

# New Pisaniinae (Mollusca, Gastropoda, Buccinidae) from New Caledonia, with remarks on *Cantharus* and related genera

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## ABSTRACT

The genera *Cantharus* Röding, 1798, *Pollia* Gray in Sowerby, 1834, and *Cancellopollia* n.g. (type species: *C. gracilis* n.sp.), are pisaniine buccinids having a small tooth (labral spine) at the edge of the crenulated outer lip. As defined and restricted here, these genera have a mainly Indo-West Pacific distribution. *Cantharus septemcostatus* n.sp., *Pollia pellita* n.sp., *Cancellopollia gracilis* n.sp., and *C. ustulata* n.sp., are reported from deep water in the New Caledonia region, and *Cantharus leucotaeniatus* Kosuge, 1985 and *Pollia vic-dani* (Kosuge, 1984) n.comb. are reported from Vanuatu. Despite a narrow bathymetric (415-560 m) and horizontal (northernmost Norfolk Ridge) distribution, *Cancellopollia gracilis* exhibits remarkable variation, with highly localised morphs.

## KEY WORDS

New Caledonia,  
bathyal,  
seamount,  
Buccinidae,  
new taxa.

## RÉSUMÉ

*Pisaniinae* (Mollusca, Gastropoda, Buccinidae) nouveaux de Nouvelle-Calédonie et remarques sur *Cantharus* et genres apparentés. Les genres *Cantharus* Röding, 1798, *Pollia* Gray in Sowerby, 1834, et *Cancellopollia* n.g. (espèce-type : *C. gracilis* n.sp.) sont des Buccinidae Pisaniinae caractérisés par la présence d'un petit denticule (épine labrale) faisant saillie au milieu des crénulations de la lèvre externe. Tels qu'ils sont redéfinis et restreints ici, sur la base de leurs espèces-types, ces genres ont essentiellement une distribution Indo-ouest Pacifique. Les espèces *Cantharus septemcostatus* n.sp., *Pollia pellita* n.sp., *Cancellopollia gracilis* n.sp. et *C. ustulata* n.sp. sont signalées des pentes bathyales de la région néo-calédonienne, et *Cantharus leucotaeniatus* Kosuge, 1985 et *Pollia vicdani* (Kosuge, 1984) n.comb. sont cités du Vanuatu. On ne connaît aucun signalement du genre *Cantharus* à l'est des îles Fidji, où il est présent dans le Pléistocène, mais n'est pas connu dans l'Actuel. Malgré sa répartition limitée à une étroite bande bathymétrique (415-560 m) dans l'extrême nord de la Ride de Norfolk, *Cancellopollia gracilis* présente une variation remarquable, avec des formes morphologiquement reconnaissables très étroitement localisées sur des monts sous-marins isolés.

## MOTS CLÉS

Nouvelle-Calédonie,  
bathyal,  
mont sous-marin,  
Buccinidae,  
nouveau taxon.

## INTRODUCTION

The Pisaniinae comprises a large subfamily of mainly tropical carnivorous buccinid neogastropods. Although Cernohorsky (1971, 1975) provided an extensive review of Indo-West Pacific species, the generic classification of the Pisaniinae requires revision, and several deep-water taxa remain to be described. In the very extensive material collected by the MUSORSTOM expeditions to New Caledonia and nearby regions, several hitherto undescribed species related to the genera *Cantharus* and *Pollia* have come to light. Our purpose here is to describe these species, to propose the new genus *Cancellopollia* for two of them, and briefly to comment on the limits and distinguishing features of *Cantharus* and *Pollia*.

The names *Cantharus* Röding, 1798 (type species: *Buccinum tranquebaricum* Gmelin, 1791), *Pollia* Gray in Sowerby 1834 (type species: *Buccinum undosum* Linnaeus, 1758), and *Tritonidea* Swainson, 1840 (type species: *Buccinum undosum* Linnaeus, 1758; thus an objective synonym of *Pollia*) have been applied to a diverse array of Paleogene to Recent gastropods with ovate to fusiform shells, a convex crenulated outer lip, and sculpture consisting of strong spiral cords crossing strong to obsolete

axial ribs or folds (see, e.g., Bellardi 1872; Cossmann 1901; Peyrot 1927; Wenz 1941; Glibert 1963; Cernohorsky 1971, 1975). This broad and inconsistent usage stems from the failure of most earlier authors to take into account important shell characters that can serve to distinguish a number of distinct clades. Although we do not wish to attempt a complete generic revision here, we take the opportunity to redefine *Cantharus* and *Pollia* in order to place the new genus *Cancellopollia* in the proper context.

We restrict the genus *Cantharus* to pisaniine buccinids with the following characters: shell ovate; teleoconch consisting of six or more shouldered whorls separated by a deeply impressed suture; base of last whorl constricted above short siphonal canal; sculpture consisting of strong, widely separated axial folds, strongest on adapical part of whorls and fading below, crossed by strong spiral cords and threads of various sizes; siphonal fasciole prominent, sculptured with fine spiral threads, demarcating a narrow umbilical slit that in many species is closed; outer lip weakly convex in profile, crenulated at edge; fourth or fifth crenulation from abapical end of outer lip enlarged to form blunt labral tooth or spine, formed in adult shell at termination of external groove; external terminal varix absent; inner side

of outer lip lirate, the number of lirae corresponding with the number of external spiral cords; columella smooth; inner lip adherent or weakly erect on abapical two-thirds, marked by a few ridges on adapical sector and by a weak parietal rib at its adapical end; parietal rib flanked on outer lip by one or two slightly enlarged tooth-like lirae; adapical end of aperture broad.

As restricted here, the genus *Cantharus* is exclusively Indo-West Pacific in distribution. It occurs along continental margins and adjacent to high islands. Living species are known from the Indian Ocean east to the Philippines, north-eastern Australia, New Caledonia and Vanuatu (see below). During the Pliocene and Pleistocene, the genus was also represented in Okinawa and Fiji (see below).

The genus *Pollia* differs from the closely related *Cantharus* by having a more fusiform shell, adapically more tapered and narrower aperture, and a stronger parietal rib; by the presence of an external terminal adult varix; and by having a very small labral tooth located midway along the edge of the outer lip instead of on its abapical one-third. The labral tooth is absent on many individuals of the type species, *P. undosa*, which also differs from other species of *Pollia* by having obsolete axial folds. Most species of *Pollia* occur in the Indo-West Pacific. The very widely distributed *P. fumosa* (Dillwyn, 1817), however, extends east to the Galapagos Islands; and *P. vermeuleni* (Knudsen, 1980) is a West African species.

Most other species that have been assigned to *Cantharus* and *Pollia* (or its synonym *Tritonidea*) lack a labral tooth or, in the case of some tropical eastern Pacific species of *Muricantharus* Olsson, 1971 (type species: *Pseudoneptunea panamica* Hertlein *et* Strong, 1951), have a small labral tooth formed as an extension of a spiral cord. Although Cernohorsky (1975) synonymized *Muricantharus* and other taxa from tropical America and the eastern Atlantic with *Cantharus*, species from these regions belong to genera other than *Cantharus* and *Pollia*. Similarly, none of the many species assigned to *Cantharus* and *Pollia* (or *Tritonidea*) from Cenozoic strata in Europe, West Africa, or the Americas belongs to *Cantharus* or *Pollia*.

