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Studies in *Canarium urceus* (Linnaeus, 1758) Part 3: new species from the western Pacific (Gastropoda: Neostromboidae: Strombidae)

Aart M. Dekkers¹ & Stephen J. Maxwell²

¹ Oasestraat 79, Purmerend, the Netherlands aart.dekkers@wns.nl

² College of Science and Engineering, James Cook University,
Cairns Qld 4870 stephen.maxwell@my.jcu.edu.au

ABSTRACT This study introduces four new species within the *Canarium urceus* complex. *Canarium daveyi* nov. sp. and the sympatric *C. geelvinkbaaiensis* nov. sp. from the region surrounding Geelvink Bay in north-eastern Indonesia, *C. youngorum* nov. sp. from the island of north-eastern Papua New Guinea, and finally *Canarium manintveldi* nov. sp. from the southern South Pacific centred on Fiji and Vanuatu. These new species differ from, and are described based on, the morphology and geographical distribution from known species belonging to the *C. urceus* complex. This study comprises part three in a series examining the broader *C. urceus* complex.

KEY WORDS *Canarium urceus*, *C. daveyi*, *C. geelvinkbaaiensis*, *C. youngorum*, *C. manintveldi*, Indonesia, new species, Papua New Guinea, Solomon Islands, taxonomy, Vanuatu, Fiji

INTRODUCTION

Historical revisions of the *Canarium urceus* (Linnaeus, 1758) complex have tended to grossly underestimate the diversity contained within the group, with a tendency to overlook the distinctive regional species (Dodge 1946, 1956; Abbott, 1960). A recent revision sought to define and restrict *C. urceus* to a distinctive regional morphotype centred on Singapore (Maxwell *et al.* 2020a). Additionally, a more nuanced approach to this taxon has disentangled those taxa previously described and recognised as species that have been buried by Abbott (1960) within the synonymy of that taxon (Maxwell *et al.* 2020b). Abbott (1960) is known for his oversimplification of the taxonomy of many groups of Mollusca (Turbinellidae – Dekkers and Maxwell 2018; Seraphsidae – Maxwell *et al.* 2018; Strombidae – Maxwell *et al.* 2019b).

Abbott (1960) did recognise the diversity of the *C. urceus* complex. However, the lack of material at hand reflected in the distribution records contained within the work, meant that a complete understanding of the complex was not able to be achieved at that time, 60 years ago. Notwithstanding these limitations, Abbott (1960, p. 63) noted that “in addition to size, sculptural and color variations that appear within a single colony, there are other geographical clines and groups of morphological variations limited to certain rather discrete geographical areas”. In this part the revision of the *C. urceus* complex, we explored the north-east of Indonesia (Geelvink Bay) to the south-western Pacific, and we recognise morphologically distinct species that are restricted in distribution that have been alluded to or overlooked by previous revisions (Dodge 1946, 1956; Abbott 1960).

Abbreviations.

AMD: Aart M. Dekkers Collection,
Purmerend, The Netherlands.
H: Height.

MNHN:	Musée National d'Histoire Naturelle, Paris, France.
NBC Naturalis:	Naturalis Biodiversity Center, Leiden, The Netherlands.
RMNH.MOL:	Rijksmuseum voor Natuur Historie, housed within the NBC Naturalis, Leiden, The Netherlands.
SMC:	Stephen Maxwell Collection, Cairns, Queensland, Australia.
VC	Valda Cantamessa Collection, Proserpine, Queensland, Australia.
W:	Width.
ZMA.MOLL:	Zoölogisch Museum Amsterdam, housed within the NBC NCB Naturalis, Leiden.

METHODS

Seven examples of an usual *cf. C. urceus* were obtained from Davey Djaja Mulia, operating in the Geelvink Bay area by the first author. A second series of shells was found that conformed strongly to the “Geelvink form” identified by Abbott (1960). Further material was sourced from the collection of NCB Naturalis within the ‘*urceus*’ lots. The NCB Naturalis houses the collections of the former RMNH and the now closed ZMA, and this contained a large number of Indonesian shells as a consequence of exploration when that region was a Dutch colony. During the examination of that material, this supplementary material confirmed the existence of two regionally restricted and distinct morphological kinds. The specimens were compared to the other species of *Canarium* Schumacher, 1817 with comparable morphological characters. In particular, these were compared to type material associated with other species within the *C. urceus* complex, namely *Strombus anatellus* Duclos, 1844, *Canarium esculentum* Maxwell, Rymer, Congdon and Dekkers, 2020b; *Strombus incisus* Wood, 1828 and *Strombus urceus* (Linnaeus, 1758). Furthermore, a new species historically misinterpreted as *C. incisum* Wood, 1828 from Indonesia (Man in ‘t Veld 1988) and left undescribed in part 2 of the *C.*

urceus revisions (Maxwell *et al.* 2020b) is herein described. The misinterpretations of this species by Abbott (1960) and later Man in ‘t Veld (1988) were likely caused by the use of uncoloured versions of the plates of Wood, the less expensive versions of the work, as the hand coloured plates commanded a premium cost.

