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Studies in *Canarium urceus* (Linné, 1758) Part 5: a New Species from the Northern Pacific Ocean (Gastropoda: Neostromboidae: Strombidae)

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ABSTRACT This part of the *Canarium (Canarium) urceus* (Linné, 1758) revision after Abbott (1960) revision examines the northwest Pacific specimens, which are currently synonymised under *Canarium (Canarium) urceus* (Linné, 1758). *Canarium (Canarium) nipponium* n. sp. is known from the Ryukyuan Subprovince, Mariana Islands and Palau. The new species differs from others in lacking the fine sculpture on the early whorls and triangulate form. Given the propensity for species of Strombidae to disperse widely, to show a high degree of variability across their ranges, and to hybridise, it is expected that traits of this new species will be present in populations of neighbouring species, particularly within the *Canarium (Canarium)* complex.

KEYWORDS *Canarium*, *C. urceus*, *C. nipponium*, Japan, Mariana Islands, Palau, *Strombus*, Ryukyuan Subprovince

INTRODUCTION

The *Canarium (Canarium) urceus* (Linné, 1758) complex (Abbott 1960) has recently been significantly revised, with the identification of many new species within bioregions of the Indo-Australian Archipelago realm (Maxwell *et al.* 2020a; 2020b; Dekkers and Maxwell 2020). There is a sound basis for the recognition of species based on biogeographic boundaries based on the phylogenetic history of a diverse set of marine organisms within the Indo-Australian Archipelago realm (Santini and Winterbottom 2002; Spalding *et al.* 2007; Carpenter *et al.* 2011; Borsa *et al.* 2016; Kulbicki *et al.* 2013; Veron *et al.* 2015; Yang *et al.* 2016; Wainwright *et al.* 2018). The distribution of *Canarium* examined in this study falls within the Ryukyuan Subprovince and the Mariana Chain of Islands, which is considered outside and to the north of the Indo-Australian

Archipelago realm (Petuch and Berschauer 2020; Figure 1).

ABBREVIATIONS

AMD Aart M. Dekkers Collection, Purmerend, The Netherlands.
SMC Stephen Maxwell Collection, Cairns, Queensland, Australia.

METHODS

The rarely observed species described in this paper is based on two specimens, one from the Hahajima Retto, Ogasawara Islands, and one collected from Ryukyu (Figure 1). The Ryukyu specimen was obtained from Thora Whitehead, Brisbane, Australia, and was collected prior to the 1970s. The Hahajima Retto, Ogasawara Islands specimen was obtained from a dealer, and was collected in the 1950s. The species is also illustrated in the molluscan literature of

Japan (Hirase 1936, 1954; Kira 1959). While the number of physical specimens at our disposal is limited, the morphological similarity of the material from two sources, the illustrations of it in literature (under the "*urceus*" name), and the morphological distinctiveness from other *Canarium* (*Canarium*) justifies their recognition.

The decision to use the rank of species or subspecies is based on Maxwell and Dekkers (2019a, b) and Maxwell *et al.* (2021). Under this system, the subspecies rank should be restricted to those taxa where there are no other forms of discrimination other than phenetic differences in genetic sequences.

SYSTEMATIC PART

| | |
|-------------|---|
| Superfamily | Stromboidea Rafinesque, 1815 |
| Epifamily | Neostromboidae Maxwell, Dekkers, Rymer & Congdon, 2019 |
| Family | Strombidae Rafinesque, 1815 |
| Subfamily | Neostrombinae Maxwell & Rymer, 2021 |
| Tribe | Neostrombini Liverani, Dekkers & Maxwell, 2021 |
| Genus | <i>Canarium</i> Schumacher, 1817 |
| Subgenus | <i>Canarium</i> Schumacher, 1817 (Type species – <i>Canarium ustulatum</i> Schumacher, 1817 = <i>Canarium (urceus) urceus</i> (Linné, 1758)) |

Canarium (Canarium) nipponium Maxwell &
Dekkers, new species
(Figure 1)

Synonymy.

