New data on the recent brachiopods from the Fiji and Wallis and Futuna islands, South-West Pacific

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ABSTRACT
Eight genera of recent brachiopods, i.e. *Pelagodiscus*, *Novocrania*, *Cryptopora*, *Xenobrochus*, *Eucalathis*, *Campages*, *Megerlia* and *Thecidellina* have been identified in the material from the Wallis and Futuna Islands, collected during the French cruise MUSORSTOM 7 in 1992. Nineteen genera of recent brachiopods, i.e. *Lingula*, *Novocrania*, *Cryptopora*, *Basiliola*, *Abyssothyris*, *Xenobrochus*, *Dallithyris*, *Terebratulina*, *Eucalathis*, *Fallax*, *Septicollarina*, *Frenulina*, *Argyrotheca*, *Amphithyris*, *Leptothyrella*, *Dallina*, *Nipponithyris*, *Campages* and *Thecidellina* have been recognized in the material collected from the Fiji Islands during the two French cruises MUSORSTOM 10 and BORDAU 1 in 1998 and 1999. Two genera, *Pelagodiscus* and *Megerlia*, found in the Wallis and Futuna region have not been recognized in the material from Fiji. In turn, 13 genera reported from Fiji have not been found in the material from the Wallis and Futuna Islands. Four species are described as new: *Xenobrochus rotundus* n. sp., *Leptothyrella fijiensis* n. sp., *Nipponithyris lauensis* n. sp. and *Campages ovalis* n. sp. *Xenobrochus roduntus* n. sp. differs from congeneric species in rounded outline and small foramen. It is characterized by the rudimentary to absent outer hinge plates and rounded, anteriorly convex transverse band with a slight median fold. *Leptothyrella fijiensis* n. sp. possesses descending branches attached to the median septum, recessive dental plates and tubercles along the sides of the beak. *Nipponithyris lauensis* n. sp. is easily differentiated from other species of the genus by the absence of crura. *Campages ovalis* n. sp. is characterized by its small, oval shell with rectimarginate anterior commissure and small pedicle opening.

KEY WORDS
Brachiopoda,
biodiversity,
biogeography,
Fiji Islands,
Wallis and Futuna,
South-West Pacific,
new species.

RÉSUMÉ

Nouvelles données sur les brachiopodes actuels des îles Fidji et Wallis et Futuna, Sud-Ouest Pacifique.

Huit genres de brachiopodes actuels, *Pelagodiscus*, *Novocrania*, *Cryptopora*, *Xenobrochus*, *Eucalathis*, *Campages*, *Megerlia* et *Thecidellina*, ont été identifiés dans le matériel des îles Wallis et Futuna récolté pendant l'expédition française MUSORSTOM 7 en 1992. Dix-neuf genres de brachiopodes actuels, *Lingula*, *Novocrania*, *Cryptopora*, *Basiliola*, *Abyssothyris*, *Xenobrochus*, *Dallithyris*, *Terebratulina*, *Eucalathis*, *Fallax*, *Septicollarina*, *Frenulina*, *Argyrotheca*, *Amphithyris*, *Leptothyrella*, *Dallina*, *Nipponithyris*, *Campages* et *Thecidellina*, ont été identifiés dans le matériel récolté aux îles Fidji pendant les expéditions françaises MUSORSTOM 10 et BORDAU 1 en 1998 et 1999. Deux genres, *Pelagodiscus* et *Megerlia*, trouvés aux îles Wallis et Futuna ne l'ont pas été aux îles Fidji, tandis que 13 autres trouvés aux îles Fidji ne l'ont pas été aux îles Wallis et Futuna. Quatre espèces sont décrites comme nouvelles : *Xenobrochus rotundus* n. sp., *Leptothyrella fijiensis* n. sp., *Nipponithyris lauensis* n. sp. et *Campages ovalis* n. sp. *Xenobrochus rotundus* n. sp. diffère des espèces congénériques par son contour arrondi et son petit foramen ; elle se caractérise par des plaques cardinales rudimentaires ou absentes et une bande transverse convexe antérieurement avec un petit repli médian. *Leptothyrella fijiensis* n. sp. présente des branches descendantes attachées au septum médian, des lamelles dentales peu développées et des tubercules le long des côtés du bec. *Nipponithyris lauensis* n. sp. se distingue facilement des autres espèces du genre par l'absence de crura et *Campages ovalis* n. sp. se caractérise par sa petite coquille ovale présentant une commissure antérieure à bord droit et un petit foramen.

