

# Diversity of chemosymbiotic bivalves on coral reefs: Lucinidae (Mollusca, Bivalvia) of New Caledonia and Lifou

Emily A. GLOVER

John D. TAYLOR

Department of Zoology, The Natural History Museum,  
London SW7 5BD (United Kingdom)

emily.glover@dial.pipex.com

j.taylor@nhm.ac.uk

Glover E. A. & Taylor J. D. 2007. — Diversity of chemosymbiotic bivalves on coral reefs: Lucinidae (Mollusca, Bivalvia) of New Caledonia and Lifou. *Zoosystema* 29 (1): 109-181.

## ABSTRACT

Thirty-four species of marine bivalve molluscs of the family Lucinidae are described and illustrated from water depths less than 200 m around New Caledonia, the Loyalty Islands and Chesterfield Bank. Most of the bivalves came from three intensively sampled sites: Koumac and Touho on New Caledonia and Lifou in the Loyalty Islands. Eighteen new species are described. Nine new genera (*Myrtina* n. gen., *Poumea* n. gen., *Solelucina* n. gen., *Discolucina* n. gen., *Lepidolucina* n. gen., *Ferrocina* n. gen., *Liralucina* n. gen., *Parvidontia* n. gen. and *Bretskyia* n. gen.) include both new and previously described species. Additionally, new descriptions and illustrations of type species are provided for two previously misunderstood genera – *Epicodakia* Iredale, 1930 and *Gonimyrtea* Marwick, 1929. The fauna described in this study is the most diverse assemblage of chemosymbiotic bivalves yet recorded.

## KEY WORDS

Mollusca,  
Bivalvia,  
Lucinidae,  
high diversity,  
coral reefs,  
chemosymbiosis,  
New Caledonia,  
new genera,  
new species.

## RÉSUMÉ

*Diversité des bivalves chémosymbiotiques des récifs coralliens: Lucinidae (Mollusca, Bivalvia) de Nouvelle-Calédonie et de Lifou.*

Trente-quatre espèces de mollusques bivalves marins de la famille des Lucinidae provenant de Nouvelle-Calédonie, des Îles Loyauté et du banc Chesterfield, sont décrites et illustrées. La plupart des bivalves proviennent de trois sites échantillonnés de façon intensive: Koumac et Touho en Nouvelle-Calédonie et Lifou aux Îles Loyauté. Dix-huit espèces sont nouvelles pour la science. Neuf nouveaux genres (*Myrtina* n. gen., *Poumea* n. gen., *Solelucina* n. gen., *Discolucina* n. gen., *Lepidolucina* n. gen., *Ferrocina* n. gen., *Liralucina* n. gen., *Parvidontia* n. gen. et *Bretskyia* n. gen.) incluent à la fois des espèces précédemment décrites et des nouvelles espèces. De plus, les espèces types de deux genres mal connus (*Epicodakia* Iredale, 1930 et *Gonimyrtea* Marwick, 1929) sont nouvellement décrites et illustrées. La faune décrite dans cette étude représente l'assemblage le plus diversifié de bivalves chémosymbiotiques mentionné à ce jour.

## MOTS CLÉS

Mollusca,  
Bivalvia,  
Lucinidae,  
grande diversité,  
récifs coralliens,  
chémosymbiose,  
Nouvelle-Calédonie,  
genres nouveaux,  
espèces nouvelles.

## INTRODUCTION

The bivalve mollusc family Lucinidae Fleming, 1828 is by far the most diverse and geographically widespread of the five families possessing an endosymbiosis with sulphide-oxidising bacteria (Fisher 1990; Reid 1990; Distel 1998). The symbiosis, from which they derive much of their nutrition, probably dates from the Lower Palaeozoic and many unusual features of lucinid morphology are considered to be adaptations to this association (Taylor & Glover 2000, 2006). Lucinids occupy a wide range of habitats from intertidal to bathyal depths, but are often associated with sites of high organic input such as seagrass beds (Barnes & Hickman 1999), mangroves (Frenkiel *et al.* 1996; Leбата 2000), O<sub>2</sub> minimum zones (Cary *et al.* 1989), cold seeps (Callender & Powell 1997) and even hydrothermal vents (Glover *et al.* 2004). Recently published and ongoing systematic studies of tropical Lucinidae (Dekker & Goud 1994; Glover & Taylor 1997, 2001; Taylor & Glover 1997, 2002, 2005; Cosel 2006; Cosel & Bouchet unpubl. data) demonstrate that diversity has been greatly underestimated and there exist many undescribed species and genera. Moreover, often seemingly better-known species turn out on closer study to be complexes of morphologically similar species (Taylor & Glover 2002, 2005).

Nevertheless, empirical observations suggest that the greatest diversities (species richness) of Lucinidae occur in reefal habitats of the tropical Indo-West Pacific and western Atlantic, often within rather oligotrophic environments. For example, Lucinidae is the third most diverse family of bivalves recorded from the Florida Keys (Bieler & Mikkelsen 2004), and from the Koumac site in New Caledonia, Bouchet *et al.* (2002) reported that Lucinidae were the eighth most species rich out of 62 bivalve families. Elsewhere, the generally poor sampling of bivalves in these coral-reef associated habitats, particularly of the smaller species, has precluded any comprehensive assessment of the true species diversity. Moreover, biological and ecological data for most of these species are generally non-existent.

Intensive sampling of molluscs at sites around New Caledonia, carried out by the MNHN (Bouchet *et al.* 2002), has provided an excellent opportunity to assess

the species richness and distribution of Lucinidae in various coral-reef associated habitats and also to obtain an estimate of their regional diversity in the southwestern Pacific. The intensive sampling took place at two locations on the northwestern (Koumac) and eastern (Touho) coasts of New Caledonia and also at Baie du Santal, Lifou, in the Loyalty Islands to the east of New Caledonia (Fig. 1). Additionally, we studied Lucinidae obtained from other subtidal sampling programmes around New Caledonia and the Loyalty Islands (details in Richer de Forges 1991). Samples taken on the Chesterfield Bank lying to the north west of New Caledonia (see Richer de Forges 1991) were also documented to provide some assessment of regional diversity. Previously, very few Lucinidae have been recorded from the New Caledonia area; for example, Melvill & Standen (1895) list only six species of Lucinidae from Lifou.

In this paper we document the Lucinidae living at water depths of less than 200 m around New Caledonia and adjacent areas with the objectives of obtaining an estimate of their species richness and phylogenetic diversity in tropical reefal environments. In a wider context these data can be used to explore how chemosymbiotic lucinid bivalves have exploited marine benthic habitats. All the Lucinidae from the area are documented and illustrated, 18 new species are described and nine new genera are erected for new or previously known species. Additionally, generic concepts are revised and type species illustrated for several poorly understood genera.

## MATERIAL AND METHODS

For the Koumac and Touho sites details of stations, habitats and sampling methods are provided in Bouchet (1994) and Bouchet *et al.* (2002), and for Lifou in Bouchet *et al.* (2001). In all, 42 discrete stations were sampled at Touho, 48 at Koumac and 65 at Lifou. A total 5420 lucinid shells was identified from these intensively sampled sites. For other subtidal sites around New Caledonia, Chesterfield Bank and Lansdowne-Fairway Banks, around 800 more lucinids were identified. Details of stations and methods are given in Richer de Forges (1991). Further information concerning

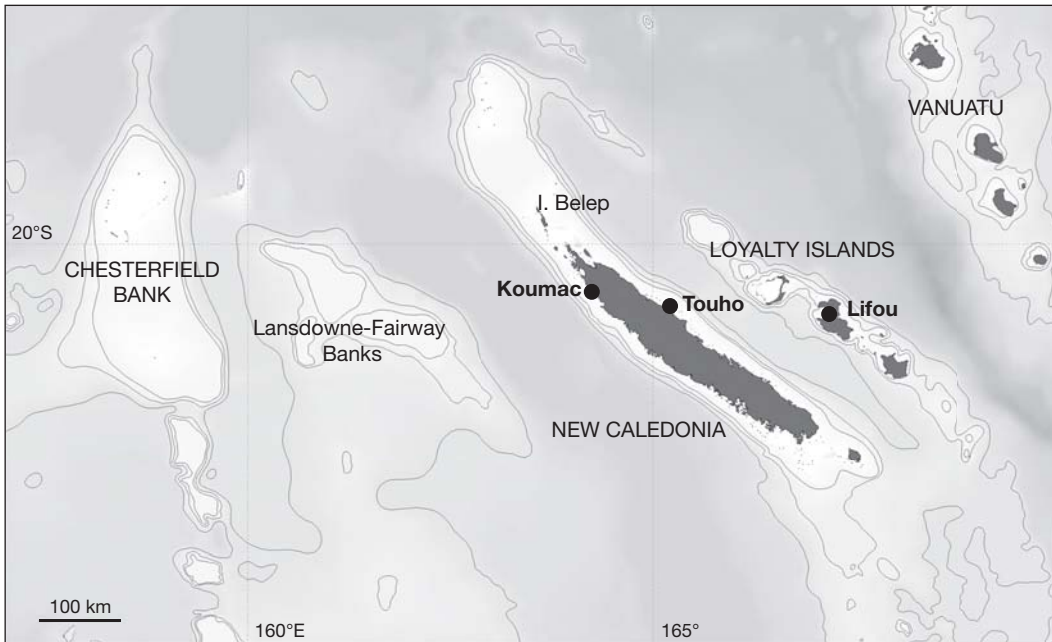


Fig. 1. — Map of New Caledonia and surrounding area showing the locations of the three intensively sampled sites.

expeditions and stations is available at the web site: [www.tropicaldeepseabenthos.org](http://www.tropicaldeepseabenthos.org)

All material is housed in MNHN, except when otherwise cited.

#### ABBREVIATIONS

AMS	Australian Museum, Sydney;
BMNH	Natural History Museum, London;
LSL	Linnean Society, London;
MNB	Museum für Naturkunde, Berlin;
MNHN	Muséum national d'Histoire naturelle, Paris;
NMGW	National Museum and Galleries of Wales, Cardiff;
NMNZ	National Museum of New Zealand, Wellington;
NMV	Museum Victoria, Melbourne;
SAM	South Australian Museum, Adelaide;
UMT	University Museum Tokyo;
USNM	National Museum of Natural History, Washington, DC;
ZISP	Zoological Institute, St. Petersburg;
ZMA	Zoological Museum, Amsterdam;
ZML	Zoological Museum, Leiden;
IWP	Indo-West Pacific;
H	shell height;
L	shell length;
LV	left valve;
PI	protoconch I;
PII	protoconch II;

RV	right valve;
sh	paired or articulated valves;
stn	station;
T	tumidity of single valve;
v	disarticulated valve(s).

#### SYSTEMATICS

A summary of the species and genera recognised is given in Table 1. Although the “standard” classification of Lucinidae is Chavan’s (1969) *Treatise on Invertebrate Paleontology* arrangement, subsequent morphological (Bretsky 1976) and molecular studies (Williams *et al.* 2004) have proved incongruent. The groupings in Table 1 are partially based on molecular evidence of major clades within the Lucinidae (Williams *et al.* 2004).

For the intensively sampled sites, Touho, Koumac and Lifou, only a summary is given below of the abundance and distribution of lucinids but full details of all the stations at the three sites have been lodged in both electronic and paper form at the MNHN and Mollusca Section, Department of Zoology, BMNH.

TABLE 1. — Summary list of Lucinidae recorded from depths &lt; 200 m around New Caledonia and Loyalty Islands.

<i>Anodontia (Pegophysema) philippiana</i> (Reeve, 1850)	<i>Epicodakia sweeti</i> (Hedley, 1899)
<i>Anodontia (Euanodontia) ovum</i> (Reeve, 1850)	<i>Lepidolucina belepia</i> n. gen., n. sp.
<i>Anodontia (Euanodontia) hawaiiensis</i> (Dall, Bartsch & Rehder, 1938)	<i>Discolucina virginea</i> (Deshayes, 1832) n. comb.
<i>Anodontia (Cryptophysema) vesicula</i> (Gould, 1850)	<i>Liralucina sperabilis</i> (Hedley, 1909) n. comb.
<i>Leucosphaera diaphana</i> n. sp.	<i>Liralucina craticula</i> n. gen., n. sp.
<i>Notomyrtea vincentia</i> n. sp.	<i>Liralucina lifouina</i> n. gen., n. sp.
<i>Myrtina porcata</i> n. gen., n. sp.	<i>Liralucina vaubani</i> n. gen., n. sp.
<i>Myrtina leptolira</i> n. gen., n. sp.	<i>Ferrocina multiradiata</i> n. gen., n. sp.
<i>Poumea coselia</i> n. gen., n. sp.	<i>Cardiolucina undula</i> n. sp.
<i>Solelucina koumacia</i> n. gen., n. sp.	<i>Pillucina pacifica</i> Glover & Taylor, 2001
<i>Gonimyrtia avia</i> n. sp.	<i>Pillucina copiosa</i> n. sp.
<i>Gonimyrtia fidelis</i> n. sp.	<i>Wallucina fijiensis</i> (Smith, 1885)
<i>Codakia paytenorum</i> (Iredale, 1937)	<i>Chavanja striata</i> (Tokunaga, 1906)
<i>Codakia punctata</i> (Linnaeus, 1758)	<i>Funafutia levukana</i> (Smith, 1885)
<i>Codakia tigerina</i> (Linnaeus, 1758)	<i>Parvidontia laevis</i> n. gen., n. sp.
<i>Ctena bella</i> (Conrad, 1837)	<i>Bretskyia scapula</i> n. gen., n. sp.
<i>Epicodakia nodulosa</i> n. sp.	<i>Fimbria fimbriata</i> (Linnaeus, 1758)

## Family LUCINIDAE Fleming, 1828

Genus *Anodontia* Link, 1807*Anodontia* Link, 1807: 156.TYPE SPECIES. — *A. alba* Link, 1807 (monotypy).

DIAGNOSIS. — Shells small to large, relatively thin-shelled, usually white, globose, subcircular, exterior smooth with irregular commarginal growth increments. Hinge teeth absent. Ligament internal either in a groove or laterally inset. Anterior adductor muscle scar generally long and in most species detached from pallial line for at least half of length. Pallial line entire or divided.

## REMARKS

Full synonymies, descriptions and distribution maps for species and genera in the *Anodontia* group are given in Taylor & Glover (2005). Twenty-five species are recognised worldwide.

Subgenus *Pegophysema* Stewart, 1930TYPE SPECIES. — *Lucina schrammi* Crosse, 1876 (original designation).

DIAGNOSIS. — As *Anodontia*, shells large, moderately inflated, thin-shelled, outer surface with prominent, irregular, rounded, commarginal ridges. Ligament internal, shallowly to deeply inset. Anterior adductor scar short,

detached for 70% of length. Pallial line entire, with secondary pallial attachment scars (Fig. 3) extending posteriorly from below anterior adductor scar.

*Anodontia (Pegophysema) philippiana*  
(Reeve, 1850)  
(Figs 2A, B; 3A)

*Lucina philippiana* Reeve, 1850: pl. 5, fig. 23a, b.*Anodontia philippiana* – Chavan 1938: 124.

TYPE MATERIAL. — 3 syntypes (BMNH 1963122/123).

TYPE LOCALITY. — Unknown.

MATERIAL EXAMINED. — **Touho**. 3 stn, 0–4 m, 2 v, 1 live.

**Other New Caledonia**. Hienghène, mission d'Ouavé, 20°41'S, 164°56'E, intertidal, 20 v.

DISTRIBUTION. — Wide ranging across the IWP, from Red Sea and East Africa, through south east Asia and northern Australia to New Caledonia and Palau Islands (Taylor & Glover 2005: fig. 22). Usually lives deeply burrowed (up to 50 cm deep) in intertidal and shallow subtidal muds and sands along the seaward fringe of mangroves.

## DESCRIPTION

Shell large but thin and light-weight, H to 60.0 mm, L to 71.0 mm, inflated (T/L 0.30). Outline

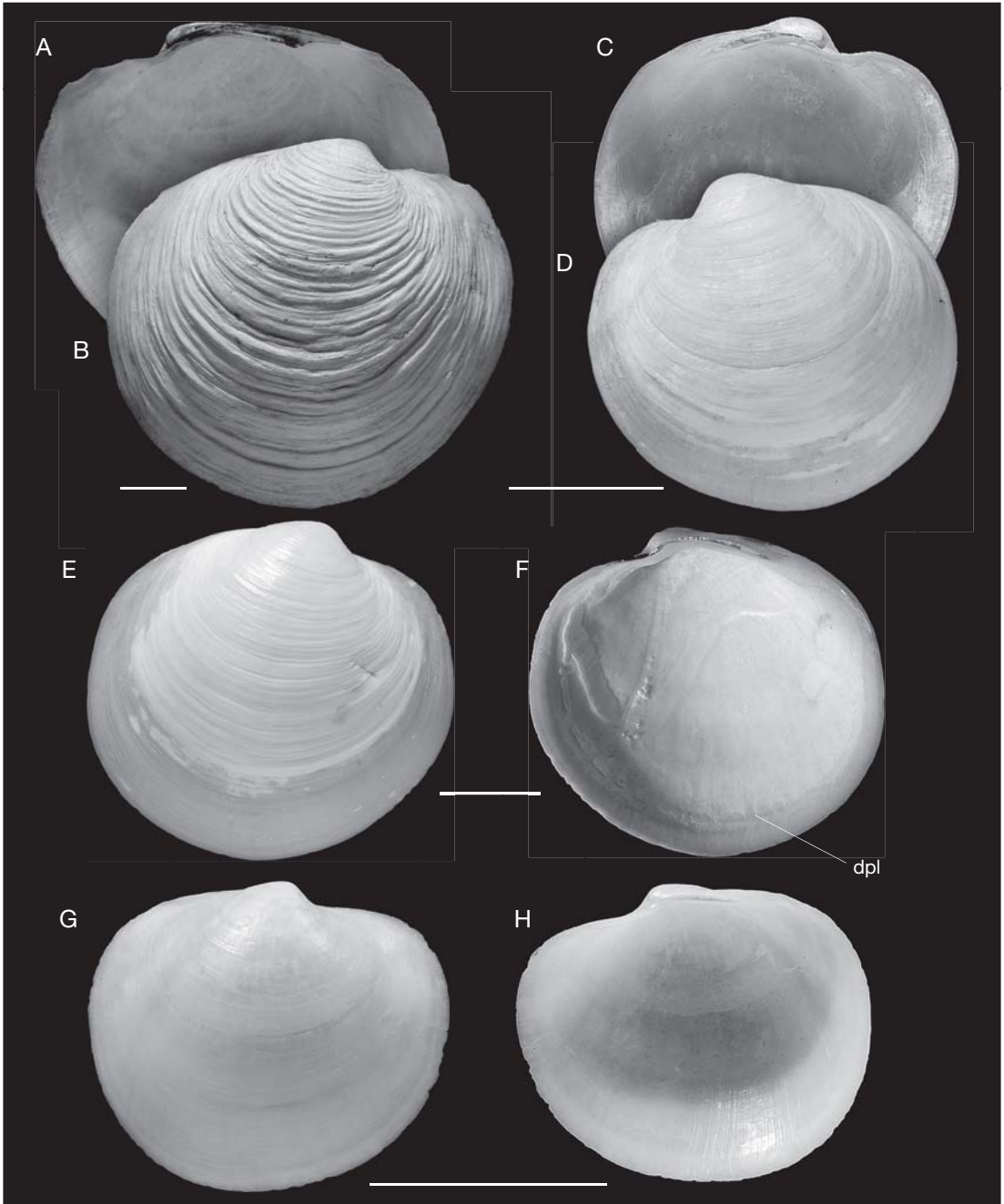


FIG. 2. — **A, B**, *Anodontia (Pegophysema) philippiana* (Reeve, 1850), New Caledonia (BMNH 1963143/2), exterior and interior of right valve; **C, D**, *Euanodontia ovum* (Reeve, 1850), stn 1406, Lifou, Loyalty Islands, interior and exterior of left valve (MNHN); **E, F**, *A. (Cryptophysema) vesicula* (Gould, 1850), Ouvéa, Loyalty Islands, exterior and interior of right valve (MNHN); **G, H**, *A. (Euanodontia) hawaiiensis* (Dall, Bartsch & Rehder, 1938), stn 1418, Lifou, Loyalty Islands (MNHN), exterior and interior of right valve. Abbreviation: **dpl**, divided pallial line. Scale bars: 10 mm.



subcircular, shell longer than high (H/L 0.89). Periostracum thick, dull brown, fibrous. Shell colour creamy or greyish white. Sculpture of many irregular, rounded, commarginal lamellae or ridges. Lunule short, heart-shaped, symmetrical. Hinge plate thin, edentulous and smooth. Ligament largely internal; inner fibrous layer of ligament extends laterally and posteriorly into the valve forming a thick, triangular pad within narrow ligamental nymph. Anterior adductor muscle scar relatively broad and short, blunt ended; diverges from pallial line at an angle of 30–34°. Pallial line entire, narrow. Secondary pallial muscle scars extend from the junction of the pallial line and anterior adductor scar to just ventral of the posterior adductor scar (Fig. 3A).

#### REMARKS

This is the largest of the *Anodontia* species from New Caledonia. Often referred to as *Anodontia edentula* in literature (e.g., Sotto & Cosel 1982; Leбата 2000).

#### Subgenus *Euanodontia* Taylor & Glover, 2005

TYPE SPECIES. — *Lucina ovum* Reeve, 1850 (original designation).

DIAGNOSIS. — As *Anodontia*, small to medium-sized shells, near circular in outline. Outer shell smooth, ligament internal, deeply inset laterally. Pallial line entire, anterior adductor scar narrow and relatively short, detached from pallial line at an angle of 30–40°.

#### *Anodontia (Euanodontia) ovum* (Reeve, 1850) (Figs 2C, D; 3B)

*Lucina ovum* Reeve, 1850: pl. 5, species 21.

*Anodontia (Euanodontia) ovum* – Taylor & Glover 2005: 310, figs 28, 31AB.

TYPE MATERIAL. — 2 syntypes (BMNH 1963195/1-2).

TYPE LOCALITY. — Isle of Burias, Philippines.

MATERIAL EXAMINED. — **Koumac.** 5 stn, 0–2 m, 14 v. **Touho.** 8 stn, 0–8 m, 13 live, 384 v.

**Lifou.** 2 stn, 0–16 m, 2 v.

**Other New Caledonia.** LAGON, Nouméa, Ouen Toro, 22°17'S, 166°27'E, intertidal, 2 v. — Secteur de Bourail,

chenal du lagon de Poe, stn 1326, 21°37'S, 165°22'E, 1–3 m, 3 v.

DISTRIBUTION. — This species is widely distributed across the IWP from the Red Sea to Society Islands and north to Okinawa, often on oceanic islands and reefs (Taylor & Glover 2005). It inhabits intertidal and shallow subtidal sands, usually associated with seagrass beds.

#### DESCRIPTION

Medium sized, H to 35 mm, L to 39 mm, moderately inflated T/L 0.29, circular in outline H/L 0.92. Colour white. Shell surface with low commarginal growth increments and halts. Umbones small. Lunule short, lanceolate, slightly impressed, slightly asymmetrical, larger in right valve. Hinge short, thin, curved, edentulous. Ligament internal, deeply inset in short nymph. Anterior adductor scar detached from pallial line for about 70% of length at an angle of about 30°. Interior of shell often glossy, sometimes pale yellow inside pallial line and spotted with small, round, translucent scars and occasional radial striations. Pallial line entire, relatively close to shell edge.

#### REMARKS

*Anodontia ovum* is similar in size and shape to *Anodontia vesicula* (Gould, 1850) but the latter species has a pallial line divided into discrete blocks (Figs 2F; 3D), a less inflated shell and a larger lunule. In the Pacific, *Anodontia ovum* overlaps in range with *Anodontia hawaiiensis* and could be confused, but the latter species is smaller, has a truncate posterior margin and is more attenuated anteriorly.

#### *Anodontia (Euanodontia) hawaiiensis* (Dall, Bartsch & Rehder, 1938) (Figs 2G, H; 3C)

*Loripinus hawaiiensis* Dall, Bartsch & Rehder, 1938: 127, pl. 34, figs 11–12.

*Lucina edentula* – Kay 1979: 543, fig. 177a, b.

*Anodontia (Euanodontia) hawaiiensis* – Taylor & Glover 2005: 312, figs 30, 31C, D.

TYPE MATERIAL. — Holotype (USNM 337404).

TYPE LOCALITY. — Honolulu harbor, 6–8 fathoms.

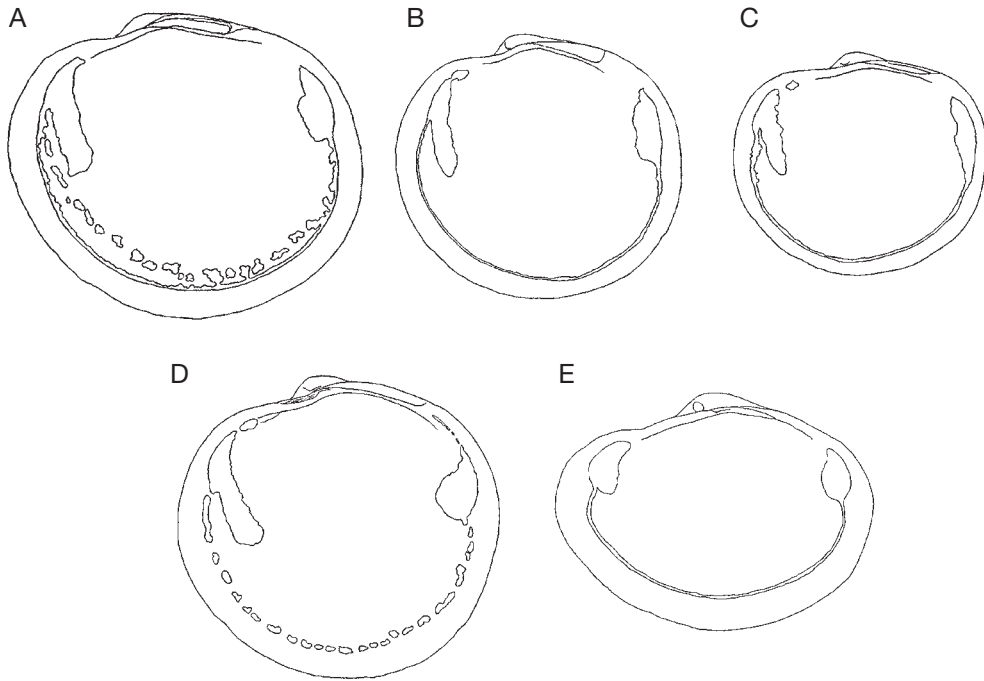


FIG. 3. — Outline drawings of interiors of right valves of *Anodontia* Link, 1807 and *Leucosphaera* Taylor & Glover, 2005 species: **A**, *A. (Pegophysema) philippiana* (Reeve, 1850); **B**, *A. (Euanodontia) ovum* (Reeve, 1850); **C**, *A. (E.) hawaiiensis* (Dall, Bartsch & Rehder, 1938); **D**, *A. (Cryptophysema) vesicula* (Gould, 1850); **E**, *L. diaphana* n. sp. Not to scale.

**MATERIAL EXAMINED.** — **Koumac.** 8 stn, 0–60 m, 16 v.

**Touho.** 3 stn, 0–4 m, 9 v.

**Lifou.** 22 stn, 0–30 m, 126 v, 5 live.

**Chesterfield Islands.** CORAIL 2, stn DW 60, 19°15'S, 158°57'E, 45 m, 1 v. — Stn DW 140, 19°34'S, 158°24'E, 57 m, 1 v.

**Other New Caledonia.** LAGON, stn 544, Grand Récif Sud, 22°51'S, 166°49'E, 25 m, 1 v. — Stn 1346, Grand Récif Abové, 5–6 m, 10 v. — Stn 1104, secteur des Belep, 19°42'S, 163°59'E, 22 m, 2 v. — Stn 1128, 19°31'S, 163°52'E, 26 m, 1 v. — Stn 1129, 19°29'S, 163°49'E, 40 m, 1 v. — Stn 1145, 19°21'S, 163°45'E, 38 m, 1 v. — Stn 1157, 19°10'S, 163°10'E, 48 m, 2 v. — Stn 449, Atoll de Surprise, 18°22'S, 163°09'E, 21 m, 2 v.

**Loyalty Islands.** MUSORSTOM 6, stn DW 430, 20°21'S, 166°07'E, 30 m, 1 v. — Stn DW 433, 20°20'S, 166°09'E, 24 m, 1 v. — Stn DW 435, 20°21'S, 166°08'E, 32 m, 1 v.

**DISTRIBUTION.** — Probably widespread on islands and atolls of the Pacific with also a few records from islands in the Indian Ocean (see Taylor & Glover 2005).

#### DESCRIPTION

Small to medium sized, H to 23.2 mm, L to 25.6 mm, sub-circular, anterior extended, posterior margin

often truncated, inflated T/L 0.35. Outer shell surface smooth with growth halts, fine radial striations. Shell white, sometimes with yellowish umbonal area. Juvenile shells often with translucent flecks. Lunule small, heart-shaped. Ligament internal, set in shallow groove. Hinge line narrow, edentulous. Anterior adductor muscle scar medium length, widely detached from the pallial line at an angle of 35°. Anterior muscle scar often lobate along dorsal edge and divided transversely into irregular blocks. Pallial line entire, frequently with irregular thickening beneath the anterior adductor scar. Shell surface within the pallial line dull, often with radial grooves and circular mantle attachment sites. Shell margin glossy with fine radial ridges.

#### REMARKS

The most closely similar species, *A. ovum*, is generally larger, has a more circular shell, is less inflated, has a more deeply inset ligament, a longer anterior adductor scar which is not divided or lobate as in

*A. hawaiiensis* and the pallial line lacks the anterior thickening. Although the species may be common, all of the material examined from major museum collections consists of dead-collected and often worn shells. The species was originally described from Hawaii and shells from there are usually smaller (< 13.0 mm in height).

Subgenus *Cryptophysema* Taylor & Glover, 2005

TYPE SPECIES. — *Lucina vesicula* Gould, 1850 (original designation).

DIAGNOSIS. — As *Anodontia*, sub-circular, smooth. Lunule prominent, slightly to deeply impressed. Ligament internal, laterally inset. Pallial line divided into discrete muscle attachment scars (Fig. 2F).

*Anodontia (Cryptophysema) vesicula*  
(Gould, 1850)  
(Figs 2E, F; 3D)

*Lucina vesicula* Gould, 1850: 256; 1852: 414, pl. 36, fig. 525a, b.

*Anodontia (Cryptophysema) vesicula* – Taylor & Glover 2005: 317, fig. 35A-D.

TYPE MATERIAL. — Lectotype, 1 sh (USNM 427779) cited as holotype by Johnson 1964: 167 (inadvertent lectotype selection).

TYPE LOCALITY. — Tongatabu (Tonga Islands).

MATERIAL EXAMINED. — **Koumac.** 3 stn, 0-13 m, 8 v.

**Touho.** 2 stn, 0 m, 2 v, 2 live.

**Lifou.** 4 stn, 1-10 m, 7 v.

**Chesterfield Islands.** CHALCAL 1, stn DC 61, 21°42'S, 159°29'E, 50 m, 1 v.

CORAIL 2, stn DW 100, 19°06'S, 158°27'E, 40 m, 1 v. — Stn DW 117, 19°25'S, 158°32'E, 52 m, 1 v. — Stn DW 120, 19°25'S, 158°22'E, 56 m, 1 v.

**Other New Caledonia.** Île des Pins, Baie de Kuto, 22°38'S, 167°26'E, 20 v.

LAGON, stn 406, Grand Récif Sud, 22°39'S, 167°21'E, 24 m, 1 v. — Secteur de Nouméa, stn 1368, 22°24'S, 166°21'E, 10 m, 2 v. — Stn 1369, 22°25'S, 166°28'E, 12 m, 4 v.

**Loyalty Islands.** Ouvéa, lagoon, 3 m, 1 v.

DISTRIBUTION. — A wide-ranging species distributed throughout the IWP from the northern Red Sea, and northern Indian Ocean to Tonga in the Pacific (see Taylor & Glover 2005 for details).

DESCRIPTION

Medium sized, H to 44.5 mm, L to 48.2 mm, moderately inflated, T/L 0.30, sub-circular in outline H/L 0.91. Colour white or cream. Periostracum fibrous, buff; shell surface smooth with commarginal growth increments and halts. Umbones small. Lunule narrow, lanceolate, impressed, slightly scooped. Hinge short, thin, curved, edentulous. Ligament internal, slightly inset. Anterior adductor scar long, relatively straight, detached from pallial line for about 70% of length, at an angle of about 25°. Tracks of adductor muscle scars often visible on the shell interior. Interior of shell dull, sometimes with radial striations. Pallial line discontinuous, divided into many small scars (Fig. 2F).

REMARKS

*Anodontia vesicula* is similar in shape to *A. ovum*, and the species are frequently confused in museum collections, but *A. vesicula* is easily distinguished by the discontinuous pallial line.

Genus *Leucosphaera* Taylor & Glover, 2005

*Leucosphaera* Taylor & Glover, 2005: 331.

TYPE SPECIES. — *Lucina (Loripinus) salamensis* Thiele & Jaeckel, 1931 (original designation).

DIAGNOSIS. — Shells small (< 10 mm), inflated, thin-shelled, white to translucent. Outline ovoid, longer than high. Posterior shell margin often truncated. Shell anteriorly extended. Sculpture of regularly spaced, thin commarginal lamellae. Hinge narrow, normal hinge teeth absent. Small knob lies below the umbones of both valves contiguous with thin flange on the anterior part of the hinge (Fig. 4G, H). Ligament narrow, short, set in shallow groove. Anterior adductor muscle scar short, ovoid to reniform in outline, slightly detached from the pallial line. Pallial line entire, sometimes with dorsal extensions. Shell margin with thin peripheral groove.

REMARKS

Shells of this newly described genus have been confused with juvenile *Anodontia* in museum collections but can be separated by the ovoid shape, the regularly spaced, fine commarginal lamellae, and the extremely short, slightly detached anterior adductor muscle scar. The hinge bears a tooth-like central knob extending



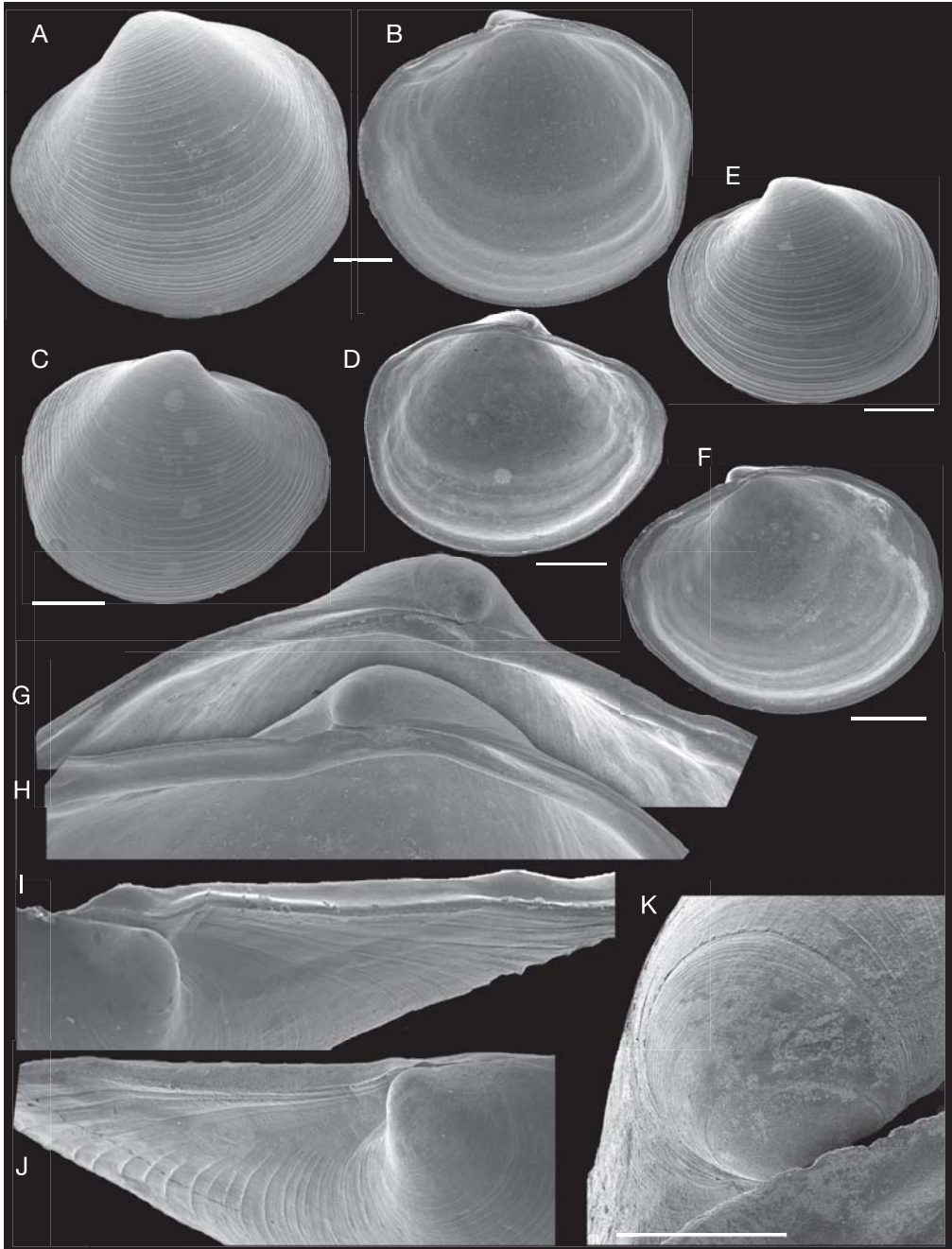


FIG. 4 — *Leucosphaera diaphana* n. sp.: **A, B**, holotype (MNHN), outside of left valve and inside of right valve, secteur de Yaté, New Caledonia, stn 622; **C**, paratype (MNHN), exterior of right valve, Passe de Touho, stn 1249, New Caledonia; **D**, paratype (MNHN), interior of left valve; **E**, paratype (MNHN), exterior of left valve; **F**, paratype (MNHN), interior of right valve; **G, H**, details of hinge of E and F; **I, J**, dorsal views of G, H; **K**, protoconch. Scale bars: A-F, 1.0 mm; K, 100 µm.

anteriorly as a flange. We are uncertain whether the knob is homologous with normal cardinal teeth of other lucinids. In addition to the type species and *Leucosphaera diaphana* n. sp. described below, we are aware of undescribed taxa from the Indo-Pacific, including Philippines, Malaysia, Maldives and the Seychelles. It is likely that *Leucosphaera* species are widely distributed in offshore muddy habitats but further work is needed to review the genus in detail.

*Leucosphaera diaphana* n. sp.  
(Figs 3E; 4)

TYPE MATERIAL. — Holotype: 1 sh, L 6.0 mm, H 5.3 mm, T 2.3 mm (MNHN).

Paratypes: New Caledonia, Passe de Touho, 20°49'S, 166°19'E, 80-140 m, stn 1249, muddy sand to mud, 290 v (MNHN); 10 v (BMNH 20050568). — Figured paratypes: same locality, L 4.3 mm, H 3.7 mm; L 4.3 mm, H 3.8 mm; L 4.1 mm, H 3.7 mm; L 4.4 mm, H 3.8 mm (MNHN).

TYPE LOCALITY. — New Caledonia, secteur de Yaté, stn 622, 22°02'S, 166°53'E, 67 m.

ETYMOLOGY. — Greek *diaphanes*, transparent.

MATERIAL EXAMINED. — Koumac. 2 stn, 30-120 m, 56 v.

Touho. 3 stn, 50-140 m, 217 v.

Other New Caledonia. LAGON, stn 429, Grand Récif Sud, 22°40'S, 167°15'E, 95 m, 1 v. — Stn 830, secteur de Poindimie, 20°49'S, 165°19'E, 105-110 m, 10 v.

BATHUS 1, côte est, stn DW 674, 20°49'S, 165°19'E, 105-110 m, 50 v. — Stn DE 700, 20°57'S, 165°35'E, 160-222 m, 5 v.

MUSORSTOM 4, stn DW 150, 19°07'S, 163°22'E, 110 m, 3 v.

Loyalty Islands. Stn DW 1650, 20°54'S, 167°02'E, 120-250 m, 11 v.

DESCRIPTION

Shell small, H to 5.3 mm, L to 6.0 mm, relatively inflated, very thin-shelled, translucent to white. Shell ovoid, longer than high, anterior attenuated, posterior shell margin often truncated. Umbones low, central. Protoconch large glassy, 150 µm, PI well marked (65 µm), smooth, PII with regular growth increments. Sculpture of regularly spaced, thin, commarginal lamellae. Faint radial anterior and posterior sulci. Hinge narrow, normal hinge teeth absent. Small knob lies below the umbones of both valves contiguous with thin

flange on the anterior part of the hinge (Fig. 4G, H). Ligament narrow, short, set in shallow groove. Anterior adductor muscle scar short, reniform in outline, slightly detached from the pallial line. Pallial line entire. Shell margin with thin peripheral groove.