## ABBREVIATIONS

AMS	Australian Museum, Sydney
MNHN	Muséum national d'Histoire naturelle, Paris
NM	Natal Museum, Pietermaritzburg
NMNZ	Museum of New Zealand <i>Te Papa Tongarewa</i> , Wellington
dd	dead specimen
lv	live specimen

## SYSTEMATICS

### Class GASTROPODA

#### Superfamily BUCCINOIDEA Rafinesque, 1815

#### Family BUCCINIDAE Rafinesque, 1815

#### Subfamily PISANIINAE Gray, 1857

#### Genus *Cantharus* Röding, 1798

#### *Cantharus septemcostatus* n.sp.

(Figs 1A, 2A, 3A, 7A)

TYPE MATERIAL. — Holotype in MNHN; paratypes: 2 (MNHN), 1 (AMS), 1 (NMNZ), 1 (NM).

TYPE LOCALITY. — North of New Caledonia, 19°05'S, 163°22'E, 220-225 m (R.V. *Alis*, SMIB 6, stn DW129).

ETYMOLOGY. — Latin *septem*, seven, and *costatus*, ribbed, with reference to the axial sculpture.

MATERIAL EXAMINED. — **North of New Caledonia.** MUSORSTOM 4, stn CP152, 19°06'S, 163°22'E, 223 m, 1 dd. — Stn CP189, 19°07'S, 163°29'E, 210 m, 1 juv. dd.

LAGON, stn 1147, 19°08'S, 163°30'E, 210 m, 2 dd. — Stn 1148, 19°07'S, 163°30'E, 220 m, 1 lv (paratype MNHN).

SMIB 6, stn DW108, 19°07'S, 163°30'E, 210-220 m, 1 dd. — Stn DW110, 19°05'S, 163°30'E, 225-230 m, 1 lv, 1 dd. — Stn DW113, 19°03'S, 163°30'E, 250 m, 1 lv (paratype MNHN). — Stn DW127, 19°07'S, 163°23'E, 190-205 m, 1 dd. — Stn DW128, 19°06'S, 163°22'E, 205-215 m, 2 dd. — Stn DW129, 19°05'S, 163°22'E, 220-225 m, 3 lv (paratypes AMS, NMNZ), 4 dd (holotype, paratype NM). — Stn DW130, 19°05'S, 163°21'E, 225-230 m, 1 lv, 3 dd.

BATHUS 4, stn DW934, 19°05'S, 163°29'E, 231-240 m, 2 lv, 1 dd.

DISTRIBUTION. — North of New Caledonia, alive in 220-250 m.

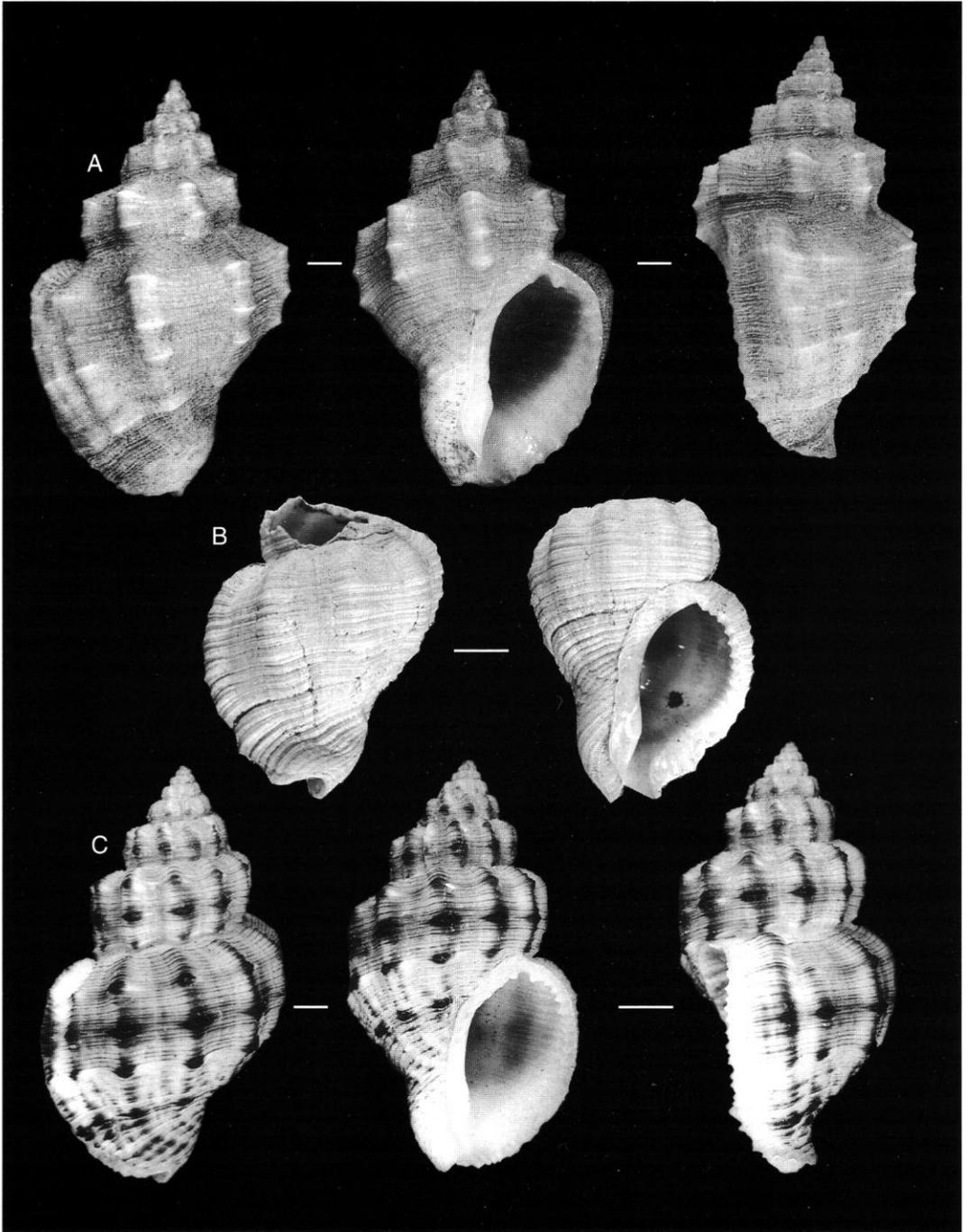


FIG. 1. — *Cantharus*; **A**, *C. septemcostatus* n.sp., north of New Caledonia, holotype, 36.2 mm; **B**, *C. sp.*, Nakasi Beds, Early Pleistocene (1.8 Ma); Saunitambu, 18°02'S, 178°29'E, Viti Levu, Fiji, Kohn coll. 1982, 28 mm; **C**, *C. leucotaeniatus* Kosuge, 1985, Pta Engano, Cebu, Philippines, leg. Kosuge (MNHN), 47.5 mm.

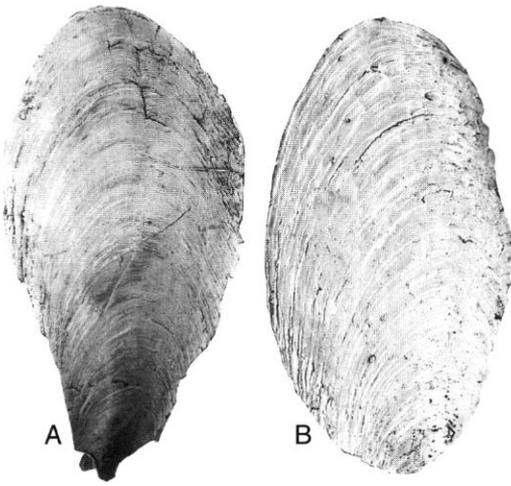


FIG. 2. — Opercula; **A**, *Cantharus septemcostatus* n.sp., north of New Caledonia, SMIB 6, stn DW128, 12.3 mm; **B**, *Cancellopollia gracilis* n.sp., Norfolk Ridge, Stylaster Bank, CHALCAL 2, stn DW76, 8.1 mm.

