margin is smooth, and the apex is highly eroded, being located between the center and the anterior third.

*C. toreuma* is the most common limpet in temperate Japan and has a low to nearly flat shell, with smooth or weakly radially ribbed surface, and margin of shell is smooth (Nakamura, 1986). The specimens shown in Figs. 7 and 8 resemble the temperate Japanese type.

*C. enneagona* (Reeve), a common species in the Ogasawaras (Asakura *et al.*, 1990, 1991), is closely related to *C. toreuma.* The taxonomic status of *C. enneagona* has been confused. Oyama and Takemura (1959) and Nakamura (1986) regarded this as an independent species. Habe (1974) suggested that it should be regarded as a subspecies of *C. toreuma*, but Powell (1973) placed this as a subspecies of *C. radiata.*

The shell surface of *C. enneagona* has several conspicuous wide radial folds, which terminal in points sometimes projecting strongly from margin of shell, and numerous narrow radial ribs are located between the folds. The shell is thicker and not lower than that of *C. toreuma.* Some characteristics such as the radial ribs, shell thickness and height of the specimens in Fig. 6 resemble to those of *C. enneagona.*

In his monograph, Powell (1973) photographed a smooth-surfaced specimen of *C. toreuma* from Anatahan (NM), which resembled the specimen in Fig. 7, but he did not discuss other types of *C. toreuma* from the northern Marianas. Since *C. toreuma* from temperate Japan and the northern Marianas and *C. enneagona* from the Ogasawaras show considerable variation in shell morphology, and since the range of their characteristics sometimes overlap, detailed taxonomic studies are needed.

We believe that *C. toreuma* and *C. enneagona* form a species group or a single species showing various phenotypes.

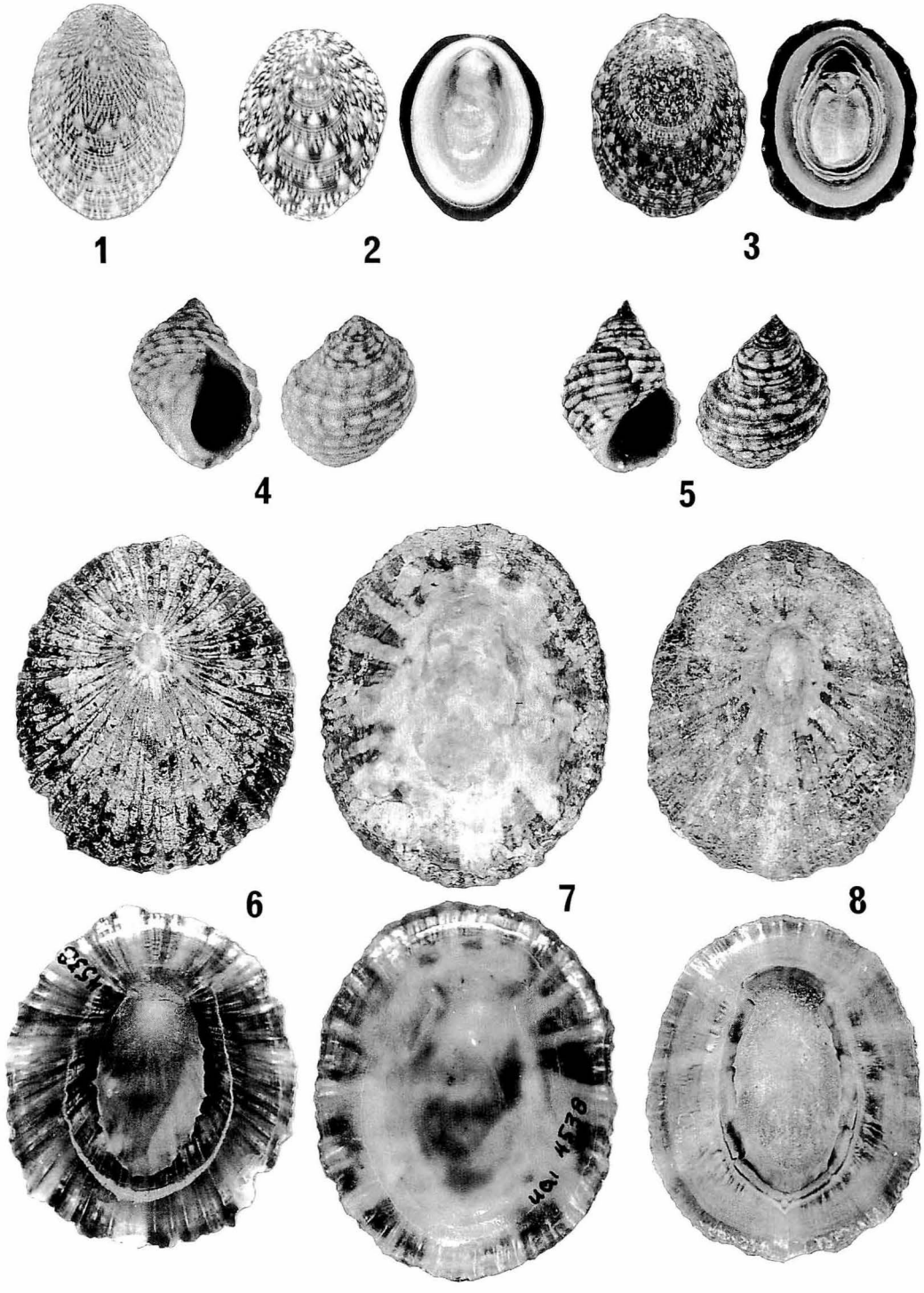
### *Nodilittorina* sp.