1936 *Strombus ustulatus* Schumacher –
Hirase, pl. 86, fig. 11, and Hirase
1954, pl. 86, fig. 11.

1959 *Strombus ustulatum* Linné – Kira, p.
35, pl. 15, fig. 4.

Diagnosis. Solid shells with triangular body whorl. The shoulders of the whorls are angulated and the early whorls lack fine sculpture. The posterior aperture is restricted. Body whorl covered with many very narrow spiral lines.

Description. The shell is heavy and solid. The shape is ovate to fusiform with an extended anterior sinus (broken in holotype) that is not dorsally exposed. The stromboid sinus is acute and axially angled in the direction of shell growth, and has a thin protruding flange that is quadrate and typically dark stained with black to brown both externally and internally. The ventral shoulder has reduced blunt knobs that continue to the dorsum with three well defined blunt shoulder knobs, and one greatly reduced knob prior to the formation of the outer lip. There are fine axial incised lines on the lower third of the body whorl both dorsally and ventrally. Early teleoconch whorls are rounded and smooth, with a distinctive subsutural ramp. Later whorls become more angulate at the shoulder, developing axially elongated shoulder knobs, with fine well-spaced spiral incised lines that do not extend to the body whorl. The spire often has a purplish tint. The aperture is lanceolate, being restricted at the posterior end, white, with very thin brownish lines entering the aperture on the inside of the lip. The columella is well formed and uniform along the aperture, having a yellowish hue. The other lip is thickened and somewhat quadrate posteriorly, joining at the shoulder of the body whorl, becoming thinner and sharp-edged anteriorly.

Type Material. Holotype – Ryukyu, Japan 37 mm MNHN-IM-2000-35893; Paratype 1 – Hahajima, Ogasawara Islands, Japan, (SMC 19g.001).

Type Locality. We designate Ryukyu, Japan as the type locality.

Etymology. Named after the country of the type population, Japan.

Locality Records. *Literary Records:* *Japan* – Ryūkyū (Hirase 1936, 1954); Yaka Beach, Ishikawa (Abbott 1960). ***Material Examined:*** *Japan* – Hahajima, Ogasawara Islands, Japan (SMC x 1); Ryūkyū (SMC x 1). *Palau* – Palau Lagoon (AMD x 3).

Comparison and Remarks. *Canarium* (*C.*) *nipponium* n. sp. is similar in form to *C.* (*C.*) *darwinensis* Maxwell and Dekkers, 2021 and *C.* (*C.*) *manintveldi* (Dekkers and Maxwell, 2020) but lacks the fine sculpture on the early whorls of that species. *C.* (*C.*) *incisum* (Wood, 1828) differs in having a uniform orange aperture, a more triangulate shape. *C.* (*C.*) *urceus* (Linné, 1758) differs in form, having a more angulate shoulder on the body whorl, and the posterior aperture not restricted as it is in *C.* (*C.*) *nipponium* n. sp.. *Canarium* (*C.*) *anatellum* (Duclos, 1844) and *C.* (*C.*) *esculentum* (Maxwell, Rymer, Congdon & Dekkers, 2020b) lack the angulated whorls and shouldered aperture of the new species. Material from online sources (www.stromboidea.de) and literary references, indicate that *C.* (*C.*) *nipponium* n. sp. is presently restricted to the Ryukyuan Subprovince of Japan and the Mariana Islands south to Palau.

DISCUSSION

There is growing evidence that the *C.* (*C.*) *urceus* (Linné, 1758) complex (Abbott 1960), despite variability in form and sharing of similar phenotypic traits (*e.g.* random presence of a black columella in some individuals), are also evolving in divergent directions, often within defined biogeographic provinces and zones. These recurrent morphological themes can be

explained in three ways: first, there is a lag between the time of genetic divergence and evidence of this split in the morphology of organisms (Baum 2008); second, within a population, there are enough carriers of a mutation that drift and selection maintain allelic frequency without leading to either extinction or fixation (Baum 2008); or third, there is enough genetic inflow from populations outside the particular bioregion that would enable recurrent introduction within a population of a particular morphological trait to sustain its ongoing recurrence (Delgado *et al.* 2006; Paris *et al.* 2006, 2008).