We have studied twenty-three examples of *C. daveyi* nov sp., fifty-three examples of *C. geelvinkbaaiensis* nov sp., and three examples of the rarer *C. youngorum* nov sp., with more of this species likely to be found as museum collections are further explored.

SYSTEMATICS

Superfamily: Stromboidea Rafinesque, 1815
 Epifamily (Clade): Neostromboidae Maxwell, Dekkers, Rymer & Congdon, 2019a
 Family: Strombidae Rafinesque, 1815
 Genus: *Canarium* Schumacher, 1817
 Type species: *Strombus urceus* Linnaeus, 1758

Canarium daveyi Dekkers & Maxwell, nov. sp.
 (Figure 1)

Type Material. Holotype – RMNH MOL.112282a, H 21.2 mm, W 10.0 mm (Figure 1A); Paratype 1– RMNH MOL.112282b, H 24.4 mm, W 10.8 mm; Paratype 2 – RMNH MOL.112282b, H 24.2 mm, W 10.7 mm; Paratype 3 – RMNH MOL.112282b, H 19.3 mm, W 8.5 mm; Paratype 4 AMD STR3583a – H 31.4 mm, W 13.6 mm, a subadult example (Figure 1B); Paratype 5 – MNHN-IM-2012-25554, H 30.1 mm, W 13.1 mm (Figure 1C); Paratype 6 – MNHN-IM-2012-25555, H 30.3 mm, W 13.0 mm (Figure 1D); Paratype 7 – AMD STR3583b, H 32.2 mm, W 13.3 mm (Figure 1E); Paratype 8 – AMD STR3583c, H 26.6 mm, W 11.6 mm (Figure 1F); Paratype 9 – AMD STR3583d, H 29.0 mm, W 11.8 mm (Figure 1G); Paratype 10 – AMD

