

ニューカレドニア産イモガイの1新種 *Conus swainsoni*

ジャンクロード・エステイバ ・ ルドフォン・コセユ

Conus swainsoni, a New Cone (Gastropoda: Conidae)
from New Caledonia*

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Abstract: *Conus swainsoni* n.sp., a member of the *C. planorbis* group, is described from New Caledonia. It inhabits coarse muddy sand with detritus and calcareous algae in about 20 m and occurs sympatrically with *C. connectens* A. Adams, 1855. Although the species had already been named *C. pulchellus* by Swainson (1822), it has no available name, and Swainson's type cannot be traced. Rather than establishing a nomen novum which is not stabilized by a type specimen, an entirely new description is made, including a biometrical comparison with the most closely related species *C. connectens*.

Among the approximately 90 species of the genus *Conus* known from New Caledonia (Estival, 1981), there were thought to be 4 species of the *C. planorbis* group: *C. planorbis* Born, 1778, *C. vitulinus* Hwass in Bruguière, 1792, *C. striatellus* Link, 1807 and *C. connectens* A. Adams, 1855. They have in common a smooth and sharply angled body whorl shoulder, slightly convex body whorl sides, a relatively low spire, a broad anterior end and a yellow animal. Of *C. planorbis*, *striatellus* and *vitulinus* it is known that they are vermivorous (Endean & Rudkin, 1965; Peile, 1939; Kohn, 1959; Lim, 1969). Whereas these three are living in sandy bottom in shallow water (0-20 m), *C. connectens* has been collected in 20-60 m from coralline gravel bottom.

Because of their rarity only now a sufficient number of specimens of cones yet thought to belong to *C. connectens* was available for study, and this leads to the conclusion that in New Caledonia 2 similar looking species, geographically

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and ecologically sympatric, are involved. They differ in several constant characteristics, especially the juveniles are quite easily distinguishable. The knowledge of the existence of the 2 species is not new. Swainson (1822: pl. 110, 114) had already described them as *C. cinctus* and *C. pulchellus*. Reeve (1843) considered them synonyms, and this view was maintained in all large monographs of the 19th century (Deshayes, 1845: 136; Kiener, 1849-50: 109; Weinkauff, 1875: 222; Tryon, 1884: 49), except Sowerby (1857-58). As a consequence, in the modern literature also both species were merged together under various names.

Conus cinctus Swainson, 1822 is preoccupied by *C. cinctus* Bosc, 1801, *C. cinctus* Link, 1807 and *C. cinctus* Borson, 1820. The species had been renamed *C. circumactus* by Iredale (1929: 281), the first available name, however, is *C. connectens* A. Adams, 1855.

Conus pulchellus Swainson, 1822 is a secondary homonym of *Cucullus pulchellus* Roeding, 1798 (Kohn, 1975: 216). Swainson's description of *C. pulchellus* was based on a single specimen of his collection, originating from "Amboyna" (Ambon, Indonesia). In the Manchester Museum, which had purchased the Swainson Collection, the "specimens were merged into the general collection and cannot now be traced" (Dean, 1936: 232). So the authenticity of the types is lost, and under these circumstances it seems to be preferable to describe Swainson's *C. pulchellus* here as a new species rather than establishing a nomen novum which is not stabilized by a type specimen.

Material and Methods

Specimens were collected or borrowed from collectors. The biometric treatment was carried out according to Kohn (1980) and Kohn and Riggs (1975). The measurements of SL (shell length), MD (maximum diameter) and AH (aperture height) were taken directly from the shells, the last by means of modified calipers (see Kohn and Riggs, 1975: 352). For the other parameters the shells were photographed with the shell axis parallel to the film, the necessary lines were drawn on $\times 2$ size prints and the measurements taken with vernier calipers. Because of the very small and unequal samples, for comparison of the two species the non-parametric Mann-Whitney U-test was applied.

Conus swainsoni n. sp.

Material examined: Holotype MNHN, 56.0 \times 28.2 mm; Paratype MNHN, 23.3 \times 11.5 mm; 2 other paratypes in coll. Estival, 5.0 \times 29.9 mm and 27.3 \times 14.7 mm. 9 other specimens, presently in private collections.

Locus typicus: New Caledonia, off Nouméa, between Ilot Canard and Ilot Maître.

Distribution: New Caledonia and possibly Indonesia (Ambon: Swainson,

1822).

Description: Shell cream white with orange brown to brown radial flames and large zones or patches of bright orange to orange brown on the body whorl, leaving the white ground colour as an irregular spiral band below midbody or only as a row of isolated white flecks. Body whorl besides this with fine dark brown spiral threads, in adult specimens 23–30 ($x = 26.7$; S.D. = 2.5; $N = 6$), in juveniles more or less missing. Base deep violet. Juvenile specimens either with the same colours as adult ones or, more commonly, unicoloured rosy-white with brown flecks only on the spire and with a violet base, or with a combination of both.