REMARKS

*Leucosphaera diaphana* n. sp. is similar to the type species, *L. salamensis*, from the western Indian Ocean but has a more elongate, anteriorly extended shell, a truncate posterior margin and more closely spaced commarginal lamellae.

Genus *Notomyrtea* Iredale, 1924

*Notomyrtea* Iredale, 1924: 206.

TYPE SPECIES. — *Myrtea botanica* Hedley, 1918 (earlier name *Tellina brazieri* Sowerby, 1883 preoccupied by *Tellina brazieri* Sowerby, 1869) (original designation).

DIAGNOSIS. — Small, flat-shelled, elongate ovoid to subtrigonal, longer than high. Sculpture of regularly-spaced, thin, commarginal lamellae, with irregular radial threads in interspaces.

Hinge with small teeth, left valve with two cardinals, right valve with one. Anterior adductor scar short, detached for about 1/3 of length.

REMARKS

Chavan (1969) synonymised *Notomyrtea* with *Myrtea* (type species *M. spinifera* (Montagu, 1803)) but the type species differ in shape, sculpture and hinge teeth. *Eulopia* (type species *Lucina sagrinata* Dall, 1886) from the western Atlantic has similar radial threads between the commarginal lamellae but is subcircular in shape (Bretsky 1976: pl. 34, figs 11-13). The shell illustrated by Cotton (1961: 213, fig. 217) as *Notomyrtea botanica* is a different species, "*Notomyrtea*" *ada* (Adams & Angas, 1863). Other bivalves with the characters of the type species are known from the western Pacific but are as yet undescribed.

*Notomyrtea vincentia* n. sp.  
(Figs 5; 6A)

TYPE MATERIAL. — Holotype: 1 sh, L 9.4 mm, H 7.7 mm, T 2.0 mm (MNHN).

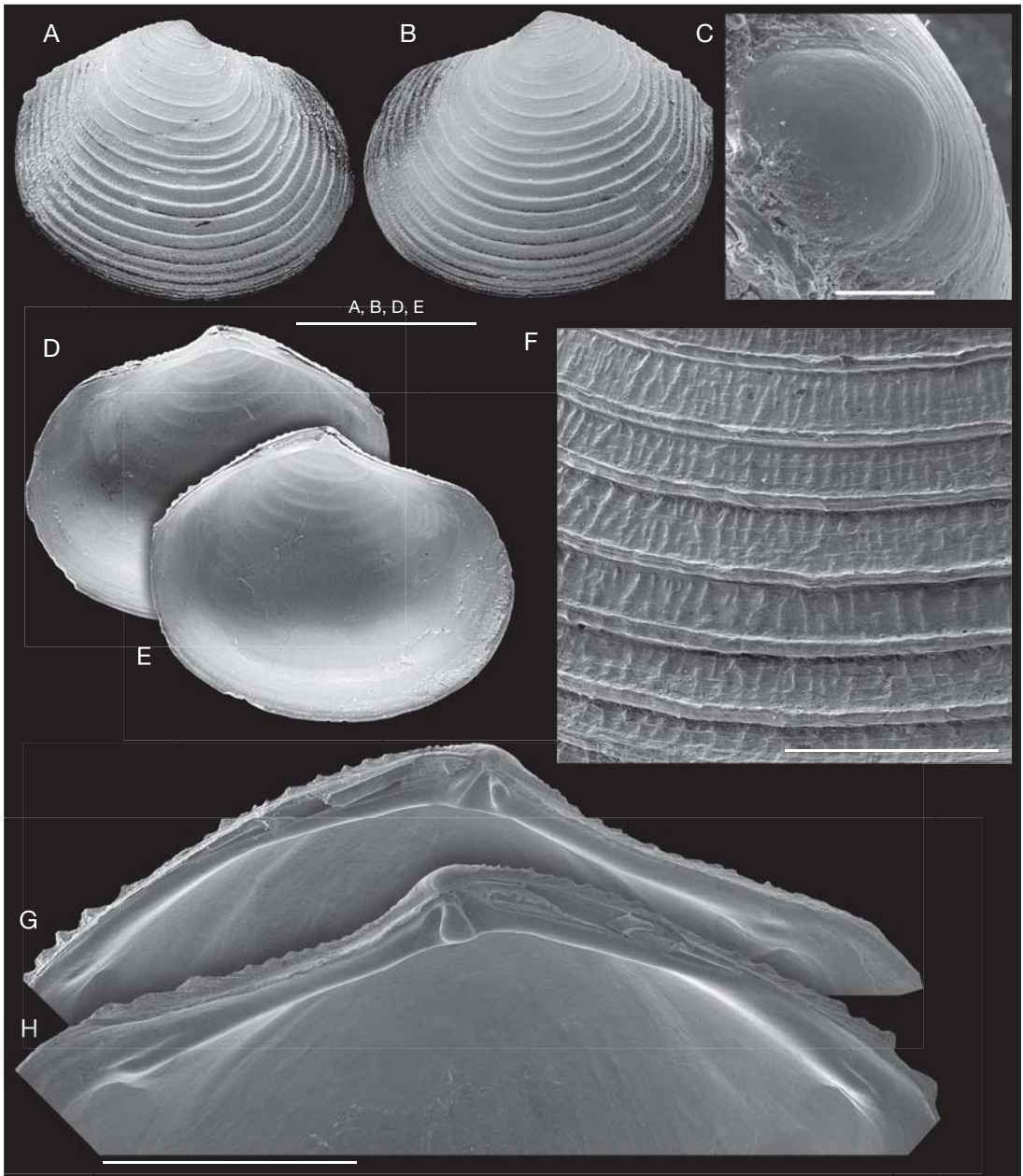


FIG. 5. — *Notomyrtea vincentia* n. sp., holotype (MNHN), Baie de St Vincent, New Caledonia (MNHN): **A, B**, exterior of right and left valves; **C**, protoconch; **D, E**, interior of right and left valves; **F**, detail of sculpture; **G, H**, detail of hinges of left and right valves. Scale bars: A, B, D, E, 5 mm; C, 75 µm; F, 1 mm; G, H, 2 mm.

Paratypes: New Caledonia, Touho, stn 1249, 20°49'S, 165°19'E, 80-140 m, 1 sh, L 6.5 mm, H 5.3 mm; 7 v, L 13.4 mm, H 11.0 mm; L 12.9 mm, H 10.9 mm, rest

damaged (MNHN). — New Caledonia, east coast, stn DW 665, 20°57'S, 165°35'E, 180-200 m, 1 v, L 12.2 mm, H 10.0 mm (MNHN).

TYPE LOCALITY. — New Caledonia, Baie de St Vincent, stn 190, 22°02'S, 165°57'E, 135-150 m.

ETYMOLOGY. — *Vincentia*, from the type locality of Baie de St Vincent.

#### DESCRIPTION

Shell small, H to 7.7 mm, L to 9.4 mm, ovate to subtrigonal, longer than high (H/L 0.82), posterior margin slightly truncate, anterior margin rounded, shell not inflated, umbones prominent. Protoconch smooth 170 µm, PI large, PII narrow. Periostracum light brown, anterior and ventral margins with red staining. Sculpture of regularly spaced, thin, commarginal lamellae, more elevated and closely spaced along antero- and posterodorsal margins. Interspaces with irregular, radial threads (Fig. 5F). Lunule, long, lanceolate, shallow, smooth, symmetrical. Ligament short, external. Hinge narrow, RV with single cardinal tooth and a distant elongate anterior lateral tooth, and a small posterior lateral. LV with two small cardinal teeth, anterior and posterior lateral teeth indistinct. Anterior adductor scar short, broad, tapers ventrally, detached from pallial line for 1/3 of length. Posterior scar short, reniform. Pallial line entire. Shell interior glossy, shell margin smooth.

#### REMARKS

This species is similar to *Notomyrtea botanica* (Hedley, 1918) from Eastern Australia but has fewer, more elevated, commarginal lamellae.

#### Genus *Myrtilina* n.gen.

TYPE SPECIES. — *Myrtilina porcata* n. sp. (here designated).

ETYMOLOGY. — *Myrtilina* diminutive of *Myrtea*.

DIAGNOSIS. — Shells small to medium in size, relatively flat, sub-circular, dorsal anterior margin with more or less elevated commarginal lamellae. Sculpture of fine to prominent, closely spaced, commarginal lamellae. Radial ribs absent. Lunule lanceolate to heart-shaped, asymmetric with larger part in right valve. Two cardinal teeth in left valve and single tooth in right valve; indistinct lateral teeth present in both valves. Anterior adductor scar short, detached for about 1/5 of length. Pallial line entire. Shell margin smooth.

#### REMARKS

*Alucinoma* Habe, 1958 is similar in outline to *Myrtilina* n. gen. but the type species, *A. soyae* Habe, 1958, from Japan, lacks hinge teeth and the thin commarginal lamellae are prominent largely on the posterior and anterior dorsal margins of the shell.

#### *Myrtilina porcata* n. sp. (Figs 6B; 7)

TYPE MATERIAL. — Holotype: 1 sh, L 10.8 mm, H 10.3 mm, T 2.9 mm (MNHN).

Paratypes: New Caledonia, secteur de Touho, Passe de Touho, stn 1249, 20°49'S, 165°19'E, 80-140 m, 1 sh, 115 v (MNHN). — Figured paratypes: same locality, 1 LV, L 6.3 mm, H 6.2 mm (MNHN); 1 LV, L 6.9 mm, H 6.7 mm (MNHN); 1 LV, L 3.7 mm, H 3.1 mm (MNHN); 1 RV, L 4.0 mm, H 3.5 mm (MNHN); 1 LV, L 6.6 mm, H 6.1 mm (BMNH 20050569); 1 RV, L 7.6 mm, H 7.3 mm (BMNH 20050569); 1 sh, L 7.1 mm (BMNH 20050569).

TYPE LOCALITY. — New Caledonia, secteur de Poindimie, stn 835, 20°47'S, 165°17'E, 135-150 m.

ETYMOLOGY. — Latin *porcata*, a ridge between furrows, a reference to the evenly spaced, commarginal lamellae.

MATERIAL EXAMINED. — Koumac. 4 stn, 30-120 m, 57 v, 3 live.

Other New Caledonia. LAGON, stn 326, Grand Récif Sud, 22°26'S, 167°02'E, 67 m, 1 v. — Stn 580, 22°44'S, 167°19'E, 95-100 m, 1 v. — Stn 604, secteur de Yaté, 22°14'S, 167°04'E, 80 m, 1 v. — Stn 605, 22°15'S, 167°02'E, 65-70 m, 1 v.

BATHUS 1, côte est, stn DW 692, 20°35'S, 164°59'E, 140 m, 2 v. — Stn DW 674, 20°49'S, 165°19'E, 105 m, 1 v. — Stn DW 640, 21°52'S, 166°48'E, 174 m, 2 v. — Stn DW 666, 20°57'S, 165°34'E, 105 m, 1 v. — Stn DW 700, 20°57'S, 165°35'E, 122-160 m, 10 sh. — Stn DW 1234, Cap N'Doua, 22°24'S, 166°55'E, 47-52 m, 1 v. MUSORSTOM 4, stn DW 149, 19°08'S, 163°23'E, 155 m, 3 v. — Stn DW 203, 22°36'S, 167°05'E, 105-110 m, 1 v.

#### DESCRIPTION

Shell white, small to medium H to 10.3 mm, L to 10.8 mm, outline subcircular (H/L 0.91-0.95), valves relatively flat (T/L 0.23-0.26); posterior margin straight. Protoconch 215 µm, PI large, smooth, PII a narrow rim. Sculpture of regular, closely spaced, flat-topped commarginal lamel-



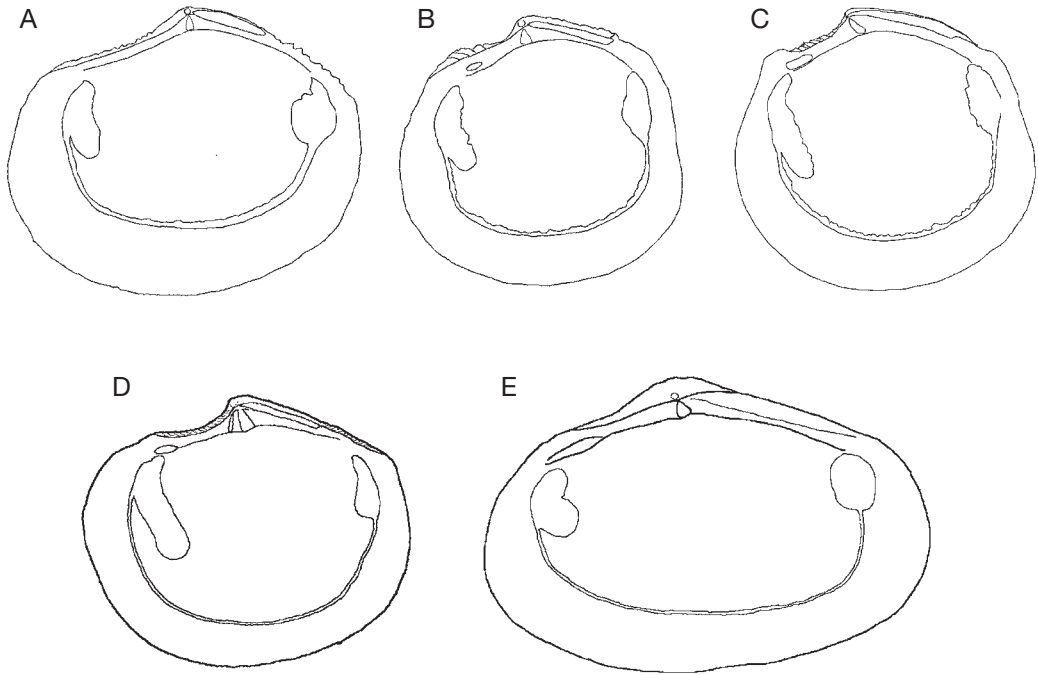


FIG. 6. — Outline drawings of interiors of right valves: **A**, *Notomyrtea vincentia* n. sp.; **B**, *Myrtina porcata* n. gen., n. sp.; **C**, *M. leptolira* n. gen., n. sp.; **D**, *Poumea coselia* n. gen., n. sp.; **E**, *Solelucina koumacia* n. gen., n. sp. Not to scale.

lae; interspaces narrow without radial striations. Commarginal lamellae elevated into folia along posterior and antero-dorsal margins. Posterior and anterior sulci marked by lower elevation of lamellae. Lunule short, lanceolate, asymmetrical, most in RV. Ligament external, short. Hinge plate narrow, RV with one cardinal and tiny anterior and posterior lateral teeth; LV with two cardinals and lateral teeth vestigial or absent. Anterior adductor muscle scar short, detached from pallial line for 1/5 of length. Posterior scar ovate. Pallial line entire, broad. Shell margin smooth.

*Myrtina leptolira* n. sp.  
(Figs 6C; 8)

TYPE MATERIAL. — Holotype: 1 RV, L 16.4 mm, H 14.8 mm, T 3.6 mm (MNHN).  
Paratypes: from type locality, 1 LV, L 14 mm, H 13.8 mm; 1 LV, L 14.3 mm, H 12.6 mm; 1 LV, L 14.3 mm, H 12.7 mm; 1 LV (damaged), L 9.7 mm, H 8.7 mm

(MNHN); 1 RV, L 15.6 mm, H 14.9 mm (BMNH 20050570).

TYPE LOCALITY. — Loyalty Islands, stn DW 442, 20°54'S, 167°17'E, 200 m.

ETYMOLOGY. — Latin *lepto*, thin, *lira*, ridge

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4, stn DW 150, 19°07'S, 163°22'E, 110 m, 1 v.  
**Loyalty Islands**. MUSORSTOM 6, stn 441, 20°54'S, 167°17'E, 80 m, 1 v. — Lifou, stn 1461, 20°54'S, 167°08'E, 100-120 m, 1 v.

DESCRIPTION

Small to medium sized, H to 14.9 mm, L to 16.5 mm, subcircular (H/L 0.90-0.99), posterior margin truncate. Sculpture of fine, closely spaced, regular, thin, commarginal lamellae with occasional radial threads. Lamellae more elevated in anterior and posterior dorsal areas. Antero-dorsal area demarcated by slight sulcus. Lunule long, lanceolate, smooth, slightly asymmetrical, slightly larger in left valve.



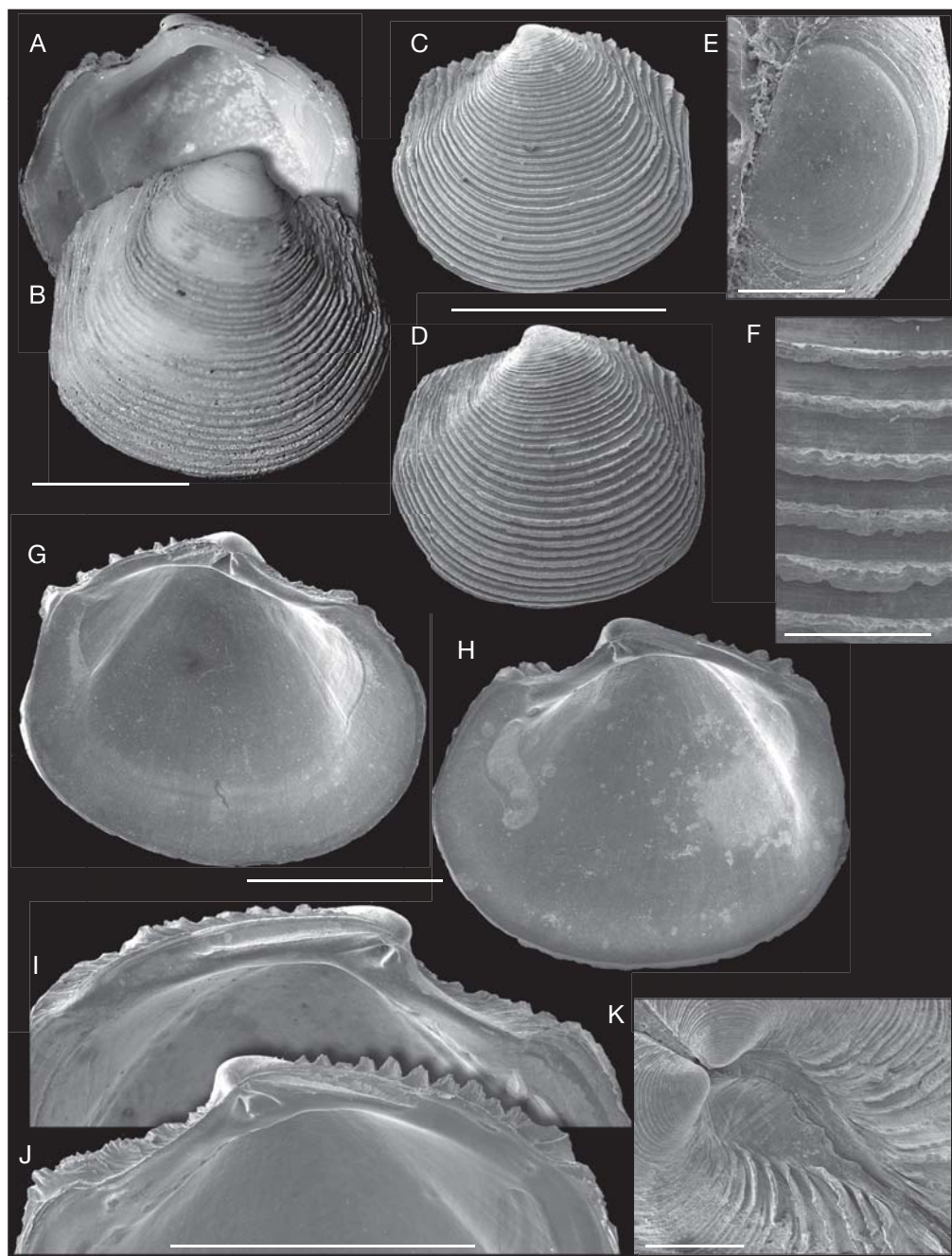


FIG. 7. — *Myrtina porcata* n. gen., n. sp.: **A, B**, holotype (MNHN), secteur de Poindimié, New Caledonia, interior and exterior of right valve; **C**, paratype (MNHN), exterior of left valve; **D**, paratype (MNHN), exterior of left valve; **E**, protoconch; **F**, detail of sculpture; **G, H**, paratypes (MNHN), interior of left and right valves; **I, J**, paratypes (BMNH 20050569), details of hinges of left and right valves; **K**, paratype (BMNH 20050569), dorsal view of lunule. Scale bars: A-D, I, J, 5 mm; E, 100  $\mu$ m; F, K, 500  $\mu$ m; G, H, 2 mm.

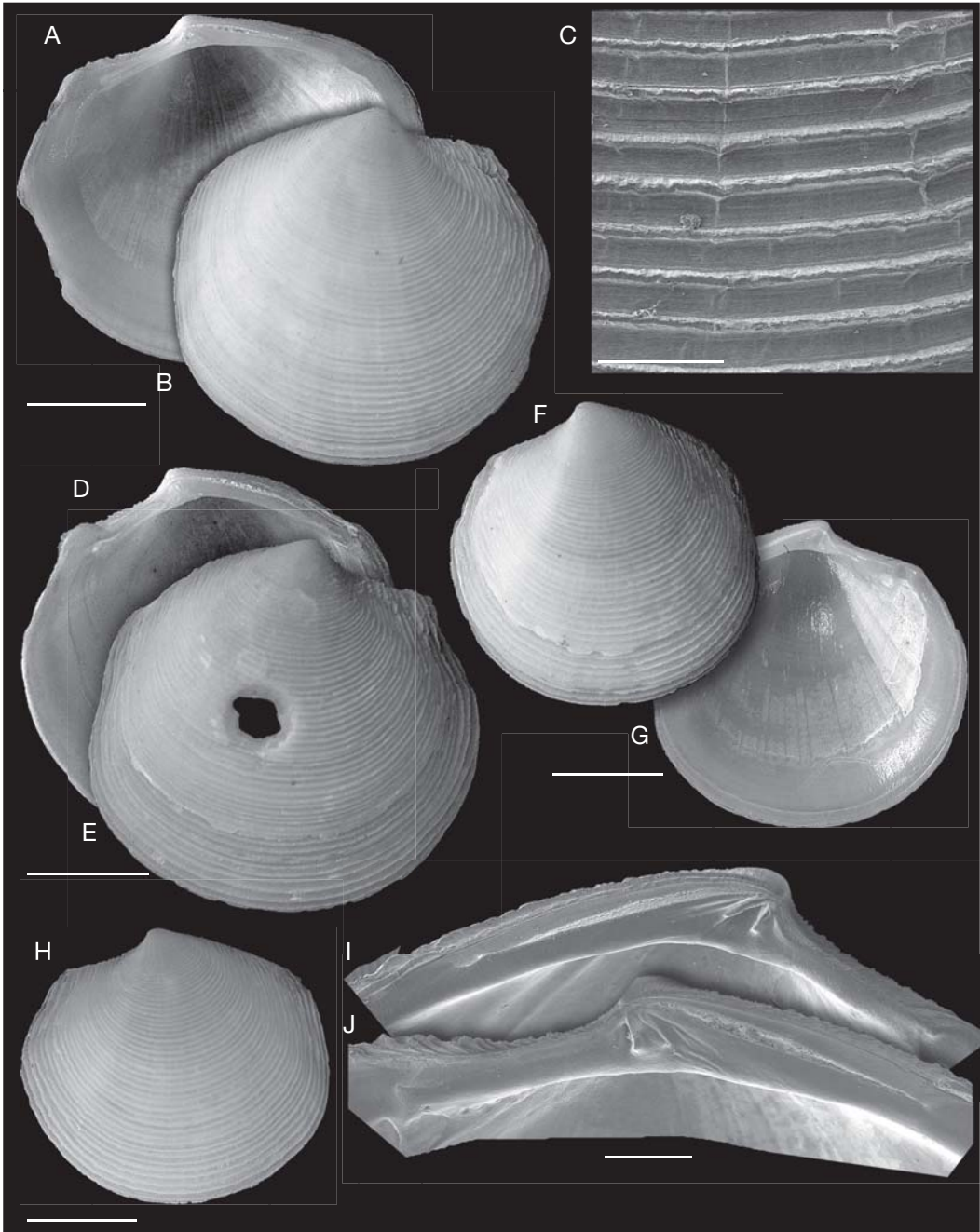


FIG. 8. — *Myrtina leptolira* n. gen., n. sp.: **A, B**, holotype (MNHN), Loyalty Ridge, stn DW 442, New Caledonia, interior and exterior of right valve; **C**, detail of sculpture; **D, E**, paratype (MNHN), interior and exterior of right valve; **F, G**, paratype (MNHN), interior and exterior of right valve; **H**, paratype (BMNH 20050570), exterior of left valve; **I, J**, detail of hinge teeth of left and right valves. Scale bars: A, B, D-H, 5 mm; C, 500 µm; I, J, 2 mm.

Ligament long, external. Hinge plate narrow; right valve with single bifid cardinal tooth, a short anterior lateral tooth and posterior lateral absent; left valve with two cardinal teeth, the anterior larger, posterior thin; lateral teeth absent. Anterior adductor muscle scar long, detached from pallial line for 1/4 of length. Posterior adductor scar oval to reniform. Pallial line sometimes discontinuous. Shell interior glossy, radial threads within pallial line, tracks of adductor scars often white (Fig. 8G); shell margin smooth

#### REMARKS

*Myrtina leptolira* n. sp. differs from *M. porcata* n. sp. in the more closely spaced and lower commarginal lamellae that are less extended dorsally, and in the more circular shell outline.

#### Genus *Poumea* n. gen.

TYPE SPECIES. — *Poumea coselia* n. sp. (here designated).

ETYMOLOGY. — Derived from Poum, the type locality of *Poumea coselia* n. sp.

DIAGNOSIS. — Shell small, subcircular, umbones prominent. Sculpture of regularly spaced, thin, commarginal lamellae. Lunule asymmetric, larger in left valve. Two cardinal teeth in each valve. Anterior lateral teeth present, posterior laterals absent. Anterior adductor scar long, detached from pallial line for 3/4 of length.

#### REMARKS

Although superficially resembling *Myrtea* and *Notomyrtea*, this new genus differs in having two cardinal teeth in each valve and a much longer anterior adductor muscle scar. Also, it lacks the radial riblets between the commarginal lamellae of *Notomyrtea* species (see Fig. 5).

#### *Poumea coselia* n. sp. (Figs 6D; 9)

TYPE MATERIAL. — Holotype: 1 sh, L 10.2 mm, H 8.5 mm, T 2.3 mm (MNHN).

TYPE LOCALITY. — New Caledonia, Secteur de Poum, stn 994, 20°16'S, 163°53'E, 70 m.

ETYMOLOGY. — Named for Rudo von Cosel in recognition of his contribution to lucinid systematics.

DISTRIBUTION. — Known only from New Caledonia.

#### DESCRIPTION

Small, H to 8.5 mm, L 10.2 mm, elongate (H/L 0.83), ovate, posterior margin slightly truncate, anterior margin rounded, umbones prominent. Periostracum light brown. Sculpture of regular, thin, commarginal lamellae, closely spaced at umbones, more widely spaced towards shell margin. Protoconch smooth, length 220 µm (PI large, PII narrow rim). Lunule lanceolate, shallow, asymmetrical, larger in left valve. Ligament medium length set in shallow groove. Hinge solid, right valve with two cardinal teeth, the posterior larger, anterior lateral tooth short and prominent; posterior lateral absent. Left valve with two cardinal teeth, one small anterior lateral and no posterior lateral. Anterior adductor scar long, narrow, detached from pallial line for 3/4 of length at angle of 25°. Posterior adductor scar short, ovate. Pallial line entire. Shell interior white, glossy, shell margin smooth.

#### REMARKS

See comments under genus.

#### Genus *Solelucina* n. gen.

TYPE SPECIES. — *Solelucina koumacia* n. sp. (here designated).

DIAGNOSIS. — Shells small, H to 19 mm, L to 23 mm, with elongate oval outline, blunt posterior shell margin. Exterior smooth, juvenile shell with prominent commarginal lamellae. Hinge with single cardinal tooth in each valve, RV with low, ridge-like, anterior and posterior lateral teeth, lateral teeth absent in LV. Anterior adductor muscle scar short, reniform in outline, detached from pallial line for only 1/5 of length. Inner shell margin smooth. Shell colour distinctive – cream to white, often with red to orange rays.

ETYMOLOGY. — Latin *sol*, sun, a reference to sunray-like, red, radiating rays on the shell.

#### REMARKS

With the elongate, smooth shell and pink/orange radial colour pattern, *Solelucina* n. gen. is a very

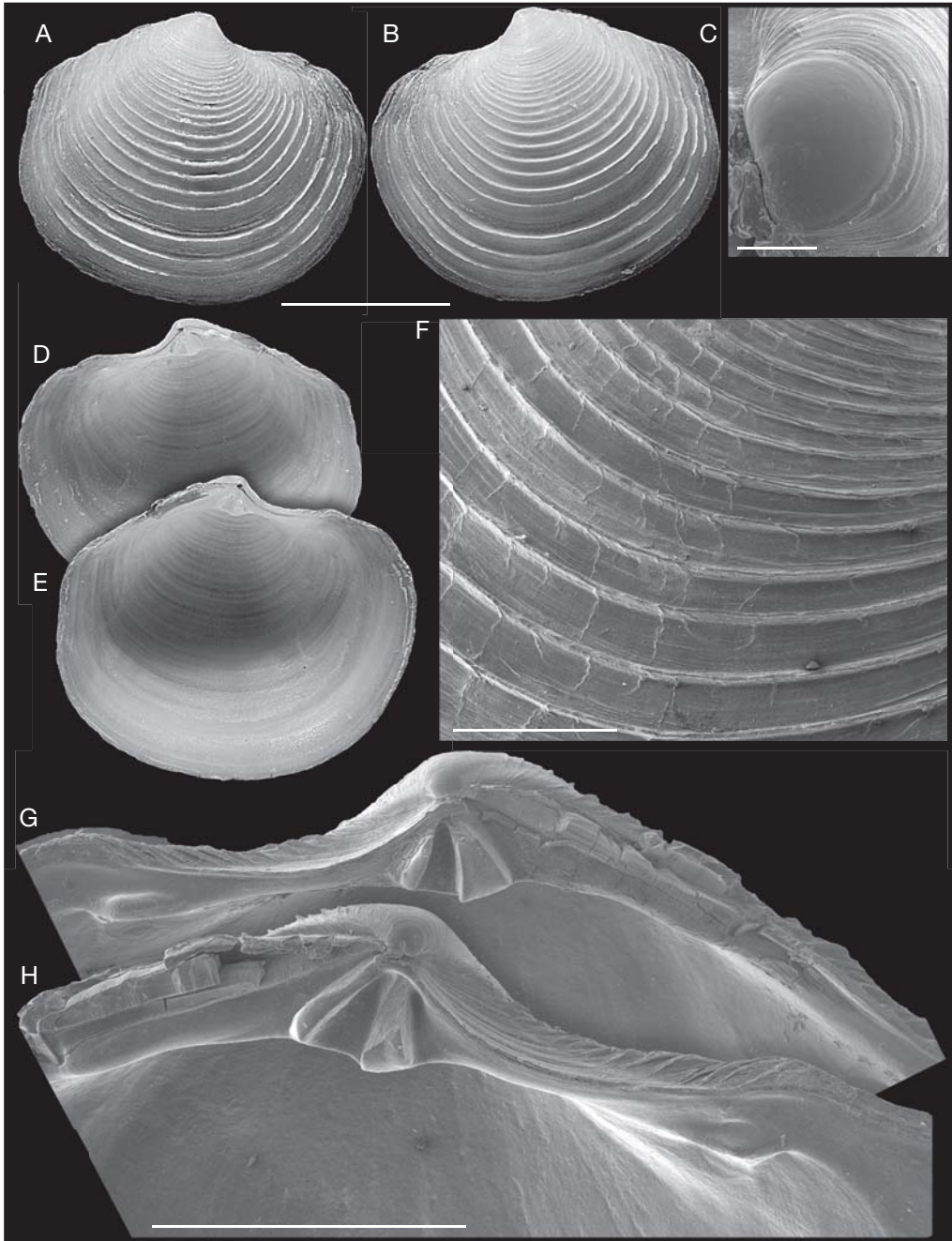


FIG. 9. — *Poumea coselia* n. gen., n. sp., holotype (MNHN), secteur de Poum, New Caledonia: **A, B**, exterior of right and left valves; **C**, protoconch; **D, E**, interior of right and left valves; **F**, detail of sculpture; **G, H**, details of hinge of right and left valves. Scale bars: A, B, D, E, 5 mm; C, 120 µm; F, 1 mm; G, H, 2 mm.



unusual lucinid with a superficial resemblance to some species of Tellinidae. However, it shares a number of characters with *Myrtea* and *Notomyrtea*, including the elongate outline and similar hinge dentition. Although the exterior shells of adult *Solelucina* n. gen. are smooth, the commarginal lamellae of the juvenile shells are similar to those of *Myrtea*. The short, reniform, anterior adductor muscle scar and the glossy shell interior are also similar.

*Solelucina koumacia* n. sp.  
(Figs 6E; 10; 11)

TYPE MATERIAL. — Holotype: 1 sh, L 14 mm, H 9.9 mm, T 3.2 mm (MNHN).

Paratypes: New Caledonia, Baie de St Vincent, stn 163, 22°12'S, 166°08'E, 15 m, 3 sh, L 17.1 mm, H 11.2 mm; L 21.0 mm, H 15.2 mm; L 14.4 mm, H 9.6 mm (MNHN). — New Caledonia, Touho, Grand Récif Mengalia, 20°45.2'S, 165°16.3'E, intertidal, stn 1245, 1 sh, L 17.4 mm, H 12.0 mm (MNHN). — Loyalty Islands, Lifou, Baie du Santal, stn 1463, 20°55.05'S, 167°03.35'E, 20-30 m, 5 sh, L 15.4 mm, H 10.6 mm; L 13.5 mm, H 9.0 mm; L 11.8 mm, H 8.5 mm; L 12.3 mm, H 9.3 mm; L 9.3 mm, H 6.8 mm (BMNH 20050571).

TYPE LOCALITY. — New Caledonia, stn 98, Île Ouen, Baie du Prony, 22°36'S, 166°32'E, 15 m.

ETYMOLOGY. — *Koumacia*, derived from the locality Koumac, New Caledonia.

MATERIAL EXAMINED. — **Koumac.** 8 stn, 0-120 m, 35 v, 4 live.

**Touho.** 1 stn, 0 m, 1 live.

**Lifou.** 10 stn, 4-45 m, 147 v, 15 live.

**Chesterfield Islands.** CORAIL 2, stn DW 04, 20°52'S, 161°37'E, 64 m, 1 v. — Stn DW 28, 20°28'S, 160°56'E, 78 m, 1 v. — Stn DW 32, 19°25'S, 158°49'E, 55 m, 1 sh. — Stn DW 60, 19°15'S, 158°57'E, 45 m, 3 v. — Stn DW 85, 19°12'S, 158°57'E, 32 m, 1 v. — Stn DW 87, 19°06'S, 158°60'E, 31 m, 1 sh. — Stn DW 91, 19°03'S, 158°55'E, 43 m, 2 v. — Stn DW 146, 19°47'S, 158°16'E, 44 m, 1 sh, 1 v. — Stn DW 147, 19°37'S, 158°14'E, 25 m, 2 v. — Stn DW 160, 19°46'S, 158°23'E, 35-41 m, 1 sh, 1 v.

**Other New Caledonia.** LAGON, stn 293, Grand Récif du Sud, 22°42'S, 166°41'E, 20 m, 4 v. — Stn 341, 22°49'S, 166°46'E, 19 m, 1 v. — Stn 544, 22°51'S, 166°49'E, 25 m, 1 sh, 1 v. — Stn 98, Île Ouen, Baie du Prony, 22°36'S, 166°32'E, 15 m, 2 v. — Stn 163, Baie de St

Vincent, 22°12'S, 166°08'E, 15 m, 3 sh. — Stn 218, 15 m, 21°52'S, 165°46'E, 1 sh. — Stn 49, secteur de Nouméa, 22°19'S, 166°14'E, 10 m, 1 sh. — Stn 1015, secteur de Poum, 20°10'S, 163°52'E, 25 m, 1 sh.

HABITAT. — Intertidal to 50 m, sandy reef platforms and seagrass.

DISTRIBUTION. — Western Pacific: Chesterfield Bank, New Caledonia, Loyalty Islands.

DESCRIPTION

Shell medium size H to 18.8 mm, L to 23.3 mm, elongate oval in outline, longer than high H/L 0.7, posterior margin blunt, anterior margin rounded, moderately inflated T/L 0.2. Posterior dorsal margin straight, long, sloping, with slightly extended dorsal margin. Anterior dorsal margin shorter, rounded. Posterior dorsal area demarcated by one or two low ridges. Umbones low, located anterior of centre. Periostracum, thin, fibrous, buff coloured. Juvenile shell to around 2.5 mm shell height with 11 or 12 thin, low, widely, but regularly spaced, commarginal lamellae (Fig. 11A). Protoconch flat (170 µm), PI large, PII a narrow rim. Adult shell smooth, glossy, with fine growth increments. Shell colour creamy white, often with up to 10 prominent, pink-orange, radial rays, that are solid or interrupted (Fig. 10). Lunule elongate, lanceolate, usually symmetrical. Escutcheon prominent, long, deep. Lunule and escutcheon areas glossy and often coloured dull orange. Ligament external, short. Hinge plate thin, RV with single cardinal, and a socket, anterior lateral low elongate, posterior lateral a low ridge. LV with single cardinal, lateral teeth absent. Anterior adductor muscle scar short, reniform, detached from pallial line for 1/4 of length. Anterior pedal retractor scar distinct. Posterior adductor scar short, reniform. Pallial line entire, broad. Shell outside pallial line glossy white to pale orange. Shell margin smooth. Shell interior glossy, sometimes slightly ridged and thickened, white to pale yellow.

*Anatomy*

Observations on a rehydrated body show this bivalve has typical lucinid features – ctenidia with thick



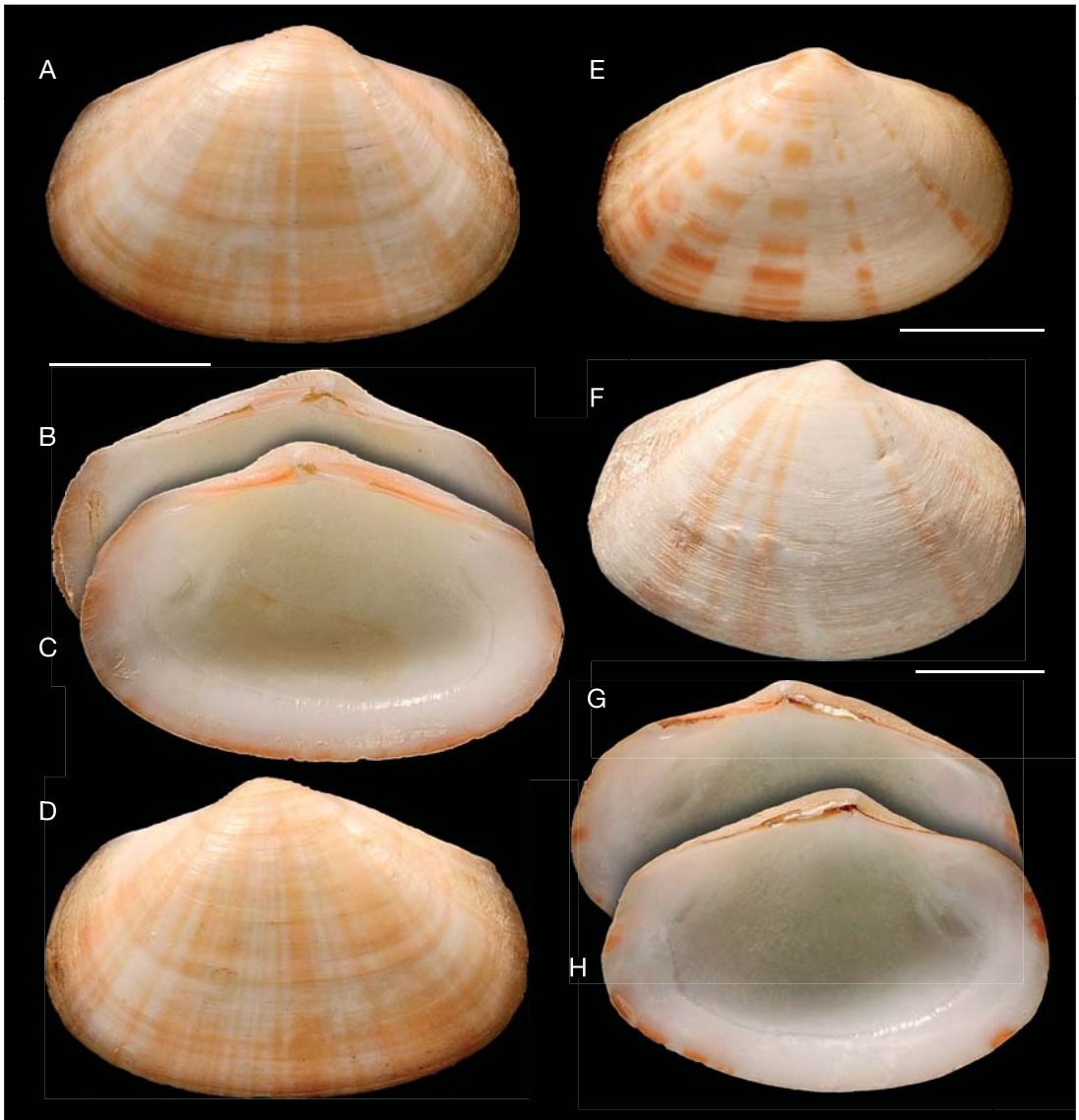


FIG. 10. — *Solelucina koumacia* n. gen., n. sp.: **A-D**, holotype (MNHN), Île Ouen, Baie du Prony, New Caledonia, LAGON, stn 98; **A**, exterior of right valve; **B, C**, interior of left and right valves; **D**, exterior of left valve; **E**, paratype (MNHN), right valve, Baie de St Vincent, stn 163; **F-H**, paratype (MNHN), exterior of right valve and interior of left and right valves, Touho, stn 1245. Scale bars: 5 mm.

single demibranchs only, highly reduced labial palps, a large foot and two posterior apertures. The exhalant aperture has a short eversible tube and there is a short length of mantle fusion ventral to inhalant aperture.