#### DESCRIPTION (Holotype)

Shell large, ovate, consisting of 1.2 protoconch and 6.0 teleoconch whorls, constricted slightly just above siphonal canal, spire moderately high. Protoconch (Fig. 4A) smooth, with five or six crowded, broad axial ribs before terminal varix, protoconch-teleoconch discontinuity sharply demarcated. Spiral cords appear along with less crowded axial ribs on first teleoconch whorl; sculpture of last whorl consisting of seven widely separated axial folds, strongest adapically, crossed by four primary and numerous secondary spiral cords; whorl broadest at level of adapical cord, which forms shoulder; fourth (abapical) cord separated from the other three primary cords. Outer lip edge erect beyond last-formed axial fold, which does not form a distinct terminal varix; lip edge with eleven crenulations, the fourth from the abapical end being larger than the others and forming a short, blunt, labral spine; this spine located at termination of external groove immediately above fourth primary spiral cord. Siphonal fasciole rounded, sculptured with about twelve fine spiral threads; umbilical slit absent; inner side of outer lip liriate, the two adapical lirae enlarged as denticles opposite very weak parietal rib at adapical end of inner lip; columella smooth, more or less straight, with

fold at base of siphonal canal; inner lip slightly erect along abapical two-thirds of its length, adherent on adapical one-third.

Background colour creamy beige, axial ribs lightly tinted with rust brown especially at shoulder angulation, two middle spiral cords white at their intersection with axials. Aperture and columella white. Rather thick periostracum with hairy projections aligned along incremental lines, hairs longest on main spiral cords.

Dimensions: holotype height 36.2 mm; diameter 23.1 mm; aperture height 23.6 mm; aperture width 12.0 mm. Other material up to 40.7 mm in height.

#### REMARKS

*Cantharus septemcostatus* is closely related to two other species, *C. leucotaeniatus* Kosuge, 1985, from the Philippines, and *C. okinawa* MacNeil, 1961, from the Pliocene of Okinawa. Together, these three species form a group characterized by having spiral sculpture consisting of four primary cords, of which the most abapical (fourth) cord is remote from the other three. A groove ending at the outer lip in a blunt labral spine lies immediately above the fourth (counted from adapical end) primary spiral cord.

*Cantharus leucotaeniatus* (Fig. 1C) differs from *C. septemcostatus* by having a larger number of axial folds (ten to twelve as compared to seven on the last whorl), a larger number of crenulations on the outer lip (eighteen as compared to eleven), and by having the second instead of the first primary spiral cord (counting from the suture) marking the broadest point of whorl. *C. leucotaeniatus* also reaches a slightly larger size (60 mm *vs* 40.7 mm) and is more vividly coloured, with spiral cords dark brown over a white background. *C. okinawa* is extremely similar to *C. leucotaeniatus*, but has nine or ten axial folds (compared to ten to twelve), twelve instead of fifteen to eighteen crenulations and lirae on the outer lip, and an adherent instead of abapically minutely erect inner lip. The fossil species reaches a maximum length of only 29.4 mm as compared to 60 mm for *C. leucotaeniatus*. It may be that, as more material becomes available, *C. leucotaeniatus* will prove to be a junior synonym of *C. okinawa*. MacNeil (1961) described

*C. okinawa* from the Shinzato Tuff (Pliocene) in the Shimajiri Group of Okinawa. A. J. Kohn (pers. comm.) has collected additional specimens from the underlying Yonabaru Formation (Early Pliocene) in Okinawa. Examination of these specimens reveals that they agree in every detail with MacNeil's shells. *C. okinawa* differs from *C. septemcostatus* by having a larger number of axial folds (nine or ten instead of seven), by having the inner lip adherent instead of abapically minutely erect, and by being somewhat smaller (height 29.4 mm instead of 40.7 mm).

A probable fourth species in this group is represented by a single well-preserved fossil specimen (Fig. 1B) from the Pleistocene of Fiji, collected by A. J. Kohn. Although the spire is broken, the last whorl is perfectly preserved. It bears eight sharply rounded axial folds, crossed by six primary spiral cords. The groove terminating at the outer lip in a blunt labral tooth is located just above the lowest primary spiral cord. There are eighteen crenulations and lirae on the outer lip, of which four are situated below the crenulation that is enlarged to form the labral tooth. This specimen represents the easternmost occurrence of the genus *Cantharus*. With only a single specimen at hand, we prefer to postpone formal description until more material becomes available.

*Cantharus leucotaeniatus* Kosuge, 1985  
(Fig. 1C)

*C. albozonatus* Kosuge, 1983: 137 (non *Cantharus* [*Tritonidea*] *albozonatus* Smith, 1890).

*Cantharus leucotaeniatus* Kosuge, 1985: 20 (nom. nov. pro *C. albozonatus* Kosuge, 1983, non Smith, 1890).

NEW RECORD. — **Vanuatu.** Off Espiritu Santo, MUSORSTOM 8, stn CP 1102, 15°04'S, 167°09'E, 208-210 m, 1 lv juv.

This new record represents a considerable extension of the known range, otherwise restricted to the Philippines (Springsteen & Leobrera 1986: 166).

Genus *Pollia* Gray in Sowerby 1834

*Pollia pellita* n.sp.  
(Fig. 4A-C)

TYPE MATERIAL. — Holotype (lv) and 2 paratypes (dd) in MNHN.

TYPE LOCALITY. — New Caledonia, Loyalty Ridge, 20°42'S, 167°00'E, 270 m (R.V. *Alis*, MUSORS-TOM 6, stn CP400).

ETYMOLOGY. — Latin *pellitus* (adj.), dressed with furs; with reference to the thick hairy periostracum of living specimens.

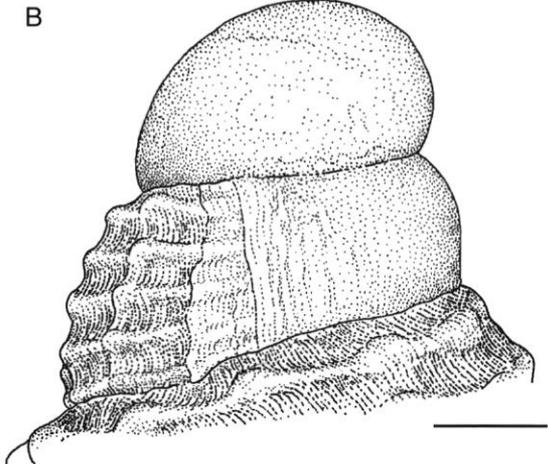
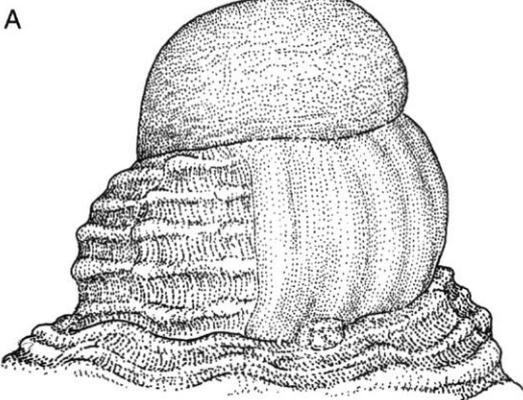


FIG. 3. — Protoconchs: **A**, *Cantharus septemcostatus* n.sp., north of New Caledonia, SMIB 6, stn DW129; **B**, *Cancellopollia gracilis* n.sp., Norfolk Ridge, Stylaster Bank, CHALCAL 2, stn DW76. Scale bars: A, B, 0.5 mm.