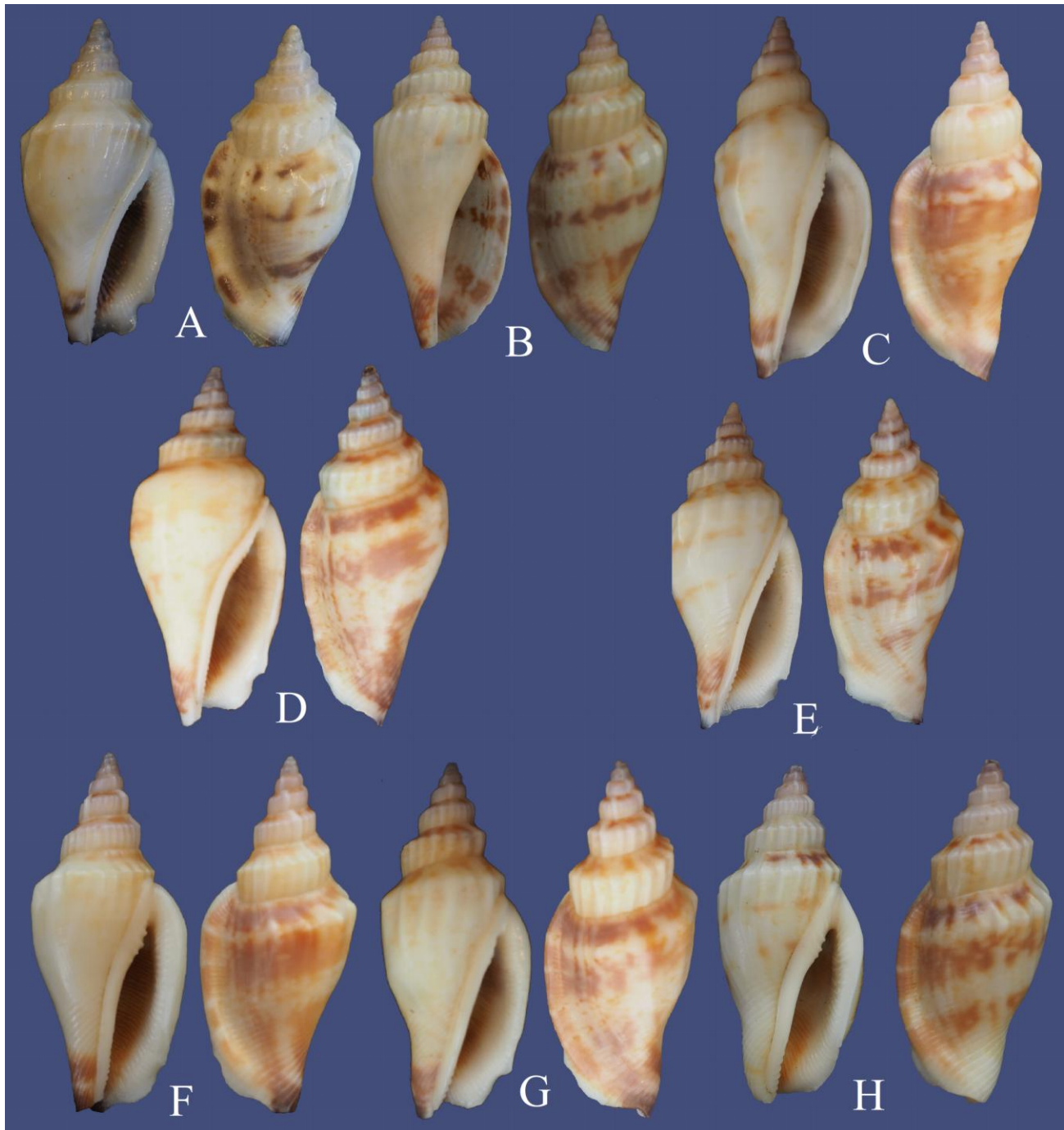


Figure 1. Types of *Canarium daveyi* n. sp. southside of the Japen Island, Geelvink Bay, Indonesia: **A**= Holotype – 21.2 mm (RMNH MOL.112282a); **B**= Paratype 4 – 31.4 mm (AMD STR3583a); **C**= Paratype 5 – 30.1 mm (MNHN-IM-2012-25554); **D**= Paratype 6 – 30.3 mm (MNHN-IM-2012-25555); **E**= Paratype 7 – 32.2 mm (AMD STR3583b); **F**= Paratype 8 – 26.6 mm (AMD STR3583c); **G**= Paratype 9 – 29.0 mm (AMD STR3583d); **H**= Paratype 10 – 28.3 mm (AMD STR3583e).

STR3583e, H 28.3 mm, W 12.6 mm (Figure 1H); Paratype 11 – SMC 19b.001, H 32.5 mm, W 14.1 mm (Figure 5C).

Type Locality. We designate Paulau Auri, ca. 1 mile NE off Palau Rumwakon, Geelvink Bay, Indonesia as the type locality.

Diagnosis. The key diagnostic feature is the small and slender shell, with 3 orange-brown coloured bands on a white shell colour and a white aperture.

Description. Slender and rather small shells for the *C. urceus* complex: average height 26.6-32.5 mm (types). The shell is lightweight, shiny and thin walled. Spire whorls consists of two protoconch whorls, which are coloured white to mostly purple glassy, and five more whorls with many axials. Earlier whorls with thinner axial ribs and some varices. Body whorl dorsally rather smooth, with the exception of axially aligned knobs on the shoulder, axial growth lines and spiral ridges that run along the anterior canal, becoming obsolete towards the shoulder. The axial ribbing continues on the ventral side of the shell, as the spiral ribbing towards the anterior end. Spire whorls with a ramp towards the shoulder. Penultimate whorl runs back to the shell below the shoulder. The rather straight and narrow wing has a strong ridge just before the end of it, only dorsally. Aperture wide, with a well-defined columellar callus that is sharply cut and raised a bit, attached to the ventral side of the body whorl with a gutter. Smooth columella in the middle and both ends bear strong white lirae. Place of attachment below the shoulder. Inside of the outer lip with visible white spiral lirae. Outer lip thickened and white. Strombid notch very shallow, almost obsolete. Colour of the shell consists of three vague bands of orange-brown on a white background, the one at the anterior end broadest and the one under the suture smallest. These bands show through at the aperture. The white bands end in four white spots on the outside part of the labrum and a broad one at the anterior end. The anterior channel ends in a black spot.

Comparison and remarks. *Canarium daveyi* nov. sp. is, at this stage, believed to be restricted to the region of Geelvink Bay. *Canarium daveyi*

nov. sp. differs from the recent *C. urceus* from the Philippines and Central Pacific by its much smaller and lightweight shell; the sculpture is finer and the colouring is very different from *C. urceus*, with its black aperture, or the multi-coloured sister species *C. esculentum* from the Philippines with its white aperture. Compared to *C. esculentum*, it has a constant colour with three orange-brown bands on a white background, and never any black or orange on the aperture as other morphs in the complex. *Canarium daveyi* nov. sp. differs from the *C. geelvinkbaaiensis* nov. sp., which has a blue-black lower third of the body whorl, no lirae on both ends of the columella and a bit longer posterior channel.

Canarium manintveldi nov. sp. from the Solomon Island and Vanuatu has a similar size range to *C. daveyi* nov. sp, but is much broader than it is high and the aperture and shoulder are almost on the same level as the suture. The typical form of this species is easy to recognize. *Canarium youngorum* nov sp. from the islands of eastern Papua New Guinea differs in being larger, and has a typical red aperture and uniform angled axial folds at the shoulder, which may be diminished in some specimens.