Shell rather high, solid, with low spire and angled, smooth shoulder and a deep suture. Protoconch with at least 2 whorls and protruding as a knob from the teleoconch. The mean shell length of the adult specimens is 48.6 mm (S.D. = 9.4; range 36.5–58.6 mm, $N = 8$), of all specimens examined 39.5 mm (S.D. = 14.2; range 17.8–58.6 mm, $N = 13$). The mean relative diameter, the ratio maximum diameter/aperture height, is 0.55 (S.D. = 0.02; $N = 13$), the ratio of maximum diameter to total shell length is 0.50 (S.D. = 0.02; $N = 13$).

Some parameters of shell coiling have the following mean values: The shape of generating curve (ratio of aperture length to aperture width) is 11.4 (S.D. = 1.22; $N = 12$), the rate of translation (from the centre of the aperture, the ratio of the distance to the posterior end of the shell along a line parallel to the shell axis, to the distance from the centre of the aperture to the shell axis) is 3.18 (S.D. = 0.22; $N = 12$). The relative whorl height (ratio of the height of the penultimate whorl to the aperture height) is 0.020 (S.D. = 0.004; $N = 12$), the convexity (a measure of the degree of curvature of the generating curve) is 0.042 (S.D. = 0.0074; $N = 12$). The position of maximum diameter (position of maximum abaxial extension of the last whorl relative to aperture height) is 0.86 (S.D. = 0.016; $N = 13$).

Surface of body whorl sides with very faint, close-set irregular spiral striae and on the anterior end with 5–6 strong spiral rows of prominent granules (mean number of rows 5.2; S.D. = 0.83; $N = 12$). In the middle of each interspace there is a usually much weaker row, but in some specimens these intermediate rows can attain the same strength as the “normal” ones. On the body whorl above the shoulder and on the spire whorls 2–3 weak spiral grooves.

Habitat: On detritic bottom consisting of coarse muddy sand with pink calcareous algae and red algae, in a depth of about 20–21 m. The biotope is in the influence of strong tidal currents. Other *Conus* species in the same biotope are: *C. connectens* A. Adams, 1855, *C. planorbis* Born, 1778, *C. consors* Sowerby, 1833, *C. imperialis* Linné, 1758, *C. optimus* Sowerby, 1913 and *C. varius* Linné, 1758. *C. connectens* seems to be rarer than *C. swainsoni* in this biotope.

Derivatio nominis: The new species is named in honour of W. Swainson who

Table 1. Comparison between *Conus swainsoni* n. sp. and *Conus connectens* A. Adams

Characteristic	<i>C. swainsoni</i>				<i>C. connectens</i>				Sign.
	\bar{x}	V	S. D.	N	\bar{x}	V	S. D.	N	
Shape of generating curve	11.38	10.72	1.22	12	9.69	6.82	0.66	4	s.
Rate of translation	3.18	6.82	0.22	12	3.38	1.48	0.05	4	n. s.
Relative whorl height	0.020	20.0	0.004	12	0.022	24.55	0.0054	4	n. s.
Convexity	0.042	17.6	0.0074	12	0.044	6.82	0.003	4	n. s.
Position of maximum diameter	0.86	1.86	0.016	13	0.85	2.82	0.024	4	n. s.
Relative diameter	0.55	3.64	0.02	13	0.60	3.33	0.02	4	s.
Ratio of maximum diameter/shell length	0.50	4.00	0.02	13	0.52	1.54	0.008	4	s.
No. of granule rows	5.2	15.96	0.83	12	5.0	16.4	0.82	4	n. s.

\bar{x} = mean ; V = coefficient of variation ; S. D. = standard deviation ; N = number of specimens ; Sign. = significantiveness after the Mann-Whitney U-test at $\alpha = 0.05$; s. = significant ; n. s. = not significant.

first noticed its existence.

Comparison with similar species: *C. swainsoni* is most similar to *C. connectens*. The values of parameters of shell coiling and sculpture are compared in Table 1. It is shown that in 3 of 8 parameters there is a significant difference between *C. connectens* and *C. swainsoni*.

The colour differences are most evident in the juvenile specimens up to 25 mm: juveniles of *C. swainsoni* are mostly unicoloured rosy white with the violet base, whereas the juveniles of *C. connectens* are more or less resembling the adult specimens: brownish with a white band at midbody and a white shoulder. Adult *C. swainsoni* is more bright orange, the colour of *C. connectens* is more brownish. The white band at midbody is more developed in *C. connectens*, whereas in *C. swainsoni* it is often interrupted or dissolved to isolated flecks. The fine brown spiral threads are not interrupted in *C. swainsoni*, in *C. connectens* they are often formed by very close-set small points.