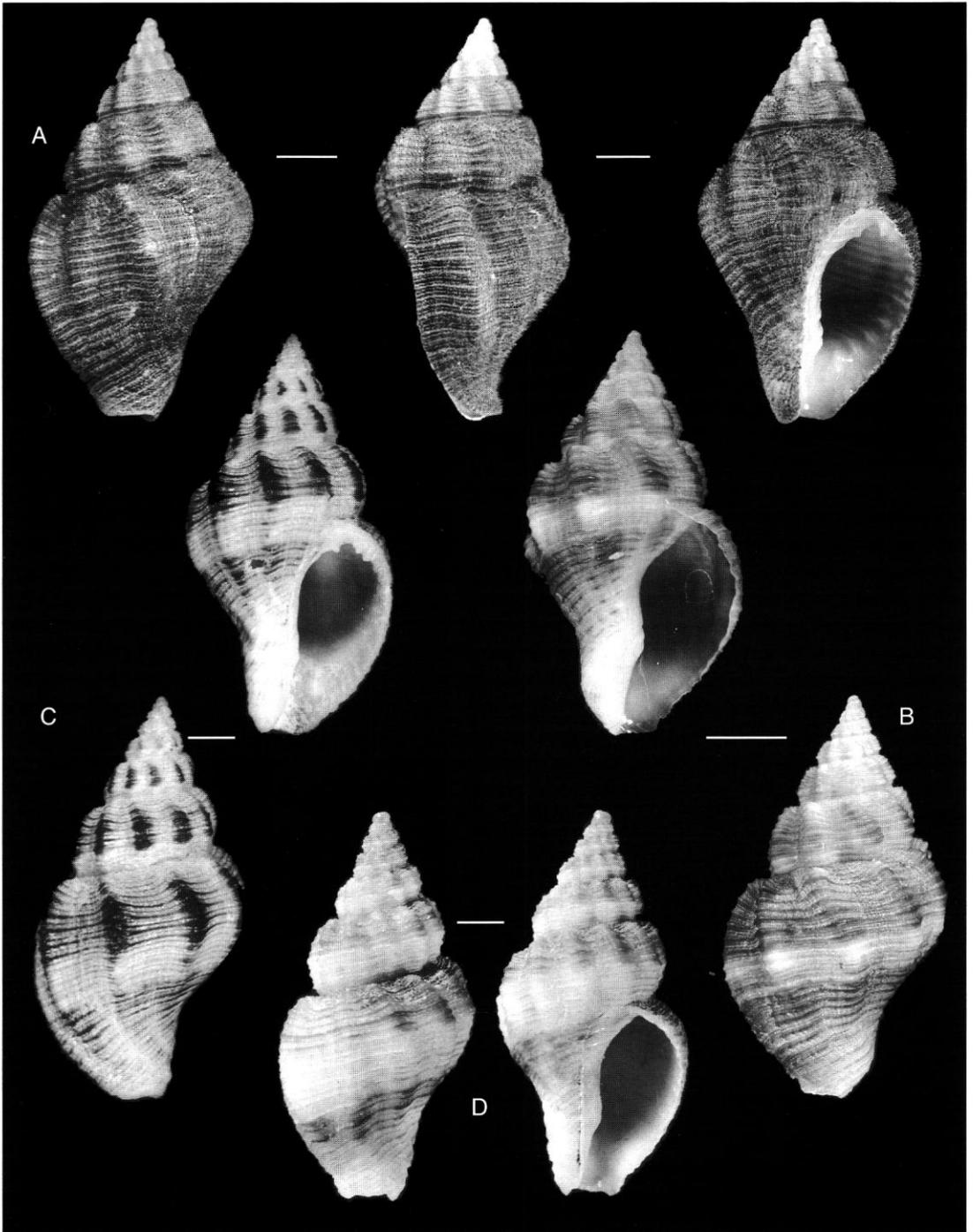


FIG. 4. — *Pollia*; **A-C**, *P. pellita* n.sp.; **A, B**, Loyalty Ridge, holotype, 26.5 mm (A) and paratype, 29 mm (B); **C**, Coral Sea, MUSORSTOM 5, stn 260, 33.5 mm; **D**, *P. vicdani* (Kosuge, 1984), Vanuatu, off Espiritu Santo, MUSORSTOM 8, stn DW1097, 19.8 mm.

**MATERIAL EXAMINED.** — **Loyalty Ridge.** MUSORSTOM 6, stn CP400, 20°42'S, 167°00'E, 270 m, 1 lv (holotype), 2 dd (paratypes).

**Coral Sea.** MUSORSTOM 5, stn 260, Capel Bank, 25°59'S, 159°44'E, 285 m, 1 dd. — Stn 275, Argo Bank, 24°47'S, 159°40'E, 285 m, 1 lv.

**DISTRIBUTION.** — Loyalty Ridge and Lord Howe Rise, alive at 270-285 m. Not found around New Caledonia proper or on the Norfolk Ridge.

**DESCRIPTION**

(Type material from Loyalty Ridge, Fig. 4A, B) Shell up to 29 mm in height, slender, fusiform, consisting of 2.0 protoconch and up to 6.1 teleoconch whorls. Protoconch diameter 2000 µm, exposed height 2080 µm, high, bulbous, with small nucleus, diameter 250 µm, whorls convex with deep suture, smooth, protoconch-teleoconch discontinuity distinct. Teleoconch spire whorls evenly convex on most exposed part, abapical part with narrow concave gutter, suture impressed, last whorl evenly convex to tapering base. Sculpture consisting of strong, broad axial ribs, crossed over by well-defined spiral cords. Eight axial ribs on all teleoconch whorls, interspaces narrower than ribs, with strong incremental lines. Spiral cords uneven, narrower than interspaces, main cords increasing from four on first whorl to nine on penultimate whorl, interspaces with one or two thinner secondary cords; one cord stronger, situated low on spire whorls, overhanging suture, equal to other cords and situated on periphery on last whorl; last whorl with *ca.* twenty primary cords extending onto siphonal canal, interspaces with one to four (most frequently one to three) secondary cords, some of these almost as strong as primary cords. Outer lip erect beyond external terminal varix, with thirteen internal lirae, adapical and abapical crenulations slightly enlarged, tenth lira (counted from adapical side) prolonged as a small labral tooth; inner lip erect, with *ca.* fifteen lirae corresponding to position of main cords below, parietal wall marked by two thickened folds, columella with bifid terminal swelling; aperture broad, tapering adapically; siphonal canal short but distinctly set off. No umbilicus. Background colour orange brown, spiral cords darker, white spiral band just below periphery. Periostracum very

thick, tightly adhering, with long hairy expansions aligned along spiral cords.

Holotype height 26.6 mm, diameter 14.5 mm; aperture height 15 mm, aperture width 7 mm.

**REMARKS**

The two specimens from the Coral Sea (Fig. 4C) differ from the three type specimens by reaching a slightly larger size (up to 34 mm), details of the sculpture (nine, rather than eight, axial ribs per whorl), and a sharper colour pattern of dark brown ribs contrasting against light background. These differences could be indicative of genetical isolation of the two groups of populations, but the material is too scanty to speculate further on these differences. We prefer to provisionally treat them as geographical variants of a single biological species.

*Pollia pellita* differs from *P. vicdani* (Fig. 4D; Bouchet & Warén 1986: fig. 63) by being proportionally distinctly broader (*pellita* h/D = 1.77-1.90, mean 1.82, n = 5; *vicdani* h/D = 1.95-2.15, mean 2.03, n = 9) and with a smaller rib number (eight or nine *vs* fifteen per adult whorl in specimens of 26-34 mm).