#### REMARKS

*Myrtea pseudocorbis* Nicklés, 1952, from West Africa, has a similar elongate shell, hinge teeth and adductor muscle but differs in the prominent concentric lamellae over all the shell.

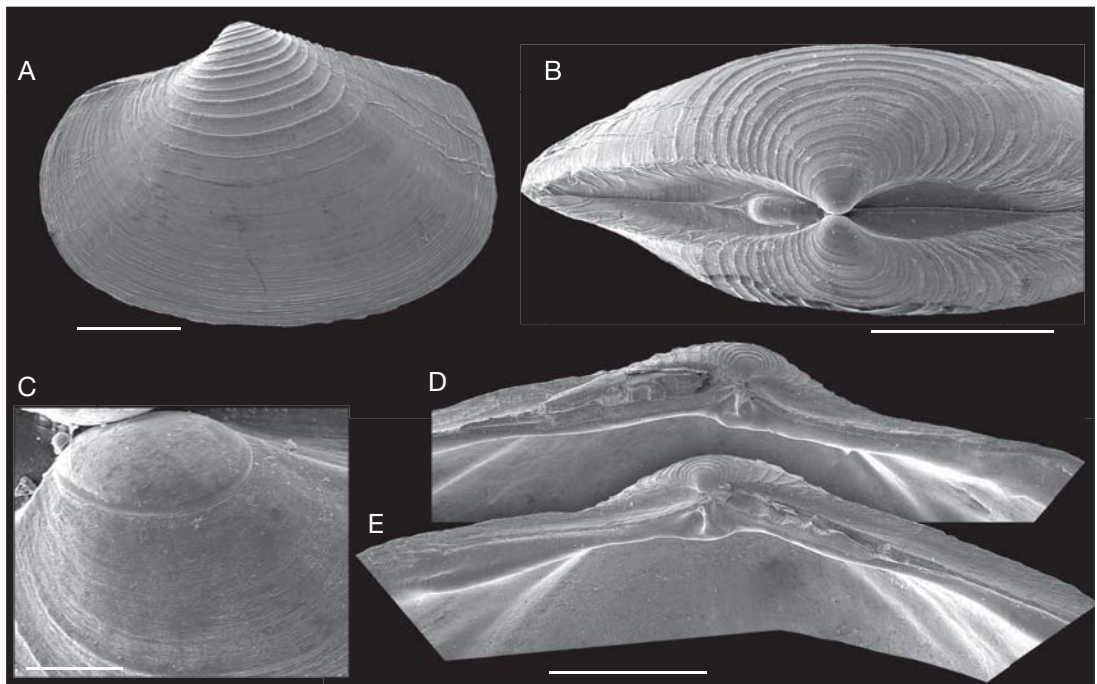


FIG. 11. — *Solelucina koumacia* n. gen., n. sp.: **A**, left valve juvenile shell, Lifou, stn 1450; **B**, dorsal view of **A**; **C**, detail of protoconch of **B**; **D**, **E**, paratype (MNHN), hinges of left and right valves, Baie de St Vincent, stn 163, New Caledonia. Scale bars: **A**, **B**, 1 mm; **C**, 100  $\mu$ m; **D**, **E**, 2  $\mu$ m.

### Genus *Gonimyrtea* Marwick, 1929

*Gonimyrtea* Marwick, 1929: 912.

TYPE SPECIES. — *Loripes concinna* Hutton, 1885 (original designation). New Zealand (Figs 12A, B; 13A).

DIAGNOSIS. — Shell small, subcircular to ovate, higher than long, inflated. Sculpture of closely spaced, thin, low commarginal lamellae. Right valve with single cardinal tooth and small anterior and posterior lateral teeth, left valve with two cardinals, the anterior much larger and small anterior and posterior lateral teeth. Lunule narrow, lanceolate. Ligament short, curved, shallowly inset. Anterior adductor scar medium long, ventrally detached from pallial line for 1/3 of length. Pallial line thick, sometimes divided into rounded blocks.

#### REMARKS

Concepts of this genus have been confused because Chavan's (1969: fig. E7.3) illustration for *Gonimyrtea* was of an Eocene species with little resemblance to the type species. Chavan (1969)

also regarded *Alucinoma* Habe, 1958 (type species *A. soyae* Habe, 1958), as a synonym of *Gonimyrtea*, but the shells are quite distinct. For example, *A. soyae* lacks cardinal teeth and has widely-spaced, commarginal lamellae. Because of this confusion we illustrate *Gonimyrtea concinna* here (Figs 12A, B; 13A).

### *Gonimyrtea avia* n. sp. (Figs 12G-L; 13C)

TYPE MATERIAL. — Holotype: 1 sh, L 11.1 mm, H 9.9 mm, T 2.7 mm (MNHN).

Paratype: Loyalty Ridge, stn 442, 20°54'S, 167°17'E, 200 m, 1 LV, L 8.7 mm, H 8.3 mm, T 2.5 mm (MNHN).

TYPE LOCALITY. — Coral Sea, Lansdowne-Fairway Banks, CORAIL 2, stn DW 18, 20°44'S, 161°00'E, 69 m.

ETYMOLOGY. — Latin *avia*, remote.

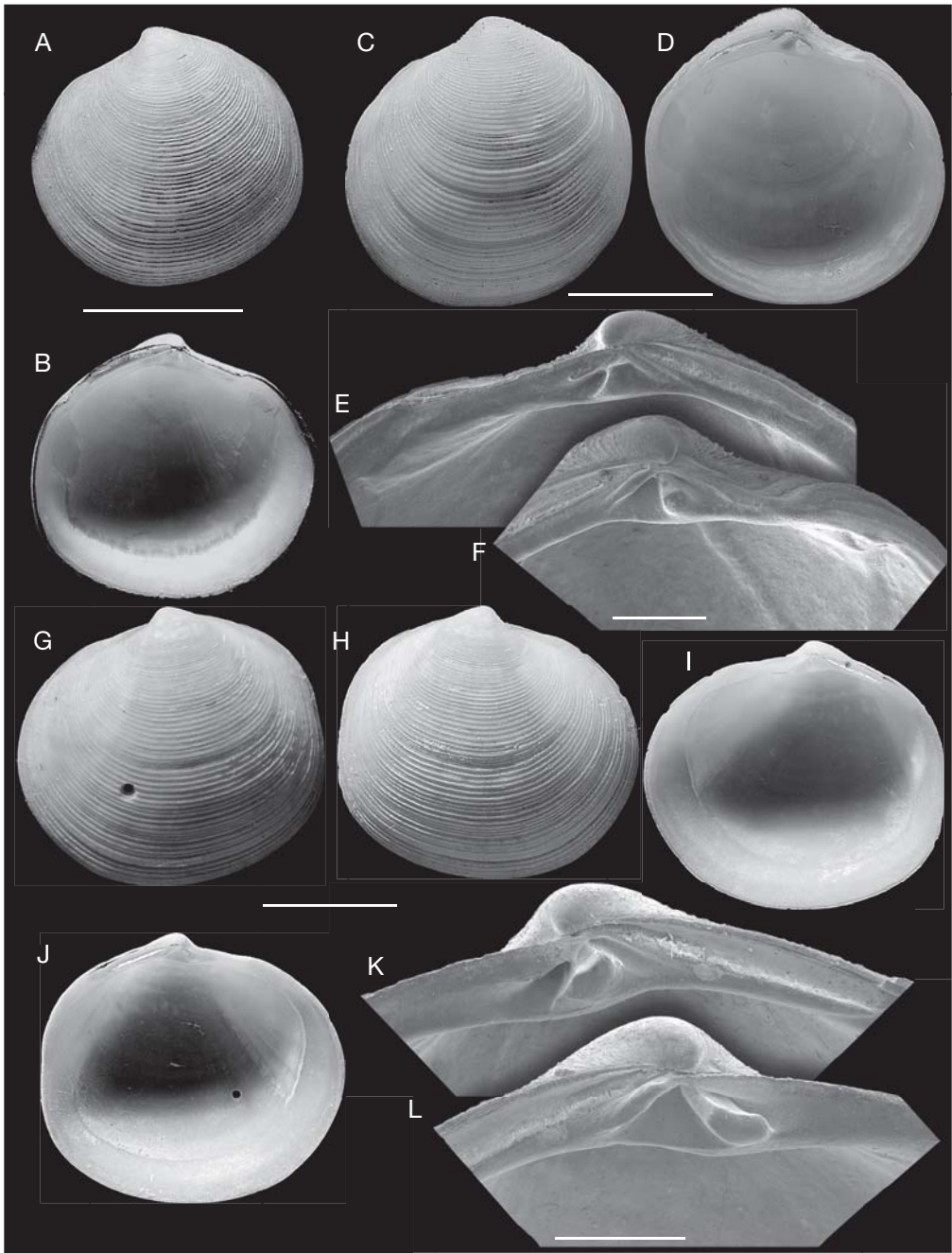


FIG. 12. — **A, B**, *Gonimyrtea concinna* (Hutton, 1885), Omaha Bay, Northland, New Zealand (NMNZ), exterior and interior of left valve; **C-F**, *G. fidelis* n. sp.; **C, D**, holotype (MNHN), exterior and interior of left valve, Loyalty Ridge, MUSORSTOM 6, stn DW 441, 80 m, New Caledonia; **E, F**, detail of hinge of right and left valves (E, paratype; F, holotype); **G-L**, *Gonimyrtea avia* n. sp., Lansdowne-Fairway Banks, New Caledonia, CORAIL 2, stn DW 18, 69 m, holotype (MNHN); **G-J**, exterior and interior of left and right valves; **K, L**, details of hinge of right and left valves. Scale bars: A-D, G-J, 5 mm; E, F, K, L, 1 mm.

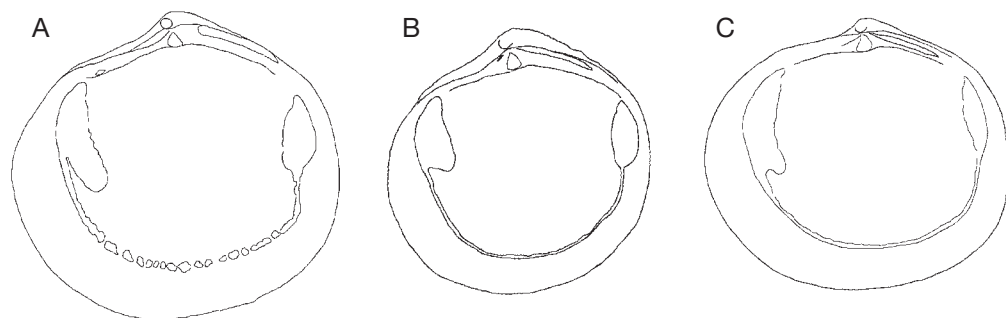


FIG. 13 — Outline drawings of interiors of right valves of *Gonimyrtia* species: **A**, *G. concinna* (Hutton, 1885); **B**, *G. fidelis* n. sp.; **C**, *G. avia* n. sp. Not to scale.

DESCRIPTION

Shells small, H to 10 mm, L to 11 mm, subcircular, anteriorly extended, moderately inflated (T/L 0.24), umbones lie posterior of mid-line. Sculpture of closely spaced, low, regular, commarginal lamellae. Lunule lanceolate, slightly impressed. Ligament shallowly inset. Hinge plate narrow, RV with one cardinal tooth, a small anterior lateral tooth, posterior lateral absent. LV with two cardinal teeth, the anterior larger, posterior a narrow ridge, lateral teeth absent. Anterior adductor scar short, detached from pallial line for 1/4 of length. Traces of adductor scars marked by radial ridges on interior of shell. Posterior scar ovate. Pallial line entire. Inner shell margin smooth.

REMARKS

*Gonimyrtia avia* n. sp. is similar to *G. fidelis* n. sp. in external sculpture but the shell is much less inflated and longer anteriorly.

*Gonimyrtia fidelis* n. sp.  
(Figs 12C-F; 13B)

TYPE MATERIAL. — Holotype: 1 LV, L 10.1 mm, H 10.4 mm, T 3.7 mm, (MNHN).

Paratype: from type locality, 1 RV, L 8.3 mm, H 8.2 mm, T 2.5 mm (MNHN).

TYPE LOCALITY. — Loyalty Islands, MUSORSTOM 60, stn DW 441, 20°54'S, 167°17'E, 80 m.

ETYMOLOGY. — Latin *fidelis*, "to have faith in", a reference to the type locality of Loyalty Ridge.

MATERIAL EXAMINED. — **Koumac**. 2 stn, 10-60 m, 5 v.  
**Lifou**. 4 stn, 10-120 m, 5 v.

DESCRIPTION

Shells small, H to 10.4 mm, L to 10.1 mm, subcircular, inflated (T/L 0.37), umbones prominent, central. Sculpture of closely spaced, low, regular, commarginal lamellae. Lunule lanceolate, slightly impressed. Ligament short, shallowly inset. Hinge: RV with two cardinal teeth, the posterior large and triangular, the anterior a small narrow ridge; anterior lateral tooth present but indistinct. LV with two cardinal teeth, the anterior larger, posterior a narrow ridge; small anterior lateral socket. Anterior adductor scar short, detached from pallial line for 1/4 of length. Traces of adductor scars marked by radial ridges on interior of shell. Posterior scar ovate. Pallial line faint, entire. Shell edge smooth but with marginal groove.

Genus *Codakia* Scopoli, 1777

*Codakia* Scopoli, 1777: 398.

*Lentillaria* Schumacher, 1817: 49. Type species: *Venus punctata* Linnaeus, 1758 (monotypy).

*Pexocodakia* Iredale, 1930: 389. Type species: *Lucina rugifera* Reeve, 1850 (original designation).

TYPE SPECIES. — *Venus orbicularis* Linnaeus, 1758 (*Chama, le codok* Adanson, 1757) (by monotypy).

DIAGNOSIS. — Shells robust, medium to large, discoidal, flat to moderately inflated. Sculpture of numerous fine



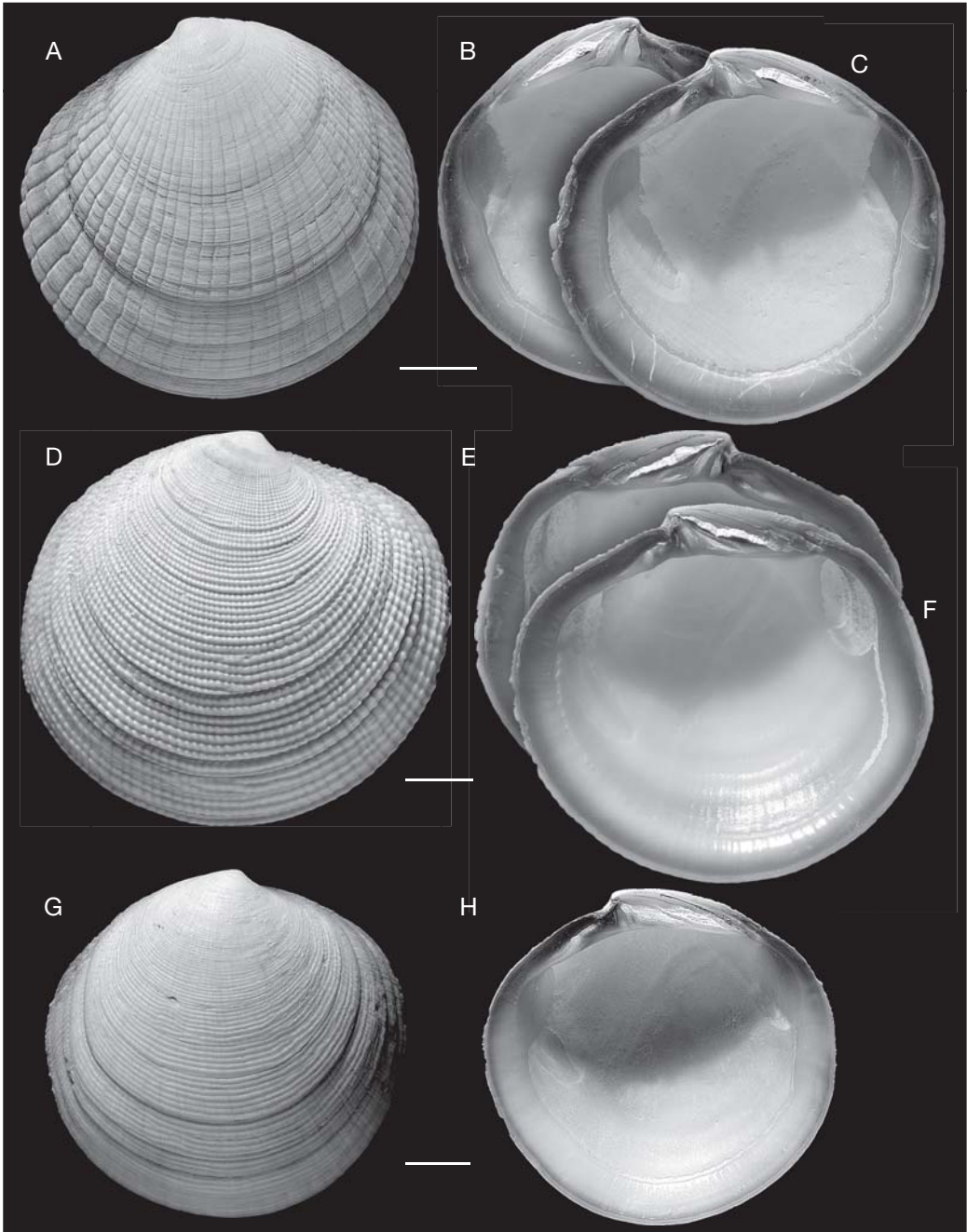


FIG. 14 — **A-C**, *Codakia punctata* (Linnaeus, 1758), Touho, stn 1242, New Caledonia (MNHN); **A**, exterior of left valve; **B, C**, interior of right and left valves; **D-F**, *C. tigerina* (Linnaeus, 1758), Touho, stn 1242, New Caledonia (MNHN); **D**, exterior of right valve; **E, F**, interior of left and right valves; **G, H**, *C. paytenorum* (Iredale, 1937), Touho, stn 1245, New Caledonia (MNHN), exterior and interior of right valve. Scale bars: 10 mm.



to broad low radial ribs crossed by fine commarginal lamellae, sometimes producing nodules at intersection with radial ribs. Lunule short, triangular to narrowly ovate, deep, strongly asymmetric, projecting from RV. Ligament large, set in deep resilifer. RV with two cardinal teeth, and a single, large anterior lateral tooth set close to cardinal teeth, posterior lateral teeth absent or indistinct. LV with 2 cardinals, anterior lateral 1 or 2, close to cardinal. Posterior lateral tiny or absent. Anterior adductor scar, long, detached from pallial line for about 2/3 of length. Shell usually white, internally with margin and hinge often rose-pink to red, within pallial line shell often yellow.

*Codakia paytenorum* (Iredale, 1937)  
(Figs 14G, H; 15A)

*Lentillaria paytenorum* Iredale, 1937: 240, 241, pl. 16, figs 2-3.

*Codakia (Codakia) paytenorum* – Lamprell & Whitehead 1992: pl. 19, fig. 120.

TYPE MATERIAL. — Figured specimen not isolated from shells of *L. paytenorum* collected by Iredale on Lord Howe Island (AMS).

TYPE LOCALITY. — Lord Howe Island, Australia.

MATERIAL EXAMINED. — **Koumac**. 3 stn, 0-12 m, 2 v, 1 live.

**Touho**. 2 stn, 0 m, 7 v, 1 live.

**Lifou**. 9 stn, 0-55 m, 16 v.

**Chesterfield Islands**. CHALCAL/CORAIL 2, recorded from 24 stn at depths from 28-69 m.

**Other New Caledonia**. LAGON, stn 161, Île Ouen, Baie du Prony, 22°34'S, 166°38'E, 2 m, 2 v. — Stn 241, 22°21'S, 167°00'E, 35 m, 1 v. — Stn 294, Grand Récif Sud, 22°44'S, 166°42'E, 21 m, 1 sh. — Stn 545, 22°52'S, 166°50'E, 37 m, 1 v. — Stn 772, secteur du Poindimie, 21°08'S, 165°41'E, 30 m, 2 v. — Stn 1139, secteur des Belep, 19°24'S, 163°47'E, 39 m, 1 v. — Stn 1140, 19°24'S, 163°44'E, 44 m, 1 v. — Stn 1156, 19°10'S, 163°13'E, 55 m, 1 v. — Stn 1157, 19°10'S, 163°10'E, 48 m, 2 v. — Stn 1196, 19°33'S, 163°21'E, 30 m, 1 v.

DISTRIBUTION. — Red Sea, Indian Ocean, West Pacific.

DESCRIPTION

Shell solid, medium to large (H to 53 mm, L to 55 mm), subcircular. Sculpture low radial ribs of variable width, narrower at anterior and posterior

margins and often sparse in central part of shell. Ribs crossed by numerous fine, sometimes anastomosing, commarginal lamellae. Anterior and posterior dorsal areas raised into finely nodular sculpture. Lunule short, heart-shaped, deeply impressed, strongly asymmetrical. RV with two cardinal teeth and a large anterior lateral very close to cardinals and a vestigial posterior lateral. LV with one cardinal, an anterior lateral close to cardinal, and a low posterior lateral. Anterior adductor scar short, tapering, detached for 1/2 of length. Shell margin smooth, glossy. Colour white, umbonal areas tinged dark pink, interior shell margin deep pink to white, shell within pallial line bright yellow.

REMARKS

Iredale (1937) introduced the name *Lentillaria paytenorum* for shells with intensely rose-red coloured shell margins from Lord Howe Island and Queensland, distinguishing the new species from the yellow-coloured *C. interrupta* (Lamarck, 1818). We have examined a large number of specimens of both the yellow and pink margined "species" from the IWP and have been unable to find any consistent morphological differences to separate them. Preliminary molecular analysis (unpublished data) has revealed differences between the yellow forms similar to *C. interrupta* and the pink margined *C. paytenorum* including a sample from the type locality. For this reason we use the name *C. paytenorum* for the pink-margined New Caledonia samples.

*Codakia punctata* (Linnaeus, 1758)  
(Figs 14A-C; 15B)

*Venus punctata* Linnaeus, 1758: 688.

*Codakia punctata* – Mörch 1853: 33.

TYPE MATERIAL. — Not located.

TYPE LOCALITY. — Indian Ocean.

MATERIAL EXAMINED. — **Koumac**. 4 stn, 0-15 m, 5 v, 6 live.

**Touho**. 4 stn, 0-2 m, 36 v, 9 live.

**Lifou**. 15 stn, 0-30 m, 46 v.

**Chesterfield Islands**. CHALCAL 1, stn DC 17, 19°12'S, 158°56'E, 44 m, 1 v.

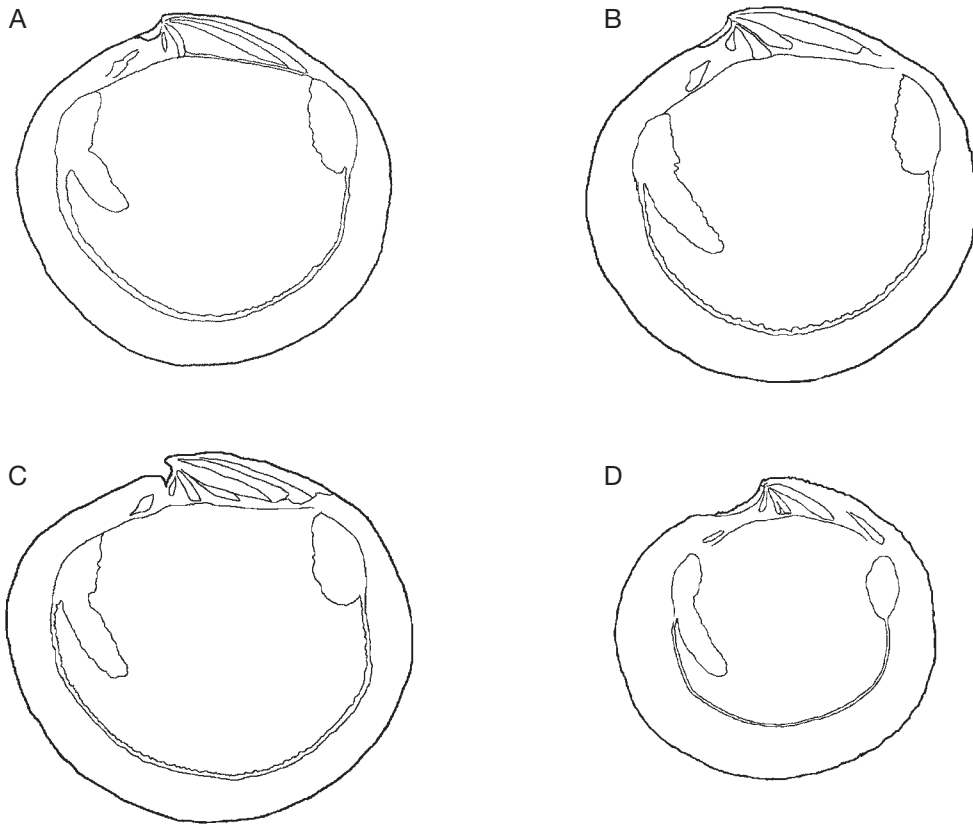


FIG. 15 — Outline drawings of interiors of right valves of *Codakia* Scopoli, 1777 and *Ctena* Mörch, 1861 species: **A**, *Codakia paytenorum* (Iredale, 1937); **B**, *Codakia punctata* (Linnaeus, 1758); **C**, *Codakia tigerina* (Linnaeus, 1758); **D**, *Ctena bella* (Conrad, 1837). Not to scale.

CORAIL 2, stn DW 42, 19°22'S, 158°29'E, 45 m, 1 v. — Stn DW 48, 19°18'S, 158°27'E, 44 m, 1 v. — Stn DW 51, 19°19'S, 158°37'E, 69 m, 1 v. — Stn DW 60, 19°15'S, 158°27'E, 45 m, 1 v. — Stn DW 87, 19°06'S, 159°00'E, 31 m, 3 v. — Stn DW 100, 19°06'S, 158°27'E, 40 m, 1 v. — Stn DW 110, 19°09'S, 158°56'E, 40 m, 6 v. — Stn DW 138, 19°34'S, 158°18'E, 31 m, 4 v. — Stn DW 158, 19°46'S, 158°17'E, 28 m, 1 v. — Stn DW 160, 19°46'S, 158°23'E, 35–41 m, 3 v.

**Other New Caledonia.** LAGON, stn 98, Île Ouen, Baie du Prony, 22°36'S, 166°32'E, 15 m, 1 v. — Stn 478, Lagon Nord, 18°53'S, 163°27'E, 35 m, 2 v. — Stn 479, 18°55'S, 163°28'E, 37 m, 1 sh. — Stn 517, 19°09'S, 163°35'E, 42 m, 1 v. — Stn 544, Grand Récif Sud, 22°51'S, 166°49'E, 25 m, 1 v. — Stn 554, 22°50'S, 166°54'E, 27 m, 1 sh. — Stn 589, Île des Pins, 22°32'S, 167°23'E, 31 m, 1 v. — Stn 1063, secteur de Belep, 20°03'S, 163°47'E, 31 m, 1 v. — Stn 1087, 19°48'S, 163°60'E, 24 m, 1 v. — Stn 1104, 19°42'S, 163°59'E,

22 m, 2 v. — Stn 1105, 19°40'S, 163°57'E, 25 m, 3 v. — Stn 1118, 19°35'S, 163°52'E, 30 m, 3 v. — Stn 1145, 19°21'S, 163°45'E, 38 m, 1 v. — Stn 1158, 19°10'S, 163°07'E, 48 m, 1 v. — Stn 1196, 19°33'S, 163°21'E, 30 m, 1 v.

**Loyalty Islands.** MUSORSTOM 6, stn DW 430, 20°21'S, 166°07'E, 30 m 1 v. — Stn DW 435, 20°21'S, 166°08'E, 32 m, 1 v.

**DISTRIBUTION.** — Widely distributed across the IWP from the Red Sea and East Africa to Rapa, SW Pacific.

#### SHORT DESCRIPTION

Shell medium to large (H to 51 mm, L to 53 mm). Sculpture of around 30–40 broad, low radial ribs, variable in width, crossed by very fine, closely-spaced, commarginal lamellae. Lunule small, narrowly triangular, slightly impressed, right valve protrudes

into left. Externally, dorsal areas sometimes dark pink. Interior shell margin deep rose-pink, yellow within pallial line.

*Codakia tigerina* (Linnaeus, 1758)  
(Figs 14D-F; 15C)

*Venus tigerina* Linnaeus, 1758: 688.

*Codakia tigerina* – Mörch 1853: 33.

TYPE MATERIAL. — Syntypes (LSL).

TYPE LOCALITY. — Indian Ocean.

MATERIAL EXAMINED. — **Koumac.** 5 stn, 0-2 m, 7 v, 3 live.

**Touho.** 5 stn, 0-10 m, 10 v, 19 live.

**Lifou.** 7 stn, 0-10 m, 15 v, 9 live.

**Other New Caledonia.** Île Nou, 2 sh. — Île des Pins, 3 v. — Îlot Maître, 2 v. — Nouméa, Ouen Toro, 9 sh.

DISTRIBUTION. — Widely distributed across the IWP from the Red Sea and East Africa to Tuamotus.

SHORT DESCRIPTION

Shell medium to large (H to 66 mm, L to 60 mm), subcircular, low umbones. Sculpture finely nodulose, with thin radial ribs crossed by sometimes anastomosing commarginal lamellae, forming rows of nodules at intersections. Lunule short, heart-shaped, deeply impressed into notch. Anterior lateral teeth of both valves lie extremely close to cardinal teeth. Interior shell colour dark rose-pink around shell margins, pale yellow within pallial line.

Genus *Ctena* Mörch, 1861

*Ctena* Mörch, 1861: 201.

TYPE SPECIES. — *Lucina pectinata* Carpenter, 1857, non *L. pectinata* C. B. Adams, 1852 (replacement name *Codakia (Jagonia) mexicana* Dall, 1901) (subsequent designation by Dall *et al.* [1938]).

DIAGNOSIS. — Shells small to medium sized, sub-circular, umbones prominent. Radial ribs prominent, bifurcating and intercalating. Commarginal lamellae fine, forming scales on summits of ribs. Lunule long, heart-shaped, asymmetric with greater part in RV. Ligament short, set in oblique triangular resilifer.

REMARKS

Although *Ctena* and *Epicodakia* are frequently confused (see below under *Epicodakia*), there are a number of characters that can be used to separate them. *Ctena* can be distinguished by the presence of irregular and bifurcating radial ribs compared to the more evenly spaced ribs that rarely bifurcate in *Epicodakia*; the commarginal lamellae are also lower, more evenly and regularly spaced in *Epicodakia*, giving a scaly appearance. *Ctena* has a short ligament located in a more or less deeply inset resilifer on the hinge plate that differs from the mainly longer and external ligament of *Epicodakia*. The hinge plate of *Ctena* is always broader and more robust and the lunule is shorter and more heart-shaped. The juvenile shell of *Ctena* has far more prominent radial ribbing.

Molecular and morphological evidence also indicates that *Ctena* and *Codakia* are related (Williams *et al.* 2004). However, *Ctena* species have smaller, more ovate shells and radial ribs that are typically bifurcated. The lunule in *Codakia* is much deeper, shorter and more triangular in outline compared to the shallower lanceolate lunule in *Ctena*. Unlike *Ctena*, the anterior lateral teeth in both left and right valves of *Codakia* lie extremely close to the cardinal teeth.

*Ctena bella* (Conrad, 1837)  
(Figs 15D; 16)

*Lucina bella* Conrad, 1837: 254, pl. 19, fig. 11.

*Lucina divergens* Philippi, 1850 (April): 103, pl. 2, fig. 4.

*Lucina ramulosa* Gould, 1850 (June): 255; 1852: 415, pl. 36, fig. 523a, b.

*Lucina fibula* Reeve, 1850 (June): pl. 7, figs 33, 37, 38.

*Ctena bella* – Dall *et al.* 1938: 129, pl. 35, figs 1-8. — Kay 1979: 543, fig. 176A-D.

TYPE MATERIAL. — *Lucina bella*: type not located (Academy of Natural Sciences, Philadelphia?).

*Lucina fibula*: 3 syntypes, St Elena, W Columbia (error?) and Isle of Ticao, Philippines (BMNH 196338/1, 196339, 196337/1).

*Lucina ramulosa*: holotype, Paumotu, Tuamotu Islands (USNM 427778).

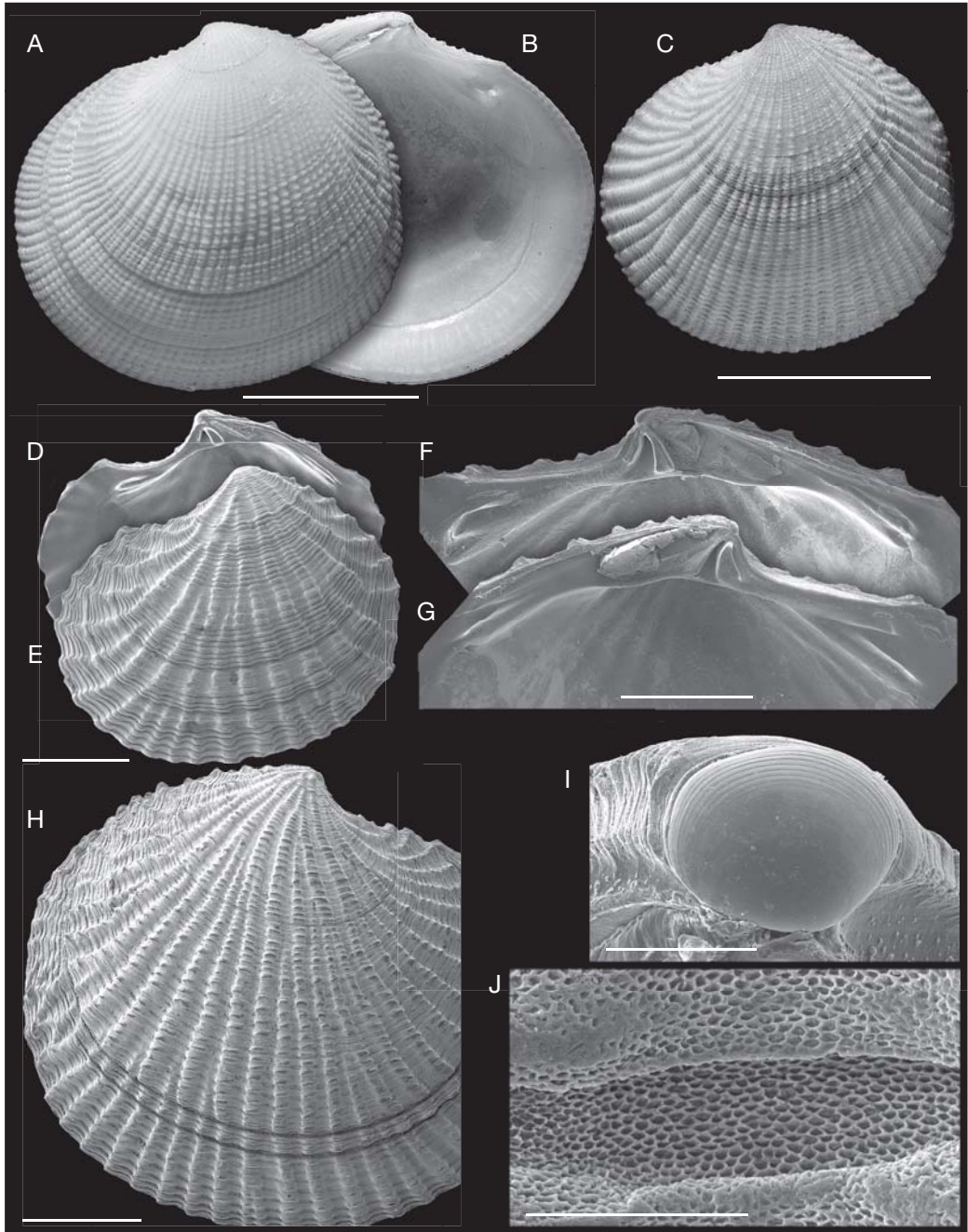


FIG. 16. — *Ctena bella* (Conrad, 1837): **A, B**, exterior and interior of left valve, Lifou, stn 1417, Loyalty Islands (MNHN); **C**, exterior of left valve, Koumac, stn 1282, New Caledonia (MNHN); **D, E**, exterior and interior of juvenile shell, Lifou, stn 1425, Loyalty Islands (MNHN); **F, G**, details of hinge teeth, Lifou, stn 1425 (MNHN); **H**, exterior of left valve, Lifou, stn 1425; **I**, protoconch, Lifou, stn 1425; **J**, detail of external shell surface. Scale bars: A-C, 10 mm; D, E, 1.0 mm; F-H, 2.0 mm; I, 100  $\mu$ m; J, 50  $\mu$ m.



TYPE LOCALITY. — Although the type locality of *L. bella* is given as muddy marshes near San Diego, Dall (1901) and Dall *et al.* (1938) argue that Nuttall (collector of the shells described by Conrad) most likely collected the specimens from the Hawaiian Islands.

MATERIAL EXAMINED. — **Koumac.** 16 stn, 0–120 m, 33 v, 8 live.

**Touho.** 13 stn, 0–35 m, 65 v, 6 live.

**Lifou.** 37 stn, 2–38 m, 650 v, 68 live.

**Chesterfield Islands.** CHALCAL 1, stn DC 27, 19°17.15'S, 158°34.05'E, 67 m, 2 v.

CORAIL 2, stn DW 148, 19°54.08'S, 158°27.12'E, 34 m, 3 v. — Stn DW 149, 19°57.0'S, 158°28.0'E, 19 m, 1 v. — Stn DW 150, 19°54.0'S, 158°25.20'E, 39 m, 50 v. — Stn DW 154, 19°52.04'S, 158°26.50'E, 35 m, 2 sh, 3 v. — Stn DW 155, 19°49.08'S, 158°24.85'E, 42 m, 9 v.

**Other New Caledonia.** Stn 374, Grand Récif Sud, 22°30'S, 167°09'E, 70 m, 1 v. — Stn 1034, secteur de Poum, 19°58'S, 163°58'E, 23 m, 1 v. — Stn 1073, secteur de Belep, 19°60'S, 164°04'E, 28 m, 2 v. — Stn 1095, 19°53'S, 163°38'E, 29 m, 1 sh. — Stn 1102, 19°43'S, 163°54'E, 38 m, 1 v. — Stn 1106, 19°40'S, 163°53'E, 39 m, 1 sh. — Stn 1165, 19°15'S, 163°15'E, 65 m, 5 v. — Stn 1168, 19°16'S, 163°09'E, 50 m, 1 v. — Stn 1170, 19°18'S, 163°14'E, 65 m, 3 v. — Stn 1172, 19°18'S, 163°20'E, 65 m, 3 v. — Stn 1173, 19°19'S, 163°16'E, 64 m, 2 v.

**Loyalty Islands.** MUSORSTOM 6, stn DW 433, 20°20'S, 166°09'E, 24 m, 1 v. — Stn 1219, Lagon d'Ouvéa, 20°30'S, 166°28'E, 15 m, 1 v. — Stn 1221, 20°29'S, 166°31'E, 10 m, 5 sh, 1 v. — Stn 1224, 20°32'S, 166°28'E, 18 m, 3 v. — Stn 1227, 20°37'S, 166°25'E, 12 m, 1 sh.

DISTRIBUTION. — Widely distributed across Indian and Pacific oceans to Marquesas and Rapa.

#### DESCRIPTION

Small to medium sized (H to 23 mm, L to 25 mm), sub-circular, anteriorly extended. Umbones prominent. Colour white, orange pink or yellow. Protoconch 160 µm long, PI smooth, 70 µm, PII with prominent growth increments. Sculpture of strong, radial ribs that bifurcate ventrally, with new ribs intercalating into interspaces. Ribs crossed by concentric lamellae forming scales on summit of ribs. Juvenile shells with more prominent and irregular ribs (Fig. 16E). Lunule elongate, asymmetric, larger in RV. Hinge with 2 cardinal teeth in each valve, anterior cardinal usually small and thin; single, large posterior and anterior lateral teeth in RV and two anterior and posterior laterals in LV. Ligament short, set deeply in an obliquely triangular resilifer. Anterior adductor muscle scar

medium long, detached for half of length, diverging from pallial line at angle of about 25°. Pallial line entire. Shell margin smooth.