C. vitulinus is in general more triangular, like *C. connectens*, with a brownish-violet (and not amethyst) internal basal blotch. The colour consists of broad brown to dark brown spiral bands with darker brown axial flammules; there are no fine brown spiral lines like in *C. swainsoni*.

In *C. striatellus* the internal basal blotch is entirely absent, the fine brown spiral lines on the body whorl are more numerous, the shell shape is more like *C. connectens*, with higher spire and sharper shoulder.

In *C. planorbis* there are, according to Röckel (1981), 2 species mixed up: *C. planorbis* s.s. and *C. vulpinus* Hwass in Bruguière, 1791, which seem to be clearly distinguishable. *C. vulpinus* lacks an amethyst internal basal blotch and has a more convex-sided body whorl and a different colour, whereas *C. planorbis* has a small internal amethyst blotch which is not visible exteriorly. The decision whether they are geographical forms or distinct (sibling) species

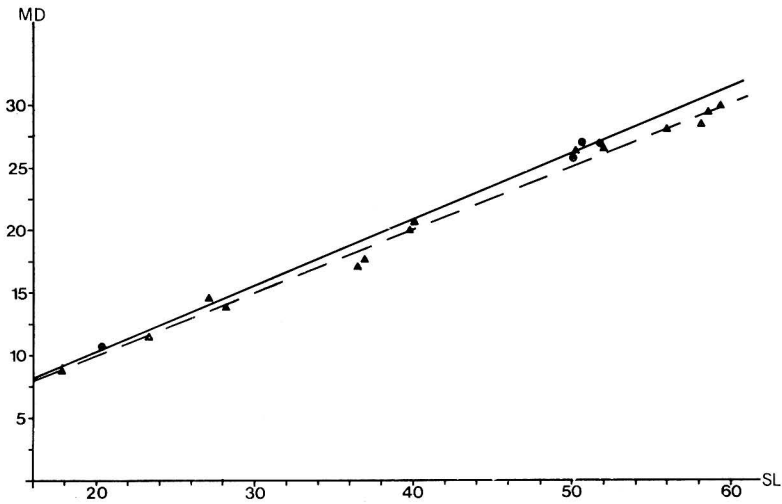


Fig. 1. Regression of maximum diameter (MD, in mm) on shell length (SL, in mm). Continuous line and full circles: *Conus connectens*, $MD=1.90 SL+0.48$; $r^2=1.00$; Dashed line and triangles: *Conus swainsoni*, $MD=1.95 SL+0.87$; $r^2=0.99$.

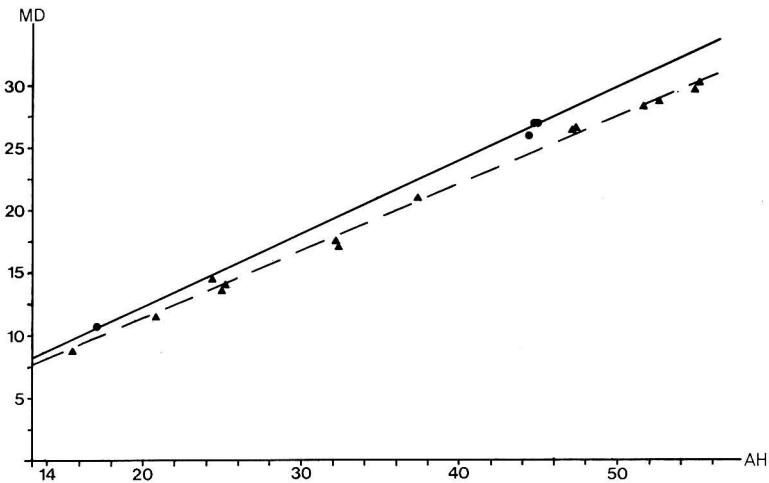


Fig. 2. Regression of maximum diameter (MD, in mm) on aperture height (AH, in mm). Continuous line and full circles: *Conus connectens*, $MD=1.39 AH+1.74$; $r^2=0.99$; Dashed line and triangles: *Conus swainsoni*, $MD=1.19 AH+1.87$; $r^2=1.00$.

can only be made after a thorough study, so for the moment we prefer to maintain the name *planorbis* for both forms. The New Caledonia population belongs to "*C. vulpinus*"; the shells differ from *C. swainsoni* in having a higher spire and a more sharply angled body whorl shoulder. They are more brown, often uniform, with brownish shoulder and a brown to dark brown external basal blotch, the aperture is entirely white. *C. planorbis* s.s. has

not yet been found in the New Caledonia area. It differs from *C. swainsoni* in being more triangular and having a small internal amethyst blotch which is not visible exteriorly.