*Pollia vicdani* (Kosuge, 1984) n.comb.  
(Fig. 4D)

*Cantharus vicdani* Kosuge, 1984: 146, pl. 49, figs 6-9.

**NEW RECORDS.** — **Vanuatu.** Off Espiritu Santo, MUSORSTOM 8, stn DW1097, 15°05'S, 167°11'E, 281-288 m, 1 dd. — Stn DW1106, 15°05'S, 167°12'E, 305-314 m, 2 dd.

**REMARKS**

We have not examined the type material (holotype from Bohol, Philippines, in 220 m), but we have seen several lots from the Philippines [MNHN (Bouchet & Warén 1986: 471, fig. 63, as *Cantharus delicatus*), NM] that conform to the original description and illustration. The status of *Cantharus vicdani* in relation to *Tritonidea delicata* Smith, 1899 is unclear. Bouchet & Warén (1986: fig. 62) illustrated the holotype of *T. delicata* from the Gulf of Bengal in 165 m, and recorded the species from the Mozambique Channel and the Philippines. We have reexamined the Philippines material, which differs from

the type material of *T. delicata* by its strong axial sculpture extending over the whole whorl height. The general shell proportions are however similar and these specimens might represent local variants of a single biological species. Without further evidence, we prefer to treat the Philippines specimens as distinct from those from the Gulf of Bengal, and identify them as *C. vicdani*. The Vanuatu shells bear a general resemblance to the Philippines shells, but appear to be adult at a smaller size (19.8–20.5 mm *vs* up to 39.6 mm) and with a correlatedly lower number (ten) of axial ribs per adult whorl. They also have a more bulbous protoconch. Obviously, more material is needed from intermediate localities to evaluate the status of the various populations.

We transfer *Cantharus vicdani* to *Pollia*, based on the position of the obsolete tooth in the middle of the outer lip of Philippines specimens.

#### Genus *Cancellopollia* n.g.

TYPE SPECIES. — *Cancellopollia gracilis* n.sp.

ETYMOLOGY. — Latin *cancelli*, lattice; and suffix *Pollia*, suggesting close relationship to *Pollia*; gender feminine.

#### DIAGNOSIS

Pisaniine buccinids of medium size having fusiform shell; teleoconch whorls evenly convex, separated by shallow suture; sculpture on last whorl consisting of numerous (eighteen or more) spiral cords, which cross fifteen or more axial ribs, giving the surface a cancellate appearance. Umbilical slit absent. Outer lip convex in profile, its edge crenulated, one to three crenulations near midpoint of outer lip slightly enlarged to form very blunt labral tooth; edge of outer lip erect, extending slightly beyond external terminal adult varix; inner side of outer lip bearing short lirae; inner lip adherent; columella smooth, with fold at base of siphonal canal; aperture narrow, tapering adapically, about three times as high as wide; parietal rib at adapical end of inner lip prominent.

Radula with central tooth moderately arched,

with three strong cusps medially and eventually smaller cusps marginally; laterals with large, strong cusp between the inner and outer cusps.

#### REMARKS

The new genus *Cancellopollia* consists of deep-water species that appear to be closely related to *Pollia*. Characters in common with *Pollia* include the terminal adult varix, the enlarged centrally placed crenulations on the edge of the outer lip, the fusiform shape, and the tapered adapical end of the narrow aperture. Both genera have a prominent parietal tooth. *Cancellopollia* differs from *Pollia* by the much finer and more numerous spiral cords and axial riblets, by having a higher spire and more slender form, by having a relatively narrower aperture, and by having fewer lirae on the inner side of the outer lip than there are spiral cords. In *Pollia*, the number of lirae roughly corresponds to the number of cords. The species currently assigned to *Cancellopollia* have a bulbous and paucispiral protoconch, indicating non-planktotrophic development, whereas those of species assigned to *Pollia* are generally multi-spiral, indicating planktotrophic larval development. However, we do not consider the mode of larval development to be a generic character, and we do not exclude that further deep-water exploration may lead to the discovery of species of *Cancellopollia* with multispiral protoconch.

*Buccinum cinis* Reeve, 1846, from the Galapagos, which has already been placed in *Monostiolum* Dall, 1904 (Keen 1971), *Caducifer* Dall, 1904 (Skoglund 1992), and a new unnamed genus (Cernohorsky 1975), is also remotely similar to species of *Cancellopollia*. It resembles them in having a slender fusiform shell, relatively numerous (eighteen) spiral cords on the last whorl, an external terminal adult varix, a liriate outer lip, and a prominent parietal rib. It differs, however, by the structure of the spiral sculpture, in which main spiral cords are flanked by secondary cords, plus spiral threadlets in between; two twin cords form a thick subsutural fold. Axial riblets are absent, instead the spiral cords are ornamented by about twenty-five granules on the last whorl. The inner lip is raised, with irregular thickened wrinkles, and there is a strong anal tooth on the outer lip. For these reasons, we believe that the

resemblance of *Buccinum cinis* to species of *Cancellipollia* is superficial, but we cannot suggest a proper generic allocation.

***Cancellipollia gracilis* n.sp.**  
(Figs 2B, 3B, 5A, 6, 7C, D)

*Cantharus* sp. — Cernohorsky 1981: 998, pl. 3, fig. 21.

TYPE MATERIAL. — Holotype in MNHN; paratypes: 2 (MNHN), 1 (NMNZ), 1 (AMS), 1 (NM).

TYPE LOCALITY. — South of New Caledonia, Stylaster Bank, 23°38'S, 167°43'E, 435 m (R.V. *Coriolis*, CHALCAL 2, stn DW77).

ETYMOLOGY. — Latin *gracilis* (adj.), graceful.

MATERIAL EXAMINED. — **New Caledonia slope.** *Vauban* 1978-1979, stn 15, 22°49'S, 167°12'E, 390-395 m, 1 lv (Cernohorsky 1981).

BIOCAL: stn CP52, 23°06'S, 167°47'E, 540-600 m, 1 lv.

MUSORSTOM 4, stn DW212, 22°47'S, 167°10'E, 375-380 m, 2 lv. — Stn DW220, 22°58'S, 167°38'E, 505-550 m, 3 lv, 1 juv. dd. — Stn DW221, 22°59'S, 167°37'E, 535-560 m, 8 lv, 1 dd. — Stn DW222, 22°58'S, 167°33'E, 410-440 m, 3 lv, 1 dd. — Stn DW230, 22°52'S, 167°12'E, 390-420 m, 1 juv. lv, 1 dd.

SMIB 1, stn DW2, 22°52'S, 167°13'E, 415 m, 2 lv, 1 dd.

SMIB 2, stn DW1, 22°53'S, 167°13'E, 438-444 m, 1 dd. — Stn DW3, 22°56'S, 167°15'E, 412-428 m, 2 lv, 2 dd. — Stn DW6, 22°56'S, 167°16'E, 442-460 m, 1 lv. — Stn DW8, 22°54'S, 167°13'E, 435-447 m, 1 lv. — Stn DW9, 22°54'S, 167°15'E, 475-500 m, 1 lv, 1 dd. — Stn DW17, 22°55'S, 167°15'E, 428-448 m, 2 lv.

SMIB 3, stn DW21, 22°59'S, 167°19'E, 525 m, 2 dd. — Stn DW22, 23°03'S, 167°19'E, 503 m, 3 dd. — Stn DW26, 22°55'S, 167°16'E, 450 m, 2 lv.