#### REMARKS

Although there are likely several species of *Ctena* living within the IWP, identification is difficult and the genus worldwide is in need of taxonomic revision. The New Caledonia specimens are very similar to samples from Hawaii, the probable type locality of *C. bella*. Zuchsin & Oliver (2003) illustrate (as *Ctena divergens*) very similar shells from the northern Red Sea.

#### Genus *Epicodakia* Iredale, 1930

*Epicodakia* Iredale, 1930: 390. Type species: *Epicodakia consettiana* Iredale, 1930 (earlier name *Lucina minima* Tenison-Woods, 1876, preoccupied by *L. minima* Roemer, 1836) (original designation).

*Talocodakia* Iredale, 1936: 273. Type species: *Talocodakia kennethi* Iredale, 1936 (original designation).

DIAGNOSIS. — Shells small to medium sized, longer than high, regularly ovate in outline with low umbones. Sculpture of 20 to 75 regularly spaced, narrow or broad radial ribs, rarely bifurcating, crossed by commarginal lamellae producing low, rounded, often closely-spaced scales on summits of ribs, (basketwork or snakeskin effect). Ligament external, short. Hinge plate narrow; 2 cardinal teeth in each valve, the larger usually bifurcate, with single anterior and posterior lateral teeth in RV and paired in LV. Anterior adductor scars medium long, detached for about 1/2 of length. Shell margin smooth or finely denticulate.

#### REMARKS

There has been much confusion concerning use of this generic name, especially since Iredale (1930) included *E. gunnamatta* Iredale, 1930 (a *Ctena* species) within his concept of the genus. Furthermore, Chavan (1969: fig. E3.9b) figured *Ctena divergens* as an example of *Epicodakia* and provided only a small, poorly reproduced image (fig. E2.2) of the outside of *E. consettiana*. Also, the various southern Australian species that have been included within *Epicodakia* appear to be a heterogeneous group of lucinids. In order to clarify the concept of *Epicodakia*,



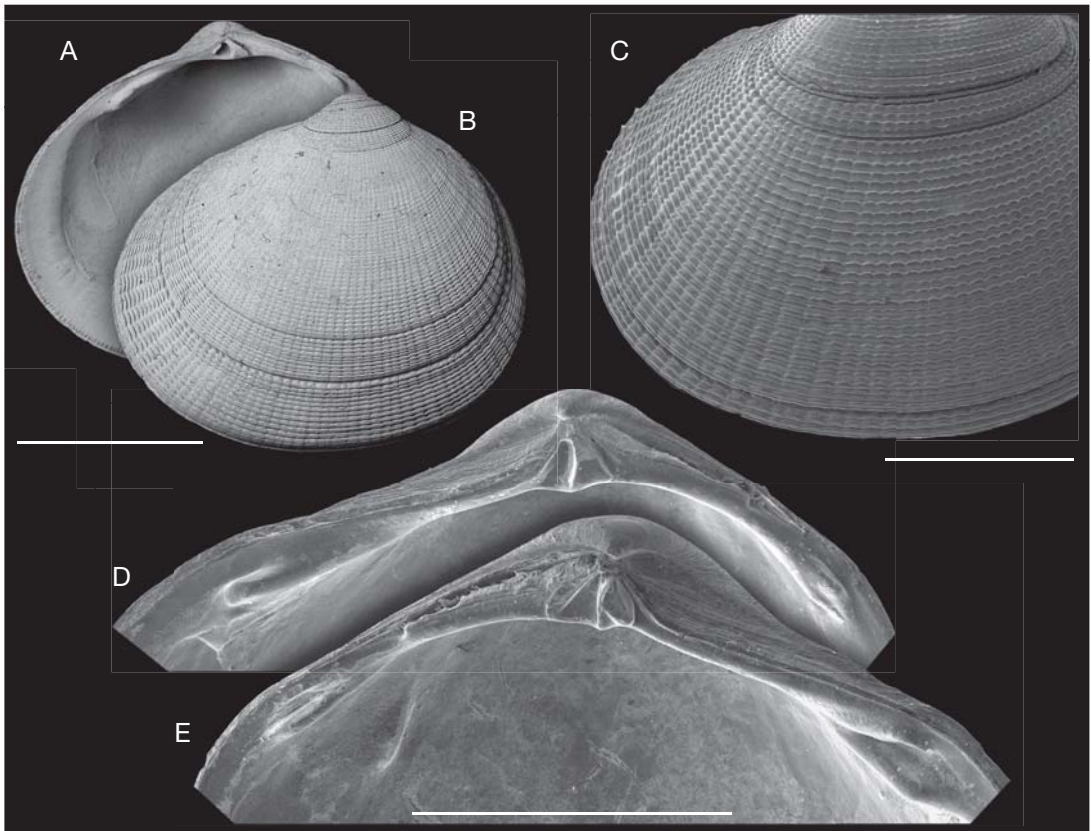


FIG. 17. — *Epicodakia consettiana* Iredale, 1930: **A, B**, exterior and interior of left valve, Houtman Abrolhos Islands, Western Australia (BMNH); **C**, detail of sculpture, Edithburgh, South Australia (SAM); **D, E**, detail of hinge teeth, Edithburgh, South Australia (SAM). Scale bars: A, B, 5 mm; C-E, 2 mm.

we include here a description and illustrations of the type species.

The type species, *E. consettiana*, has less prominent sculpture, with a larger number of radial ribs than some of the other species we have included in the genus, but other features including overall shell shape, ligament, hinge teeth and muscle scars are similar.

*Ctena* species can be distinguished from *Epicodakia* by their more circular outline, the strong, bifurcating and intercalating radial ribs and the short ligament that is deeply inset into hinge plate.

We include the following IWP species in our concept of *Epicodakia*: *Lucina obliqua* Reeve, 1850, China; *E. sweeti* (Hedley, 1899) see below; *E. nodulosa* n. sp.; *Lucina minuata* Deshayes, 1863, Réunion; *E. neozelanica* Powell, 1937, New Zealand. The

southern Atlantic species *Epicodakia falkandica* Dell, 1964 has little resemblance to the type species and should be excluded from the genus.

*Epicodakia consettiana* Iredale, 1930  
(Figs 17; 18A)

*Lucina minima* Tenison-Woods, 1876: 30 (non *Lucina minima* Roemer, 1836).

*Epicodakia consettiana* Iredale, 1930: 391 (replacement name for *L. minima*).

TYPE MATERIAL. — Syntype of *L. minima* Tenison-Woods, 1876 (Tasmanian Museum and Art Gallery, Hobart; see May 1903: 114, fig. 12).

TYPE LOCALITY. — Badger Island, Tasmania.

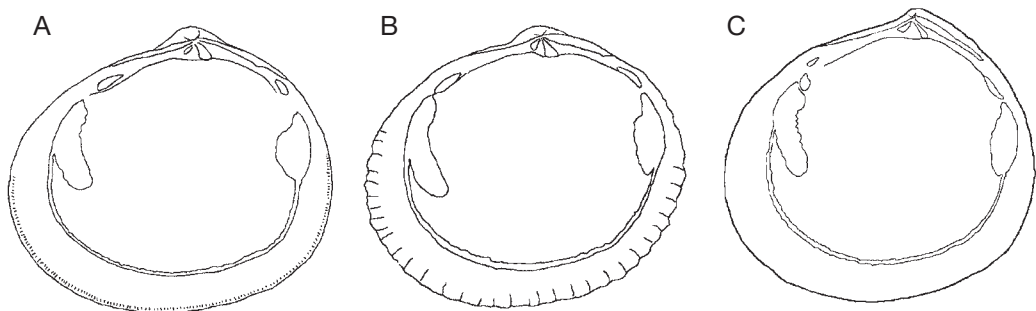


FIG. 18. — Outline drawings of interiors of right valves of *Epicodakia* Iredale, 1930 species: **A**, *E. consettiana* Iredale, 1930; **B**, *E. sweetii* (Hedley, 1899); **C**, *E. nodulosa* n. sp. Not to scale.

MATERIAL EXAMINED. — **Australia**. Western Port, Victoria (NMV). — Edithburgh, South Australia (SAM). — Houtman Abrolhos Islands, western Australia (BMNH).

DISTRIBUTION. — Southern Australia.

DESCRIPTION

Small (L to 25 mm), white, sometimes yellow internally, oval, longer than high, not inflated. Sculpture of many (up to 75) narrow, low, closely-spaced radial ribs crossed by regularly-spaced commarginal lamellae, forming small scales on ribs (Fig. 17C). Lunule narrowly lanceolate, not sunken and slightly asymmetrical, with RV extending into LV. Ligament short, external. LV with 2 cardinal teeth, anterior larger and bifid, posterior tiny; two posterior and two anterior lateral teeth; RV with two cardinals, anterior small, posterior larger, and usually bifurcate, with single anterior and posterior laterals. Anterior adductor scar short and detached from pallial line for about 1/2 length. Pallial line entire. Shell margin outside pallial line glossy, edge finely denticulate.

REMARKS

*Codakia perobliqua* Tate, 1892 and *Talocodakia kennethi* Iredale, 1936 are possibly conspecific with *E. consettiana* but further analysis of shell variation is needed to confirm this.

*Epicodakia nodulosa* n. sp.  
(Figs 18C; 19)

*Codakia reevei* – Hedley 1909: 426.

*“Lucina” reevei* – Lamprell & Whitehead 1992: pl. 20, fig. 124.

TYPE MATERIAL. — Holotype: 1 sh, L 16.6 mm, H 15.2 mm, T 4.0 mm (MNHN).

Paratypes: Loyalty Islands, Lifou, Baie du Santal, stn 1421, 20°52.4'S, 167°08.5'E, 1 sh, L 12.5, H 11.1 mm, T 2.7 mm (BMNH 20050572). — Atoll de Surprise, stn 449, 18°22'S, 163°09'E, 21 m2 sh, L 14.2 mm, H 12.8 mm, T 3.2 mm; L 11.5 mm, H 9.6 mm, T 2.5 mm (MNHN).

TYPE LOCALITY. — New Caledonia, Koumac, Chenal de l'Infernet, stn 1304, 20°38.6'S, 164°13.2'E, 12-15 m.

ETYMOLOGY. — *Nodulosa* refers to the nodulose sculpture.

MATERIAL EXAMINED. — **Koumac**. 3 stn, 0-15 m, 6 v. **Lifou**. 11 stn, 4-30 m, 14 v.

**Chesterfield Islands**. CHALCAL 1, stn DC 17, 19°12'S, 158°56'E, 44 m, 1 sh. — Stn DC 24, 19°11'S, 158°11'E, 38 m, 2 v.

CORAIL 2, stn DW 31, 19°25'S, 158°45'E, 57 m, 1 v. — Stn DW 40, 19°30'S, 158°35'E, 58 m, 1 v. — Stn DW 42, 19°22'S, 158°29'E, 45 m, 5 v. — Stn DW 44, 19°22'S, 158°23'E, 40 m, 1 v. — Stn DW 60, 19°15'S, 158°57'E, 45 m, 3 v. — Stn DW 72, 19°15'S, 158°21'E, 32 m, 2 v. — Stn DW 73, 19°12'S, 158°23'E, 41 m, 2 v. — Stn DW 76, 19°12'S, 158°33'E, 53 m, 1 v. — Stn DW 87, 19°06'S, 158°60'E, 31 m, 1 v. — Stn DW 94, 19°06'S, 158°50'E, 36 m, 3 v. — Stn DW 96, 19°06'S, 158°42'E, 41 m, 1 v. — Stn DW 101, 19°09'S, 158°26'E, 37 m, 5 v. — Stn DW 110, 19°09'S, 158°56'E, 40 m, 1 v. — Stn DW 122, 19°28'S, 158°17'E, 32 m, 2 v. — Stn DW 126, 19°28'S, 158°27'E, 46 m, 1 sh. — Stn DW 133, 19°31'S, 158°25'E, 45 m, 1 v. — Stn DW 155, 19°49'S, 158°25'E, 42 m, 1 v. — Stn DW 156, 19°49'S, 158°21'E, 42 m, 2 v. — Stn DW 160, 19°46'S, 158°23'E, 35 m, 1 v. — Stn DW 163, 19°42'S, 158°16'E, 23 m, 1 v.

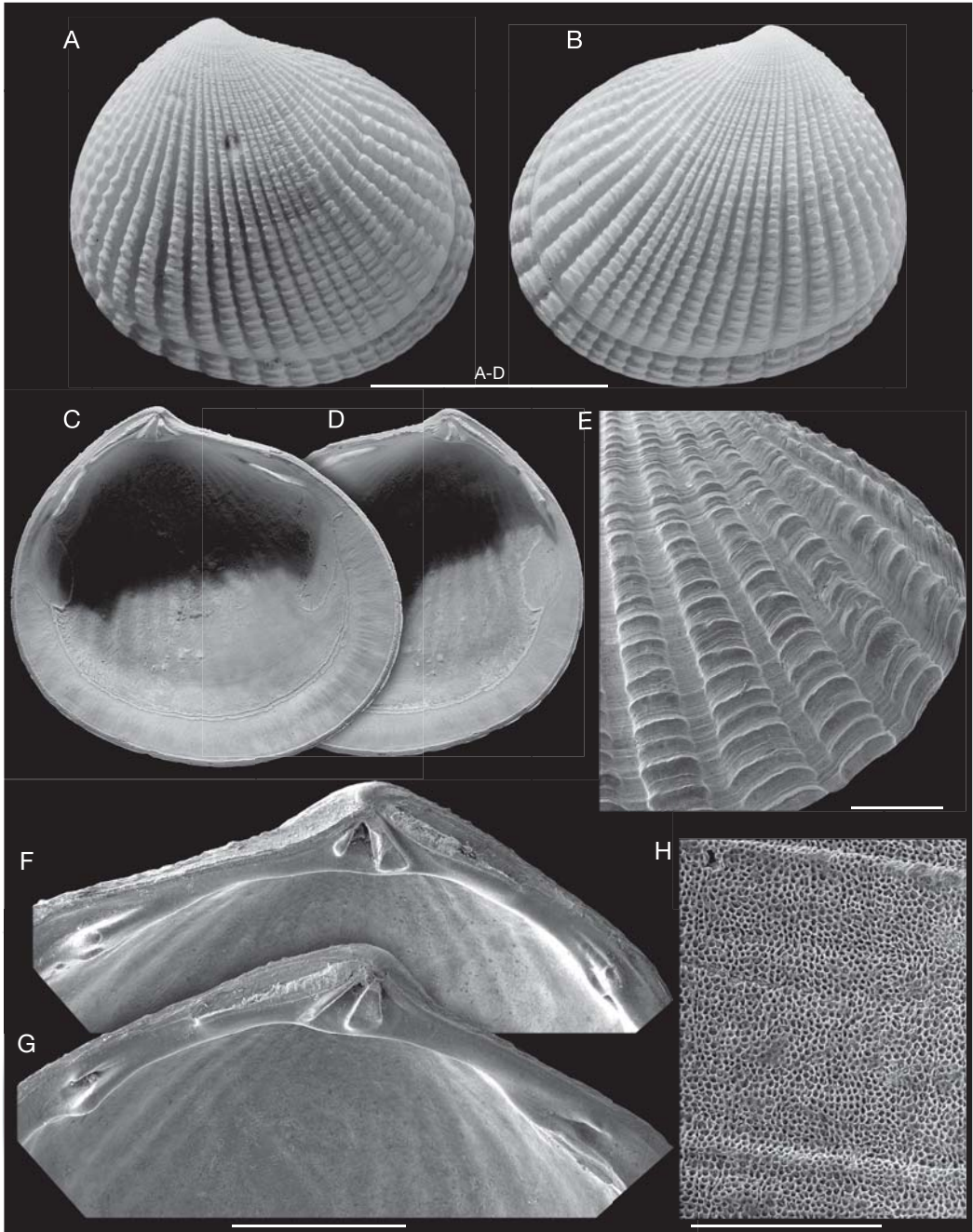


FIG. 19. — *Epicodakia nodulosa* n. sp.: **A-D**, holotype (MNHN), Koumac, stn 1304, Chenal de l'Infernet, New Caledonia; **A, B**, exterior of right and left valves; **C, D**, interior of left and right valves; **E**, paratype, detail of anterior sculpture; **F, G**, paratype (BMNH 20050572), Lifou, stn 1421, details of hinge teeth; **H**, detail of shell surface. Scale bars: A-D, 10 mm; E, 1 mm; F, G, 2 mm; H, 100  $\mu$ m.

**Other New Caledonia.** LAGON, stn 60, secteur de Nouméa, 22°12'S, 166°11'E, 1 m, 2 v. — Stn 449, Atoll de Surprise, 18°22'S, 163°09'E, 21 m, 1 v. — Stn 1063, secteur des Belep, 20°03'S, 163°47'E, 31 m, 3 v. — Stn 1088, 19°46'S, 163°58'E, 23 m, 1 v. — Stn 1096, 19°51.4'S, 163°41'E, 27 m, 3 v. — Stn 1104, 19°42'S, 163°59'E, 22 m, 3 v. — Stn 1105, 19°40'S, 163°57'E, 25 m, 5 v. — Stn 1118, 19°35'S, 163°52'E, 30 m, 2 v. — Stn 1154, 19°09'S, 163°19'E, 40 m, 1 v. — Stn 1158, 19°10'S, 163°07'E, 48 m, 1 v. — Stn DW 1396, 18°21'S, 163°05'E, 39 m, 1 v.

**Loyalty Islands.** MUSORSTOM 6, stn DW 433, 20°20'S, 169°09'E, 24 m, 1 v. — Stn DW 435, 20°21'S, 166°08'E, 32 m, 6 v. — Stn DW 436, 20°20'S, 166°07'E, 33 m, 1 v.

**Australia.** Big Sandy Cay, Swain Reefs, Queensland, 21°48'S, 151°52'E, 10 m (AMS C.066765).

**DISTRIBUTION.** — Australia (Great Barrier Reef), Irian Jaya, Solomon Islands, New Caledonia.

#### DESCRIPTION

Shell medium size, H to 15.2 mm, L to 16.6 mm, ovate, longer than high, H/L 0.90, not inflated, T/L 0.22, yellow to white. Anteriorly extended, low umbones lie posterior of centre. Sculpture of around 20 strong, rounded, radial ribs separated by wide interspaces. Ribs crossed by regular commarginal lamellae producing thick scales or nodules on summits (Fig. 19E). Lamellae thinner and less prominent in interspaces between ribs. Periostracum surface micro-vesicular (Fig. 19H). Lunule long, shallow, lanceolate, slightly asymmetrical. Ligament short, external, set in shallow groove. RV with two cardinal teeth, the posterior larger and slightly bifid; single anterior and posterior lateral teeth. LV with two cardinals and two anterior and posterior lateral teeth. Anterior adductor muscle scar medium long, detached from pallial line for about 2/3 of length. Posterior adductor scar small, ovate. Pallial line entire. Shell interior radially undulose with impressions of ribbing; shell outside pallial line glossy with smooth margin.

#### REMARKS

Although this species has been occasionally referred to as "*Lucina reevei* Deshayes (e.g., Hedley 1909; Lamprell & Whitehead 1992), the original description of *Lucina reevei* Deshayes, 1863 (pl. 3, figs 8, 9), from Réunion (holotype MNHN) is of a *Ctena*

species with strong, bifurcating radial ribs and an inset, triangular ligament. *Epicodakia nodulosa* n. sp. is most similar to *E. sweeti* but has fewer radial ribs (20 vs. 40) that are crossed by more widely spaced, commarginal lamellae that produce thick, nodulose scales on the ribs.

#### *Epicodakia sweeti* (Hedley, 1899) (Figs 18B; 20)

*Cardita sweeti* Hedley, 1899: 495, fig. 5.

*Ctena transversa* Dall, Bartsch & Rehder, 1938: 131, pl. 35, figs 9-12.

*Epicodakia sweeti* – Paulay 2003: 233.

**TYPE MATERIAL.** — *Cardita sweeti*: holotype, 1 sh, L 13.9 mm, H 12.2 mm, T 4.2 mm (NMV F27464C). *Ctena transversa*: holotype, off Waikiki, Oahu, Hawaiian Islands (USNM 337409).

**TYPE LOCALITY.** — Funafuti Atoll, Tuvalu.

**MATERIAL EXAMINED.** — **Koumac.** 3 stn, 12-120 m, 3 v. **Touho.** 3 stn, 0-35 m, 8 v.

**Lifou.** 9 stn, 0-30 m, 16 v.

**Other New Caledonia.** LAGON, stn 383, Grand Récif Sud, 22°32'S, 167°13'E, 62 m, 1 v. — Stn 1104, secteur de Belep, 19°42'S, 163°59'E, 22 m, 1 v.

**Chesterfield Islands.** CORAIL 2, stn DW 09, 20°53'S, 161°35'E, 62 m, 1 v. — Stn DW 60, 19°15'S, 158°57'E, 45 m, 1 v. — Stn DW 136, 19°31'S, 158°16'E, 37 m, 2 v. — Stn DW 144, 19°28'S, 158°23'E, 50 m, 2 v.

**DISTRIBUTION.** — Amirante Islands (Indian Ocean), Bali, Great Barrier Reef, Hawaii, Marquesas.

#### DESCRIPTION

Shell medium sized, white or yellowish; H to 17.0 mm, L to 18.3 mm, oval, longer than high, moderately inflated, T/L 0.27. Sculpture of about 40 closely-spaced, rarely bifurcate, radial ribs that become more widely-spaced, asymmetric and steeper to anterior. Ribs crossed by closely spaced commarginal lamellae, producing low, regular, rounded scales on summits of ribs (Fig. 20F). Lunule shallow, lanceolate, slightly asymmetrical, RV protruding. Ligament short, external. Hinge plate narrow, RV with 2 cardinal teeth, large posterior cardinal bifurcate, with single anterior and posterior lateral



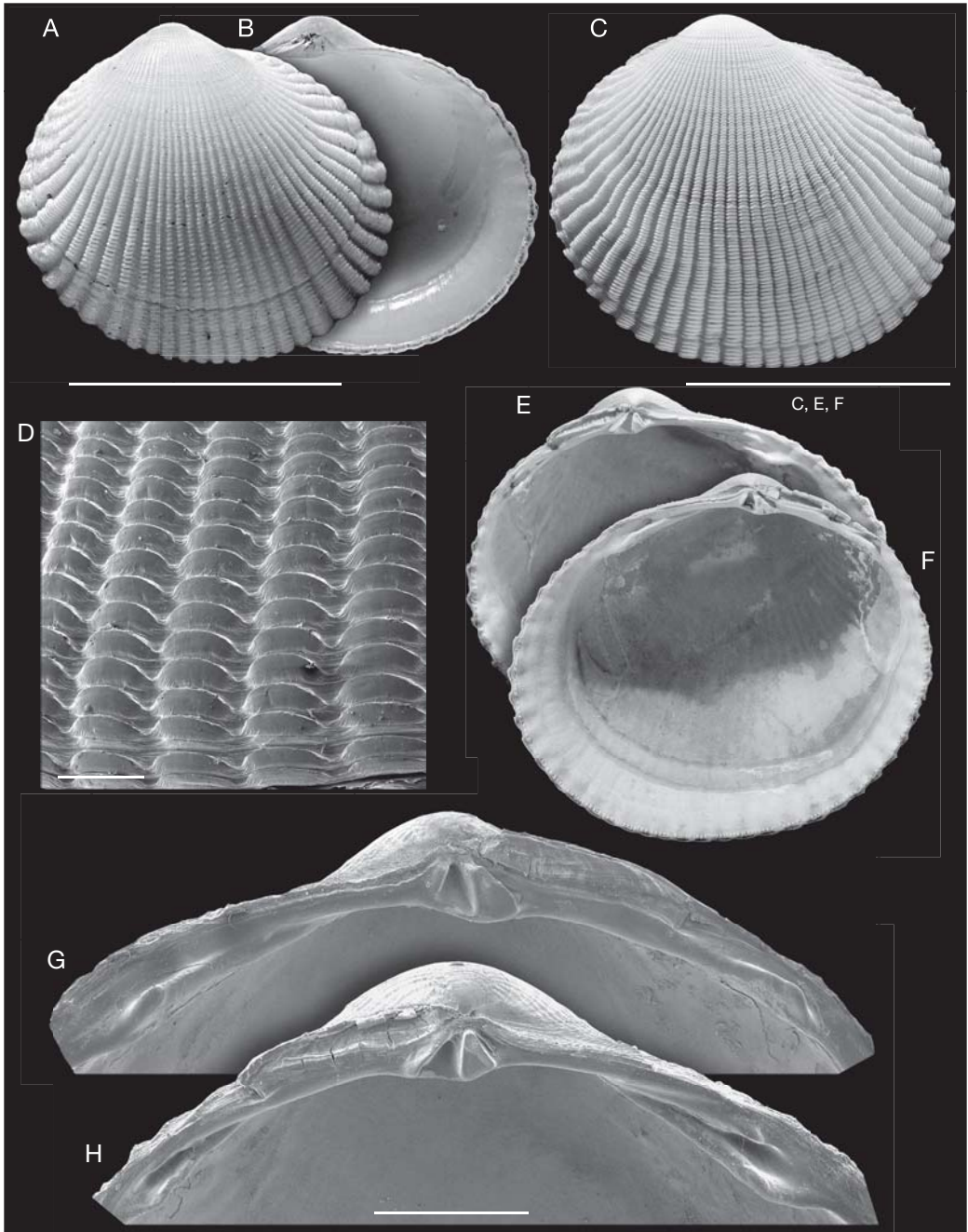


FIG. 20. — *Epicodakia sweeti* (Hedley, 1899): **A, B**, holotype, Funafuti (NMV F27464C), exterior of right valve and interior of left valve; **C**, exterior of right valve, Grand Récif du Sud, New Caledonia, stn 383, 22°32'S, 167°13'E, 62 m (MNHN); **D**, detail of sculpture of C; **E, F**, interior of left and right valves of C; **G, H**, details of hinge teeth of D and E. Scale bars: A-C, E, F, 10 mm; D, 500 µm; G, H, 2 µm.

teeth. LV with 2 cardinal teeth, larger is bifurcate, and 2 anterior and posterior laterals. Anterior adductor muscle scar medium long, detached for half of length. Pallial line entire. Shell outside pallial line fluted from impression of ribbing, glossy, margin finely denticulate.

#### REMARKS

This species is similar in shape and hinge characters to *E. consettiana* but can be easily distinguished by the fewer and more prominent radial ribs. The other *Epicodakia* species from New Caledonia, *E. nodulosa* n. sp., has fewer ribs (around 20) than *E. sweeti* as well as distinctive nodulose scales.

From the original illustration, *Lucina minuata* Deshayes, 1863 (p. 20, pl. 3, figs 4, 5), from Réunion, appears similar to *E. sweeti*, but the figured specimen is not same as the putative type specimen (MNHN) which is a *Ctena* species resembling *C. bella* (also see Lamy 1921: 258).

#### Genus *Lepidolucina* n. gen.

TYPE SPECIES. — *Lucina venusta* Philippi, 1847 (here designated).

ETYMOLOGY. — Greek *lepidos*, scale, a reference to the fine, scale-like sculpture.

INCLUDED SPECIES. — *L. venusta* (Philippi, 1847) n. comb., *L. odontotis* (Salisbury, 1934) n. comb., *L. belepina* n. sp.

DIAGNOSIS. — Medium sized, subcircular, inflated, sculpture of around 50-60 closely spaced radial ribs, that are wider in the anterior and posterior sectors of the shell, ribs bear closely spaced, dorsally inclined, semicircular or arcuate scales. Hinge with one or two small cardinal teeth and very small (pimple-like) anterior and posterior lateral teeth. Anterior adductor muscle scar medium-long, detached from pallial line at angle of around 25°. Interior margin of shells serrate with superimposed fine denticulations.

#### REMARKS

A similar genus is *Lucinisca* Dall, 1901 (type species *Lucina nassula* Conrad, 1846) with species in the western Atlantic and tropical Eastern Pacific, to which *L. venusta* n. comb. has often been referred (Chavan 1937). Species of *Lucinisca* can be distinguished from *Lepidolucina* n. gen. by the large anterior and

posterior lateral teeth, the shell sculpture that, in *L. nassula*, consists of fine radial ribs crossed by widely spaced, thin, commarginal lamellae, with scales forming at their intersection.

#### *Lepidolucina venusta* (Philippi, 1847) n. comb. (Fig. 21A, B, E-H)

*Lucina venusta* Philippi, 1847: 206, pl. 1, fig. 2. — Reeve 1850: pl. 3, fig. 15.

*Lucina (Myrtea) layardii* A. Adams, 1855: 225.

*Lucina (Myrtea) strangei* A. Adams, 1855: 226.

*Codakia strangei* – Hedley 1909: 187.

*Myrtea venusta* – Hedley 1913: 266, pl. 16, fig. 10.

*Phacoides (Lucinisca) venustus* – Lamy 1920: 186.

*Codakia golikovi* Zorina, 1978: 196, figs 4, 5 (cited fig. 6 corresponds to *Pillucina vietnamica* Zorina, 1978).

TYPE MATERIAL. — *L. venusta*: not located.

*L. layardii*: holotype, Sri Lanka (BMNH 1963556).

*L. strangei*: holotype, Moreton Bay, Queensland, Australia (BMNH 1963557).

*C. golikovi*: syntypes, Gulf of Tonkin, Vietnam (ZISP; see Lutaenko 2000: 384, pl. 1, figs 7, 8).

TYPE LOCALITY. — Unknown.

MATERIAL EXAMINED. — **Sri Lanka.** (BMNH).

**Thailand.** Kampuan, Ranong (BMNH).

**Philippines.** Luzon I., Manila (BMNH).

**Indonesia.** Moluccas (BMNH).

**China.** Daya Bay (BMNH).

**Australia.** Moreton Bay, Queensland (BMNH; AMS).

DISTRIBUTION. — Central IWP from Sri Lanka to Queensland.

#### DESCRIPTION

Small to medium size (H to 31 mm, L to 34 mm), subcircular, inflated, white, umbones low. Lateral edges of dorsal margins rounded. Sculpture of around 50 narrow, closely-spaced, radial ribs; ribs are broader in anterior and posterior sectors of shell. Each rib bears closely spaced, dorsally curved, arcuate scales. The scales are wider and flaring on the anterior broader ribs. Lunule short, lanceolate, asymmetrical, greater part in right valve. Escutcheon narrow, dorsal edge with slightly extended scales.

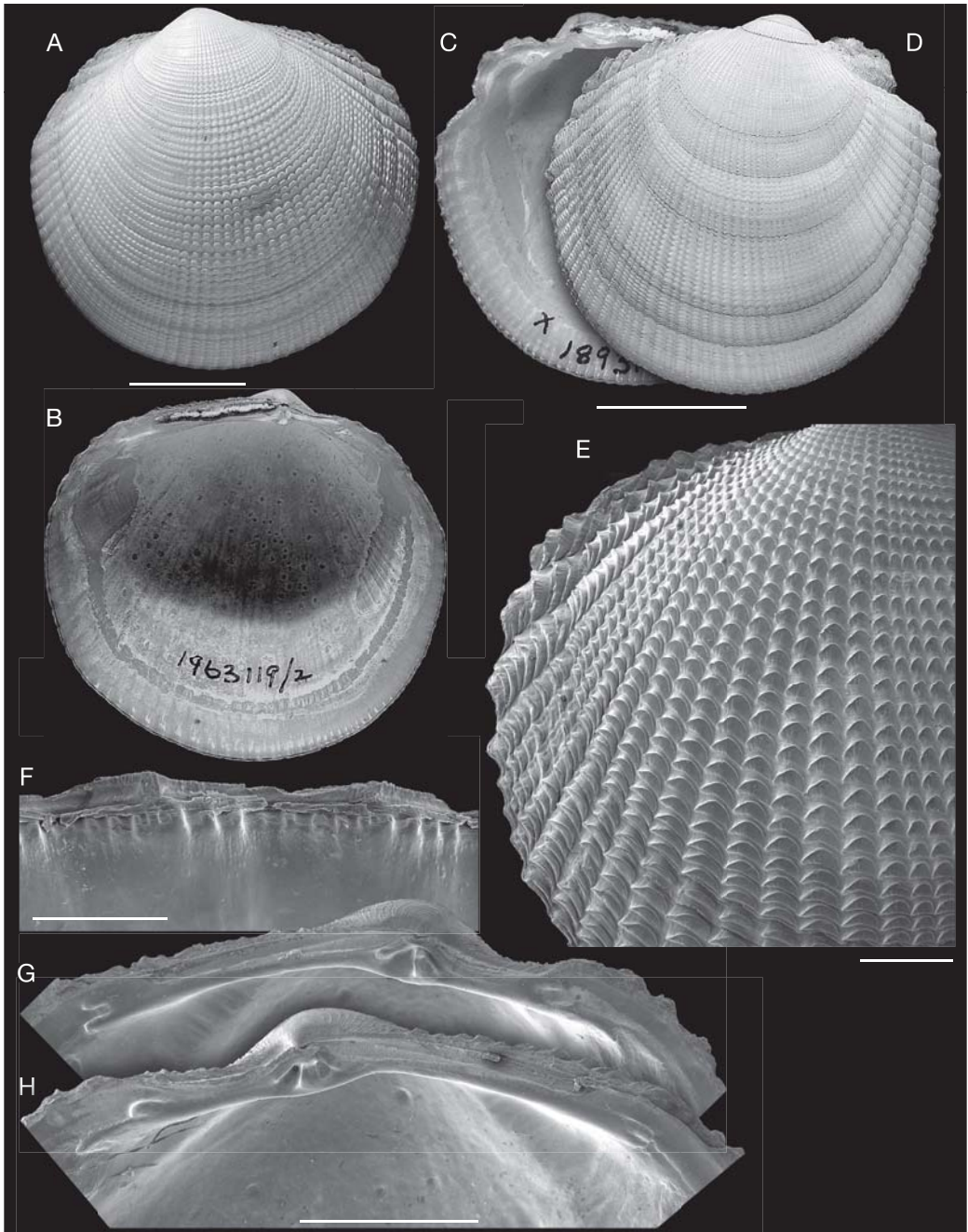


FIG. 21. — **A, B, E-H**, *Lepidolucina venusta* (Philippi, 1847) n. comb.; **A, B**, Isle of Luzon, Philippines (BMNH 1969119/2); **A**, exterior left valve; **B**, interior left valve; **E**, detail of sculpture, Borneo (BMNH 77.4.26.43); **F**, inner shell margin, Borneo; **G, H**, detail of hinge teeth, Borneo (BMNH); **C, D**, *L. odontotis* (Salisbury, 1934) n. comb., holotype, Sarawak (BMNH 1893.9.1.12-1), interior and exterior of right valve. Scale bars: A-D, 10 mm; E, 1 mm; F, 0.5 mm; G, H, 2 mm.

Hinge plate narrow, LV with two cardinal teeth and small anterior and posterior lateral teeth; RV with two cardinal teeth, and very small anterior and posterior lateral teeth. Ligament external, straight. Anterior adductor muscle scar medium long, detached from pallial line for 2/3 of length. Posterior adductor scar oval. Pallial line entire, broad. Shell outside of pallial line glossy and shell margin serrate with finer denticulations (Fig. 21F). Shell within pallial line dull, with small circular pallial attachment scars. Pallial blood vessel scar often visible.

## REMARKS

The type specimens of *L. layardi* and *L. strangei* are very similar to Philippi's figure of *L. venusta*.

*Lepidolucina belepia* n. sp.  
(Figs 22; 23A)

TYPE MATERIAL. — Holotype: 1 sh, L 13.1 mm, H 12.2 mm, T 3.6 mm (MNHN).

Paratypes: from type locality, 1 RV, L 12.6 mm, H 12.4 mm, T 3.4 mm (MNHN); 1 sh, L 10.1 mm, H 9.5 mm, T 2.8 mm (BMNH 20050581); 1 sh, L 7.9 mm, H 6.8 mm, T 2.1 mm (MNHN). — Secteur des Belep, stn 1145, 19°21'S, 163°45'E, 38 m, 6 v (MNHN).

ETYMOLOGY. — Named for the Îles Belep.

TYPE LOCALITY. — New Caledonia, secteur des Belep, stn 1129, 19°29'S, 163°49'E, 40 m.

MATERIAL EXAMINED. — **Touho**. 2 stn, 0-4 m, 4 v.

**Other New Caledonia**. LAGON, stn 442, Atoll de Huon, 18°02'S, 162°56'E, 39 m, 1 v. — Stn 454, Atoll de Surprise, 18°30'S, 163°10'E, 36 m, 1 v. — Stn 468, 18°27'S, 163°10'E, 40 m, 1 sh. — Stn 517, lagon Nord, 19°09'S, 163°35'E, 42 m, 2 v. — Stn 1087, secteur des Belep, 19°48'S, 163°60'E, 24 m, 1 v. — Stn 1096, 19°51'S, 163°41'E, 27 m, 3 v. — Stn 1103, 19°43'S, 163°57'E, 32 m, 3 v. — Stn 1117, 19°38'S, 163°54'E, 36 m, 2 v. — Stn 1118, 19°45'S, 163°52'E, 30 m, 1 v. — Stn 1129, 19°29'S, 163°49'E, 40 m, 5 v. — Stn 1128, 19°31'S, 163°52'E, 26 m, 4 v. — Stn 1145, 19°21'S, 163°45'E, 38 m, 1 v. — Stn DW 1390, Atoll de Surprise, 18°28'S, 163°09'E, 38 m, 1 v. — Stn DW 1394, 18°18'S, 163°03'E, 36 m, 1 v.

## DESCRIPTION

Small to medium size (H to 12.5 mm, L to 13.5 mm), subcircular, H/L 0.94, moderately inflated (T/L 0.27),

white, umbones low, near mid-plane. Lateral edges of dorsal areas sharply angulated. Protoconch smooth 190 µm, PI large, PII a narrow rim (Fig. 22G). Sculpture of around 54-58 narrow, radial ribs with thin but distinct interspaces. Ribs are broader in anterior and posterior sectors of shell. Each rib bears closely spaced, dorsally curved, semicircular scales. The scales are wider and flaring on the anterior broader ribs. Lunule short, lanceolate, asymmetrical, greater part in right valve. Escutcheon narrow, dorsal edge with slightly extended scales. Hinge plate narrow, LV with two cardinal teeth and small anterior and posterior laterals; RV with two cardinal teeth the posterior much larger and sometimes bifid, anterior and posterior laterals very small. Ligament external and straight. Anterior adductor muscle scar medium long, detached from pallial line for 1/2 of length at angle of 15°. Posterior adductor scar oval. Pallial line entire, broad. Shell outside of pallial line glossy and shell margin serrate with finer denticulations superimposed on the serrations (Fig. 22H). Shell within pallial line dull with small, circular, pallial attachment scars. Pallial blood vessel scar often visible.

## REMARKS

*Lepidolucina belepia* n. sp. is similar to *L. venusta* n. comb. but with distinct interspaces between the radial ribs, generally semicircular rather than arcuate scales, more sharply defined edges to the anterior and posterior dorsal margins, a shorter ligament and a shorter anterior adductor muscle scar.

*Lepidolucina odontotis*  
(Salisbury, 1934) n. comb.  
(Fig. 21C, D)

*Lucina odontotis* Salisbury, 1934: 58, pl. 1, figs 1-4.

*Lucinisca venusta* – Swennen *et al.* 2001: 78, fig. 085.

*Lucina (Lucinisca) venusta* – Robba *et al.* 2002: 77, pl. 7, fig. 4.

TYPE MATERIAL. — Holotype and 2 paratypes (BMNH 1893.9.1.12-1).

TYPE LOCALITY. — Sarawak.

MATERIAL EXAMINED. — **Thailand**. Hua Hin (BMNH). **Sarawak**. Kota Tinggi (BMNH).