Etymology. The new species is named after Davey Djaja Mulia from Jakarta, Indonesia, who collected the shells during leisure time at his work on the Island of Palau Japen and brought this new species to the authors' attention.

Supplementary Material. *Indonesia* Seroei, Japen Island, ex coll. L. de Priester (RMNH MOL.179483 x 1); Coral coast near Hollandia, leg. G. den Hoed (ZMA MOLL.48218 x 1); Dohreh-baai, ex coll. E.F. Jochem (RMNH MOL.179467 x 1); Wandammen Bay, Wasior. Geelvink Bay. leg. G.V. Hansen (ZMA MOLL.50579 x 3); Serui, Japen Island, ex coll.

Daan Smits (ZMA MOLL.50570 x 4). Note: Dohreh-baai = Dorey-Bay = smaller west part of Geelvink Bay); Dohreh (= Dorey, present day Manokwari).

Canarium geelvinkbaaiensis Dekkers & Maxwell, nov. sp.
(Figure 2)

Type Material. Holotype – RMNH MOL.179571a, Manokwari, ex coll. Kaas & ten Broeke, collected by Mevr. M.v d Wiel, 1956, H 24.5 mm, W 10.9 mm (Figure 2B); Paratype 1 – RMNH MOL.179571b, Manokwari, ex coll. Kaas & ten Broeke, collected by Mevr. M.v/d Wiel, 1956, H 28.3 mm, W 12.9 mm (Figure 2A, 5H). Paratype 2 – MNHN-IM-2012-25556,

from Manokwari, Leg. Daan Smits 1958, H 27.2 mm, W 12.9 mm; Paratype 3 – MNHN-IM-2012-25557, from Manokwari, Leg. Daan Smits, 1958, H 28.1 mm, W 14.2 mm; Paratype 4 – AMD STR3689a, from Manokwari, Leg. Daan Smits, 1958, H 28.5 mm, W 13.1 mm; Paratype 5 – AMD STR3689b, from Manokwari, Leg. Daan Smits, 1958, H 28.1 mm, W 14.5 mm; Paratype 6 – AMD STR3689c, from Manokwari, Leg. Daan Smits, 1958, H 26.6 mm, W 11.6 mm; Paratype 7 – from Manokwari, Leg. Daan Smits, 1958, SMC 19e.001, H 25.3 mm, W 12.4 mm (chipped protoconch).

Type Locality. We designate Manokwari, West Guinea, Indonesia as the type locality.