SMIB 8, stn DW193-196, 22°59'-23°00'S, 167°21'-167°23'E, 491-558 m, 6 lv, 6 dd. — Stn DW197-199, 22°51'-22°52'S, 167°12'E, 408-436 m, 5 lv, 22 dd. — Stn DW200, 23°00'S, 167°21'E, 514-525 m, 2 dd.

BATHUS 2, stn DW729, 22°52'S, 167°12'E, 400 m, 5 lv, 2 dd.

**Aztèque Bank.** SMIB 8, stn DW189, 23°18'S, 168°06'E, 400-402 m, 1 dd.

BATHUS 3, stn DW829, 23°21'S, 168°02'E, 386-390 m, 3 dd. — Stn DW830, 23°20'S, 168°01'E, 361-365 m, 1 dd.

**Stylaster Bank.** CHALCAL 2, stn CP25, 23°39'S, 167°43'E, 418 m, 1 lv. — Stn DW76, 23°41'S, 167°45'E, 470 m, 6 lv (paratypes AMS, NMNZ, NM), 7 dd. — Stn DW77, 23°38'S, 167°43'E, 435 m, 6 lv (holotype), 1 dd.

SMIB 3, stn DW12, 23°38'S, 167°42'E, 470 m, 5 dd. — Stn DW13, 23°38'S, 167°42'E, 448 m, 2 lv (1 paratype MNHN), 1 dd.

SMIB 8, stn DW166, 23°38'S, 167°43'E, 433-450 m, 2 lv, 2 dd, 3 juv. dd. — Stn DW167, 23°38'S, 167°43'E, 430-452 m, 4 lv, 2 juv. lv, 3 dd, 1 juv. dd. — Stn DW168, 23°38'S, 167°43'E, 433-450 m, 2 lv, 3 dd. — Stn DW169, 23°37'S, 167°42'E, 447-450 m, 1 lv, 3 juv. lv.

BERYX 11, stn DW27, 23°37'S, 167°41'E, 460-470 m, 2 lv (1 paratype MNHN), 7 juv. lv/dd. — Stn CP32, 23°38'S, 167°43'E, 420-460 m, 1 lv. — Stn DW38, 23°38'S, 167°39'E, 550-690 m, 4 lv, 14 dd. — Stn DW39, 23°37'S, 167°40'E, 490-500 m, 2 dd.

**Norfolk Ridge.** BERYX 11, stn DW34, 23°33'S, 167°17'E, 560-570 m, 1 lv, 1 dd.

DISTRIBUTION. — South of New Caledonia, Norfolk Ridge, alive at 415-560 m.

DESCRIPTION

Shell up to 31.8 mm in height, slender, fusiform, consisting of 1.2 protoconch and up to 5 teleoconch whorls. Protoconch (Fig. 3B) bulbous, consisting of 1.2 whorls, paucispiral, smooth, terminating with a varix followed by a fraction of a whorl with teleoconch spiral cords sculpture already present, and a second discontinuity marking transition to teleoconch. Teleoconch whorls evenly convex separated by indistinct, appressed suture; sculpture consisting of about forty fine spiral cords crossing thirty-five axial riblets on the last whorl, and eleven cords crossing thirty-one axial ribs on the penultimate whorl; outer lip crenulate, erect beyond external terminal varix; three centrally placed crenulations on outer lip slightly ventrally and adaxially enlarged; inner side of outer lip with thirteen to eighteen lirae; inner lip adherent, its adapical end marked by a prominent parietal rib; aperture narrow, tapering adapically; siphonal canal short; umbilical slit absent.

Colour off-white with tightly adhering, light yellowish beige periostracum, forming short lamellar expansions along incremental lines.

Holotype height 30.0 mm, diameter 13.2 mm;

aperture height 19.2 mm, aperture width 6.1 mm.

#### DISCUSSION

Despite a geographical distribution restricted to the northern part of the Norfolk Ridge,

*Cancellopollia gracilis* exhibits major variation, and morphological extremes might easily be mistaken for separate species (Fig. 6). Numerous dredge hauls have been made between 300 and 800 m in the area considered, and we consider that the known narrow bathymetric distribution

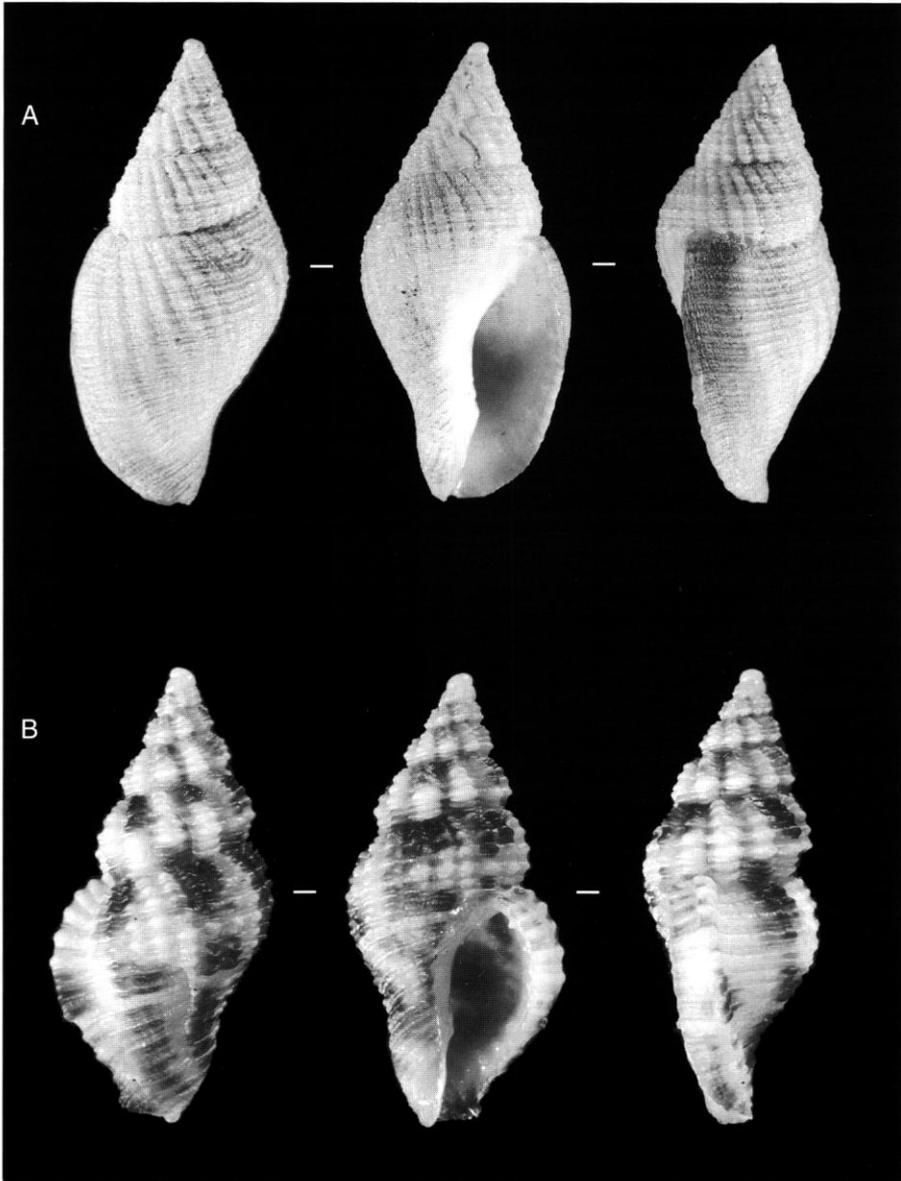


FIG. 5. — *Cancellopollia*; **A**, *C. gracilis* n.sp., Norfolk Ridge, Stylaster Bank, holotype, 30.0 mm; **B**, *C. ustulata* n.sp., Coral Sea, Chesterfield Plateau, holotype, 15.2 mm.