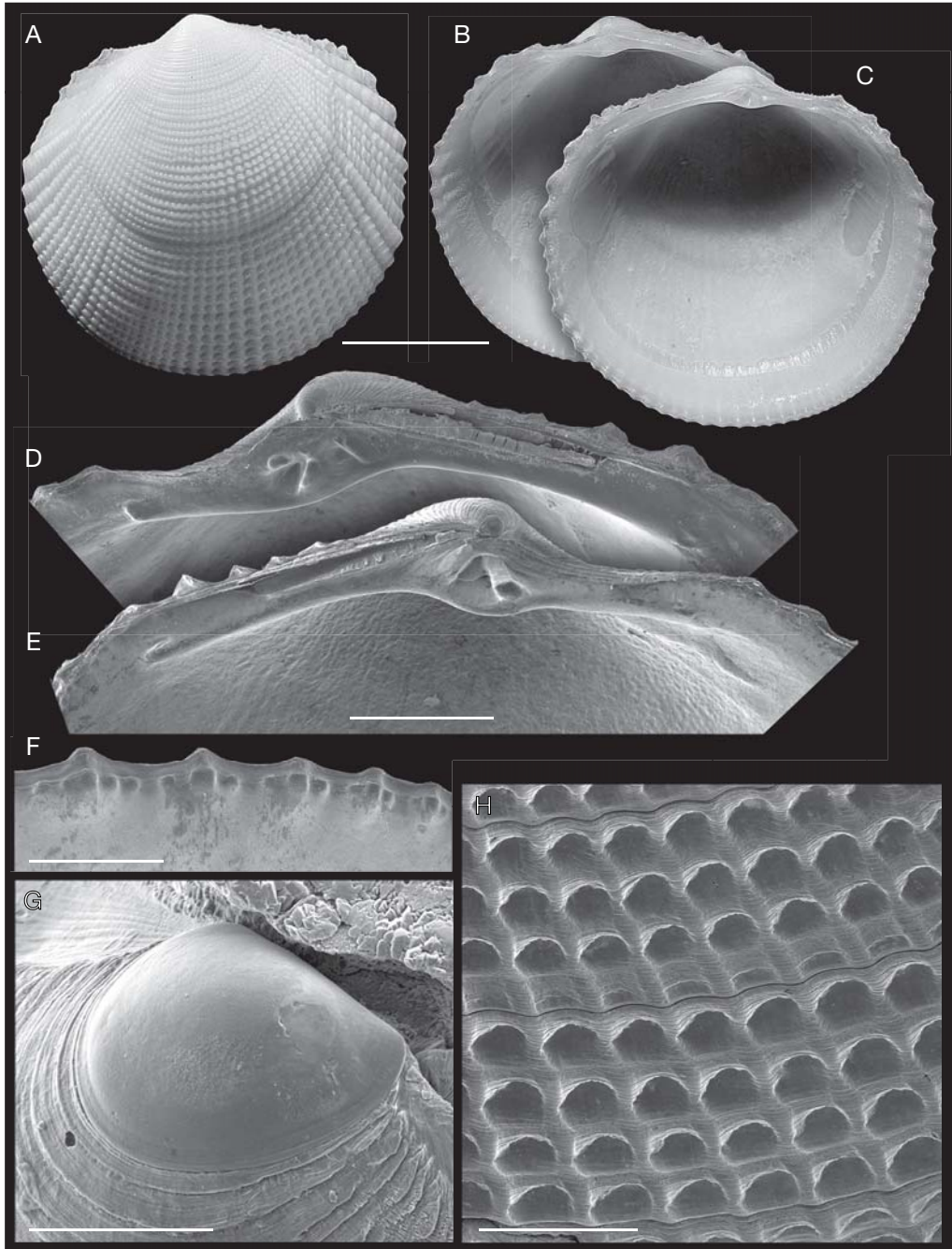


FIG. 22. — *Lepidolucina belepia* n. gen., n. sp., Îles Belep, New Caledonia: **A-C**, holotype (MNHN), exterior left valve, interior right and left valves; **D, E**, paratype (MNHN), detail of hinge teeth left and right valves; **F**, paratype (MNHN), inner shell margin; **G**, protoconch; **H**, paratype, detail of sculpture. Scale bars: A-C, 5 mm; D, E, 1 mm; F, H, 500  $\mu$ m; G, 100  $\mu$ m.

#### REMARKS

Although not found in New Caledonia, we illustrate this neglected species because it has been confused with *Lepidolucina venusta* n. comb. It differs in having the antero-dorsal area projected as a semicircular lobe or “ear”. Internally, this extension is occupied by the dorsal part of the anterior adductor muscle scar.

#### Genus *Discolucina* n. gen.

TYPE SPECIES. — *Lucina virginea* Deshayes, 1832 (here designated).

ETYMOLOGY. — Latin, *discus*, flat plate.

DIAGNOSIS. — Shell, medium large, subcircular, discoidal, translucent, with projecting arcuate, anterior dorsal area. Sculpture of irregularly spaced, low, commarginal lamellae. Ligament large, set into deep groove, nymph straight. Lunule very small. Cardinal teeth indistinct. Anterior lateral teeth short, close to cardinals. Posterior lateral teeth absent or vestigial. Anterior adductor muscle scar long, dorsal portion extended onto the hinge line above the lateral teeth, long ventral part lies close but parallel to the pallial line.

#### REMARKS

One of the most distinctive features of this genus is the very long anterior adductor muscle scar that extends dorsally onto the hinge line. Although dissimilar in general morphology, *Lepidolucina odontotis* n. comb. also has an extended anterior muscle scar and projecting lobate anterior dorsal area (Fig. 21C, D). Another lucinid with a dorsally extended adductor scar is *Loripes clausus* (Philippi, 1848), from the western Indian Ocean, but this species has a prominent, obliquely inset internal ligament, similar to that of *Loripes lucinalis*.

*Discolucina virginea* (Deshayes, 1832) n. comb.  
(Figs 23B; 24A-D)

*Lucina virginea* Deshayes, 1832: 379.

*Lucina argentea* Reeve, 1850: pl. 2, fig. 6.

*Lucina sulcata* Reeve, 1850: pl. 4, fig. 20.

*Phacoides argenteus* — Lamy 1920: 176.

*Lucinoma argentea* — Chavan 1938: 83.

TYPE MATERIAL. — *L. virginea*: holotype, 1 sh, L 46.9 mm, H 43.6 mm (MNHN).

*L. argentea*: syntypes, 3 sh (Fig. 24E, F), Moluccas (BMNH 1963113-4).

*L. sulcata*: syntypes, 2 sh (Fig. 24G, H), no locality given (BMNH 1963188-9).

TYPE LOCALITY. — Amboina, Indonesia.

MATERIAL EXAMINED. — **Touho**. 2 stn, 0-4 m, 3 v.

DISTRIBUTION. — Indonesia, Amboina (MNHN); Hitulama, Hitu, Ambon (ZML); Moluccas (BMNH; ZMA). Philippines, Calapan, Mindoro (Museum of Comparative Zoology, Harvard University); Lubang Island (NMGW).

#### DESCRIPTION

Shell large, H to 44 mm, L to 47 mm, subcircular to discoidal, compressed, shell colour white, translucent, anterior dorsal area extended as arcuate projection. Sculpture of fine, low, irregularly but closely spaced, commarginal lamellae and growth increments with faint radial striations between the lamellae; anterior parts of shell with an irregular, radial crumpled zone. Lunule very small, triangular, asymmetric with larger part in RV. Umbones low. Ligament sunk into long deep groove; posterior dorsal area marked by elevated lamellae along the escutcheon. Hinge large, straight, RV with single, small, cardinal tooth, no posterior lateral, anterior lateral with small knob and low ridge. LV with two cardinal teeth the anterior larger and bifid, posterior lateral absent, anterior lateral a low ridge and knob. Anterior adductor muscle scar long, dorsal part extending onto the hinge line and anterior dorsal area above the lateral teeth; ventral part broader, closely parallel to the pallial line, detached for 2/3 of length. Posterior muscle scar oval. Pallial line broad and prominent. Shell interior dull white with numerous mantle attachment scars, impression of pallial blood vessel prominent. Shell outside pallial line shell glossy, margin finely dentate.

#### REMARKS

This is the first record of this species outside of the central IWP area of Indonesia and Philippines. The type shells of *L. sulcata* and *L. argentea* are similar to the Deshayes holotype.

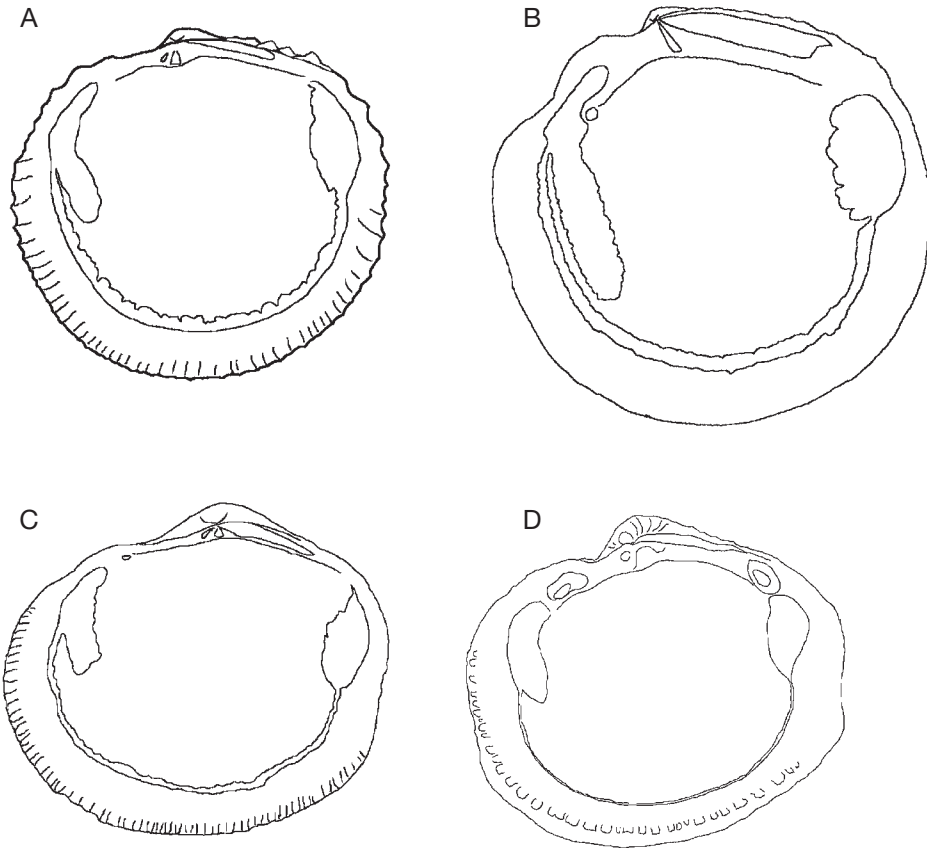


FIG. 23. — Outline drawings of interiors of right valves of *Lepidolucina* n. gen., *Discolucina* n. gen., *Ferrocina* n. gen. and *Cardiolucina* Sacco, 1901 species: **A**, *L. belepia* n. gen., n. sp.; **B**, *D. virginea* (Deshayes, 1832) n. comb.; **C**, *F. multiradiata* n. gen., n. sp.; **D**, *C. undula* n. sp. Not to scale.

### Genus *Liralucina* n. gen.

TYPE SPECIES. — *Phacoides sperabilis* Hedley, 1909 (here designated).

INCLUDED SPECIES. — *L. sperabilis* n. comb., *L. craticula* n. sp., *L. lifouina* n. sp. and *L. vaubani* n. sp.

DIAGNOSIS. — Shells small (< 10 mm), subcircular, inflated, with prominent radial ribs (up to 35) crossed by regularly spaced, very thin, commarginal lamellae. Radial ribs obsolete at posterior dorsal margin. Lunule heart-shaped to lanceolate, symmetrical. Hinge teeth small, LV with anterior lateral, 2 cardinal teeth and posterior lateral; RV with anterior lateral, a single cardinal and posterior lateral. Anterior adductor muscle scar short, slightly detached from pallial line. Interior shell margin coarsely crenulate.

ETYMOLOGY. — Latin *lira*, ridge, in reference to the radial ribs.

### REMARKS

Many small species of lucinids with fine commarginal lamellae and radial ribs have been referred to *Parvilucina* Dall, 1901 (type species: *Lucina tenuisculpta* Carpenter, 1864 from the temperate northeast Pacific), but we think that several distinct taxa have been included within this concept. *Parvilucina tenuisculpta* differs from *Liralucina* n. gen. in having a much smoother shell with numerous, indistinct, fine radial ribs, a longer ligament, relatively larger teeth, a longer anterior adductor scar and a finely crenulate inner shell margin (see Hickman

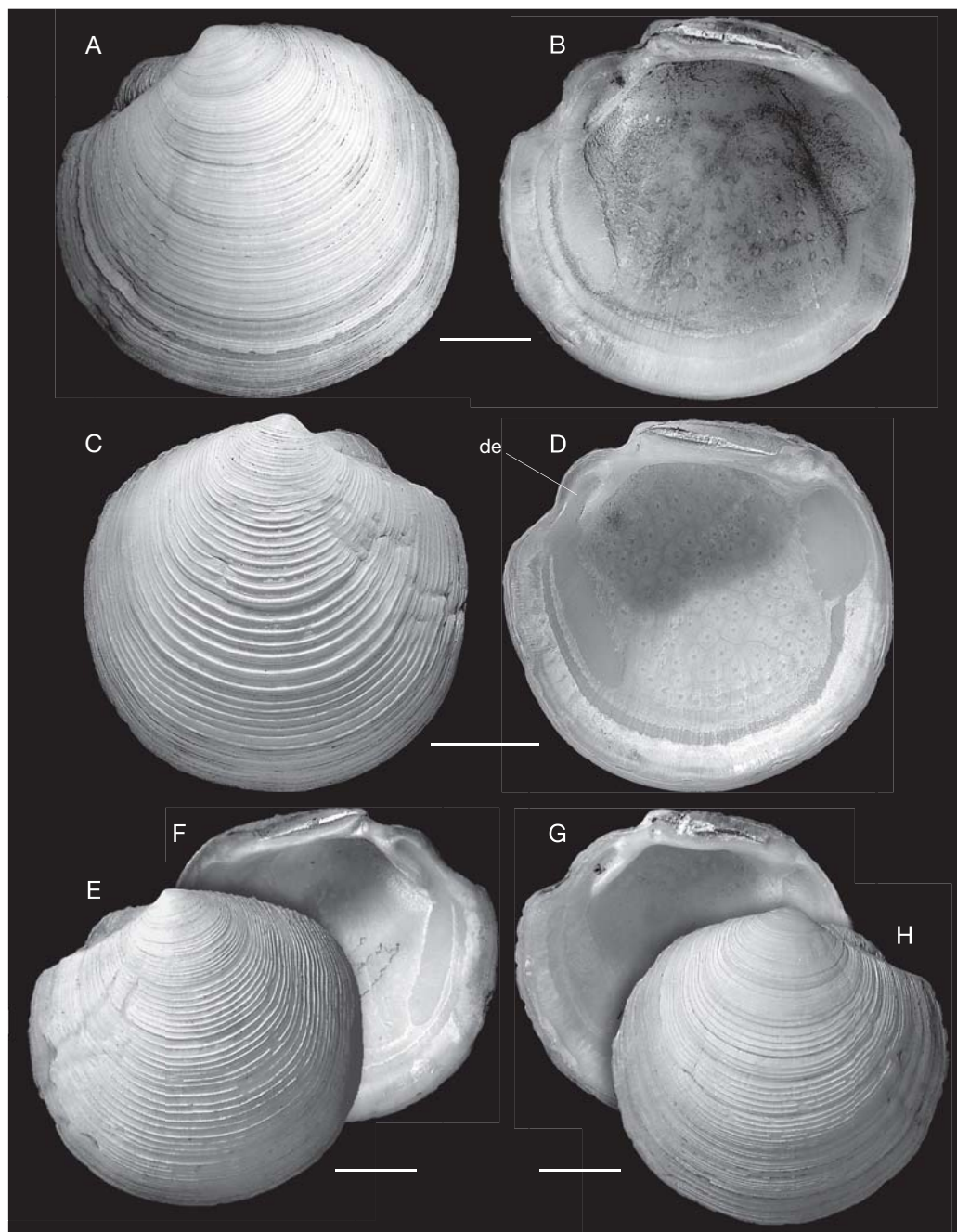


FIG. 24. — *Discolucina virginea* (Deshayes, 1832) n. comb.: **A, B**, holotype, Amboina, Indonesia (MNHN), exterior of left valve and interior of right valve; **C, D**, Touho, stn 1267, New Caledonia (MNHN), exterior and interior of right valve; **E, F**, exterior and interior of left valve of figured syntype of *Lucina argentea* Reeve, 1850, Moluccas (BMNH 1963113); **G, H**, exterior and interior of right valve of figured syntype of *L. sulcata* Reeve, 1850 (BMNH 1963189). Abbreviation: **de**, dorsal extension of anterior adductor muscle scar onto hinge plate. Scale bars: 10 mm.



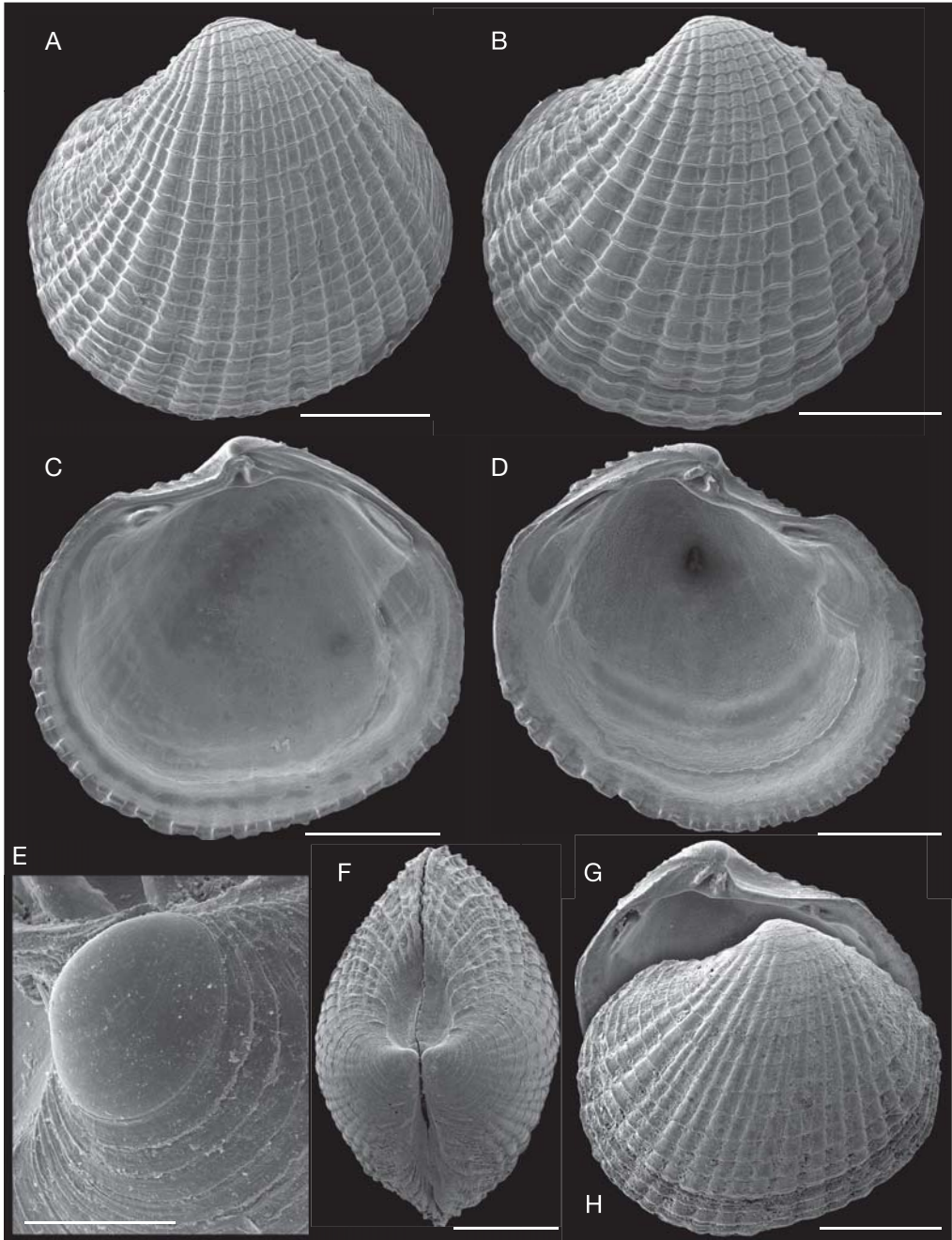


FIG. 25. — *Liralucina sperabilis* (Hedley, 1909) n. comb.: **A-F**, Touho, stn 1264, New Caledonia (MNHN); **A, B**, exterior of left valves; **C, D**, interior of right and left valves; **E**, protoconch; **F**, dorsal view; **G, H**, interior and exterior of left valve of possible syntype (BMNH 1910.9.28.72) from the type locality, Hope Islands, Queensland, Australia. Scale bars: A-D, F-H, 1.0 mm; E, 85  $\mu$ m.

[1994] and Coan *et al.* [2000] for illustrations of *Parvilucina* species from NE Pacific).

*Liralucina sperabilis* (Hedley, 1909) n. comb.  
(Figs 25; 26A)

*Phacoides sperabilis* Hedley, 1909: 427, pl. 37, fig. 18.

*Linga* (*Bellucina*) *sperabilis* – Lamprell & Healy 1998: 254, fig. 777 (not fig. 778 as given).

*Parvilucina* cf. *sperabilis* – Zuschin & Oliver 2003: 108, pl. 25, figs 7-11.

TYPE MATERIAL. — Holotype: 1 LV, L 3.3 mm, H 3.1 mm (AMS C.27565).

Probable paratypes: from type locality, 4 v (BMNH 1910.928.72-6).

TYPE LOCALITY. — Hope Islands, Queensland, Australia, 5-10 fathoms.

MATERIAL EXAMINED. — **Koumac.** 14 stn, 0-120 m, 268 v.

**Touho.** 12 stn, 6-60 m, 282 v, 16 live.

**Chesterfield Islands.** CHALCAL 1, stn DC 20, 19°12'S, 158°42'E, 67 m. — Stn DC 21, 19°18'S, 158°43'E, 73 m. — Stn DC 27, 19°17'S, 158°34'E, 67 m.

**New Caledonia.** LAGON, stn 25, secteur de Nouméa, 22°21'S, 166°27'E, 28 m, 1 v. — Stn 41, 22°19'S, 166°16'E, 28-46 m, 1 v. — Stn 42, 22°17'S, 166°17'E, 25 m, 2 v. — Stn 119, Île Ouen, Baie du Prony, 22°28'S, 166°46'E, 20 m, 1 v. — Stn 439, Atoll de Huon, 18°07'S, 162°55'E, 39 m, 28 v. — Stn 440, 18°05'S, 162°55'E, 39 m, 1 v. — Stn 503, 19°12'S, 163°29'E, 64 m, 2 v. — Stn 517, 19°09'S, 163°35'E, 42 m, 1 v. — Stn 575, Grand Récif Sud, 22°55'S, 166°59'E, 62 m, 1 v. — Stn 729, secteur de Canala, 21°19'S, 165°54'E, 42 m, 30 v. — Stn 830, secteur de Poindimie, 20°49'S, 165°19'E, 105 m, 2 v. — Stn 898, secteur de Puebo, 20°14'S, 164°27'E, 22 m, 1 v. — Stn 973, secteur de Poum, 20°24'S, 163°60'E, 27 m, 1 v. — Stn 1082, secteur des Belep, 19°55'S, 163°45'E, 34 m, 1 v. — Stn 1085, 19°50'S, 163°53'E, 33 m, 3 v. — Stn 1091, 19°48'S, 163°48'E, 38 m, 6 v. — Stn 1092, 19°50'S, 163°46'E, 37 m, 4 v. — Stn 1093, 19°53'S, 163°44'E, 37 m, 1 v. — Stn 1111, 19°42'S, 163°42'E, 38 m, 1 v. — Stn 1114, 19°38'S, 163°50'E, 43 m, 1 v. — Stn 1129, 19°29'S, 163°49'E, 40 m, 1 v. — Stn 1205, 19°42'S, 163°26'E, 38 m, 1 v. — Stn 1214, 19°50'S, 163°37'E, 29 m, 1 v. — Stn 1216, 19°50'S, 163°38'E, 30 m, 1 v.

BATHUS 1, stn DW 674, East coast, 20°49'S, 165°19'E, 105 m, 10 v.

DISTRIBUTION. — Red Sea (Zuschin & Oliver 2003) to northern Australia and New Caledonia.

DESCRIPTION

Small, white, H to 4.5 mm, L to 4.3 mm, subcircular (H/L 1.0), inflated (T/L 0.41). Umbones prominent. Sculpture of 18-20 radial ribs with broad interspaces. Ribs rounded in profile, occasionally dividing, crossed by regularly-spaced, fine commarginal lamellae; ribs less prominent posteriorly. Juvenile shell to 500 µm with commarginal lamellae only. Protoconch large (140 µm), rounded, PI (c. 90 µm) smooth, PII with faint growth increments. Lunule long, wide, and slightly asymmetric, right part larger. Ligament short, slightly inset. Hinge: LV with two cardinal teeth and large anterior and posterior lateral teeth and sockets; RV with one cardinal tooth and anterior and posterior lateral teeth. Anterior adductor scar short, rounded, slightly detached from pallial line; posterior scar oval. Pallial line continuous. Inner shell margin coarsely crenulate.

REMARKS

*Lucina pulchella* Lynge, 1909 (p. 173, 174, pl. III, figs 13-15) (see also Robba *et al.* 2002: 78, fig. 5), described from the Gulf of Thailand, is similar but the figure shows clearly dividing radial ribs.

*Liralucina sperabilis* n. comb. is most similar to *L. vaubani* n. sp. (see below) but differs in having fewer, more prominent and widely spaced radial ribs and the inner shell margin is much more coarsely crenulate. *Liralucina craticula* n. sp. and *L. lifouina* n. sp. (below) differ in having far more fine, closely spaced, radial ribs.

*Liralucina craticula* n. sp.  
(Figs 26B; 27)

TYPE MATERIAL. — Holotype: 1 RV, L 3.8 mm, H 3.3 mm, T 1.1 mm (MNHN).

Paratypes: from type locality, 43 v and 3 juvenile shells (largest L 4.5 mm, H 3.8 mm, T 1.3 mm) (MNHN). — Figured paratypes: from type locality, 1 LV, L 3.8 mm, H 3.2 mm, T 1.0 mm; 1 LV, L 3.5 mm, H 3.0 mm, T 1.0 mm (MNHN); 1 LV, L 3.5 mm, H 3.2 mm, T 1.1 mm (BMNH 20050574); 1 RV, L 3.4 mm, H 2.9 mm, T 1.0 mm (BMNH 20050574).

ETYMOLOGY. — Latin *cratis*, wickerwork or hurdle, reference to the form of sculpture.

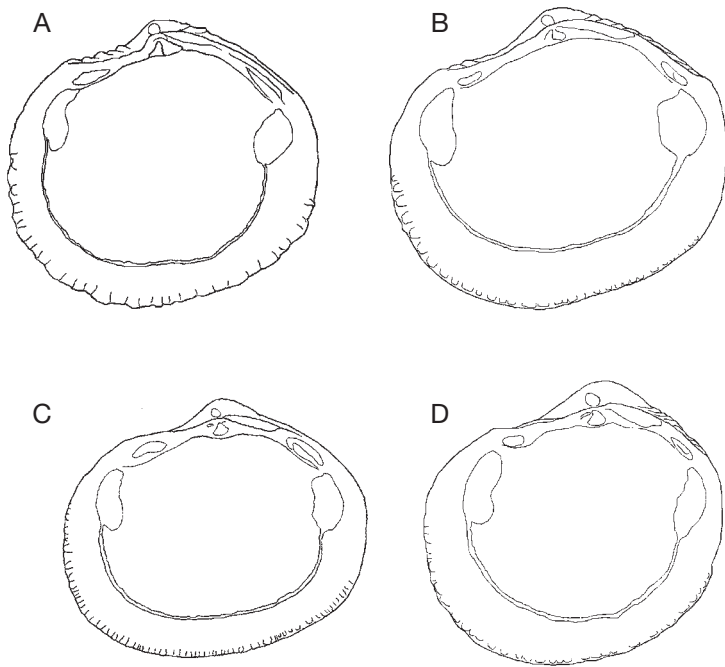


FIG. 26. — Outline drawings of interiors of right valves of *Liralucina* n. gen. species: **A**, *L. sperabilis* (Hedley, 1909) n. comb.; **B**, *L. craticula* n. gen., n. sp.; **C**, *L. lifouina* n. gen., n. sp.; **D**, *L. vaubani* n. gen., n. sp. Not to scale.

TYPE LOCALITY. — New Caledonia, Baie de Touho, stn 1250, 20°46.7'S, 165°13.7'E, 3-6 m.

MATERIAL EXAMINED. — **Touho**. 6 stn, 0-8 m, 120 v, 2 live.

DISTRIBUTION. — Known only from New Caledonia.

#### DESCRIPTION

Shell white, small, H to 3.8 mm, L to 4.5 mm, subovate, anteriorly extended, longer than high (H/L 0.86), inequilateral, anterior end longer, moderately inflated (T/L 0.29) umbones elevated. Sculpture of numerous fine, radial ribs (35-38), rounded in profile, variable in thickness, occasionally dividing, crossed by fine, widely spaced commarginal threads. Radial ribs become indistinct on posterior dorsal area. In juvenile shells radial ribs absent or faint (Fig. 27G). Protoconch large (140  $\mu$ m); PI flat, smooth, PII a very narrow rim. Lunule large, symmetrical. Ligament short, slightly inset. RV with a single cardinal tooth and anterior lateral and posterior lateral teeth and sockets. LV with two small cardinal teeth, long anterior lateral socket

and a posterior tooth and socket. Anterior adductor scar short, detached from pallial line for about 1/5 of length. Posterior scar ovate. Pallial line continuous. Shell margin finely crenulate, indistinct near anterior and absent along posterior margin.

#### REMARKS

*Liralucina craticula* n. sp. is similar to *L. lifouina* n. sp. but has fewer radial ribs with broader interspaces, more widely spaced commarginal lamellae and a longer, more incised lunule. The protoconch of *L. craticula* n. sp. has a large, smooth PI and very narrow PII compared with *L. lifouina* n. sp. that has a convex protoconch with a broad PII with growth increments.

#### *Liralucina lifouina* n. sp. (Figs 26C; 28)

TYPE MATERIAL. — Holotype: 1 sh, L 7.4 mm, H 6.6 mm T (2v) 5.0 mm (MNHN).

Paratypes: Loyalty Islands, Baie du Santal, stn 1450, 20°45.8'S, 167°01.65'E, 27-31 m 12 v (MNHN). —

Figured paratypes: from type locality, 1 RV, L 5.7 mm, H 4.4 mm (MNHN); 1 sh, L 3.7 mm, H 3.3 mm (BMNH 20050573); 1 RVL 5.2 mm, H 4.5 mm (BMNH 20050573); 1 LV, L 5.5, H 4.5 mm (BMNH 20050573); 1 sh, L 3.7 mm, H 3.1 mm (MNHN).

TYPE LOCALITY. — Loyalty Islands, Baie du Santal, stn 1425, 20°46.8'S, 167° 07.2'E, 4-5m.

ETYMOLOGY. — Named for the island of Lifou

MATERIAL EXAMINED. — **Lifou**. 13 stn, 2-30 m, 31 v, 9 live.

DISTRIBUTION. — Known only from the Loyalty Islands.

#### DESCRIPTION

Shell white, pink or orange, small, H to 6.9 mm, L to 7.2 mm, subovate, anteriorly extended longer than high (H/L 0.89), moderately inflated (T/L 0.34). Sculpture of numerous fine, radial ribs (about 35-40), rounded in profile, variable in thickness, occasionally dividing, very closely spaced and crossed by fine, regularly spaced commarginal threads. Radial ribs become indistinct in anterior and posterior. In juvenile shells radial ribs absent or faint (Fig. 28E). Protoconch large (150 µm); PI 100 µm, smooth and globose, PII with growth increments. Lunule large, heart-shaped, symmetrical. Ligament short, slightly inset. RV with single cardinal tooth, and prominent anterior lateral and posterior lateral teeth. LV with two small cardinal teeth, a long anterior lateral socket and a posterior tooth and socket. Anterior adductor scar short, detached from pallial line for about 1/5 of length. Posterior scar ovate. Pallial line continuous. Shell margin crenulate, crenulae absent along posterior margin (Fig. 28D).

#### REMARKS

See comparison with *L. craticula* n. sp. above.

### *Liralucina vaubani* n. sp. (Figs 26D; 29)

TYPE MATERIAL. — Holotype: 1 sh, L 3.2 mm, H 3.1 mm, T 1.5 mm (MNHN).

Paratypes: from type locality, 3 sh and 1 v (BMNH 20050575). — Figured paratypes: from type locality, 2 v, L 2.5 mm, H 2.2 mm; L 2.6 mm, H 2.3 mm (MNHN).

TYPE LOCALITY. — New Caledonia, MUSORSTOM 4, stn DW 149, 19°08'S, 163°23'E, 155 m.

ETYMOLOGY. — After NO *Vauban*, name of the ship that collected the material.

DISTRIBUTION. — Known only from New Caledonia.

#### DESCRIPTION

Shell small, white, H to 3.1 mm, L to 3.2 mm, sub-circular (H/L 0.97), inflated. Umbones prominent. Sculpture of 22-24 radial ribs. Ribs rounded in profile, occasionally dividing, crossed by regularly spaced, fine commarginal lamellae, ribs are less prominent to posterior. Juvenile shell to c. 500 µm with commarginal lamellae only. Protoconch large (160 µm), rounded, PI 90 µm, smooth, PII with fine growth increments. Lunule long, wide and slightly asymmetric, right part larger. Ligament short, slightly inset. Hinge: LV with two cardinal teeth and large anterior lateral and posterior lateral teeth and sockets. RV with one cardinal tooth and prominent anterior and posterior lateral teeth. Anterior adductor scar short, rounded, slightly detached from pallial line; posterior scar oval. Pallial line continuous. Inner shell margin coarsely crenulate.

#### REMARKS

See comparison with *L. sperabilis* n. comb. above.

### Genus *Ferrocina* n. gen.

TYPE SPECIES. — *Ferrocina multiradiata* n. sp. (here designated).

ETYMOLOGY. — Latin *ferrum*, iron, a reference to the rusty brown coloration.

DIAGNOSIS. — Shell small, thin, subovate, posteriorly truncate, sculpture of numerous fine radial ribs crossed by fine commarginal threads. Hinge plate thin, single small cardinal tooth in right valve, two in left valve, lateral teeth small to obsolete. Anterior adductor scar detached from pallial line for 1/3 of length. Inner shell margin crenulate. Colour usually rusty red-brown.

#### REMARKS

In general shape with the truncated posterior margin and the sculpture of fine radial ribs *Ferrocina*



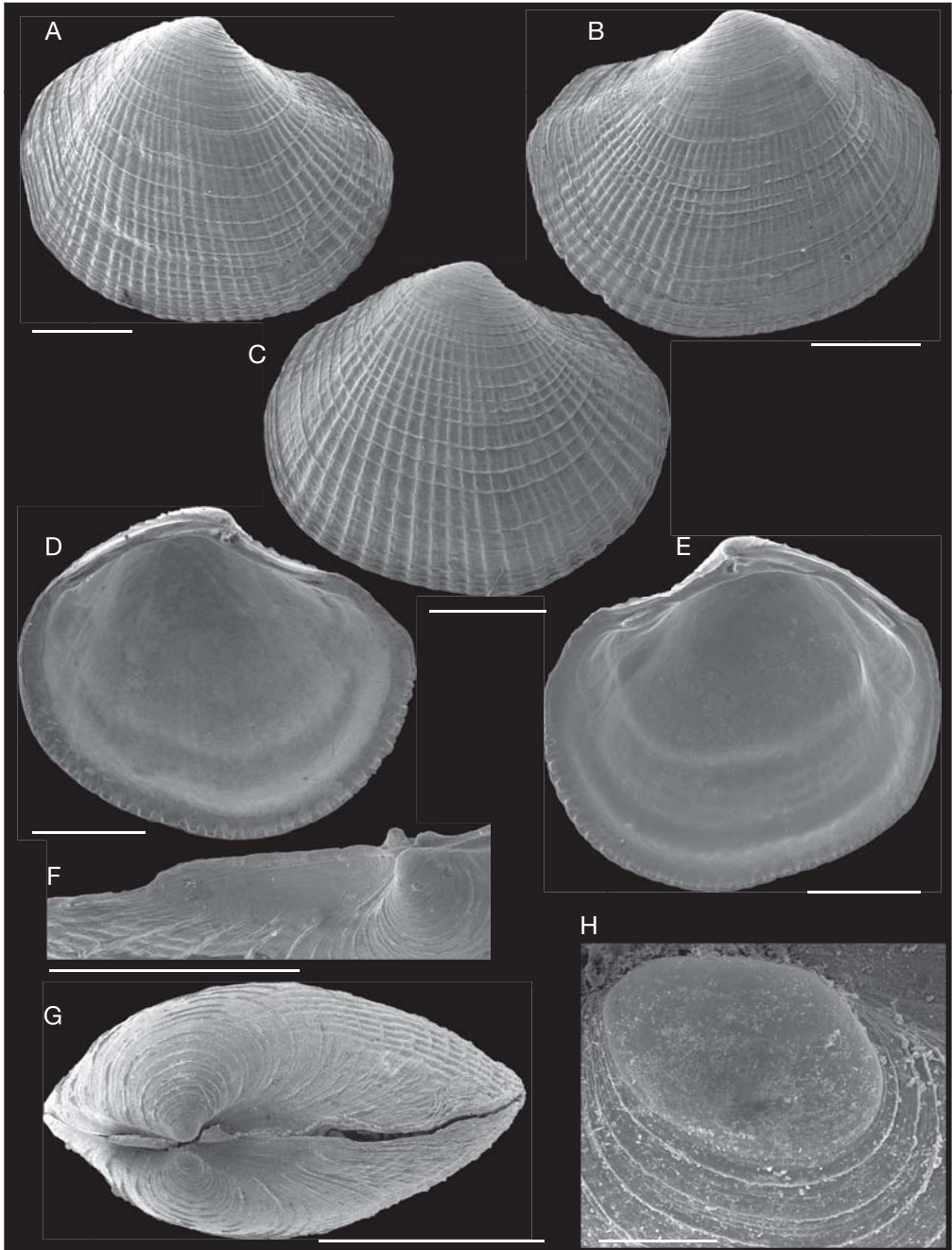


FIG. 27. — *Liralucina craticula* n. gen., n. sp., Touho, stn 1249, New Caledonia: **A**, holotype (MNHN) exterior of right valve; **B**, paratype (MNHN), exterior of left valve; **C**, paratype (MNHN), exterior of right valve; **D**, paratype (BMNH 20050574), interior of left valve; **E**, paratype (BMNH 20050574), interior of right valve; **F**, dorsal view of left valve; **G**, paratype (MNHN), dorsal view of juvenile shell; **H**, protoconch. Scale bars: A-G, 1.0 mm; H, 60  $\mu$ m.

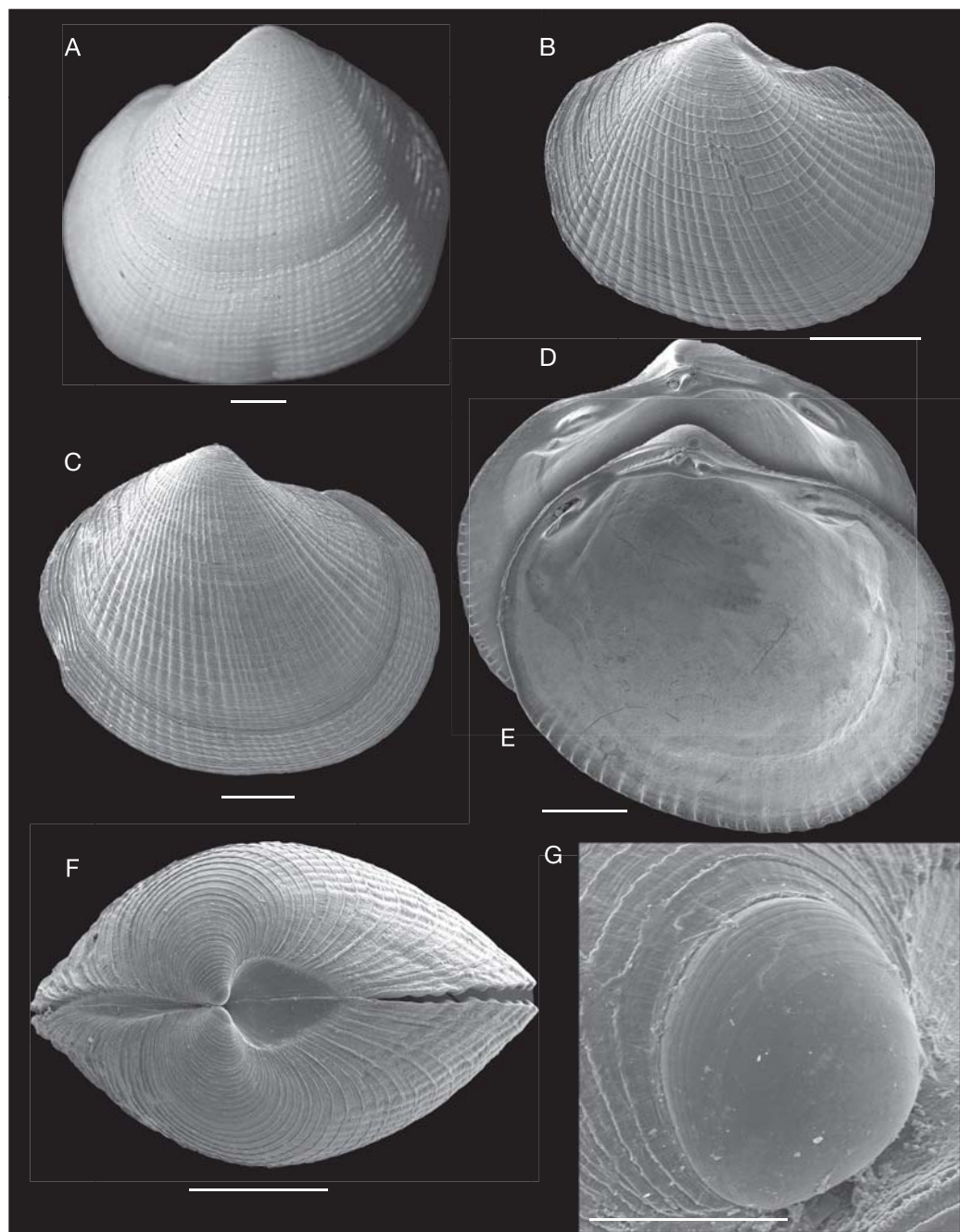


FIG. 28. — *Liralucina lifouina* n. gen., n. sp., Lifou, Loyalty Islands: **A**, holotype (MNHN), exterior of left valve; **B**, paratype (BMNH 20050573), exterior of right valve; **C**, paratype (MNHN), exterior of right valve; **D**, **E**, paratypes (BMNH 20050573), interior of right and left valves; **F**, paratype (MNHN), dorsal view; **G**, protoconch. Scale bars: A-F, 1.0 mm; G, 100 µm.