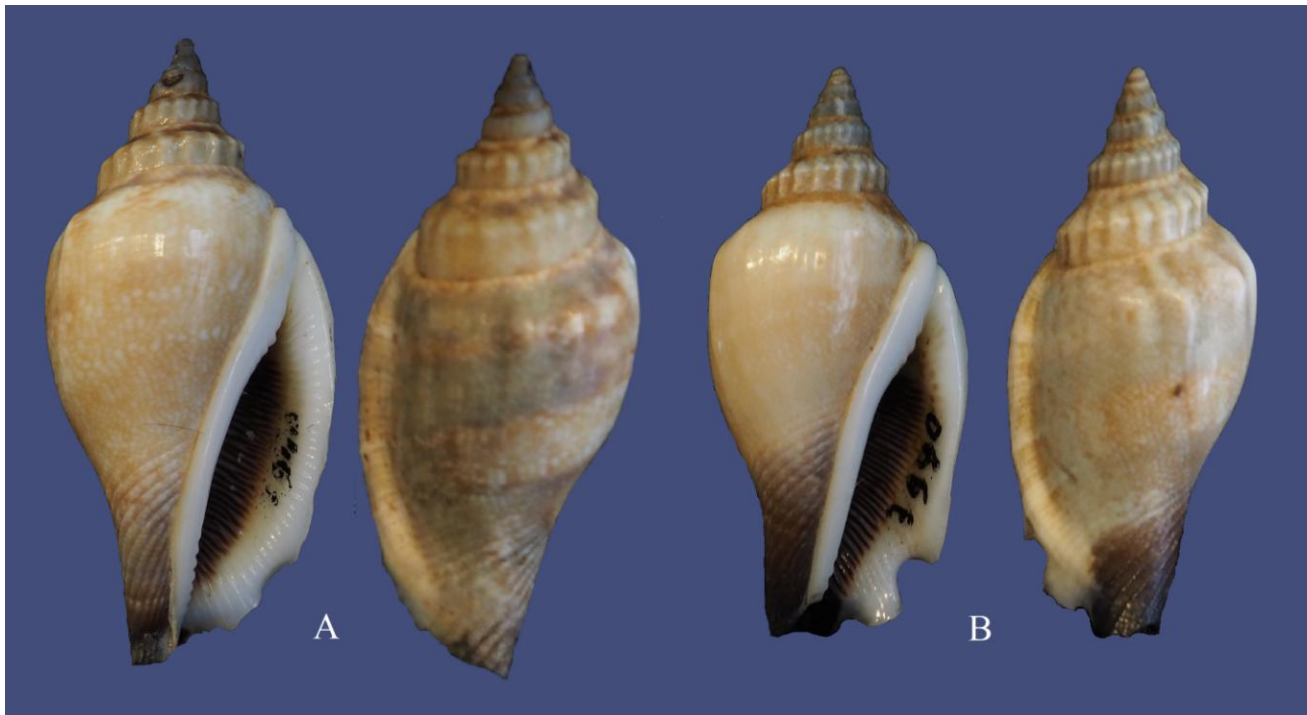


Figure 2. Types of *Canarium geelvinkbaaiensis* nov. sp. from Manokwari, Indonesia: **A**= Holotype – 28.3 mm (RHNH MOL.179571b); **B**= Paratype – 24.5 mm (RHNH MOL.179571a).

Diagnosis. The key diagnostic feature is a small and slender shell decorated with 2 vague brownish bands on a white base colour, and the

anterior part of the shell toward the anterior channel with a dark brown to black band that is broadest at the ventral side of the shell.

Description. Slender and rather small shells for the *C. urceus* complex, height between 21.2-29.5 mm (types), but mostly around 27-28 mm. The shell is lightweight, shiny, and has thin shell walls. Spire whorls consists of about three protoconch whorls, mostly brown-purple and glassy, and 4-5 more whorls with many axials. Earlier whorls with thinner axial ribs and sometimes old varices. Body whorl dorsally rather smooth with the exception of axially aligned knobs on the shoulder, and ca. 10 stronger spiral ridges that run along the anterior canal; the remainder of the body whorl bears many very thin spiral lines that become obsolete around and above the shoulder. No visible axial growth lines. The axial knobs dorsally are preceded on the ventral side of the shell, just towards the aperture in the paratypes 2-7 and in the holotype and paratype 1 the ventral side is smooth. It is preceded on the penultimate whorl with about 20-21 finely raised knobs that form the axial ribbing in that whorl, and form a corona on the shoulder. This is preceded on the earlier whorls, becoming more and more tiny. Spire whorls with a smooth ramp from the simple suture towards the shoulder; after the coronation on the shoulder the shell becoming smaller, giving a sharp edged shoulder. Penultimate whorl runs back to the shell below the shoulder. The rather straight and narrow wing has a strong ridge of about 2.5-3 mm just before the end of it, only dorsally and not internally reinforced. Aperture narrow, with a well-defined columellar callus that is sharply cut and raised a bit, attached to the ventral side of the body whorl with a gutter. Smooth columella to the naked eye, but some tiny lirae near the small posterior sinus. Place of attachment below the shoulder of the penultimate whorl. Inside of the outer lip with many clearly visible, but thin, white spiral lirae, that become brown after about 4 mm. Outer lip white. Strombid notch very shallow, about 1 mm deep and 4 mm wide. Colour of the shell

dirty white with 2 greenish bands. Old shells dirty white with purple hue dorsally and two vague bands of orange-brown that start mid dorsally and end before the reinforced lip; the one at the anterior end broadest and darkest and the one there under the longest and the lightest of colour. These bands show through at the aperture. The anterior part of the shell toward the anterior channel with a dark brown to black band that is broadest at the ventral side of the shell.

Synonymy.

Strombus (Canarium) urceus 'Geelvink Bay form' Abbott (1960 p. 64, pl. 41, fig. 3). Dutch New Guinea.

Etymology. The new species is named after the type location, Geelvink Bay, as Dutch name it (Geelvink Baai).

Comparison and Remarks. Abbott treated *C. geelvinkbaaiensis* nov. sp. as an unnamed form of *S. (C.) urceus* coming from Dutch New Guinea (now: West Guinea, part of Indonesia). He also mentions Palaus and Ponape Island in the Carolinas. Abbott does not depict these shells coming from these island chains. We were unable to locate any material matching *C. geelvinkbaaiensis* nov. sp. outside of north-west Indonesia, and thus we are not able to confirm these locations. The species is easily recognisable by the fine beaded shoulder in combination with the brown-black broader band at the anterior end. *Canarium. geelvinkbaaiensis* nov. sp. has three vague brownish bands where *C. daveyi* nov. sp. only has two bands. Ecological records indicate that the species can be found from 20-25 fathoms in association with weed, sponge and rubble.