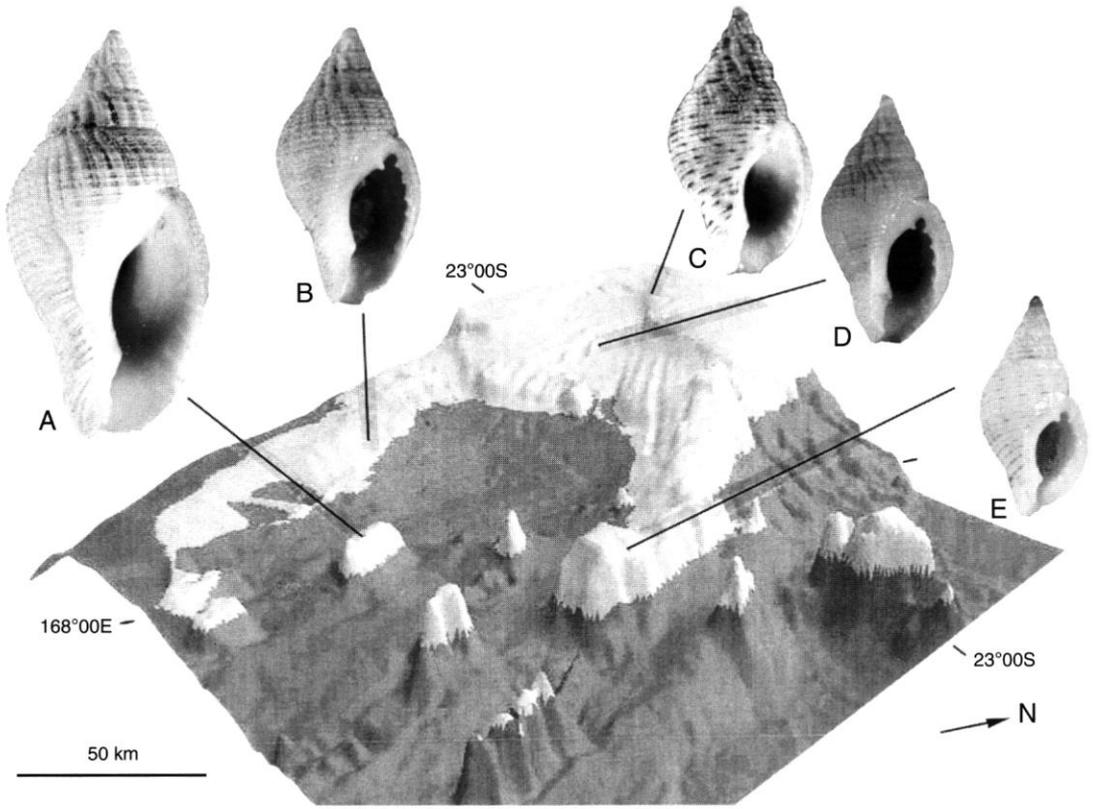


FIG. 6. — Geographical variants of *Cancellopolia gracilis* n.sp. positioned over three-dimensional bathymetry of southernmost New Caledonia and northern Norfolk Ridge. The model is positioned with the NW at top angle and the main axis of Norfolk Ridge running from the top right to lower left. Light areas are above 800 m deep, dark areas deeper than 800 m. Shell variants are printed at the same magnification. **A**, Stylaster Bank, CHALCAL 2, stn DW77, 435 m, 28.5 mm; **B**, Norfolk Ridge, BERYX 11, stn DW34, 560-570 m, 19.1 mm; **C**, New Caledonia slope, SMIB 8, stn DW197-199, 408-436 m, 18.3 mm; **D**, New Caledonia slope, SMIB 2, stn DW6, 442-460 m, 17.5 mm; **E**, Aztèque Bank, BATHUS 3, stn DW829, 386-390 m, 15.6 mm.

(415-560 m) is not a sampling artifact. Within the horizontal range are four discrete forms separated by deeper water. This, in combination with non-planktotrophic development, explains why the observed variation appears to have a strong geographical component.

**1.** A large number of samples originate from the slope south of New Caledonia and the Isle of Pines where bottoms at adequate depths form a continuous belt. All specimens have in common a small adult size ( $h = 14.9-21.1$  mm) and a broad shell ( $h/D$  ratio = 1.78-2.01, mean 1.87,  $n = 34$ ). Colour and sculpture are stable within a sample but show a depth-related variation. In the shallower part of the range (415-450 m), speci-

mens have a pattern of interrupted brownish spiral cords (Fig. 6C); the axial ribs are low, almost obsolete on the last adult whorl. In the deeper part of the range (475-540 m), specimens have a uniform off-white shell (Fig. 6D); axial sculpture is much stronger and extends onto the last adult whorl.

**2.** Three samples originate from Aztèque Bank (Fig. 6E), a seamount to the southeast of the preceding. This population is characterized by a small adult size ( $h = 15.4-16.4$  mm), a slender shell ( $h/D$  ratio = 1.97-2.15, mean 2.03,  $n = 4$ ) with high conical spire, and a colour pattern with at least a few brownish spiral cords. Empty shells only have been dredged in 360-400 m,

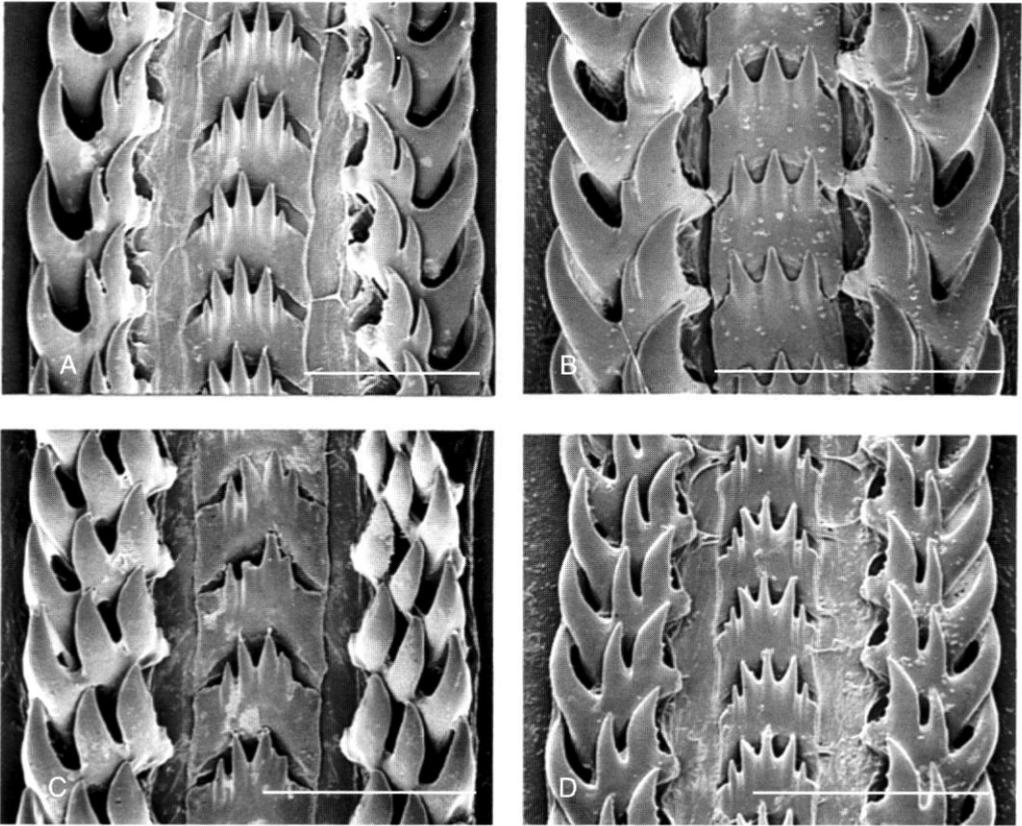


FIG. 7. — Radulae; **A**, *Cantharus septemcostatus* n.sp., north of New Caledonia, SMIB 6, stn DW128; **B**, *Cancellopollia ustulata* n.sp., Coral Sea, Chesterfield Plateau, MUSORSTOM 5, stn 379; **C**, *C. gracilis* n.sp., Stylaster Bank, CHALCAL 2, stn DW76; **D**, *C. gracilis* n.sp., New Caledonia slope, SMIB 3, stn DW26. Scale bars: 100  $\mu$ m.

suggesting that *C. gracilis* lives shallower on Aztèque Seamount than elsewhere.