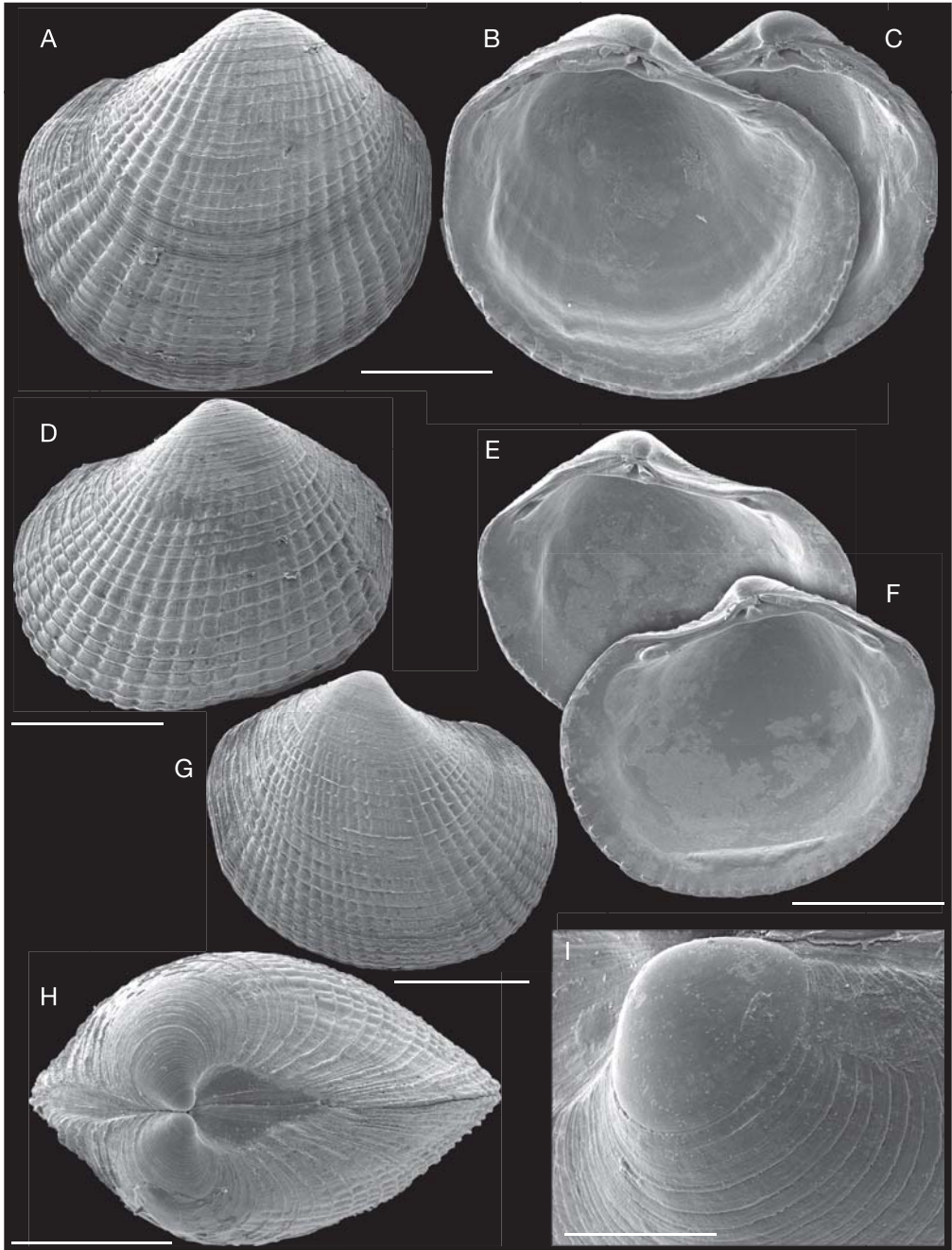


FIG. 29. — *Liralucina vaubani* n. gen., n. sp., New Caledonia, *Vauban*, stn 149: **A**, holotype (MNHN), exterior of right valve; **B, C**, holotype, interior of left and right valves; **D**, paratype (MNHN), exterior of left valve; **E, F**, paratype (MNHN), interior of left and right valves; **G**, paratype (MNHN), exterior of right valve; **H**, paratype (MNHN), dorsal view; **I**, protoconch. Scale bars: A-H, 1.0 mm; I, 100  $\mu$ m.

n. gen. has superficial resemblance to species of Cardiidae. Amongst Lucinidae, *Parvilucina* and *Liralucina* n. gen. species often have fine radial ribs but differ from *Ferrocina* n. gen. in having much more prominent hinge teeth and a very short anterior adductor scar only slightly detached from the pallial line.

*Ferrocina multiradiata* n. sp.

(Figs 23C; 30)

TYPE MATERIAL. — Holotype: 1 sh, L 11.2 mm, H 10.1 mm, T 3.3 mm (MNHN).

Paratypes: from type locality, 1 LV, L 9.5 mm, H 7.7 mm, T 2.2 mm. — Vanuatu, stn DW 1000, 90-200 m, 18°49'S, 169°00'E, 1 LV, L 18.2 mm, H 16.6 mm, T 5.0 mm (MNHN).

TYPE LOCALITY. — Vanuatu, MUSORSTOM 8, stn DW 999, 18°49'S, 169°00'E, 80-110 m.

ETYMOLOGY. — *Multiradiata* refers to the many fine, radial ribs of this species.

MATERIAL EXAMINED. — **Koumac**. 1 stn, 80-120 m, 1 v.

**Touho**. 2 stn, 80-140 m, 4 v.

**Fiji**. South of Viti Levu, MUSORSTOM 10, several stn DW 1374, CP 1384, CP 1387, CP 1386, CP 1389, CP 1390, between 229-417 m (MNHN).

DISTRIBUTION. — New Caledonia, Vanuatu, Fiji, from 80-400 m

DESCRIPTION

Shell small, rusty red, H to 16.6 mm, L to 18.0 mm, thin shelled, subovate, longer than high H/L 0.90, posterior margin quadrate, slightly inflated (T/L 0.28). Umbones low, slightly posterior of centre. Sculpture of numerous (*c.* 60), closely spaced, fine, rounded, radial ribs, that occasionally divide. Ribs crossed by low, fine, irregular, commarginal threads. Ribs obsolete on anterior and posterior dorsal areas. Posterior sulcus marked by lack of ribs. Lunule lanceolate, slightly asymmetric, RV extends into LV. Hinge plate narrow, RV with single, small cardinal tooth, a single small, elongate anterior lateral, and a small posterior lateral fold. LV with two very small cardinal teeth, anterior cardinal twice size of posterior cardinal, anterior

lateral indistinct, posterior lateral absent. Ligament short, inset. Anterior adductor scar medium length, detached for 1/3 of length. Posterior scar ovate. Pallial line wide, continuous. Shell inside pallial line dull with radial striations; outside pallial line, glossy, shell margin crenulate, with ribs extending deeply into shell interior. Internal coloration rusty red.

Genus *Cardiolucina* Sacco, 1901

*Cardiolucina* Sacco, 1901 (June): 89.

*Bellucina* Dall, 1901 (August): 806.

TYPE SPECIES. — *Cardium agassizi* Michelotti, 1839 (original designation).

DIAGNOSIS. — Shells small (H to 14 mm), subcircular, moderately inflated to subspheroidal. Sculpture of radial ribs crossed by commarginal lamellae, that are often fluted. Lunule heart-shaped, often deeply impressed. Hinge plate thick, 2 cardinal teeth and single anterior and posterior lateral teeth in each valve. Ligament external, short. Anterior adductor scar short, slightly detached from pallial line. Ventral margin crenulate.

*Cardiolucina undula* n. sp.

(Figs 23D; 31)

TYPE MATERIAL. — Holotype: 1 sh, L 4.0 mm, H 3.6 mm, T (2v) 3.2 mm (MNHN).

Paratypes: from type locality, 5 sh, 12 v (MNHN); 2 sh, 1 v (BMNH 20050576). — Figured paratypes: from type locality, 2 v, L 4.1 mm, H 4.0 mm, T 1.7 mm; L 3.1 mm, H 3.0 mm, T 1.2 mm (MNHN).

TYPE LOCALITY. — New Caledonia, MUSORSTOM 4, stn DW 149, 19°08'S, 163°23'E, 155 m.

ETYMOLOGY. — *Undula* refers to the undulating surface of the shell.

MATERIAL EXAMINED. — **Touho**. 1 stn, 80-140 m, 1 v. **Other New Caledonia**. Baie de St Vincent, LAGON, stn 190, 22°02'S, 165°57'E, 135-150 m, 2 v. — Stn 410, Grand Récif Sud, 22°42'S, 167°22'E, 35 m, 1 v. MUSORSTOM 4, stn DW 149, Grand Passage, 19°08'S, 163°23'E, 155 m, 7 sh, 14 v. — Stn DW150, 19°07'S, 163°22'E, 110 m, 11 sh, 20 v. — Stn DW 151, 19°07'S, 163°22'E, 200 m, 8 v.



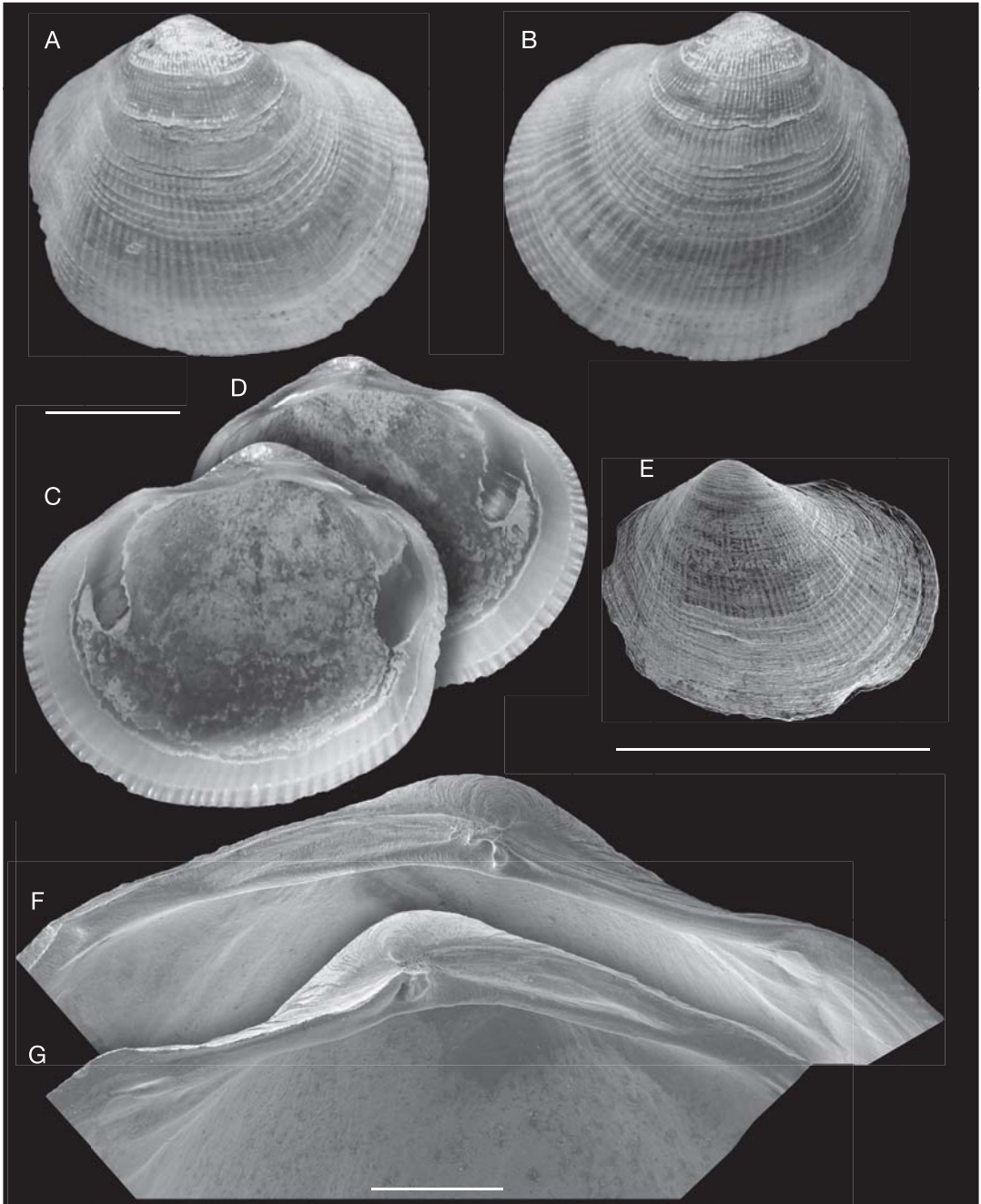


FIG. 30. — *Ferrocina multiradiata* n. gen., n. sp.: **A-D, F, G**, holotype, Vanuatu (MNHN); **E**, New Caledonia; **A, B**, exterior of left and right valves; **C, D**, interior of right and left valves; **E**, right valve, Touho, stn 2049, New Caledonia (MNHN); **F, G**, hinges of left and right valves of holotype. Scale bars: A-E, 5 mm; F, G, 2 mm.

DESCRIPTION

Shells small, L to 5.0 mm, H to 4.5 mm, white or pink, solid, subcircular, anteriorly extended (H/L 0.97), inflated (T/L 0.4). Posterior sulcus prominent. Lunule small, heart-shaped. Sculpture of prominent, flaring, regularly spaced, undulate commarginal lamellae. Interspaces with low radial ribs. Shell surface with linear punctations (Fig. 31F). Radial sculpture absent in anterior and posterior dorsal areas. Commarginal lamellae more closely spaced on juvenile shells. Hinge teeth: LV with 2 small cardinal teeth and large anterior and posterior laterals, RV with 2 cardinal teeth, the anterior much smaller, and anterior and posterior lateral sockets. Anterior adductor muscle scar short, detached for 1/5 of length. Pallial line continuous. Interior shell margin crenulate, finer crenulae anteriorly and posteriorly.

REMARKS

Previously, Taylor & Glover (1997: 102) included samples of this species from New Caledonia within *Cardiolucina civica* (Yokoyama, 1927), but that species is larger, has a more circular shell and more prominent radial ribs. Another similar species is *C. rugosa* (Hedley, 1909) of the W Pacific but this is smaller (c. 3.0 mm shell length), with relatively larger hinge teeth, the commarginal lamellae less conspicuously folded and the inner shell margin with far fewer crenulations.

Genus *Pillucina* Pilsbry, 1921

*Pillucina* Pilsbry, 1921: 382. Type species: *Pillucina spaldingi* Pilsbry, 1921 (junior subjective synonym of *P. hawaiiensis* (Smith, 1885)) (original designation).

*Sydlorina* Iredale, 1930: 390. Type species: *Sydlorina symbolica* Iredale, 1930 (original designation).

DIAGNOSIS. — Shells small (H to 14 mm), inflated, sculpture of fine to broad radial ribs that often bifurcate, crossed by fine, low, commarginal lamellae. Sculpture usually more prominent on anterior and posterior parts of shell. Hinge with two cardinal teeth in left valve and a single cardinal tooth in right valve. Posterior lateral tooth present in both valves, anterior lateral tooth present or absent. Ligament internal, located on elongate resilifer that widens to the posterior. Anterior adductor muscle scar short and detached from pallial line for about 1/4-1/2 of length. Inner shell margin finely to coarsely crenulate.

*Pillucina copiosa* n. sp.

(Figs 32; 34D)

TYPE MATERIAL. — Holotype: 1 sh, L 2.9 mm, H 2.7 mm, T 0.9 mm (MNHN).

Paratypes: from type locality, 42 shells, 37 v (MNHN); 4 v (BMNH 20050577). — Figured paratypes: from type locality, 1 sh, L 1.5 mm, H 1.5 mm; 1 RV, L 3.0 mm, H 2.9 mm, T 1.2 mm; 1 LV, L 3.3 mm, H 3.2 mm, T 1.1 mm; 1 LV, L 2.8 mm, H 2.8 mm, T 1.0 mm; 1 shell, L 2.5 mm, H 2.2 mm (MNHN).

TYPE LOCALITY. — New Caledonia, Anse de Koumac, 20°34'S, 164°16'E, 0-2 m, Expédition Montrouzier.

ETYMOLOGY. — Latin *copiosus*, abundant, a reference to the frequency of the species at Koumac.

MATERIAL EXAMINED. — Koumac. 22 stn, 0-120 m, 188 v, 61 live.

Touho. 10 stn, 0-30 m, 76 v, 2 live.

Other New Caledonia. Secteur de Nouméa, Pointe Magnin, stn 1355, 7-10 m, 5 v. — Platier Îlot Maitre, stn 1351, intertidal, 2 v.

DISTRIBUTION. — Known only from New Caledonia.

DESCRIPTION

Shell small, white to grey, H to 4.2 mm, L to 4.1 mm, moderately inflated, longer than high, ovoid to obliquely oval (H/L 0.97). Umbones prominent. Protoconch 150 µm, PI about 70 µm, PII with regular growth increments. Shell sculpture of fine radial ribs (c. 40-48), that both bifurcate and intercalate, more distinct at posterior and anterior. Ribs crossed by fine, regularly spaced, slightly elevated, commarginal lamellae. Ribs strongly divergent in anterior third of shell. Juvenile shell to around 350 µm with commarginal lamellae only. Lunule broad, lanceolate, asymmetric, greater part in right valve. RV with two cardinal teeth the posterior much larger, a small anterior lateral, and short, posterior lateral. LV with two cardinal teeth, no anterior lateral and a short, posterior lateral. Ligament internal, short, occupying an obliquely extended triangular resilifer. Anterior adductor muscle scar short, detached for about one third of length. Posterior adductor muscle scar ovate. Pallial line patchily discontinuous. Ventral shell margin slightly thickened and finely dentate.

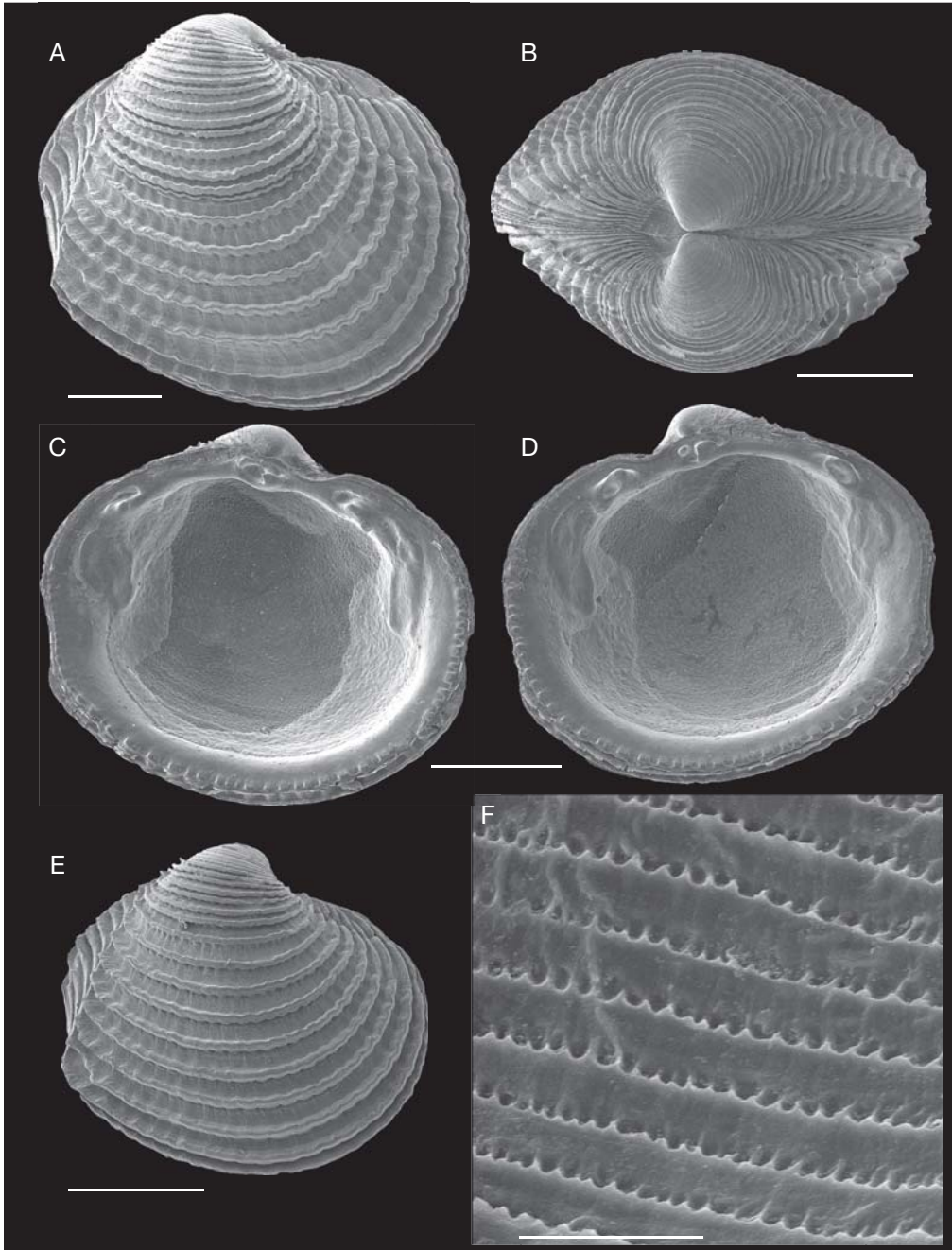


FIG. 31. — *Cardiolucina undula* n. sp., LAGON, stn DW 149, New Caledonia: **A**, exterior of right valve; **B**, dorsal view; **C**, **D**, interior of left and right valves; **E**, exterior of right valve; **F**, detail of shell surface; **A**, **B**, **F**, holotype (MNHN); **C**-**E**, paratype (MNHN). Scale bars: **A**-**E**, 1.0 mm; **F**, 10  $\mu$ m.

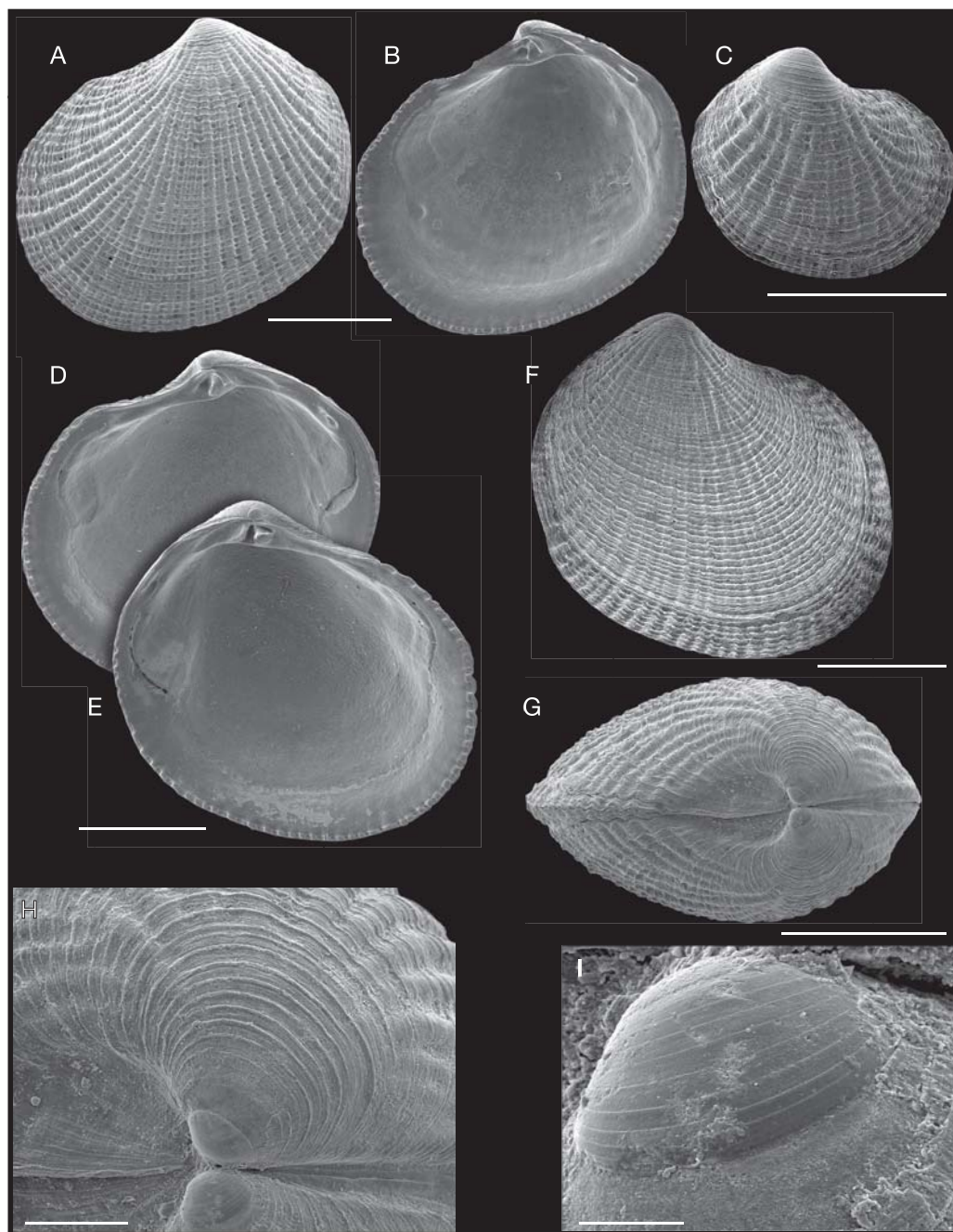


FIG. 32. — *Pillucina copiosa* n. sp., Koumac, stn 1277, New Caledonia: **A, B**, holotype (MNHN), exterior of left valve and interior of right valve; **C**, juvenile shell, right valve; **D, E**, paratypes (MNHN), interior of right and left valves; **F**, paratype (MNHN) exterior of right valve; **G**, paratype (MNHN), dorsal view; **H**, umbonal area of **G**; **I**, detail of protoconch. Scale bars: A-G, 1.0 mm; H, 200  $\mu$ m; I, 50  $\mu$ m.



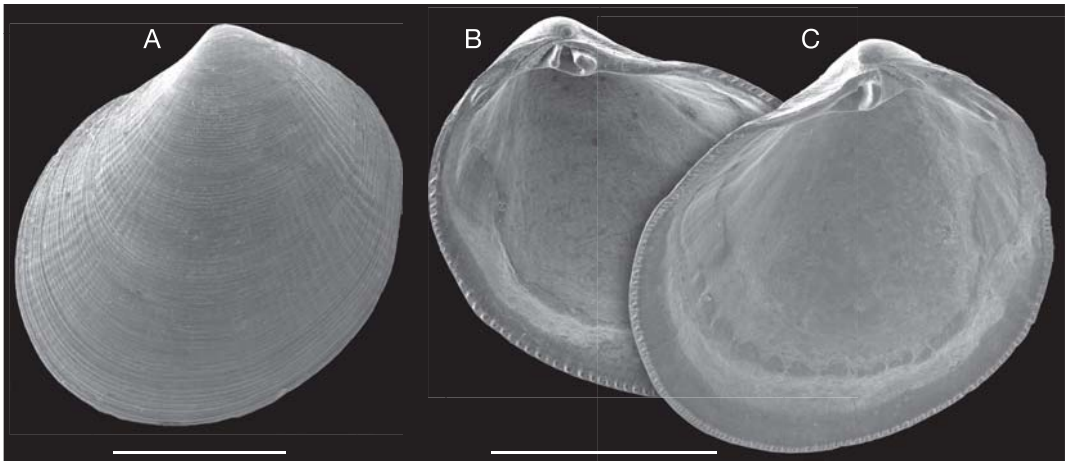


FIG. 33. — *Pillucina pacifica* Glover & Taylor, 2001, Lifou, stn 1430, Loyalty Islands (MNHN): **A**, exterior of left valve; **B, C**, interior of left and right valves. Scale bars: 2 mm.

#### REMARKS

Previously, Glover & Taylor (2001: 270) included the New Caledonia specimens within our concept of *Pillucina pisidium* (Dunker, 1860), but the new species is smaller, more elongate, with fewer, more prominent radial ribs. *Pillucina neglecta* Habe, 1960, from Japan has a more scooped lunule, a larger posterior lateral tooth and fewer ribs (*c.* 30). *Pillucina australis* Glover & Taylor, 2001, from southwestern Australia is similar in shape and ribbing but has a prominent anterior lateral tooth in the left valve and a single cardinal tooth in the right valve.

#### *Pillucina pacifica* Glover & Taylor, 2001 (Figs 33; 34C)

*Pillucina pacifica* Glover & Taylor, 2001: 266, figs 2a-g, 3.

TYPE MATERIAL. — Holotype (AMS C.355685).

Paratypes: from type locality (AMS C.380464, BMNH 2000204).

TYPE LOCALITY. — Australia, Michaelmas Cay, Great Barrier Reef, Queensland, 16°36'S, 145°59'E.

MATERIAL EXAMINED. — Koumac. 5 stn, 12-120 m, 21 v.

Lifou. 10 stn, 4-30 m, 34 v, 1 live.

DISTRIBUTION. — Known from Queensland, Australia, Papua New Guinea, Kiribati and New Caledonia but

probably more widespread in the West Pacific (Glover & Taylor 2001: 268).

#### DESCRIPTION

Shell small (H to 8 mm), white, robust, inflated, obliquely ovoid, slightly higher than long (H/L 1.1). Sculpture of fine radial ribs (> 50) that are slightly more prominent in anterior of the shell, broader posteriorly. Radial ribs are crossed by thread-like, commarginal lamellae giving a reticulate ornament. Ribbing is often worn in the middle part of the shell. Lunule short, broad and slightly impressed. Hinge plate sinuous, with cardinal teeth located on downward projection. RV with single prominent cardinal tooth, a thin, elongate posterior lateral tooth and a short anterior lateral. LV with two cardinal teeth of which the anterior is larger. Posterior lateral tooth a thin ridge, anterior lateral indistinct. Ligament internal, short. Anterior adductor scar short, barely detached from the pallial line, posterior scar ovate. Pallial line sometimes divided. Shell margin finely and evenly crenulate.

#### Genus *Wallucina* Iredale, 1930

*Wallucina* Iredale, 1930: 390. Type species: *Lucina jacksoniensis* Smith, 1885 (prior valid name *Wallucina assimilis* (Angas, 1867)) (original designation).

DIAGNOSIS. — Shells small, subcircular in outline. Moderately inflated, relatively thin-shelled. Sculpture of fine, closely spaced commarginal lamellae, sometimes slightly raised to posterior, fine radial striations sometimes present. Hinge plate narrow. RV with single cardinal tooth and posterior lateral tooth, anterior lateral absent or very small. LV with two cardinal teeth and a posterior lateral tooth. Ligament internal, set in elongate, oblique resilifer. Anterior adductor muscle scar elongate, detached from pallial line for about 1/2 to 1/3 of length. Pallial line irregularly lobed and divided. Inner shell margin finely crenulate.

*Wallucina fijiensis* (Smith, 1885)  
(Figs 34A; 35)

*Lucina* (*Codakia*) *fijiensis* Smith, 1885: 184, pl. 13, fig. 9.

*Lucina* (?*Loripes*) *gordoni* Smith, 1885: 186, pl. 13, fig. 12.

*Loripes haddoni* Melville & Standen, 1899: 200, fig. 12.

*Wallucina gordoni* — Maes 1967: 159, pl. 22, fig. e.

*Wallucina fijiensis* — Glover & Taylor 2001: 289, fig. 24a, b.

TYPE MATERIAL. — *L. fijiensis*: Levuka, Fiji, holotype (BMNH 1887.2.9).

*L. gordoni*: Levuka, Fiji, holotype (BMNH 1887.2.9.2886).

*L. haddoni*: Torres Strait, Warrior Island, holotype (BMNH 1899.2.23.12).

TYPE LOCALITY. — *L. fijiensis*: Levuka, Fiji

MATERIAL EXAMINED. — **Koumac**. 1 stn, 11-13 m, 2 v.

**Touho**. 5 stn, 0-6 m, 328 v, 1 live.

**Lifou**. 7 stn, 1-12 m, 39 v, 4 live.

**Other New Caledonia**. LAGON, stn 49, secteur de Nouméa, 22°19'S, 166°14'E, 10 m, 1 v. — Stn 284, 22°26'S, 166°25'E, 6 m, 1 v. — Stn 1510, Quatres Bancs de l'Ouest, 22°27'S, 166°68'E, 1 m, 30 v.

DISTRIBUTION. — Eastern Indian Ocean to West Pacific: Cocos Keeling Atoll, Great Barrier Reef, to Southern Japan, Guam, Kiribati, Fiji (see Glover & Taylor 2001).

DESCRIPTION

Shell white, small, thin, H to 15 mm, circular to subcircular in outline; posterior shell margin slightly truncate. Protoconch 160 µm long, PI smooth, 110 µm, PII with growth increments. Sculpture

of extremely fine, low commarginal lamellae with fine radial striae between commarginal lamellae (Fig. 35E). Commarginal lamellae are slightly broader and more elevated near dorsal margins. Lunule narrow, lanceolate to heart-shaped and slightly excavated. Anterior dorsal area often with irregular folds. Hinge plate narrow; RV with prominent cardinal tooth, two small posterior lateral teeth and tiny anterior lateral tooth. LV with two cardinals, anterior cardinal is trigonal and larger, posterior laterals are low and anterior lateral absent. Ligament internal, deeply impressed into each valve. Anterior adductor muscle scar short, broad and detached from the pallial line for about 1/2 of length. Pallial line with irregular lobes and partially divided. Pallial blood vessel impression faint. Surface of shell inside pallial line with indistinct, narrow, radial ridges, shell outside the pallial line glossy with fine radial striations. Shell margin finely denticulate.

Genus *Chavania* Glover & Taylor, 2001

*Chavania* Glover & Taylor, 2001: 282.

TYPE SPECIES. — *Lucina erythraea* Issel, 1869 (original designation).

DIAGNOSIS. — Shells small, robust, H to 12 mm. Outline generally circular to slightly higher than long but variable. Sculpture of fine, closely-spaced, low commarginal lamellae that anastomose occasionally; fine ribs sometimes visible on anterior and posterior of shell and also fine radial striations visible within the outer shell layer. Shallow posterior sulcus present on both valves. RV with large projecting tooth and LV with two cardinal teeth, of which the anterior is larger. Anterior lateral teeth absent or vestigial ridge in both valves. Ligament internal, short, deeply inset laterally into valves. Anterior adductor scar short, rounded and detached from pallial line for about 1/5 to 1/3 of length. Pallial line discontinuous. Shell margin broad, thickened, inner margin finely crenulate.

*Chavania striata* (Tokunaga, 1906)  
(Figs 34B; 36)

*Lucina contraria* Dunker, 1882: 215, pl. 13, figs 12-14. (non *Lucina contraria* Dunker, 1846, a West African species).

*Lasaea striata* Tokunaga, 1906: 53, 54, pl. 3, fig. 14.

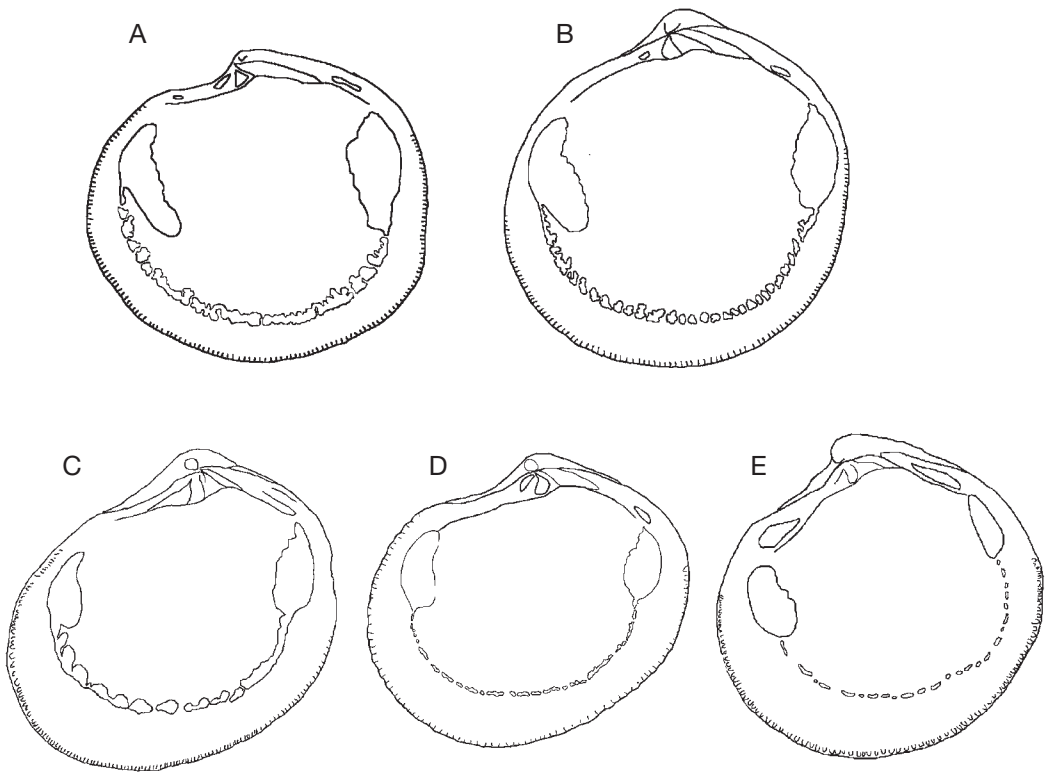


FIG. 34. — Outline drawings of interiors of right valves of *Pillucina* Pilsbry, 1921, *Wallucina* Iredale, 1930, *Chavania* Glover & Taylor, 2001 and *Funafutia* Glover & Taylor, 2001 species: **A**, *W. fijiensis* (Smith, 1885); **B**, *C. striata* (Tokunaga, 1906); **C**, *P. pacifica* Glover & Taylor, 2001; **D**, *P. copiosa* n. sp.; **E**, *F. levukana* (Smith, 1885). Not to scale.

*Phacoides minutus* Thiele, 1930: 592, pl. 4, fig. 72.

*Wallucina lamyi* Chavan, 1938: 227, fig. 19 (replacement name for *L. contraria* Dunker, 1882). — Habe 1977: 126, pl. 24, figs 1, 2.

*Pillucina* (*Wallucina*) *striata* — Kuroda *et al.* 1971: 392, pl. 118, fig. 15.

*Wallucina* aff. *jacksoniensis* — Hickman & Barnes 1999: 240, fig. 1a-e.

*Chavania striata* — Glover & Taylor 2001: 282, fig. 18a-h.

TYPE MATERIAL. — *Lasaea striata*: 21 syntypes (UMT, CM 13599, CM 13753-1377).

*Lucina contraria*: Japan, holotype (MNB). *Phacoides minutus*: Warnbro Sound, western Australia, 3 syntypes (MNB 67727).

TYPE LOCALITY. — *C. striata*, Oji, Tokyo City (Pleistocene fossil).

MATERIAL EXAMINED. — **Koumac**. 12 stn, 0-120 m, 117 v, 2 live.

**Touho**. 3 stn, 0-140 m, 5 v.

**Lifou**. 2 stn, 4-10 m, 2 v.

**Chesterfield Islands**. CHALCAL 1, stn DC 28, 19°24.18'S, 158°31.40'E, 51 m.

CORAIL 2, stn DW 41, 19°21.52'S, 158°31.87'E, 52 m, 2 v. — Stn DW 73, 19°12.11'S, 158°22.57'E, 41 m. — Stn DW 100, 19°05.99'S, 158°26.89'E, 40 m, 20 v. — Stn DW 120, 19°24.97'S, 158°21.59'E, 56 m. — Stn DW 121, 19°25.08'S, 158°18.00'E, 34 m. — Stn DW 122, 19°28.17'S, 158°17.06'E, 32 m. — Stn DW 135, 19°31.37'S, 158°19.14'E, 46 m. — Stn DW 152, 19°52.00'S, 158°20.00'E, 51 m. — Stn DW 212, 34 m, 20++ v.