MOTS CLÉS
Brachiopoda,
biodiversité,
biogéographie,
îles Fidji,
Wallis et Futuna,
Sud-Ouest Pacifique,
espèces nouvelles.

INTRODUCTION

Although intensively studied in the western Pacific, from Japan to New Zealand, recent brachiopods are still poorly known from the south-western Pacific archipelago islands. This paper deals with the brachiopod fauna from Fiji, and Wallis and Futuna islands. The Wallis and Futuna archipelago is situated about two-thirds of the way from Hawaii to New Zealand. This volcanic island group is composed of three main islands (Wallis, Futuna and Alofi) and 20 islets. The Fiji Island group, situated about 250 km to the south-west of Wallis and Futuna, consists of 323 islands and more than 500 islets. The most important islands are Viti Levu and Vanua Levu. The two brachiopod species, *Lingula anatina* Lamarck, 1801 and *Rhynchonella grayi* Woodward, 1955, from off Fiji were recorded by Woodward (1855), Davidson (1880) and Thomson (1927). The first taxonomic study of the brachiopod fauna from Fiji, and Wallis and Futuna islands by Bitner (2006b) was based on a small part of the material collected during the French cruises MUSORSTOM 7, 10 and BORDAU 1, thus providing an incomplete picture of the brachiopod biodiversity. The present paper describes the material collected during these cruises that was not available to the author while preparing the first publication (Bitner 2006b). Those new data allow us to recognize a real brachiopod diversity and their biogeographic distribution. The number of species recognized in the Fiji region increases from nine (Bitner 2006b) to 22, including four new forms. In the Wallis and Futuna region, eight species have been identified.