Appendix

Some remarks on C. connectens: The holotype of *Conus connectens* (Coomans et al., 1985: 296, fig. 462a-b) is a faded and obviously beach-worn specimen. Therefore, Coomans et al. consider "the identity of *C. connectens* questionable" and continue using Iredale's name *C. circumactus*. Judging from the illustration in Coomans et al., *C. connectens* can well be our species, because among the material examined (see list below) there are some very pale more or less fresh specimens. So for the moment we prefer maintaining the name *C. connectens*.

Moreover Coomans et al. split the species into two species, *C. circumactus* (p. 296, fig. 460a-b) and *C. hammatus* Bartsch & Rehder, 1943 (p. 296, fig. 461a-b), *C. circumactus* having a straight body whorl and concave spire whorls with a "deep groove in the middle" and *C. hammatus* having a convex body whorl, straight "and grooved" spire whorls and a different colouration. The authors refer (besides their own figures) to colour illustrations in Walls (1979: 240). The 26 specimens examined by us show all grades of intergradation between *C. circumactus* and *C. hammatus* as understood by Coomans et al. in colour and in shape. A colour photo of the holotype of *C. hammatus* shows a pale brownish shell of 22.5 mm with nearly no amethyst blotch, there is no similarity with the specimen figured under this name by Coomans et al., neither a similarity in colour with young shallow water specimens of the same size. *C. hammatus* is generally considered conspecific with *C. connectens* and seems to be a deepwater form (holotype from 400–500 m, see Bartsch & Rehder, 1943: 89).

Specimens examined of C. connectens: Mauritius, 2 spms. coll. Röckel 588; 2 spms. MNHN, coll. Jousseau; 3 spms MNHN, coll. Carie; 1 spm. MNHN; Nosy-Tanga, Nosy-Be, Madagascar, 14. 12. 1966, 1 spm. MNHN, coll. Chavane; Madagascar, 1 spm. coll. Röckel 587; Seychelles, 2 spms. MNHN, coll. Rousseau; Seychelles, 05°02'S/55°44'E, 45 m, REVES 2, Sta. 10, 1980, 1 spm. MNHN; Bohol, Philippines, 1 spm. coll. Röckel 1776; Cebu, Phil., 1 spm. coll. Röckel 1265; Zamboanga, Phil., 1 juv. spm. coll. Röckel 2950; Siasi, Phil., 2 spms. MNHN, coll. Stadt; Laminusa, Siasi, Phil., 1 spm. MNHN, coll. Stadt; Hawaii, 1 spm. coll. Röckel 3053.

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要 約

ニューカレドニアからは凡そ90種のイモガイ類が知られているが、ヒラマキイモガイ *Conus planorbis* 種群はこれまで4種知られていた。すなわちヒラマキイモガイ, *C. vitulinus* サラサミンガイ, *C. siriatellus* ユキゲイモガイ, *C. connectens* ヤヨイイモガイである。これらはいずれも平滑で、鋭い肩角、僅かに凸出する体層壁、低い螺塔、広い前端及び黄色の軟体部をもつ点で共通している。最近このうちヤヨイイモガイと混同されていた1種が更に存在することが判ったので新種として記載する。

Conus swainsoni n. sp.

殻は高く、螺塔は低い。縫合は深く、肩は平滑。体層には密に螺条があり、殻底に5~6本の強い螺肋がある。各螺層には2~3の弱い螺溝をもつ。殻はクリーム色で、体層には褐色の焰状模様か橙色の帯をもち、中央付近に白っぽい地肌を帯状に残している。殻高56.0mm、殻幅28.2mm (パリ自然史博物館所蔵の完模式標本)。

分布：ニューカレドニアと恐らくはインドネシア

比較：ヤヨイイモガイに似ているが、幼貝の色彩において決定的な相違がある(カラー図版参照)。

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Plate 1. (all slightly reduced)

1. *Conus swainsoni* n. sp. Holotype, MNHN Paris
2. Growth row of *C. swainsoni* n. sp.
3. Young and adult *C. swainsoni* n. sp. (Holotype, and paratype MNHN)
4. Young and adult *C. connectens* A. Adams, Estival coll.

Plate 2. (all natural size)

1. *Conus swainsoni* n. sp. Holotype, Museum National d'Histoire Naturelle Paris (MNHN)
2. *Conus swainsoni* n. sp. Paratype, Estival coll.
3. *Conus swainsoni* n. sp. juv. Paratype, MNHN Paris
- 4-6. *Conus swainsoni* n. sp. additional specimens from private collections 4. 50.2×26.4mm; 5. 58.3×28.8mm; 6. 52.0×26.6mm
7. *Conus connectens* A. Adams, juvenile specimen 20.7×10.7mm, Estival coll.
- 8-9. *Conus connectens* A. Adams, adult specimens, Estival coll.
8. 51.8×27.0mm; 9. 50.7×27.0mm

Plate 1