**Other New Caledonia**. LAGON, stn 63, Île Ouen, Baie du Prony, 22°26'S, 166°26'E, 20 m, 1 v. — Stn 436, 18°06'S, 162°50'E, Atoll de Huon, 45 m, 1 v. — Stn 438, 18°10'S, 162°51'E, 37 m, 15 v. — Stn 440, 18°05'S, 162°55'E, 39 m, 1 v. — Stn 441, 18°04'S, 162°56'E, 37 m, 1 v. — Stn 442, 18°02'S, 162°56'E, 39 m,

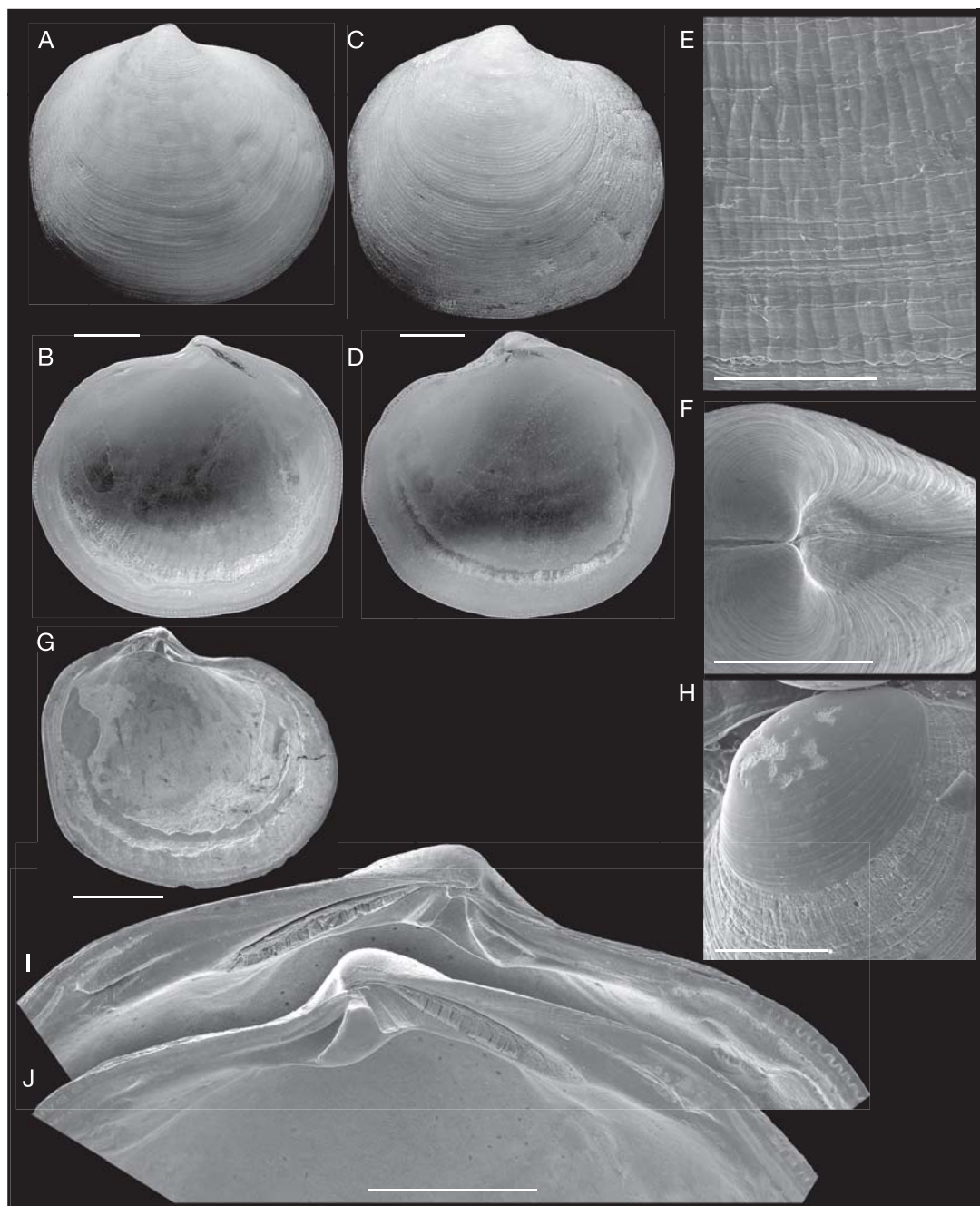


FIG. 35. — *Wallucina fijiensis* (Smith, 1885): **A, B**, exterior and interior of right valve, Touho, stn 1242, New Caledonia; **C, D**, exterior and interior of right valve, Touho, stn 1242; **E**, detail of surface sculpture; **F**, umbonal area, Lifou, stn 1420; **G**, interior of left valve juvenile shell, Lifou, stn 1240; **H**, protoconch, Lifou, stn 1240; **I, J**, details of hinge teeth of left and right valves of A. Scale bars: A-D, 2 mm; E, 200 µm; F, G, I, J, 1.0 mm; H, 75 µm.



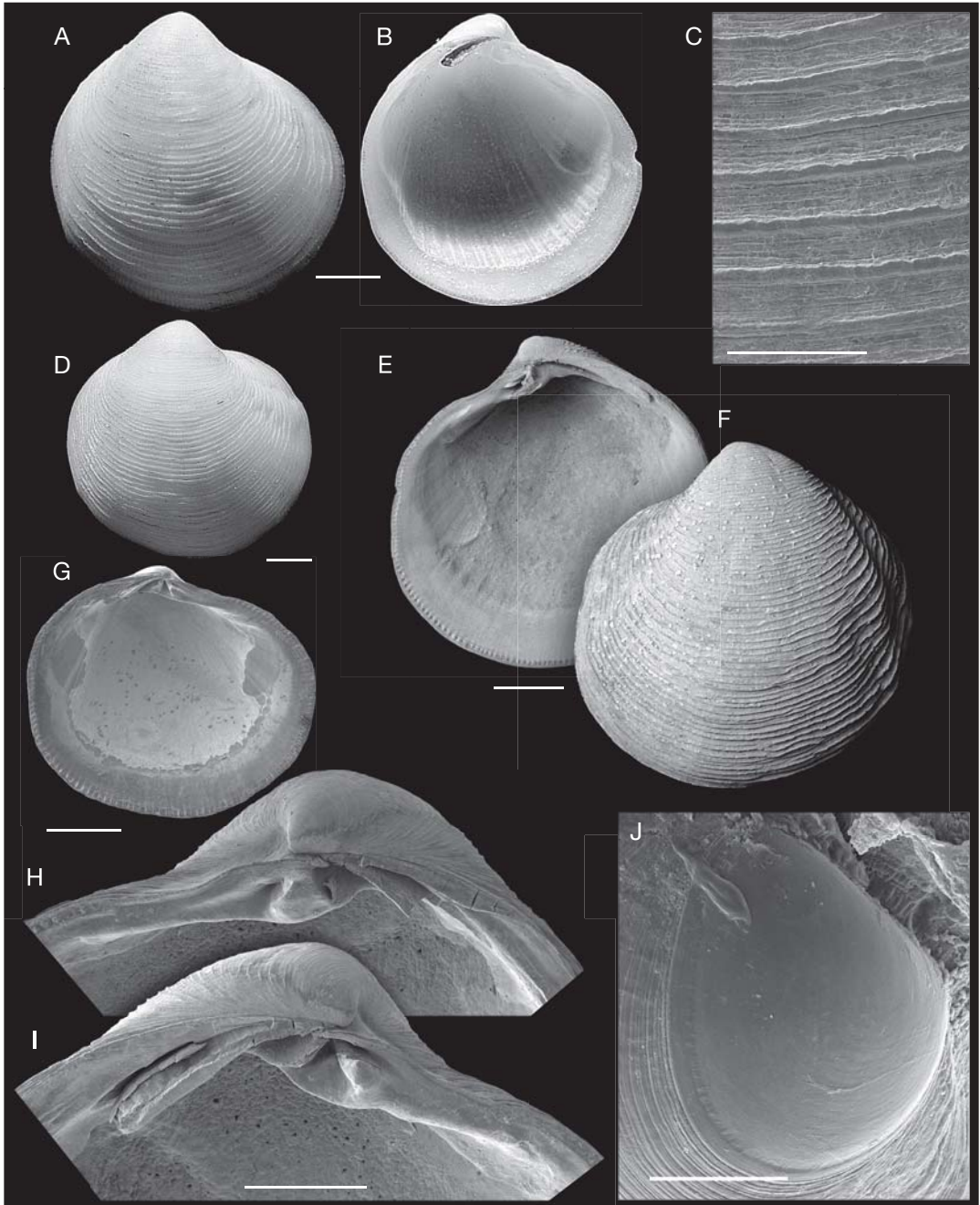


FIG. 36. — *Chavania striata* (Tokunaga, 1906): **A**, exterior of right valve, Atoll de Surprise, stn 451, New Caledonia, 30 m (MNHN); **B**, interior of left valve; **C**, detail of surface sculpture; **D**, exterior of right valve; **E**, **F**, interior of right valve, exterior of left valve, Atoll de Huon, New Caledonia (MNHN); **G**, interior of left valve of juvenile shell, Lizard Island, Queensland (BMNH); **H**, **I**, detail of hinges of right and left valves, Atoll de Surprise, stn 451 (MNHN); **J**, protoconch, Lizard Island (BMNH). Scale bars: A, B, D-F, 2.0 mm; C, 250  $\mu$ m; G-I, 1.0 mm; J, 60  $\mu$ m.

1 v. — Stn 447, Atoll de Surprise, 18°20'S, 163°06'E, 36 m, 2 v. — Stn 452, 18°27'S, 163°12'E, 27 m, 1 v. — Stn 456, 18°29'S, 163°06'E, 73 m, 1 v. — Stn 454, 18°30'S, 163°10'E, 36 m, 1 v. — Stn 466, 18°24'S, 163°07'E, 42 m, 1 v. — Stn 468, 18°27'S, 163°10'E, 40 m, 1 v. — Stn 478, lagon Nord, 18°53'S, 163°27'E, 35 m, 1 v. — Stn 564, Grand Récif Sud, 22°47'S, 166°56'E, 35 m, 1 v. — Stn 589, Île des Pins, 22°32'S, 167°23'E, 31 m, 1 v. — Stn 595, 22°33'S, 166°21'E, 37 m, 1 v. — Stn 729, secteur de Canala, 21°19'S, 165°54'E, 42 m, 1 v. — Stn 922, secteur de Koumac, 20°51'S, 164°24'E, 12 m, 1 v. — Stn 962, secteur de Poum, 20°27'S, 164°01'E, 25 m, 1 v. — Stn 1103, secteur des Belep, 19°43'S, 163°57'E, 32 m, 6 v. — Stn 1107, 19°41'S, 163°50'E, 41 m, 1 v.

PALEO-SURPRISE, stn CP 1380, North New Caledonia, 18°27'S, 163°13'E, 24 m, 2 v. — Stn CP 1377, 18°27'S, 163°10'E, 36 m, 1 v.

**Loyalty Islands.** MUSORSTOM 6, stn DW 431, 20°21'S, 166°07'E, 21 m, 1 v. — Stn DW 433, 20°22'S, 166°10'E, 24 m, 1 v. — Stn DW 435, 20°21'S, 166°09'E, 32 m, 2 v. — Stn 1219, Lagon d'Ouvéa, 20°29'S, 166°29'E, 15 m, 1 v.

DISTRIBUTION. — Central IWP, India to Japan, western and northern Australia, Marshall Islands, New Caledonia (Glover & Taylor 2001: fig. 21).

#### DESCRIPTION

Shell small, white or cream, H to 12 mm, sub-circular, but shape variable (mean H/L 1.02), posterior margin often truncate. Protoconch 125 µm long (Fig. 36K), PI large, smooth, PII, a narrow rim. Sculpture of fine, low, closely spaced, commarginal lamellae which occasionally intersect and divide; lamellae slightly higher on posterior dorsal margin. Fine radial riblets sometimes visible on anterior ventral margin. Posterior dorsal area demarcated by a narrow sulcus. Lunule heart-shaped and impressed. Hinge plate narrow, RV with single cardinal tooth, elongate posterior lateral tooth and no anterior lateral. LV with two cardinal teeth, an elongate posterior lateral tooth and no defined anterior lateral although there is sometimes a vestigial ridge in that position. Ligament internal, short, deeply inset laterally into valves. Anterior adductor scar short, rounded and detached from pallial line for about 1/5 of its length. Pallial line discontinuous, divided into small blocks. Inner shell margin finely crenulate.

#### Genus *Funafutia* Glover & Taylor, 2001

*Funafutia* Glover & Taylor, 2001: 286.

TYPE SPECIES. — *Lucina levukana* Smith, 1885 (original designation).

DIAGNOSIS. — Shells small, inflated, anteriorly extended. Sculpture of prominent commarginal lamellae with finely striated interspaces, shell surface finely punctate. Umbones prominent, lunule lanceolate, impressed. Ligament internal, short, triangular. Two cardinal teeth in left valve, one in right valve; anterior and posterior lateral teeth prominent in both valves. Pallial line discontinuous. Shell margin finely crenulate.

#### REMARKS

This genus is distinguished from others with an internal ligament by the anteriorly extended shell, the prominent, rounded, commarginal lamellae and the strong anterior and posterior lateral teeth in both valves. On the basis of the shared character of the oblique internal ligament, we included *Funafutia* along with *Pillucina*, *Wallucina* and *Chavania* as a possible monophyletic clade (Glover & Taylor 2001). However, molecular data (Taylor & Glover unpublished) suggests that *Funafutia* is unrelated to these other genera.

#### *Funafutia levukana* (Smith, 1885) (Figs 34E; 37)

*Lucina levukana* Smith, 1885: 181, pl. 13, fig. 6.

*Lucina (Codakia) oblonga* Hedley, 1899: 497, fig. 51.

*Lucina funafutica* Finlay, 1927: 529.

*Funafutia levukana* – Glover & Taylor 2001: 286, fig. 22a-d.

TYPE MATERIAL. — *L. levukana*: 2 syntypes, decayed (BMNH 1887.2.9.2778).

*Lucina oblonga*: Funafuti, 2 syntypes (AMS C.6157).

TYPE LOCALITY. — Levuka, Fiji.

MATERIAL EXAMINED. — **Koumac.** 9 stn, 10-20 m, 38 v, 33 live.

**Touho.** 8 stn, 0-35 m, 80 v, 14 live.

**Lifou.** 33 stn, 0-30 m, 480 v, 81 live.

**Other New Caledonia.** LAGON, stn 251, secteur de

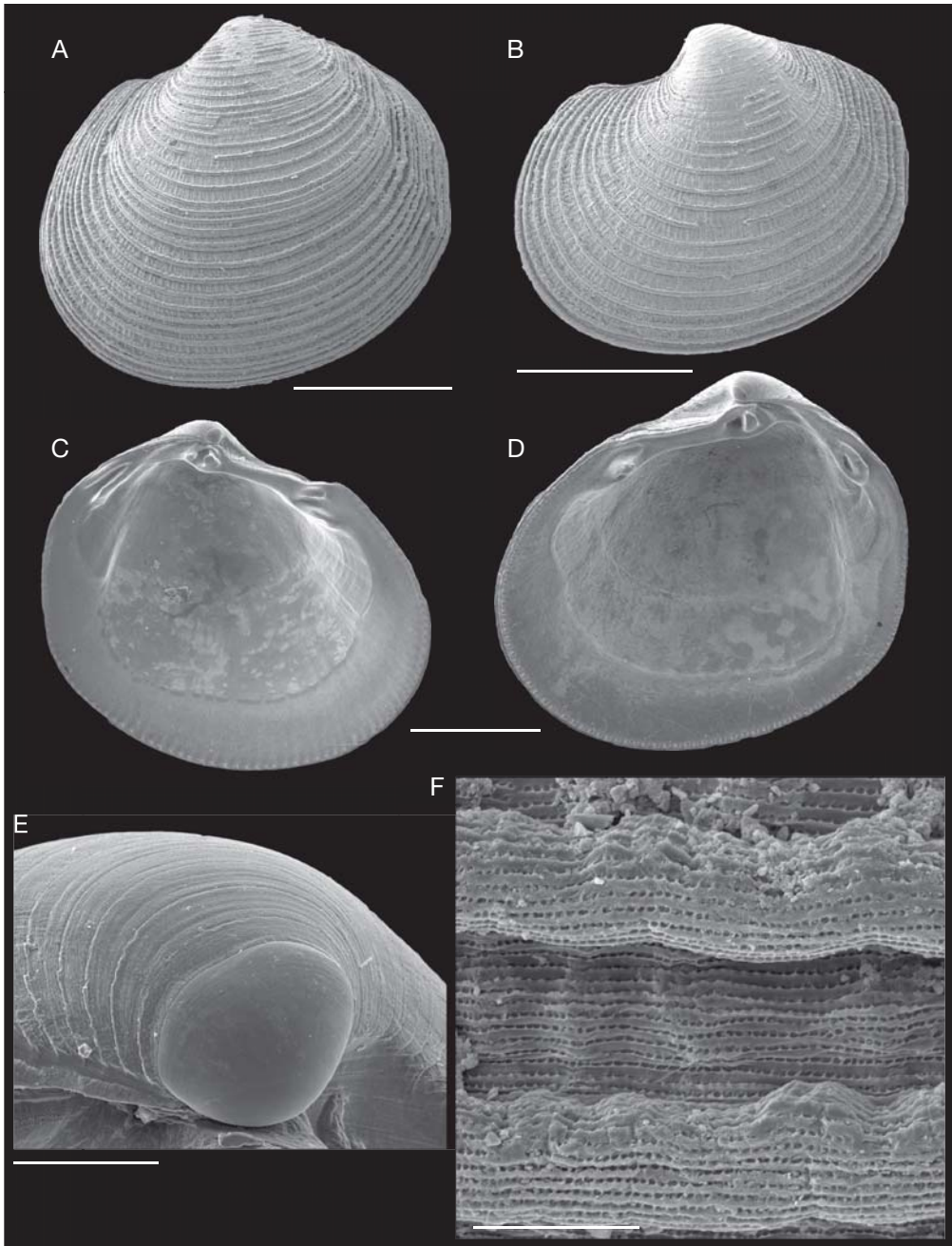


FIG. 37. — *Funafutia levukana* (Smith, 1885), Lifou, stn 1444, Loyalty Islands (MNHN): **A, B**, exterior of left and right valves; **C, D**, interior of left and right valves; **E**, protoconch; **F**, detail of shell surface. Scale bars: A-D, 1.0 mm; E, 100  $\mu$ m; F, 30  $\mu$ m.

Nouméa, 22°19'S, 166°25'E, 20 m, 1 sh.

DISTRIBUTION. — ?Red Sea, western Indian Ocean to West Pacific, Tuvalu, Wallis Islands, Marquesas.

#### DESCRIPTION

Small, white, yellow or pink, H to 6 mm, longer than high (H/L 0.89) and extended anteriorly, robust, inflated. Protoconch inflated (L 160 µm), PI smooth, 88 µm, PII with growth increments. Sculpture of prominent, rounded, regularly spaced commarginal lamellae that are often abraded. Surface of shell and lamellae with fine increments divided by lines of pits about 2.0 µm in diameter (Fig. 37F). Numerous fine radial folds within interspaces. Lunule long, lanceolate and impressed; umbonal area prominent. RV with large, single cardinal tooth and prominent posterior and anterior lateral teeth. LV with two cardinal teeth and two anterior and posterior lateral teeth. Ligament internal, with short, narrow, triangular resilifer. Anterior adductor scar short and rounded, barely detached from the pallial line, posterior scar ovate. Pallial line discontinuous. Shell margin outside the pallial line finely and evenly crenulate.

#### REMARKS

*Lucina crosseana* Issel, 1869 (p. 255, pl. 3, fig. 3) described from Pleistocene deposits of the Red Sea is possibly an earlier name for this species, but the type material has not been located. Zuschin & Oliver (2003: 109, pl. 25, figs 12-15) illustrate *Funafutia* cf. *crosseana* from the northern Red Sea. This is very similar to *F. levukana* but further work is needed to establish if it is conspecific.

#### Genus *Parvidontia* n. gen.

TYPE SPECIES. — *Parvidontia laevis* n. sp. (here designated).

ETYMOLOGY. — Latin *parvi*, small, and Greek *odontos*, teeth.

DIAGNOSIS. — Small, thin-shelled, subcircular, umbones prominent, external surface smooth except for fine commarginal threads. Ligament external, very short. Hinge narrow, teeth small, left valve with 2 cardinal teeth, of which anterior is larger and projecting; right valve with

2 cardinals of which anterior is very small. Lateral teeth absent. Anterior adductor scar narrow, detached for 1/2 length. Pallial line entire, broad with dorsal extensions. Inner shell margin smooth.

#### REMARKS

The smooth, thin shell of *Parvidontia* n. gen., with fine commarginal growth increments, resembles *Anodontia* and *Leucopshaera* species but can be easily distinguished by the presence of cardinal teeth.

#### *Parvidontia laevis* n. sp.

(Figs 38; 39A)

TYPE MATERIAL. — Holotype: 1 LV, L 5.8 mm, H 5.5 mm, T 1.8 mm (MNHN).

Paratypes: New Caledonia, secteur de Canala, stn 729, coarse shell sand, 21°19'S, 165°54'E, 42-45 m, 2 LV, 1 RV, L 6.5 mm, H 5.7 mm, T 1.9 mm; L 5.8 mm, H 1.5 mm; L 3.2 mm, H 3.0 mm (MNHN). — New Caledonia, Secteur de Belep, stn 1196, 19°33'S, 163°21'E, 30 m, 1 LV, L 10.7 mm, H 10.9 mm, T 3.4 mm (BMNH 20050578).

TYPE LOCALITY. — New Caledonia, Touho, stn 1260, 20°44'S, 165°14'E, shell sand, 49-59 m.

ETYMOLOGY. — Latin *laevis*, smooth.

MATERIAL EXAMINED. — **Touho**. 1 stn, 49-59 m, 1 v.

#### DESCRIPTION

Small, H to 10.9 mm, L to 10.7 mm, thin-shelled, subcircular, umbones prominent, external surface smooth, except for fine commarginal threads. Protoconch large, 210 µm, smooth, with a few marginal growth increments. Ligament external, very short. Hinge narrow, teeth small, LV with two cardinal teeth of which anterior is larger and projecting; RV with 2 cardinals of which anterior is very small. Lateral teeth absent. Anterior adductor muscle scar narrow, detached for 1/2 length. Pallial line entire, broad, with dorsal extensions. Inner shell margin smooth.

#### REMARKS

Externally, the smooth shell, with low commarginal lamellae, of *P. laevis* n. sp. resembles *Leucopshaera diaphana* n. sp. (p. 118) but it can easily be distinguished by the presence of cardinal teeth.



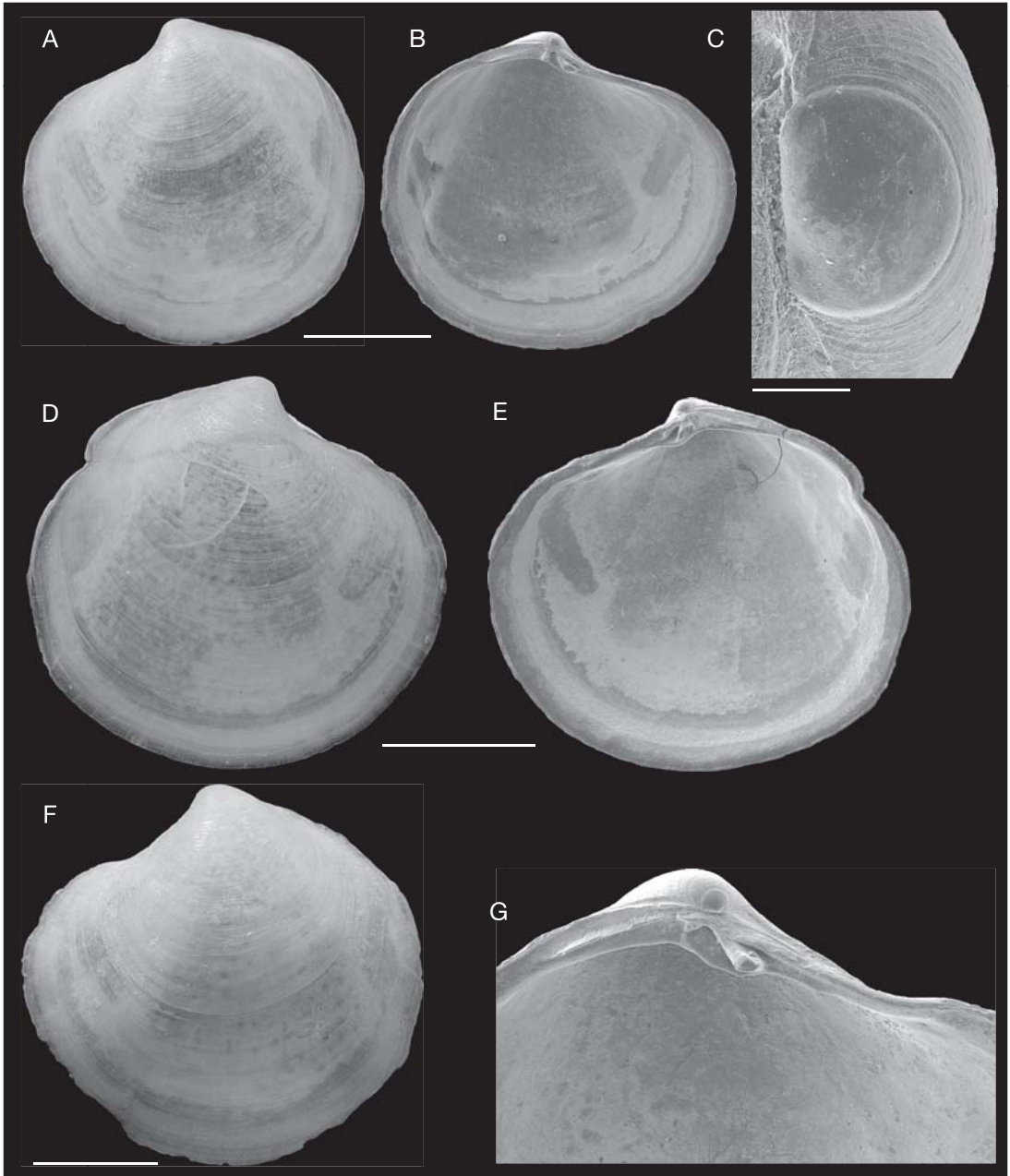


FIG. 38. — *Parvidontia laevis* n. gen., n. sp.: **A, B**, holotype (MNHN), Touho, stn 1260, New Caledonia, exterior and interior of left valve; **C**, protoconch; **D, E**, paratype (MNHN), secteur de Canala, stn 729, New Caledonia, exterior and interior of right valve; **F**, paratype (MNHN), exterior of left valve; **G**, detail of hinge of holotype, left valve. Scale bars: A, B, D-F, 2 mm; C, 100 µm.

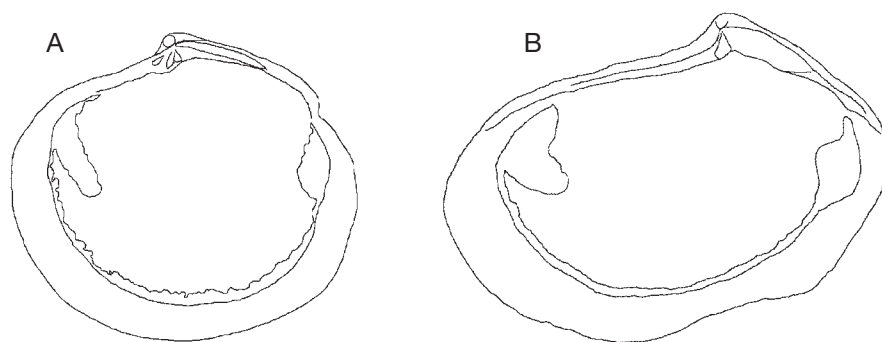


FIG. 39. — Outline drawings of interiors of right valves of *Paravidontia* n. gen. and *Bretskya* n. gen. species: **A**, *P. laevis* n. gen., n. sp.; **B**, *B. scapula* n. gen., n. sp. Not to scale.

Genus *Bretskya* n. gen.

TYPE SPECIES. — *Bretskya scapula* n. sp. (here designated).

ETYMOLOGY. — Named for Sara Bretsky in recognition of her contribution to lucinid systematics.

DIAGNOSIS. — Shells small, thin, elongate, umbones posterior and prominent, outline irregularly ovoid, posterior margin truncate to sinuate. Sculpture of thin, low, irregularly spaced, commarginal lamellae and growth increments, shell surface often distorted. Ligament large, inset on elongate resilifer. Hinge with two small cardinal teeth in left valve and one in right valve. Anterior adductor scar short, detached from pallial line for about 1/3 of length. Interior margin smooth.

REMARKS

*Bretskya* n. gen. differs from all other described lucinids by its extremely anteriorly extended shell, with prominent, posteriorly located umbones and a deep resilifer. Some *Megaxinus* and *Rasta* species have similarly crumpled, exterior shell surfaces (Glover & Taylor 1997).

*Bretskya scapula* n. sp.  
(Figs 39B; 40; 41)

TYPE MATERIAL. — Holotype: 1 sh, L 6.8 mm, H 4.4 mm, T 1.4 mm (BMNH 20050579).

Paratypes: from type locality, 1 sh, L 6.8 mm, H 5.5 mm, T (2v) 3.2 mm (BMNH 20050580); 1 sh, L 6.7 mm, H 6.2 mm, T(2v) 3.3 mm (Conchology Inc. Reference Collection, Philippines). — Figured paratypes: from type locality, 1 sh, L 6.3 mm, H 5.6 mm, T 1.6 mm

(MNHN); 1 sh, L 5.0 mm, H 3.8 mm, T (2v) 2.2 mm (BMNH 20050580); 1 sh, L 6.8 mm, H 6.1 mm, T (2v) 3.2 mm (BMNH 20050580); 1 sh, L 6.0 mm, H 4.5 mm, T (1v) 1.3 mm (BMNH 20050580); 1 sh, L 4.0 mm, H 3.0 mm, T (2v) 1.9 mm (BMNH 20050580).

TYPE LOCALITY. — Philippines, Pipe Point, Pandanan Island, Jetafe, Bohol, 10°10.34'N, 124°05.94'E, 5 m, muddy sand, 12.III.2005, col. P. Poppe.

ETYMOLOGY. — Latin *scapula*, shoulder blade – in reference to the shape of this bivalve.

MATERIAL EXAMINED. — **Touho**. Stn 1249, 20°49'S, 165°19'E, 80-140 m, 1 RV, L 8.5 mm, H 7.7 mm (MNHN).

**Philippines**. MUSORSTOM 3, stn DR 140, 11°43'N, 122°34'E, 93-99 m, 8 v (MNHN).

DISTRIBUTION. — Recorded only from Philippines and New Caledonia at depths from 5-100 m.

DESCRIPTION

Small, thin-shelled, H to 6.9 mm, L to 8.4 mm, outline irregularly elongate ovoid, truncate to sinuate posteriorly, longer than high, H/L 0.68-0.82; highly anteriorly extended, slightly inflated. Umbones prominent, usually in posterior part of shell. Protoconch 160 µm long, PI 85 µm. PII with marked growth increments. Shell sculpture of irregular, thin, low, commarginal lamellae and fine growth increments, shell surface often distorted and plicate. Anterior dorsal margin elongate. Posterior dorsal margin steeply sloping. Lunule narrow, lanceolate. Ligament large, set on elongate resilifer. Hinge with two small, cardinal teeth in left valve and one in

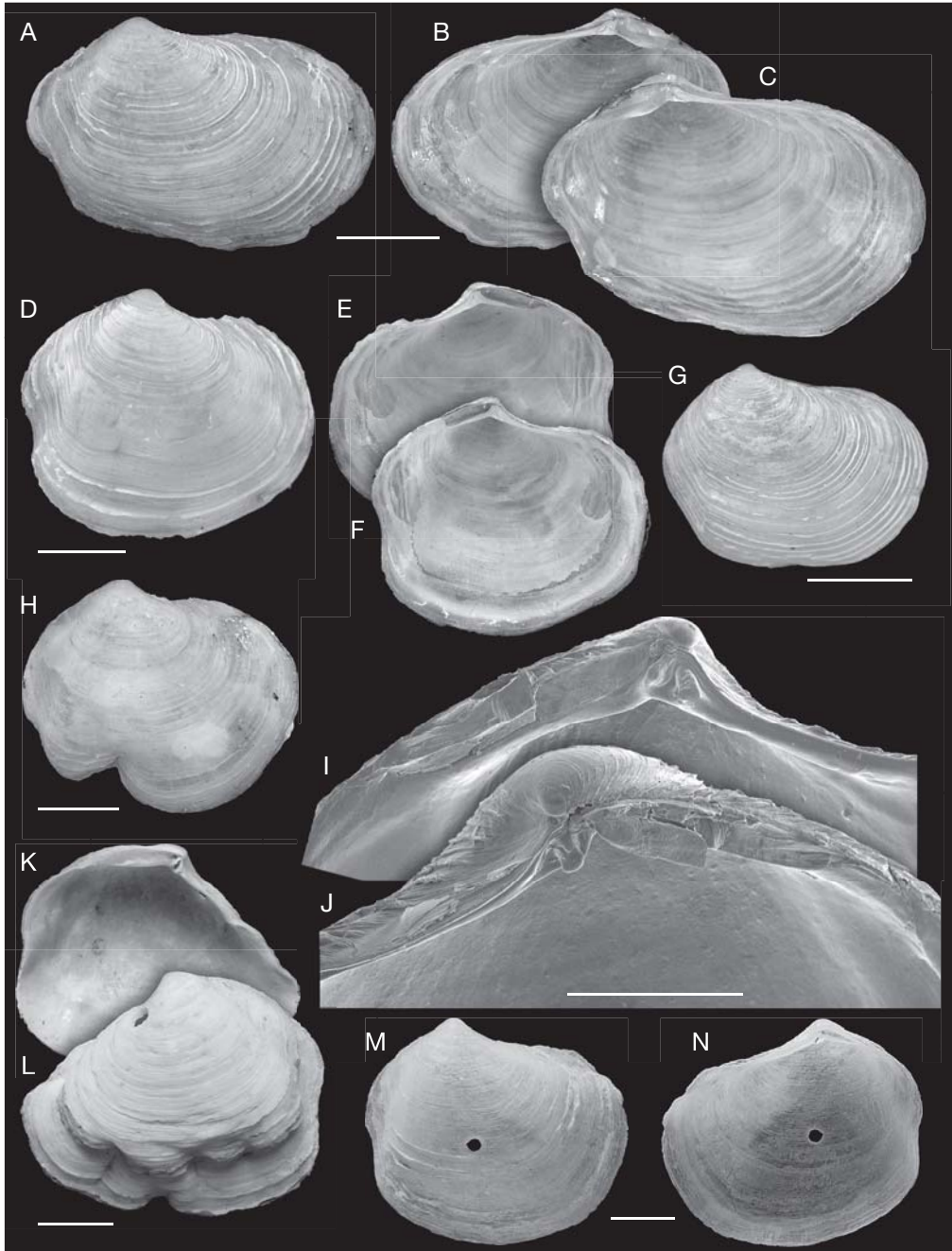


FIG. 40. — *Bretskyia scapula* n. gen., n. sp.: **A-J**, Pandanan Island, Philippines; **A-C**, holotype (BMNH 20050579), exterior of right valve and interior of right and left valves; **D-J**, paratype (BMNH 20050580); **D-F**, exterior of right valve and interior of right and left valves; **G**, exterior of right valve; **H**, exterior of right valve; **I, J**, detail of hinges of left and right valves; **K, L**, Philippines, MUSORSTOM 3, stn DR 140, 93-99 m (MNHN); **M, N**, Touho, stn 1249, New Caledonia, exterior and interior right valve. Scale bars: A-H, K-N, 2.0 mm; I, J, 1.0 mm.

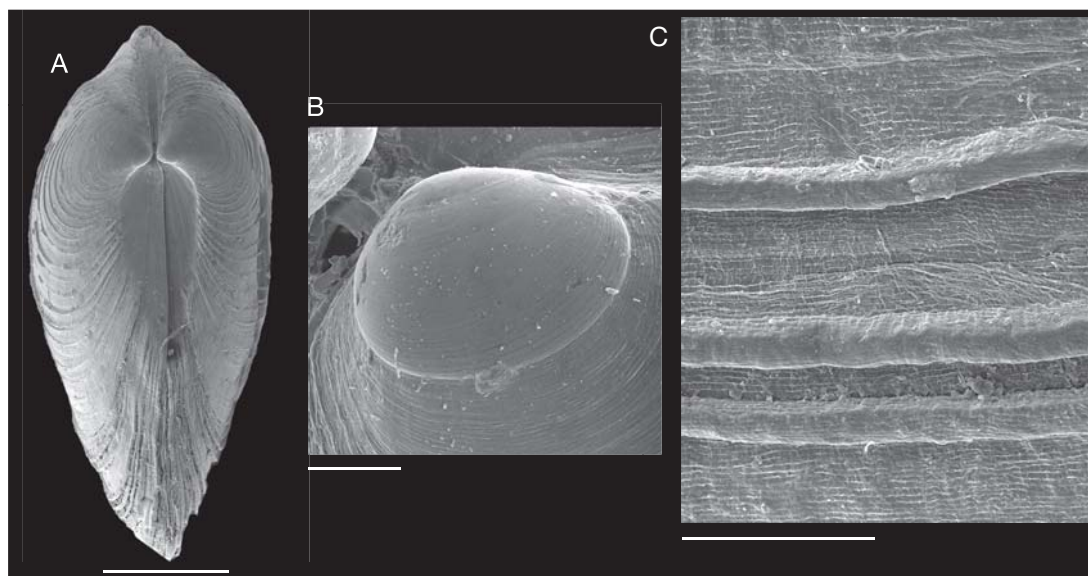


FIG. 41. — *Bretskyia scapula* n. gen., n. sp., Pandanan Island, Philippines: **A**, dorsal view of paratype (BMNH 20050580); **B**, protoconch; **C**, detail of sculpture. Scale bars: A, 1 mm; B, 50 µm; C, 100 µm.

right valve, lateral teeth absent. Anterior adductor muscle scar short, reniform, detached from pallial line for about 1/3 of length. Pallial line entire. Shell margin smooth.

REMARKS

The material from the Philippines, on which this new species and genus is based, consists of seven live-collected shells. The characters are highly distinctive and unlike any other known lucinid. Although we have only a single right valve of this species from New Caledonia, it matches the characters of the type specimens.

Genus *Fimbria* Mühlfeld, 1811

*Fimbria* Mühlfeld, 1811: 52.

TYPE SPECIES. — *Fimbria magna* Mühlfeld, 1811 (junior synonym of *Venus fimbriata* Linnaeus, 1758). (monotypy).

DIAGNOSIS. — Shell large, thick, ovate, anteriorly extended, inflated. Umbones low. Sculpture of radial ribs crossed by closely spaced, rounded commarginal lamellae. Lunule short, lanceolate. Ligament set in

shallow groove. Hinge massive, with 2 cardinal teeth in each valve, a single, large anterior lateral tooth close to cardinals, with smaller posterior lateral located above posterior adductor scar. Anterior adductor muscle scar short, broad, reniform in outline, slightly deviating from the pallial line. Pallial line entire. Interior shell margin strongly denticulate.

REMARKS

Although often separated as a distinct family Fimbriidae (e.g., Chavan 1969), recent molecular analysis of *Fimbria fimbriata* indicates that it groups within a monophyletic Lucinidae (Williams *et al.* 2004).

*Fimbria fimbriata* (Linnaeus, 1758)  
(Fig. 42)

*Venus fimbriata* Linnaeus, 1758: 687.

*Fimbria fimbriata* – Nicol 1950: 83, figs 1, 2, 4, 6, 7.

MATERIAL EXAMINED. — **Koumac**. 10 stn, 0-15 m, 29 v, 26 live.