Supplementary Material. 1/2 mile south of Ambai, Japen Island. ex coll. Philidelphia Ao. Soi. reg. no. 1408. Nat. Sci. Foundation

(RMNH MOL.112281 x 1); Doreh Baai, ex coll. E.F. Jochem (RMNH MOL.179467 x 4, dead coll.); coast near Sara Wandori, West of Serui, Japen Island, expedition L.D. Brongersma c.s. 1954-1955 (RMNH MOL.179489 x 1); Beach of Sorong, ex. coll. Mr. P. van Royen, reg. No. 1112 (RMNH MOL.179491 x 2); Near Seroei Leg. D. Smits, ex coll. J. van der Land (RMNH MOL.179541 x 3); Manokwari, ex coll. Kaas & ten Broeke (RMNH MOL.179561 x 7); Doreh Baai, ex coll. E.F. Jochem (RMNH MOL.179566 x 1); Bay of Seroei, Japen Island, ex coll. D. Smits (no. 298), reg. no. 1453 (RMNH MOL.179567 x 8); Palau Roon, Geelvink Bay, ex coll. L. de Priester (ZMA MOLL.45999 x 1); Serui, Japen Island, ex. coll. Daan Smits (ZMA MOLL 50570 x 5); Wandammen Bay, Wasior, Geelvink Bay, leg. G.V. Hansen (ZMA MOLL 50579 x 7); Serui Bay, ex coll. Bergström, leg. Smits D. 298 (ZMA MOLL.73838 x 8). Note: Dohreh-baai = Dorey-Bay = smaller west part of Geelvink Bay. Dohreh = Dorey = present day Manokwari.

Canarium manintveldi Dekkers &
Maxwell, nov. sp.
(Figure 3)

Type Material. Holotype – ZMA MOLL. 187523a, H 20.1 mm, W 10.3 mm, Malapoa, Vila, Vanuatu, ex. P. Hessel coll. (Figure 3A); Paratype 1 – ZMA MOLL.187523b, H 18.6 mm, W 10.1 mm, Malapoa, Vila, Vanuatu, ex. P. Hessel coll. (Figure 3B); Paratype 2 – Crab Bay, Malekula, Vanuatu, AMD STR2817, H 20.0 mm, W 10.5 mm; Paratype 3 – Madang, North coast Papua New Guinea, AMD STR1625, H 21.8 mm, W 10.5 mm; Paratype 4 – Vanuatu Islands, 1-2 meter depth on reef AMD STR2551, H 19.7 mm, W 10.8 mm; Paratype 5 – Uoei Island, Solomon Islands, H 16.1 mm, W 9.1 mm (SMC 21.003); Paratype 6 – Irirka Islands, Vanuatu, H 19.1, W 10.5 mm (SMC

21.001a); Paratype 7 – Lord Howe Island, H 24.9 mm, W 13.1 mm (SMC 21.002); Paratype 8 – Kakabona, Solomon Islands, H 28.9 mm, W 12.9 mm (SMC 21.004a); Paratype 9 – Irirka Islands, Vanuatu, H 18.2 mm, W 10.0 mm (SMC 21.001b).

Type Locality. We designate Malapoa, Islands, Vanuatu as the type locality.

Diagnosis. The species is constant in having the aperture raised above the shoulder of the body whorl with a greatly thickened callus either side of the sinus at the posterior end.

Description. Shells small in size for the *C. urceus* complex, height between 20-28 mm (types), but mostly around 20 mm in the Solomons Islands and Vanuatu and becoming larger (27-29 mm) in the southern range. The shell is sturdy and the body whorl is almost smooth and shiny. The width of the shell is variable, from relatively slender to broad at the shoulder. Spire whorls consists of about three protoconch whorls, regularly becoming larger. Dirty white to brown-purple, and 4-5 more whorls with many axials. Earlier whorls with tiny axial ribs and old varices. Body whorl dorsally rather smooth to the naked eye but on close inspection with ca. 6 slightly stronger spiral ridges that run along the anterior canal, and the remainder of the body whorl with many very thin spiral lines that become obsolete around and above the shoulder. No visible axial growth lines. Body whorl with a central knob on the shoulder; the axial knob dorsally is proceeded towards and on the ventral side of the shell, just towards the aperture. It is succeeded on the penultimate whorl with about 13-20 finely raised knobs that form the axial ribbing in that whorl, and form a corona on the shoulder. This is proceeded on the earlier whorls,



Figure 3. The types of *Canarium mantinveldi* nov. sp.: **A**= Holotype – Malpona,Vila, Vanuatu, 20.1 mm (ZMA MOLL.187523a); **B**= Paratype 1 – Malpona,Vila, Vanuatu, 18.5 mm (ZMA MOLL.187523b); **C**= Paratype 5 – Uoei Island, Solomon Islands, 16.1 mm (SMC 21.003); **D**= Paratype 6 – Irirka Islands, Vanuatu, 19.1 mm (SMC 21.001a); **E**= Paratype 7 – Lord Howe Island, 24.9 mm (SMC 21.002); **F**= Paratype 8 – Kakabona, Solomon Islands 28.9 mm (SMC 21.004a).