*Nodilittorina miliaris* (Quoy and Gaimard), Habe, 1951, Illustrated catalogue of Japanese shells, (14), pl.14, Fig. 5.

*Nodilittorina miliaris* (Quoy and Gaimard), Oyama and Takemura, 1963, The molluscan shells, 6, *Nodilittorina • Tectarius,* Fig. 5.

*Granulilittorina millegrana* (Philippi), Okutani, 1986, Seibutu-Daizukan, Kairui, p.71 (photo).

Materials examined: 9 specimens; UG1-650, Pagan Harbor. Mar. 1971, 7.3 mm(D)-8.8 mm (H) (Fig.4) (Name on the label is *Nodilittorina millegrana*); no registration number, Anatahan, Jan. 1981, 7.4 mm(D)-9.1 mm(H) (Fig. 5) (Name on the label is *Nodilittorina quadricincta feejeensis*. Besides these, 2 more




**Figs. 1-8.** Molluscs from the northern Marianas. Figs.1-3. *Notoacmea schrenckii boninensis* Asakura and Nishihama 1: UG1-863, Asuncion Island, July 1975; 2: UG1-852, Maug Island, July 1975; 3: UG1-925, Maug Island (east coast of West Island), Jan. 1975. Figs. 4-5. *Nodilittorina* sp. 4: UG1-650, Pagan Harbor, Mar. 1971; 5: no registration number, Anatahan, Jan. 1981. Figs. 6-8. *Cellana toreuma* (Reeve) var. 6: UG1-4538, Pagan, March 1981; 7: UG1-4538, Pagan, March 1981; 8: UG1-947, Asuncion, January 1975.

individuals in UG1-650, 5 more individuals (no registration number) were examined without size measurement.

The shell is round at the base. The body whorl has few wide spiral cords, and between them are clear narrow intercalated spiral cords. Shell color is whitish-gray with irregular, zigzag chocolate-brown stripes nearly along shell axis.

The characteristics of these agree well with those of the species of *Nodilittorina* from the Ogasawaras, which is highly abundant in the splash and high intertidal zones (Asakura *et al.*, 1990, 1991).

Oyama (1940), Habe (1951), and Oyama and Takemura (1963) identified the species from the Ogasawaras as *Nodilittorina miliaris* (Quoy and Gaimard). Rosewater (1970), however, pointed out that an original *N. miliaris* is the Atlantic species, and identified it as *N. leucosticta feejeensis* (Reeve). Then Rosewater and Kadolsky (1981) synonymized it as *N. quadricincta feejeensis*. Vermeij *et al.* (1983) adopted the latter identification and recorded it from Anatahan, Guguan, Pagan, Asuncion and Maug (NM).

However, *N. q. feejeensis* illustrated by Rosewater (1970) obviously has weaker spiral cords on the body whorl, a darker shell color, taller shell form, and more slanting and clear zigzag stripe patterns than the specimens from the northern Marianas and Ogasawaras. Moreover, the main distribution area of *N. q. feejeensis* is the Fiji Islands and its neighbor areas in the eastern Pacific of southern hemisphere, but the northern Marianas and Ogasawaras are very distant from these areas, and located in a different ocean current system in the north-west Pacific of northern hemisphere.

Thus, the specimens from the northern Marianas and Ogasawaras should be distinguished from *N. q. feejeensis*.

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## 北マリアナ諸島(ミクロネシア)産貝類に関する知見

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グアム大学臨海実験所に所蔵されている北マリアナ産の巻貝類(軟体動物,腹足類)の標本調査をおこない,特に日本産種と関連が深い3種類について新産地と新知見を述べた.オガサワラアオガイ *Notoacmea schrenckii boninensis* Asakura and Nishihama はこれまで小笠原諸島のみで知られていたが，北マリアナからも産することが判った(新産地)．ヨメガカサガイ *Cellama toreuma* (Reeve)は日本の温帯域に多産する種類であるが Vermeij *et al*.（1983）によって北マリアナからも記録があった．しかし今回の標本調査でそれが日本産種とはかなり違う形態をもつものが含まれていることが判った(新知見)．小笠原諸島にはヨメガカサガイに近縁のシワガサガイ *Cellana enneagona*(ヨメガカサガイの亜種とみなされることもあるが）が分布し，北マリアナの個体はそれとも共通する形態があるが,異なるものである．小笠原に多産するオガサワラタマキビが北マリアナからも産することがわかった(新産地)．この種の学名は Rosewater and Kadolsky (1981) によって *Nodilittorina quadricincta feejeensis* とされたが,これは南半球のフィージー島とその近海に分布する種類であり形態的にも異なり，小笠原産・北マリアナ産種は別種とすべきである．