**Touho**. 5 stn, 0-8 m, 8 v, 11 live.

**Lifou**. 10 stn, 0-45 m, 30 v, 14 live.

**Chesterfield Islands**. 14 stn, depth range 25-69 m.

**Other New Caledonia**. LAGON, 21 stn, from intertidal



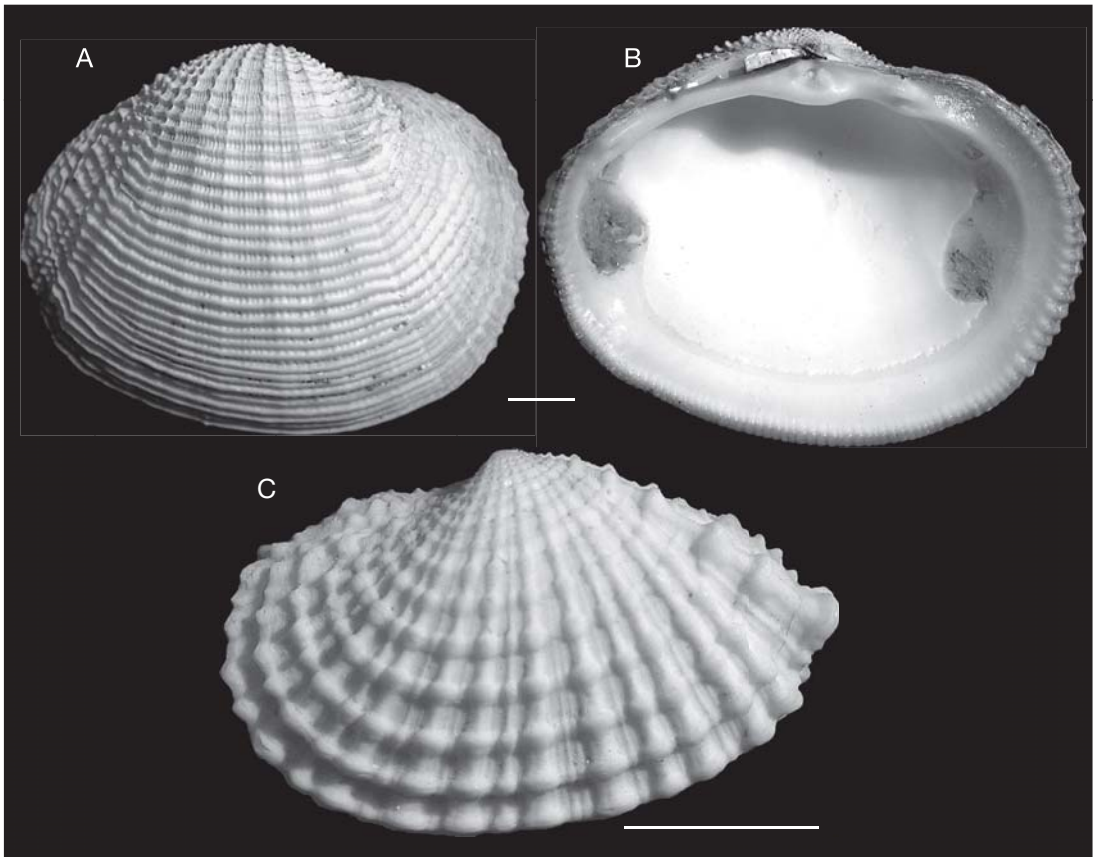


FIG. 42. — *Fimbria fimbriata* (Linnaeus, 1758): **A, B**, exterior of right valve and interior of left valve, Touho, stn 1242, New Caledonia (MNHN); **C**, juvenile, left valve, Koumac, stn 1286 (MNHN). Scale bars: A, B, 10 mm; C, 5 mm.

zone to 48 m.

**Loyalty Islands.** MUSORSTOM 6, stn DW 430, 20°21'S, 166°07'E, 30 m, 3 v. — Stn DW 435, 20°21'S, 166°08'E, 32 m, 1 v; Ouvéa lagoon, 5 sh.

**DISTRIBUTION.** — Central IWP: Andaman Islands to Marshall Islands, Fiji and Tonga (see Nicol 1950: fig. 9).

#### DESCRIPTION

As generic diagnosis. L to 106 mm, H to 89 mm, commarginal lamellae closely spaced, often sinuous and dividing. Radial ribs more prominent to anterior and posterior. Juvenile shells (Fig. 42C) are generally longer than high and have more prominent commarginal lamellae and posterior sulcus.

#### SUMMARY OF DISTRIBUTION OF LUCINIDS AT KOUMAC, TOUHO AND LIFOU

A range habitats were sampled, from intertidal mangroves, seagrass beds and sands to reef fronts, lagoon sands and deeper passes between the reefs. Full details of the distribution of lucinids at the stations sampled are available on files deposited in MNHN (Malacologie) and NHM (Mollusca Section) and only a brief summary is given below. At the three intensively sampled sites around 75% of stations yielded lucinids, Touho (74%), Koumac (81%) and Lifou (72%).

Inshore sandy habitats from the intertidal to

TABLE 2. — Distribution of Lucinidae in the New Caledonia area with average length.

	Average L (mm)	Intensively sampled sites			New Caledonia other sites	Loyalty Islands	Chesterfield Bank
		Touho	Koumac	Lifou			
<i>Anodontia philippiana</i>	60	*			*		
<i>Anodontia ovum</i>	40	*	*	*	*		
<i>Anodontia hawaiiensis</i>	26	*	*	*	*	*	*
<i>Anodontia vesicula</i>	48	*	*	*	*	*	*
<i>Leucosphaera diaphana</i>	6	*	*		*		
<i>Notomyrtea vincentia</i>	9	*			*		
<i>Myrtina porcata</i>	11	*	*		*		
<i>Myrtina leptolira</i>	17				*	*	*
<i>Poumea coselia</i>	10				*		
<i>Solelucina koumacia</i>	23	*	*	*	*		*
<i>Gonimyrtea avia</i>	10			*		*	
<i>Gonimyrtea fidelis</i>	10		*		*	*	
<i>Codakia paytenorum</i>	55	*	*	*	*		*
<i>Codakia punctata</i>	53	*	*	*	*	*	*
<i>Codakia tigerina</i>	65	*	*	*	*		
<i>Ctena bella</i>	24	*	*	*	*	*	*
<i>Epicodakia nodulosa</i>	16		*	*	*	*	*
<i>Epicodakia sweeti</i>	15	*	*	*	*	*	*
<i>Lepidolucina belepia</i>	14	*			*		
<i>Discolucina virginea</i>	46	*					
<i>Liralucina sperabilis</i>	4	*	*	*			*
<i>Liralucina craticula</i>	5	*					
<i>Liralucina lifouina</i>	5			*			
<i>Liralucina vaubani</i>	3				*		
<i>Ferrocina multiradiata</i>	11	*	*				
<i>Cardiolucina undula</i>	4	*			*		
<i>Pillucina pacifica</i>	4		*	*			
<i>Pillucina copiosa</i>	3	*	*		*		
<i>Wallucina fijiensis</i>	12	*	*	*	*		
<i>Chavania striata</i>	11	*	*		*	*	*
<i>Funafutia levukana</i>	4	*	*	*	*		
<i>Parvidontia laevis</i>	10	*					
<i>Bretskya scapula</i>	9	*					
<i>Fimbria fimbriata</i>	90	*	*	*	*	*	*
Total: 34		26	21	17	25	11	12

about 5 m were characterised by a lucinid fauna of *Codakia* species, *Ctena bella*, *Anodontia ovum*, and *Wallucina fijiensis* while in deeper sandy lagoon bottoms *Liralucina sperabilis* n. comb. and *Pillucina copiosa* n. sp. were most typical. Sand deposits in coral-dominated habitats and reef slopes contained abundant *Funafutia levukana*. Deeper channels and reef passes with muddy substrates had a distinctive fauna dominated by *Leucosphaera diaphana* n. sp. and *Myrtina porcata* n. gen., n. sp. At the Baie du Santal, Lifou, habitats were less varied, comprising coarse, bioclastic sands with no fine sand or mud, and the lucinids were more uniformly distributed.

Notable, however, was the higher abundance of *Anodontia hawaiiensis* and *Solelucina koumacia* n. gen., n. sp. at this more oceanic site.

Of the 34 species of Lucinidae recognised, only three were not present at the three intensively sampled sites (Table 2). Twenty-nine species were recorded from Touho (26 species) and Koumac (21 species) sites. Of these, 18 occurred at both sites (62% overlap), eight species were found only at Touho and another three recorded only at Koumac. Another five species that did not occur either at Touho or Koumac were recorded at other sites around New Caledonia. For the Lifou stations, a

TABLE 3. — Ranked relative abundance of lucinids at the intensively sampled sites (% of total valves).

Koumac	%	Touho	%	Lifou	%
<i>Pillucina copiosa</i>	25.5	<i>Liralucina sperabilis</i>	20.7	<i>Ctena bella</i>	39.3
<i>Liralucina sperabilis</i>	22.1	<i>Anodontia ovum</i>	20.4	<i>Funafutia levukana</i>	33.0
<i>Chavania striata</i>	9.9	<i>Wallucina fijiensis</i>	16.3	<i>Solelucina koumacia</i>	8.1
<i>Funafutia levukana</i>	8.7	<i>Leucosphaera diaphana</i>	10.7	<i>Anodontia hawaiiensis</i>	6.8
<i>Fimbria fimbriata</i>	7.0	<i>Liralucina craticula</i>	5.6	<i>Fimbria fimbriata</i>	2.7
<i>Myrtina porcata</i>	5.3	<i>Funafutia levukana</i>	5.3	<i>Codakia punctata</i>	2.1
<i>Ctena bella</i>	3.9	<i>Myrtina porcata</i>	4.0	<i>Wallucina fijiensis</i>	1.9
<i>Solelucina koumacia</i>	3.5	<i>Pillucina copiosa</i>	3.9	<i>Pillucina pacifica</i>	1.7
<i>Leucosphaera diaphana</i>	3.4	<i>Ctena bella</i>	3.8	<i>Codakia tigerina</i>	1.5
<i>Anodontia hawaiiensis</i>	3.0	<i>Codakia punctata</i>	2.4	<i>Codakia paytenorum</i>	0.7
<i>Pillucina pacifica</i>	1.7	<i>Codakia tigerina</i>	2.4	<i>Epicodakia sweeti</i>	0.7
<i>Codakia punctata</i>	1.4	<i>Fimbria fimbriata</i>	1.5	<i>Epicodakia nodulosa</i>	0.6
<i>Anodontia ovum</i>	1.2	<i>Anodontia hawaiiensis</i>	0.4	<i>Anodontia vesicula</i>	0.3
<i>Codakia tigerina</i>	1.1	<i>Notomyrtea vincentia</i>	0.4	<i>Gonimyrtea fidelis</i>	0.2
<i>Anodontia vesicula</i>	0.7	<i>Codakia paytenorum</i>	0.4	<i>Anodontia ovum</i>	0.1
<i>Epicodakia nodulosa</i>	0.5	<i>Epicodakia sweeti</i>	0.4	<i>Liralucina lifouina</i>	0.1
<i>Gonimyrtea fidelis</i>	0.4	<i>Anodontia vesicula</i>	0.3	<i>Chavania striata</i>	0.1
<i>Codakia paytenorum</i>	0.3	<i>Lepidolucina belepia</i>	0.2		
<i>Epicodakia sweeti</i>	0.2	<i>Anodontia philippiana</i>	0.2		
<i>Wallucina fijiensis</i>	0.2	<i>Chavania striata</i>	0.2		
<i>Ferrocina multiradiata</i>	0.1	<i>Discolucina virginea</i>	0.1		
		<i>Ferrocina multiradiata</i>	0.1		
		<i>Cardiolucina undula</i>	0.05		
		<i>Parvidontia laevis</i>	0.05		
		<i>Bretskyia scapula</i>	0.05		
Total valves	1216		2023		2178

total of 18 species of Lucinidae was recognised, with only two unique species, and 89% of the species were shared with the Touho and Koumac sites.

In terms of species abundance the three sites differed considerably (Table 3). At Touho and Koumac many species were quite rare with 40% and 38% occurring at three stations or less, while at Lifou only 22% of species occurred at less than three stations. At Touho the most abundant taxa were *Liralucina sperabilis* n. comb. (c. 20% of valves), *Anodontia ovum* (20%), *Wallucina fijiensis* (16%) and *Leucosphaera diaphana* n. sp. (10%). While at Koumac, *Pillucina copiosa* n. sp. (26%), *Liralucina sperabilis* n. comb. (22%), *Chavania striata* (10%) and *Funafutia levukana* (9%) were dominant. By contrast, at Lifou, 39% of the valves consisted of *Ctena bella* and 33% *Funafutia levukana*. Species varied considerably in distributional range (Table 4); at Touho the most widespread species was *Ctena bella* occurring at 45% of the 29 stations with lucinids, followed by *Liralucina sperabilis* n. comb. (41%)

and *Pillucina copiosa* n. sp. (35%). At Koumac, *Pillucina copiosa* n. sp. occurred at 56% of stations with lucinids, followed by *Ctena bella* (41%) and *Liralucina sperabilis* n. comb. (36%). At Lifou, the lucinid fauna was much more uniformly distributed and from the 47 stations at which lucinids were recorded, *Ctena bella* occurred at 79%, *Funafutia levukana* at 70% and *Anodontia hawaiiensis* at 47% of sites.

## DISCUSSION

### SPECIES RICHNESS

In this study we have recorded a total of 34 species of Lucinidae from New Caledonia and the Loyalty Islands (at depths < 200 m) and this is the most species-rich lucinid fauna yet recorded from anywhere in the world. Most New Caledonian Lucinidae are small (Table 2), 68% of them measuring less than 20 mm shell length, 31% less than 10 mm, with

TABLE 4. — Ranked occurrence of lucinids among stations at the intensively sampled sites (% of stations with lucinids; n, number of stations).

Koumac			Touho			Lifou		
	n	%		n	%		n	%
<i>Pillucina copiosa</i>	22	56	<i>Ctena bella</i>	13	45	<i>Ctena bella</i>	37	79
<i>Ctena bella</i>	16	41	<i>Liralucina sperabilis</i>	12	41	<i>Funafutia levukana</i>	33	70
<i>Liralucina sperabilis</i>	14	36	<i>Pillucina copiosa</i>	10	35	<i>Anodontia hawaiiensis</i>	22	47
<i>Chavania striata</i>	12	31	<i>Anodontia ovum</i>	8	28	<i>Codakia punctata</i>	15	32
<i>Fimbria fimbriata</i>	10	26	<i>Funafutia levukana</i>	8	28	<i>Epicodakia nodulosa</i>	11	23
<i>Funafutia levukana</i>	9	23	<i>Liralucina craticula</i>	6	21	<i>Solelucina koumacia</i>	10	21
<i>Anodontia hawaiiensis</i>	8	21	<i>Codakia tigerina</i>	5	17	<i>Pillucina pacifica</i>	10	21
<i>Solelucina koumacia</i>	8	21	<i>Wallucina fijiensis</i>	5	17	<i>Fimbria fimbriata</i>	10	21
<i>Anodontia ovum</i>	5	13	<i>Fimbria fimbriata</i>	5	17	<i>Codakia paytenorum</i>	9	19
<i>Codakia tigerina</i>	5	13	<i>Codakia punctata</i>	4	14	<i>Epicodakia sweeti</i>	9	19
<i>Pillucina pacifica</i>	5	13	<i>Anodontia philippiana</i>	3	10	<i>Codakia tigerina</i>	7	15
<i>Myrtina porcata</i>	4	10	<i>Anodontia hawaiiensis</i>	3	10	<i>Wallucina fijiensis</i>	7	15
<i>Codakia punctata</i>	4	10	<i>Leucosphaera diaphana</i>	3	10	<i>Anodontia vesicula</i>	4	9
<i>Anodontia vesicula</i>	3	8	<i>Epicodakia sweeti</i>	3	10	<i>Gonimyrtea fidelis</i>	4	9
<i>Codakia paytenorum</i>	3	8	<i>Chavania striata</i>	3	10	<i>Anodontia ovum</i>	2	4
<i>Epicodakia nodulosa</i>	3	8	<i>Anodontia vesicula</i>	2	7	<i>Chavania striata</i>	2	4
<i>Epicodakia sweeti</i>	3	8	<i>Codakia paytenorum</i>	2	7	<i>Liralucina lifouina</i>	1	2
<i>Leucosphaera diaphana</i>	2	5	<i>Lepidolucina belepia</i>	2	7			
<i>Gonimyrtea fidelis</i>	2	5	<i>Discolucina virginea</i>	2	7			
<i>Ferrocina multiradiata</i>	1	3	<i>Notomyrtea vincentia</i>	1	3			
<i>Wallucina fijiensis</i>	1	3	<i>Myrtina porcata</i>	1	3			
			<i>Ferrocina multiradiata</i>	1	3			
			<i>Cardiolucina undula</i>	1	3			
			<i>Parvidontia laevis</i>	1	3			
			<i>Bretskyia scapula</i>	1	3			
Total stations with lucinids	39			29			47	
Total stations sampled	48			39			65	

some of the most abundant taxa, *Pillucina*, *Liralucina* n. gen. and *Funafutia*, less than 5 mm.

Bouchet *et al.* (2002) have argued that the high molluscan species diversities recorded for New Caledonia are likely unexceptional for the IWP, but are a product of the massive collecting effort, as well as attention to sampling of small species and specialized habitats. Certainly, for lucinids, no other area within the tropical Indo-West Pacific has been sampled so intensively and furthermore, little attention has been given to small species, making comparison with other areas difficult. Based on museum collections (AMS), a high species richness would be expected from the Great Barrier Reef but no detailed collations have been made. Furthermore, no detailed inventories have yet been completed in the central Indonesia/Philippines diversity hot spot. Elsewhere in the Pacific, 17 species of Lucinidae, out of 339 bivalves, have been reported from Guam (Paulay 2003), and only five species from

the more isolated Hawaiian Islands (Kay 1979). From the Red Sea, including some intensively sampled sites at Sarfaga and Aqaba, 24 species have been recorded (Oliver 1992; Taylor & Glover 2002, 2005; Zuchsin & Oliver 2003). By contrast, only five species are known from Rodrigues in the southwestern Indian Ocean (Oliver *et al.* 2004). In the Atlantic Ocean, recent intensive sampling and collation of all museum and published records for the Florida Keys yielded 22 lucinid species (Bieler & Mikkelsen 2004). From the West African coast between Mauritania and Southern Angola, 24 species are recorded from depths less than 200 m (Cosel 2006: 851). In the tropical eastern Pacific, 26 species are recorded from shallow waters (Keen 1971; Coan & Valentich-Scott unpubl.). In the Japanese islands, ranging from subtropical to cool temperate latitudes, 23 species are recorded (Matsukuma 2000). At higher latitudes, lucinids are much less diverse with eight shallow-water species recorded from the



Mediterranean (CLEMAM, Checklist of European Marine Mollusca, <http://www.somali.asso.fr/clemam>), four from NW Europe, six from the temperate NW Pacific (Coan *et al.* 2000) and three from New Zealand (Spencer & Willan 1996).

#### DISTRIBUTION IN THE INDO-PACIFIC

Although we have described 18 new species, it is likely that most of these will not be endemic to New Caledonia. Faunas from other Pacific islands have not been investigated as intensively and there is little comparative information. Some species may be very widespread, for instance, shells closely resembling *Liralucina sperabilis* n. comb. and *Funafutia levukana* have been described from the northern Red Sea (Zuschin & Oliver 2003) and some *Anodontia* species range from the Pacific as far westwards as the Red Sea (Taylor & Glover 2005). Although many species are shared with the Great Barrier Reef there are some notable differences; for example, lucinids with a divaricate sculpture, *Divaricella*, *Divalinga* and *Divalucina* are absent from New Caledonia and indeed from the Pacific other than mainland and islands of eastern Australia, southern Japan or New Zealand (Dekker & Goud 1994). For example, *Divaricella irpex* (Smith, 1885) is abundant in some reef lagoons of the Great Barrier Reef but does not extend eastwards to Pacific reefs. *Austriella corrugata* (Deshayes, 1843), a large lucinid closely associated with mangroves, is common in tropical Australia, New Guinea and New Britain, but appears absent from Pacific islands.

One of the most distinctive of the new lucinids is *Solelucina koumacia* n. gen., n. sp., around 20 mm in length and with radial red rays, and it is surprising that it has not been previously recognised nor seen in other museum collections. It seems restricted in distribution to Chesterfield Bank, New Caledonia and the Loyalty Islands.

#### DIVERSITY OF CHEMAUTOTROPHS IN REEFAL ENVIRONMENTS

This study has confirmed empirical observations that the highest diversities of lucinids occur in coral reef associated habitats of the Indo-West Pacific. Lucinids are nutritionally largely reliant on the obligate chemosymbiosis with sulphide-oxidising

bacteria housed in the ctenidia (Distel 1998; Taylor & Glover 2006). They depend on exploiting dissolved sulphides in interstitial water from the sub-oxic zones of marine sediments. Although some lucinids are associated with sites of high organic input such as mangroves, black muds and cold seeps it seems paradoxical that many others occur in sediments with apparently much lower levels of organic input as in oligotrophic reefal environments. Within reef systems, lucinids are often associated with seagrass-vegetated sediment where sulphide levels may be more elevated (review in Barnes & Hickman 1999), but others, such as *Fimbria*, occur in unvegetated, white sand areas with seemingly little organic or sulphide content. However, the sources of organic input may be less obvious, for example, Wild *et al.* (2004) have highlighted the importance of coral mucus in the economy of coral lagoons; aggregates of mucus may provide up to 20% of the total organic carbon metabolized by the sediment-living community. In some coral lagoons located in clear oligotrophic waters, the dominant bivalves are often those possessing photosymbionts (*Tridacna*, *Hippopus*, *Fragum*) or chemosymbionts (lucinids) (e.g., Réao in Tuamotus [Salvat 1972]; Lizard Island, Queensland, pers. obs.). Little is known about the biology of coral reef lucinids and most are known only from dead shells but they are likely to be exploiting sulphides in the sediment in differing ways. *Anodontia ovum* for example burrows up to 25 cm into the sediment while *Fimbria fimbriata* lives close to the surface.

#### Acknowledgements

The bivalves reported on here result from a huge sampling effort by many people over many years. We are grateful to Philippe Bouchet (MNHN) for granting access to the New Caledonia lucinid samples, for discussion and encouragement, and to his colleagues Virginie Héros, Philippe Maestrati and Pierre Lozouet for much assistance and Rudo von Cosel for discussions on lucinid systematics.

We thank Harry Taylor and Phil Crabb (BMNH) who produced most of the macro-images and Alex Ball and Ben Williamson (BMNH Electron Microscope Unit) for much help and advice. Philippe Poppe

generously donated the type material of *Bretskya scapula* n. gen., n. sp. Chris Rowley (NMV) loaned the holotype of *Cardita sweeti*. We are grateful to Ian Loch (AMS) for access to collections and loan of eastern Australian samples. Our friends Yuri and Tanya Kantor generously shared their apartment and meals during several visits to Paris.

An award from SYS-RESOURCE facilitated the initial work on MNHN collections. We acknowledge the continuing support for our lucinid research from The Natural History Museum, London and Prof. Phil. Rainbow in particular.

## REFERENCES

- ADAMS A. 1855. — Descriptions of twenty-five new species of shells from the collection of Hugh Cuming Esq. *Proceedings of the Zoological Society of London* 1855: 221-227.
- BARNES P. A. G. & HICKMAN C. S. 1999. — Lucinid bivalves and marine angiosperms: a search for causal relationships, in WALKER D. I. & WELLS F. E. (eds), *The Seagrass Flora and Fauna of Rottne Island, Western Australia*. Western Australian Museum, Perth: 215-238.
- BIELER R. & MIKKELSEN P. M. 2004. — Marine bivalves of the Florida Keys: a qualitative faunal analysis based on original collections, museum holdings and literature data. *Malacologia* 46: 503-544.
- BOUCHET P. 1994. — Atelier Biodiversité récifale, Expédition Montrouzier, Touho-Koumac, Nouvelle-Calédonie 23 août-5 novembre 1993. *ORSTOM, Centre de Nouméa, Rapports de Missions, Sciences de la Mer, Biologie marine* 24: 1-63.
- BOUCHET P., HÉROS V., LE GOFF A., LOZOUET P. & MAESTRATI P. 2001. — *Atelier Biodiversité Lifou 2000, grottes et récifs coralliens*. Rapport de mission, Paris, 110 p.
- BOUCHET P., LOZOUET P., MAESTRATI P. & HÉROS V. 2002. — Assessing the magnitude of species richness in tropical marine environments: exceptionally high numbers of molluscs at a New Caledonia site. *Biological Journal of the Linnean Society* 75: 421-436.
- BRETSKY S. S. 1976. — Evolution and classification of the Lucinidae (Mollusca; Bivalvia). *Palaeontographica Americana* 8 (50): 219-337.
- CALLENDER W. R. & POWELL E. N. 1997. — Autochthonous death assemblages from chemautotrophic communities at petroleum seeps: palaeoproduction, energy flow and implications from the fossil record. *Historical Biology* 12: 165-198.
- CARY S. C., FRY B., FELBECK H. & VETTER R. D. 1989. — Habitat characterization and nutritional strategies of the endosymbiont-bearing bivalve *Lucinoma aequizonata*. *Marine Ecology Progress Series* 55: 31-45.
- CHAVAN A. 1937. — Essai critique de classification des lucines. *Journal de Conchyliologie* 81: 133-153; 198-216; 237-282.
- CHAVAN A. 1938. — Essai critique de classification des lucines. *Journal de Conchyliologie* 82: 59-97; 105-130; 215-241.
- CHAVAN A. 1969. — Superfamily Lucinacea Fleming, 1828, in MOORE R. C. (ed.), *Treatise on Invertebrate Paleontology*, Part N, *Mollusca* 6, *Bivalvia*, vol. 2. Geological Society of America and University of Kansas, Boulder, Colorado: N491-N518.
- COAN E. V., SCOTT P. V. & BERNARD F. R. 2000. — *Bivalve Seashells of Western North America*. Santa Barbara Museum of Natural History, Santa Barbara, 764 p.
- CONRAD T. A. 1837. — Descriptions of new marine shells, from Upper California. Collected by Thomas Nuttall Esq. *Journal Academy of Natural Sciences, Philadelphia* 7: 227-268.
- COSEL R. VON 2006. — Taxonomy of tropical West African bivalves VI. Remarks on Lucinidae (Mollusca, Bivalvia), with descriptions of six new genera and eight new species. *Zoosystema* 28 (4): 805-851.
- COTTON B. C. 1961. — *The Molluscs of South Australia*. Part I. *The Pelecypoda*. South Australian Branch of the British Science Guild, Adelaide, 363 p.
- DALL W. H. 1901. — Synopsis of the Lucinacea and of the American species. *Proceedings of the United States National Museum* 23: 779-833.
- DALL W. H., BARTSCH P. & REHDER H. A. 1938. — A manual of the Recent and fossil marine pelecypod mollusks of the Hawaiian Islands. *Bulletin of the Bernice P. Bishop Museum* 153: 1-233.
- DEKKER H. & GOUD J. 1994. — Review of the living Indo-West-Pacific species of *Divaricella* sens auct. With descriptions of two new species and a summary of species from other regions. *Vita Marina* 42: 115-136.
- DESHAYES M. G. P. 1832. — *Encyclopédie méthodique. Histoire naturelle des vers, par Bruguière et de Lamarck*. Volume 2 (2). Agasse, Paris: 145-584.
- DESHAYES M. G. P. 1863. — *Conchyliologie de l'Île de la Réunion*. Dentu, Paris, 144 p.
- DISTEL D. L. 1998. — Evolution of chemoautotrophic endosymbioses in bivalves. *Bioscience* 48: 277-286.
- DUNKER W. 1882. — Index Molluscorum Maris Japonici. *Novitates Conchologicae*, Supplement 7: 1-301.
- FINLAY H. J. 1927. — New specific names for Austral Mollusca. *Transactions of the New Zealand Institute* 57: 488-533.
- FISHER C. R. 1990. — Chemoautotrophic and methanotrophic symbioses in marine invertebrates. *Reviews in Aquatic Sciences* 2: 399-436.
- FRENKIEL L., GROS O. & MOUËZA M. 1996. — Gill structure in *Lucina pectinata* (Bivalvia: Lucinidae)

- with reference to hemoglobin in bivalves with symbiotic sulphur-oxidising bacteria. *Marine Biology* 125: 511-524.
- GLOVER E. A. & TAYLOR J. D. 1997. — New species and records of *Rastafaria* and *Megaxinus* from the western Indian Ocean and Red Sea, with a reappraisal of *Megaxinus*. *Journal of Conchology* 36: 1-18.
- GLOVER E. A. & TAYLOR J. D. 2001. — Systematic revision of Australian and Indo-Pacific Lucinidae (Mollusca: Bivalvia): *Pillucina*, *Wallucina* and descriptions of two new genera and four new species. *Records of the Australian Museum* 53: 263-292.
- GLOVER E. A., TAYLOR J. D. & ROWDEN A. A. 2004. — *Bathyaustriella thionipta*, a new lucinid bivalve from a hydrothermal vent on the Kermadec Ridge, New Zealand and its relationship to shallow-water taxa (Bivalvia: Lucinidae). *Journal of Molluscan Studies* 70: 283-295.
- GOULD A. 1850. — Shells collected by the United States Exploring Expedition under the command of Charles Wilkes. *Proceedings of the Boston Society of Natural History* 3: 252-256.
- GOULD A. 1852. — Mollusca and shells, in *United States Exploring Expedition during the Years 1839-1842 under the Command of Charles Wilkes, USN*. Volume 12. Sherman, Philadelphia, 510 p.
- HABE T. 1977. — *Systematics of Mollusca in Japan, Bivalvia and Scaphopoda*. Hokuryukan, Tokyo, 372 p.
- HEDLEY C. 1899. — The Mollusca of Funafuti. Part II. Pelecypoda and Brachiopoda. *Memoirs of the Australian Museum* 3: 491-510.
- HEDLEY C. 1909. — Mollusca from the Hope Islands, North Queensland. *Proceedings of the Linnean Society of New South Wales* 34: 420-466.
- HEDLEY C. 1913. — Studies on Australian Mollusca. Part XI. *Proceedings of the Linnean Society of New South Wales* 38: 258-339.
- HICKMAN C. S. 1994. — The genus *Parvilucina* in the Eastern Pacific: making evolutionary sense of a chemosymbiotic species complex. *Veliger* 37: 43-61.
- HICKMAN C. S. & BARNES P. A. G. 1999. — Fossil lucinid bivalves of Rottnest Island: anomalous Late Quaternary geographic distributions, in WALKER D. I. & WELLS F. E. (eds), *The Seagrass Flora and Fauna of Rottnest Island, Western Australia*. Western Australian Museum, Perth: 239-245.
- IREDALE T. 1924. — Results from Roy Bell's molluscan collections. *Proceedings of the Linnean Society of New South Wales* 49: 179-278.
- IREDALE T. 1930. — More notes on the marine Mollusca of New South Wales. *Records of the Australian Museum* 17: 384-407.
- IREDALE T. 1936. — Australian molluscan notes: No. 2. *Records of the Australian Museum* 19: 267-340.
- IREDALE T. 1937. — Middleton and Elizabeth Reefs, South Pacific Ocean. Mollusca. *Australian Zoologist* 8: 232-261.
- ISSEL A. 1869. — *Malacologia del Mare Rosso, ricerche zoologiche e paleontologiche*. Editori della Biblioteca Malacologia, Pisa, 387 p.
- JOHNSON R. 1964. — The Recent Mollusca of Augustus Addison Gould. *Bulletin of the United States National Museum* 239: 1-182.
- KAY E. A. 1979. — Hawaiian marine shells. *Bernice P. Bishop Museum Special Publication* 64 (4): 1-652.
- KEEN A. M. 1971. — *Seashells of Tropical West America; Marine Mollusks from Baja California to Peru*. 2nd ed. Stanford University Press, Stanford, California, 1064 p.
- KURODA T., HABE T. & OYAMA K. 1971. — *The Seashells of Sagami Bay*. Maruzen, Tokyo, 489 p.
- LAMPRELL K. & WHITEHEAD T. 1992. — *Bivalves of Australia*. Crawford House Press, Bathurst, Australia, 182 p.
- LAMPRELL K. & HEALY J. 1998. — *Bivalves of Australia*. Volume 2. Backhuys Publishers, Leiden, 288 p.
- LAMY É. 1920. — Révision des Lucinacea vivants du Muséum d'Histoire naturelle de Paris. *Journal de Conchyliologie* 65: 71-222.
- LAMY É. 1921. — Révision des Lucinacea vivants du Muséum d'Histoire naturelle de Paris. *Journal de Conchyliologie* 65: 223-388 (dated 1920, published 1921).
- LEBATA J. H. L. 2000. — Elemental sulfur in the gills of the mangrove mud clam *Anodontia edentula* (family Lucinidae). *Journal of Shellfish Research* 19: 241-245.
- LINK H. F. 1807. — *Beschreibung der Naturalien-Sammlung der Universität Rostock*. Universität zu Rostock, Rostock, 160 p.
- LINNAEUS C. 1758. — *Systema Naturae per Regna Tria Naturae, Secundum Classes, Ordines, Genera, Species, cum Characteribus, Differentiis, Synonymis, Locis*. Tomus 1, 10th ed. L. Salvii, Stockholm, 824 p.
- LYNGE H. 1909. — The Danish Expedition to Siam 1899-1900. IV. Marine Lamellibranchiata. *Kongelige Danske Videnskabernes Selskabs Skrifter* 5: 101-299.
- LUTAENKO K. A. 2000. — Russian contributions to studies of Vietnamese bivalves. Part 2. List of species recorded by Russian authors or stored in museums. *Phuket Marine Biological Center Special Publication* 21: 361-390.
- MAES V. O. 1967. — The littoral marine mollusks of Cocos Keeling Islands (Indian Ocean). *Proceedings of the Academy of Natural Sciences of Philadelphia* 119: 93-217.
- MARWICK J. 1929. — Tertiary molluscan fauna of Chatton, Southland. *Transactions of the New Zealand Institute* 59: 903-934.
- MATSUKUMA A. 2000. — Lucinidae, Ungulinidae, Thyasiridae, in OKUTANI T. (ed.), *Marine Mollusks in Japan*. Tokai University Press, Tokyo: 929-937.

- MAY W. L. 1903. — On Tenison-Woods types in the Tasmanian Museum, Hobart. *Proceedings of the Royal Society of Tasmania* 1902: 106-114.
- MELVILL J. C. & STANDEN R. 1895. — Notes on a collection of shells from Lifou and Uvea, Loyalty Islands, formed by the Rev. James and Mrs Hadfield, with list of species. *Journal of Conchology* 8: 84-132.
- MELVILL J. C. & STANDEN R. 1899. — Report on the marine Mollusca obtained during the first expedition of Professor A. C. Haddon to the Torres Strait in 1888-89. *Journal of the Linnean Society, Zoology* 27: 150-206.
- MÖRCH O. A. L. 1853. — *Catalogus Conchyliorum, reliquit d'Alphonso d'Aguirra & Gadea Comes de Yoldi*. 2. Ludovici Kleini, Hafniae, 74 p.
- MÖRCH O. A. L. 1861. — Beiträge zur Molluskenfauna Central-Amerika's. *Malacozoologische Blätter* 7: 171-213.
- MÜHLFELD, MERGELE VON J. K. 1811. — Entwurf eines neuen Systems der Schalthiergehäuse. *Magazin Gesellschaft Naturforschender Freunde Berlin* 5: 38-72.
- NICOL D. 1950. — Recent species of the lucinoid pelecypod *Fimbria*. *Journal of the Washington Academy of Sciences* 40: 82-87.
- OLIVER P. G. 1992. — *Bivalved Seashells of the Red Sea*. Verlag Christa Hemmen, Wiesbaden; National Museum of Wales, Cardiff, 330 p.
- OLIVER P. G., HOLMES A. M., KILLEEN I. J., LIGHT J. M. & WOOD H. 2004. — Annotated checklist of the marine Bivalvia of Rodrigues. *Journal of Natural History* 38: 3229-3272.
- PAULAY G. 2003. — Marine Bivalvia (Mollusca) of Guam. *Micronesica* 35-36: 218-243.
- PHILIPPI R. A. 1847. — *Lucina. Abbildungen und Beschreibungen neuer oder wenig gekannter Conchylien*. Volume 2. T. Fischer, Casel: 205-207.
- PHILIPPI R. A. 1850. — *Lucina. Abbildungen und Beschreibungen neuer oder wenig gekannter Conchylien*. Volume 3. T. Fischer, Casel. : 101-105.
- PILSBRY H. A. 1921. — Marine Mollusks of Hawaii – XIV, XV. *Proceedings of the Academy of Natural Sciences of Philadelphia* 72: 360-382.
- REEVE L. A. 1850. — Monograph of the genus *Lucina*. *Conchologica Iconica* vol. 6. Reeve, Benham & Reeve, London, 11 pls.
- REID R. G. B. 1990. — Evolutionary implications of sulphide-oxidising symbioses in bivalves, in MORTON B. (ed.), *The Bivalvia – Proceedings of a Memorial Symposium in Honour of Sir Charles Maurice Yonge, Edinburgh, 1986*. Hong Kong University Press, Hong Kong: 127-140.
- RICHER DE FORGES B. 1991. — Les fonds meubles des lagons de Nouvelle-Calédonie: généralités et échantillonnages par dragages, in *Le benthos des fonds meubles des lagons de Nouvelle-Calédonie*. Collection Études et Thèses, ORSTOM, Paris 1: 7-148.
- ROBBA E., GERONIMO I. D., CHAIMANEE N., NEGRI M. P. & SANFILIPPO R. 2002. — Holocene and Recent shallow soft-bottom mollusks from the northern Gulf of Thailand area: Bivalvia. *Bolletino Malacologico* 38: 49-132.
- SACCO F. 1901. — *I molluschi dei terreni terziarii del Piemonte e della Liguria*. Parte 29. Clausen, Torino, 216 p.
- SALISBURY A. E. 1934. — A new species of *Lucina*. *Journal of Conchology* 20: 58.
- SALVAT B. 1972. — La faune benthique du lagon de l'atoll de Reao (Tuamotu, Polynésie). *Cahiers du Pacifique* 16: 31-109.
- SCOPOLI G. A. 1777. — *Introductio ad historiam naturalium sistens genera lapidum, plantarum, et animalium*. Gerle, Prague, 506 p.
- SMITH E. A. 1885. — Report on the Lamellibranchiata collected by H.M.S. *Challenger* during the years 1873-76. *Report of the Scientific Results of the Voyage of H.M.S. Challenger 1873-76* 13: 1-341.
- SOTTO F. B. & COSEL R. VON 1982. — Some commercial bivalves of Cebu, Philippines. *The Philippine Scientist* 19: 43-101.
- SPENCER H. G. & WILLAN R. C. 1996. — The marine Fauna of New Zealand: index to the fauna. Mollusca. *New Zealand Oceanographic Institute Memoir* 105: 1-125.
- SWENNEN C., MOOLENBEEK R. G., RUTTANADAKUL N., HOBELINK H., DEKKER H. & HAJISAMAE S. 2001. — The molluscs of the southern Gulf of Thailand. *Thai Studies in Biodiversity* 4: 1-210.
- TAYLOR J. D. & GLOVER E. A. 1997. — The lucinid bivalve genus *Cardiolucina* (Mollusca, Bivalvia, Lucinidae): systematics, anatomy and relationships. *Bulletin of the Natural History Museum, London (Zoology)* 63: 93-122.
- TAYLOR J. D. & GLOVER E. A. 2000 — Functional anatomy, chemosymbiosis and evolution of the Lucinidae, in HARPER E. M., TAYLOR J. D. & CRAME J. A. (eds), *The evolutionary biology of the Bivalvia. Geological Society Special Publication* 177: 207-225.
- TAYLOR J. D. & GLOVER E. A. 2002. — *Lamellolucina*: a new genus of lucinid bivalve with four new species from the Indo-West Pacific. *Journal of Conchology* 37: 317-336.
- TAYLOR J. D. & GLOVER E. A. 2005. — Cryptic diversity of chemosymbiotic bivalves: a systematic revision of worldwide *Anodontia* (Mollusca: Bivalvia: Lucinidae). *Systematics and Biodiversity* 3: 281-338.
- TAYLOR J. D. & GLOVER E. A. 2006. — Lucinidae – the most diverse group of chemosymbiotic molluscs. *Zoological Journal of the Linnean Society* 148: 421-438.
- TENISON-WOODS J. E. 1876. — Description of new Tasmanian shells. *Papers and Proceedings of the Royal Society of Tasmania* 1875: 2-30.



- THIELE J. 1930. — Gastropoda und Bivalvia, in MICHAELSON W. & HARTMEYER R. (eds), *Die Fauna Sudwestaustraliens*. Gustav Fischer, Jena: 561-596.
- TOKUNAGA S. 1906. — Fossils from the environs of Tokyo. *Journal of the College of Science, Imperial University, Tokyo* 21: 1-96.
- WILD C., HUETTEL M., KLUETER A., KREMB S. G., RASHEED M. Y. M. & JØRGENSEN B. B. 2004. — Coral mucus functions as an energy carrier and particle trap in the reef system. *Nature* 428: 66-70.
- WILLIAMS S. T., TAYLOR J. D. & GLOVER E. A. 2004. — Molecular phylogeny of the Lucinoidea (Bivalvia): non-monophyly and separate acquisition of bacterial chemosymbiosis. *Journal of Molluscan Studies* 70: 187-202.
- ZORINA I. P. 1978. — [New species of bivalve molluscs (Bivalvia) of the Gulf of Tonkin (South China Sea)]. *Trudy Zoological Institut, Leningrad* 61: 193-203 (in Russian).
- ZUCHSIN M. & OLIVER P. G. 2003. — *Bivalves and Bivalve Habitats in the Northern Red Sea. The Northern Bay of Safaga (Red Sea, Egypt): an Actinopalaontological Approach*. VI. *Bivalvia*. Naturhistorisches Museum, Vienna, 304 p.

*Submitted on 23 November 2005;  
accepted on 23 June 2006.*