becoming more and more tiny. Spire whorls with a smooth ramp from the simple suture towards the shoulder; after the coronation on the shoulder the shell becomes smaller giving a sharp edged shoulder. The earliest whorls are straighter. Penultimate whorl runs back to the shell well above the shoulder, even surpassing the suture. The rather straight and narrow wing has a strong ridge of about 2.0-2.5 mm just before the end of it, only dorsally and not internally reinforced. Aperture very narrow, with a well-defined columellar callus that is sharply cut and raised a bit, attached to the ventral side of the body whorl with a deep gutter. Smooth columella to the naked eye, but some tiny lirae near the small posterior sinus. The aperture callus is bulbous at the posterior end where it is raised above the suture; it is so thick that the posterior channel is often very shallow. First 1 mm of the inside of the outer lip smooth, then with many thin white spiral lirae on a white to brownish background inside the aperture. Outer lip white. Strombid notch very shallow, about 1 mm deep and 3-4 mm wide. Colour of the shell dirty white with more or less purplish hue dorsally and very vague broad bands of blueish-brown that start dorsally and (as the ventral side is dirty white) end before the reinforced lip. Towards the lip they can fuse into a broad axial band. Sometimes these bands do show through at the inside of the aperture. The anterior part of the shell toward the anterior channel with a dark brown to black band that is broadest at the ventral side of the shell, but the last 1 mm is often white.

Synonymy.

Strombus (Canarium) urceus incisus Wood – Man in 't veld 1988, p. 6-10.

Strombus (Canarium) urceus incisus Wood – Cernohorsky 1972, p. 74; pl. 20, fig. 2. Walls 1980, pp. 107, 108. Kreipl *et al.* 1999, pp. 12, 40; pl. 76.

Strombus urceus Linnaeus – Hinton 1972, p. 10; pl. 5, fig. 15.

Strombus urceus urceus Linnaeus – Hinton 1978, p. 11, no. 14.

Strombus (Canarium) incisus Wood – Abbott 1960, p. 64, pl. 41, fig. 4 'Quadrate form'.

'a form close to incisum' – Romagna Manojó 1980, pl. 1, fig. 9 (no locality).

Etymology. The new species is named after Leo Man in 't Veld, Vlaardingen, The Netherlands, a painter (drawings and airbrush) and well known Strombidae collector in the Netherlands. He mixed up the newly described species named after him with the species Wood named *Canarium incisum*, which has an orange columella. We also honour Leo for his fine artwork in Kronenberg & Visser, 1984; the plates in this book (in Dutch) is almost entirely based on his collection and this species name recognises his unrecognised contribution to that work.

Comparison and Remarks. The new species is readily recognized by its high shouldered aperture with a thickened callus at the posterior end combined with a white columella. It is the only species in the complex that has the very high shouldered aperture. It can be confused with *C. orrae* Abbott, 1960 from west-northern Australia, but that species is much larger (up to 35-50 mm) and rugged, with stepped spire whorls.

Abbott (1960) treated the new species as the 'quadrate' form of *C. urceus*. He probably realised it could be a species (Abbott: 64): "An additional and evidently closely related form appears to have received the name *incisus* Wood, 1828. We have this form from the Solomons and from other localities of which the data is questionable and "... it may subsequently be considered a subspecies...". The conclusion is that: 1) Abbott was convinced

that it is an additional form and 2) he mixes it up with the true Indonesian *C. incisum* of Wood, 1828, which is highlighted in part 2 of the *C. urceus* revisions (Maxwell *et al.* 2020b). Leo Man in 't Veld (Man in 't Veld, 1988) made the same mistake as Abbott, both most likely caused by an uncoloured version of Wood's work. We must bear in mind that much of Abbott's (1960) designated subspecies are now considered full species. The latest example is in the genus *Doxander* (Kronenberg & Wieneke 2020).

Canarium youngorum Dekkers &
Maxwell, nov. sp.
(Figure 4)

Type Material. A) Holotype – Manus Island, H 35.6 mm, W 16.1 mm (QM MO85756); B) Paratype 1 – Rabaul, H 37.9 mm, W 22.5 mm

(SMC 19f.001); C) Paratype 2 – Rabaul, H 35.3 mm, W 15.5 mm (VC).

Type Locality. We designate Manus Island, Papua New Guinea as the type locality.

Diagnosis. Shell of medium size with uniform axial folds that reach the suture on the spire and are sinusoidal on the ventral body of whorl the shoulder.

Description. The fusiform shells are medium sized for the *C. urceus* complex; height between 35-40 mm (types). The shell is thin with a uniformly thickened outer lip. The spire is approximately one third to one quarter the length of the shell. The protoconch is smooth consisting of one or two whorls. The first spiral whorls are convex smooth with a subsutural chord (paratype 1), that may be indistinct in some specimens due to wear (holotype), and



Figure 4. The types of *Canarium youngorum* nov. sp.: A= Holotype – Manus Island 35.6 mm (QM MO85756); B= Paratype 1 – Rabaul 37.9 mm (SMC 19f.001); C= Paratype 2 – Rabaul 35.3 mm (VC).

without varices. Varices appearing only on the third and fourth whorls, typically with three per whorl. Later spire without the earlier subsutural chord that forms into a short subsutural ramp, becoming moderately angulated at the shoulder.