**3.** Samples from Stylaster Bank (Fig. 6A) form an isolated and homogeneous group to the south. This population is characterized by a large adult size ( $h = 28.0\text{--}33.7$  mm), a slender shell ( $h/D$  ratio = 1.94–2.16, mean 2.09,  $n = 12$ ) and a uniform off-white colour with yellowish beige periostracum.

**4.** Finally a single sample, with two specimens (Fig. 6B), originates from an isolated projection along the Norfolk Ridge, to the southwest. The shells look like a miniature of the Stylaster Bank form, with a much smaller adult size ( $h = 19.0$  and 19.1 mm), broader outline ( $h/D$  ratio = 1.93), but similar sculpture and colour.

***Cancellopollia ustulata* n.sp.**  
(Figs 5B, 7B)

TYPE MATERIAL. — Holotype and 3 paratypes in MNHN.

TYPE LOCALITY. — Coral Sea, Chesterfield Plateau, 19°53'S, 158°38'E, 400 m (MUSORSTOM 5, stn 361).

ETYMOLOGY. — From the Latin *ustulatus* (adj.), a little brown as a result of burning, with reference to the brownish colour patches.

MATERIAL EXAMINED. — MUSORSTOM 5, stn 361, 19°53'S, 158°38'E, 400 m, 1 lv (holotype). — Stn 379, 19°53'S, 158°40'E, 370–400 m, 2 lv, 1 dd (paratypes).

## DESCRIPTION

Shell up to 16.0 mm in height, slender, fusiform, consisting of 1.2 protoconch and five teleoconch whorls. Protoconch bulbous, paucispiral, smooth, protoconch-teleoconch discontinuity distinct. Teleoconch whorls evenly convex separated by shallow, impressed suture. Sculpture consisting of strong, broad axial ribs, crossed over by well-defined spiral cords. Axial ribs eleven on first teleoconch whorl, then nine on spire whorls, twelve on penultimate, and eighteen on last whorl, interspaces narrower than ribs. Spiral sculpture consisting of six cords on exposed part of spire whorls, interspaces broader than cords; cord 5 (cord 1 = adapical) stronger, situated low on spire whorls, equal to other cords and situated on periphery on last whorl; last whorl with nine evenly spaced primary cords, separated by a slightly broader interspace from another group of *ca.* ten cords on shell base, crowded on siphonal canal; secondary cords present between primary cords on last whorl. Outer lip crenulate, erect beyond external terminal varix; one crenulation slightly enlarged, situated at level of fasciole between two groups of spiral cords; inner side of outer lip with nine spirally elongated swellings; inner lip adherent, parietal wall marked by a weak but distinct lira, columella with bifid terminal swelling; aperture narrow, tapering adapically; siphonal canal short but distinctly set off. No umbilicus.

Colour off-white with irregular, axially elongated brown patches. Periostracum tightly adhering, light yellowish beige, forming short lamellar expansions along incremental lines.

Holotype height 15.2 mm, diameter 7.3 mm; aperture height 6.5 mm, aperture width 3.1 mm.

## DISCUSSION

*Cancellopolia ustulata* differs from *C. gracilis* by its smaller adult size, more slender spire with more convex spire whorls, coarser axial and spiral sculpture, with fewer ribs and cords, and correlatedly fewer apertural lirae. It also differs from the coloured individuals of *C. gracilis* by the brown colour forming distinctly axial blotches, rather than spirally discontinuous cords.

*C. ustulata* is known only from the slope of the Chesterfield Plateau, a mid-Tertiary isolated

structure in the middle of the Coral Sea, separated from New Caledonia and Australia by abyssal depths.

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## REFERENCES

- Bellardi L. 1872. — *I Molluschi dei terreni Terziari del Piemonte e della Liguria. Parte I. Gasteropoda (Muricidae et Tritonidae)*. Stamperia Reale, Torino, 264 p.
- Bouchet P. & Warén A. 1986. — Mollusca Gastropoda: Taxonomical notes on tropical deep water Buccinidae with descriptions of new taxa. *Mémoires du Muséum national d'Histoire naturelle*, série A, 133 : 457-517.
- Cernohorsky W. O. 1971. — Indo-Pacific Pisaniinae (Mollusca: Gastropoda) and related buccinid genera. *Records of the Auckland Institute and Museum* 8: 137-167.
- 1975. — Supplementary notes on the taxonomy of buccinid species of the subfamily Pisaniinae (Mollusca: Gastropoda). *Records of the Auckland Institute and Museum* 12: 175-211.
- 1981. — On a collection of buccinacean and mitracean gastropods (Mollusca, Gastropoda) from the Mozambique Channel and New Caledonia. *Bulletin du Muséum national d'Histoire naturelle*, série 4, 3 (A) : 985-1009.
- Cossmann M. 1901. — *Essais de Paléoconchologie Comparée, Volume 4*. Paris, 293 p., 10 pls.
- Glibert M. 1963. — Les Muricacea et Buccinacea fossiles du Cénozoïque étranger des collections de l'Institut Royal des Sciences Naturelles de Belgique. *Mémoires de l'Institut Royal des Sciences Naturelles de Belgique*, série 2, 74 : 1-179.
- Keen A. M. 1971. — *Seashells of Tropical West America*. Stanford University Press, Palo Alto, 1064 p.
- Kosuge S. 1983. — Description of a new species of the genus *Cantharus* (Gastropoda, Buccinacea). *Bulletin of the Institute of Malacology, Tokyo* 1 (9): 137-138.

- 1984. — Studies on the collection of Mr. Victor Dan (6). Descriptions of new species of the genera *Pterochelus*, *Takia*, *Muricopsis* and *Cantharus*. *Bulletin of the Institute of Malacology, Tokyo* 1 (10): 143-146.
- 1985. — New name for the genus *Cantharus*. *Bulletin of the Institute of Malacology, Tokyo* 2 (2): 20.
- MacNeil F. S. 1961 [“1960”]. — Tertiary and Quaternary Gastropoda of Okinawa. *U.S. Geological Survey Professional Paper* 339: 1-148.
- Peyrot A. 1927. — *Conchologie Néogénique de l'Aquitaine, Tome V (1) : gastropodes*. Bordeaux, 206 p.
- Springsteen F. J. & Leobrera F. M. 1986. — *Shells of the Philippines*. Carfel Seashell Museum, Manila, 377 p.
- Wenz W. 1941 [in 1938-1944]. — Gastropoda. Teil I, Allgemeiner und Prosobranchia: 961-1200, in Schindewolf O. H. (ed.), *Handbuch der Paläozoologie*. Borntraeger, Berlin, 1639 p.

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