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Cite as: Maxwell, S.J. and A.M. Dekkers. 2021. Studies in *Canarium urceus* (Linné, 1758) Part 5: a New Species from the Northern Pacific Ocean (Gastropoda: Neostromboidae: Strombidae). *The Festivus* 53(4):282-287.

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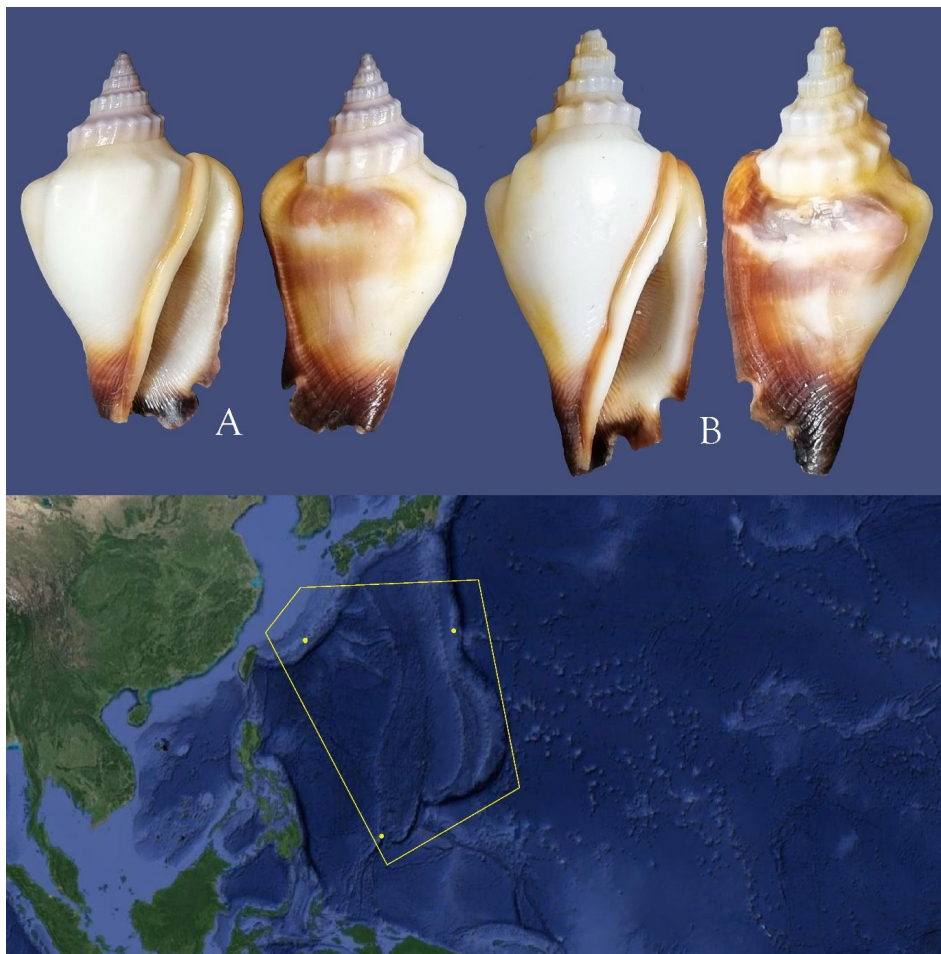


Figure 1. Distribution of *Canarium (Canarium) nipponium* n. sp.: A) Holotype – Ryukyu, Japan 37 mm MNHN-IM-2000-35893; B) Paratype 1 – Hahajima Retto, Ogasawara Islands, Japan, (SMC 19g. 001) (Image modified from Google Earth, accessed August 2021).