The shoulder of latter whorls with distinctive and regular small axial folds that reach the suture of the proceeding whorl. The folds tend to be skewed spirally forward as they descend the whorl. There is an absence of spiral

sculpture on the spire. The ventral body whorl with the same uniform axial folds that do not extend below the top one third of the whorl, these may be diminished in some specimens. The dorsal body whorl folds have diminished in number, becoming axially elongated knobs, which do not extend much past the mid-dorsum. The edge of the outerlip is dorsally stepped and thickened in contrast to the smooth shell. The stromboid notch is moderately shallow but well formed. The spiral striae on the lower third body whorl reduce in width towards the anterior. The columella is uniform in thickness, with a few faint, but distinct, lirae at the anterior and posterior ends. Both the columella and outerlip share the same uniform colouration, typically red. The columella and outerlip join below the shoulder of the body whorl, forming two sides of a shallow sinus. The inner aperture with many fine raised lirae that move more toward the edge of the outer lip anteriorly, and which become darkly stained over a plain interior base colour. The colour and pattern of the shell is small fine white tents on a tan shell giving the appearance of axially formed maculations. The colour of the inner aperture can be seen through some specimens, giving the appearance of a dark hue to the area preceding the outer lip. The lower third of the body whorl may contain a dark stain in some examples, being a continuation and deepening of the colour of the inner aperture.

Etymology. This species is named in honour of Trevor and Marguerite Young of Cannonvale, Queensland, who, as active citizen scientists, have supported many budding taxonomists and proffered new insights leading to new molluscan species being described.

Comparison and Remarks. Currently *C. youngorum* nov. sp. is only known from the far north eastern islands of Papua New Guinea. However, it is expected that this range will be

expanded as further explorations of museum records are further undertaken. *C. youngorum* nov. sp. differs from *C. manintveldi* nov. sp., by the uniform thickening of the outer lip and larger size. The spire, sculpture and size distinguish *C. youngorum* nov. sp. from its western neighbours, *C. geelvinkbaaiensis* nov. sp. and *C. daveyi* nov. sp..

DISCUSSION

We have demonstrated that the *urceus*-complex has four more related species in the north of Papua Island and the Solomon-Vanuatu chain of Islands. Most remarkable is *Canarium manintveldi*, which was for a long time wrongly known under the name of *C. incisus*. All the new species described differ from *C. anatellum*, *C. esculentum* and *C. urceus* by their much smaller and lightweight shells; the sculpture is finer and the colouring is constant in all specimens, lacking the colouration variability found in multi-coloured *C. anatellum* and *C. esculentum* (Figure 5), nor do they have the uniformity in black colouration associated with *C. urceus*. Furthermore, the new species introduced herein complete the distribution of the *C. urceus* complex in the south-western Pacific. In particular, *C. youngorum* nov. sp. is distributed between the new species contained in the northern Indonesian *C. geelvinkbaaiensis* nov. sp. and *C. daveyi* nov. sp. and the south-eastern *C. manintveldi* nov. sp. and are not currently known to be congruent with other species within the *C. urceus* complex.

FUTURE RESEARCH

This paper is part 3 of a larger revision of *Canarium urceus* (Linnaeus, 1758) after Abbott (1960), describing species from the south-western Pacific. The next steps in this study series will examine the morphotypes that

surround the western areas of the central Indo-Pacific.

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Figure 5. The Strombidae that have historically been buried within the *Canarium urceus* complex: **A**= *C. youngorum* nov. sp., Rabaul, Papua New Guinea, 37.9 mm (Paratype 1; SMC 19f.001); **B**= *C. insisum* (Wood 1828), Kangean Islands, Indonesia (SMC 19d.003j); **C**= *C. daveyi* nov. sp., Geelvink Bay, Indonesia, Paratype 11, 32.5 mm (SMC 19b.001); **D**= *C. anatellum* (Duclos, 1844), Kangean Islands, Indonesia (SMC 19b.003v); **E**= *C. mantinveldi* nov. sp., Irika Islands, Vanuatu, Paratype 9, 18.2 mm (SMC 21.001b); **F**= *C. urceus* (Linnaeus, 1758) Changi Beach, Singapore (SMC U1.002); **G**= *C. orrae* (Abbott, 1960) Onslow, 41.5 mm (SMC 20.006); **H**= *C. geelvinkbaaiensis* nov. sp., Manokwari, Indonesia, 28.3 mm (RMNH MOL.179571); **I**= *C. esculentum* Maxwell, Rymer, Congdon and Dekkers, 2020, Surigao, Philippines (SMC 19a.001ab).