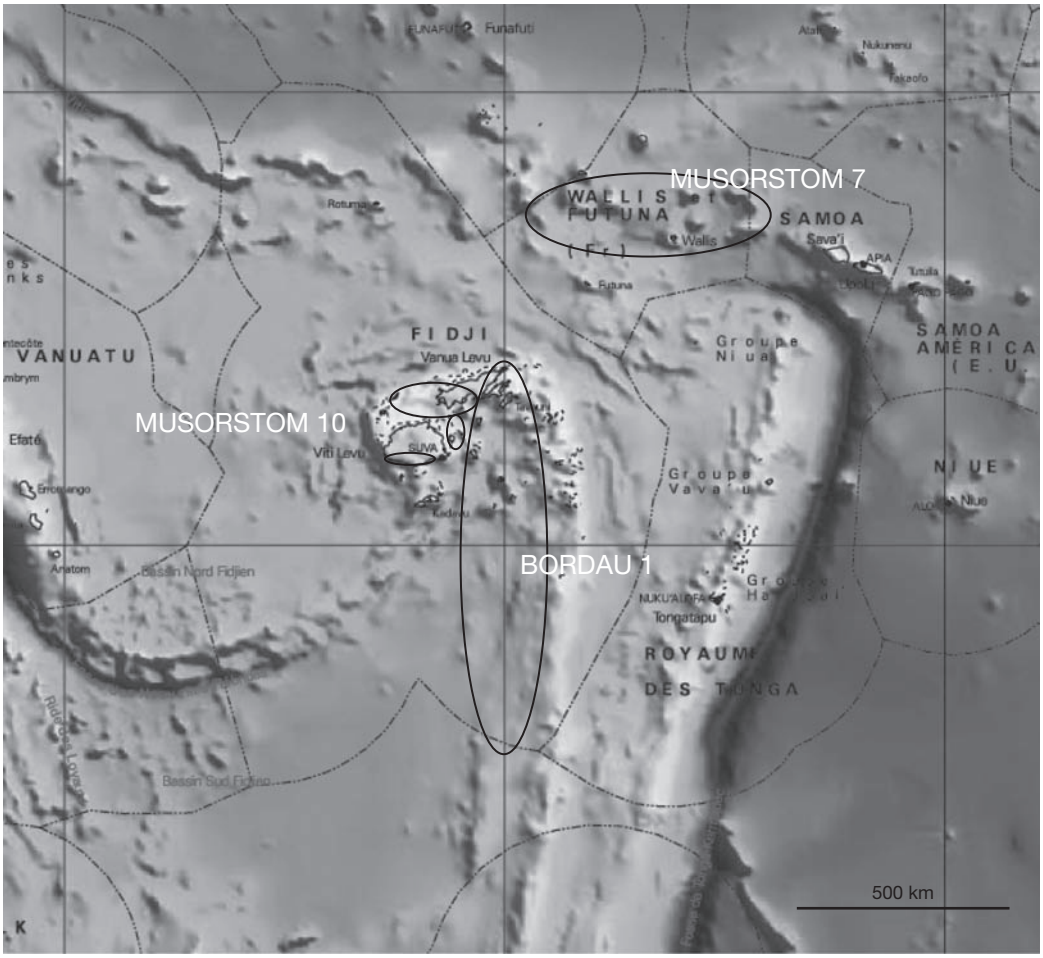

FIG. 1. — South-western Pacific showing areas sampled during the cruises MUSORSTOM 7, 10, and BORDAU 1. Map from ZoNéCo, data after http://www.tropicaldeepseabenthos.org.

MATERIAL AND METHODS

The brachiopods of the Wallis and Futuna Islands were collected by dredging (Warén Dredge, DW) and trawling (beam trawl, CP) during the cruise MUSORSTOM 7 (Fig. 1) on board RV*Alis* from 5th May to 4th June 1992 (Richer de Forges & Menou 1993). They were found in 11 out of 142 stations (but see also Bitner 2006b). A full station list is available at http://www.tropicaldeepseabenthos.org.

The brachiopods of Fiji were sampled by dredging (DW) and trawling (CP; otter trawl, CC) during the two cruises of RV*Alis*. During the first cruise, MUSORSTOM 10 (Fig. 1), 5-19 August 1998, the samples were collected on the outer reef slopes of Viti Levu and from Bligh Water, in the upper bathyal zone and the circalittoral depths (Richer de Forges *et al.* 2000b). The brachiopods were found in 26 out of 82 samples. During the second cruise, BORDAU 1 (Fig. 1), carried out from 22 February

to 14 March 1999, the samples were collected in the Lau Ridge in the upper bathyal zone and the circalittoral depths (Richer de Forges *et al*. 2000a). The brachiopods were found in 42 out of 118 stations (see also Bitner 2006b). A few additional specimens come from the sampling in the lagoons of the Viti Levu Island in Fiji during two shallow water cruises SUVA 2 and SUVA 4 in 1998 and 1999, respectively.

The studied collection includes both the specimens sorted on board ship as well as those picked from the loose sediment in the laboratory which revealed that micromorphic species constitute a significant part of the brachiopod diversity.

All the material of the present study is kept in the Muséum national d'Histoire naturelle, Paris under the numbers MNHN BRA-3056 to 3122. The exact location, depth and species identified at each stations are given in the Appendix.

SYSTEMATICS

The brachiopod classification used in this paper follows that adopted in the revised edition of the *Treatise on Invertebrate Paleontology* (H) Brachiopoda (Kaesler 1997, 2000a, b, 2002, 2006).

Phylum BRACHIOPODA Duméril, 1806
Subphylum LINGULIFORMEA Williams, Carlson, Brunton, Holmer & Popov, 1996
Class LINGULATA Gorjansky & Popov, 1985
Order LINGULIDA Waagen, 1885
Superfamily LINGULOIDEA Menke, 1828
Family LINGULIDAE Menke, 1828

Genus *Lingula* Bruguière, 1797

TYPE SPECIES. — *Lingula anatina* Lamarck, 1801, by designation of ICZN (1985).

Lingula sp.

MATERIAL EXAMINED. — **Fiji.** SUVA 2, Viti Levu, Suva Lagoon, stn CP 65, 1 specimen.

DEPTH. — 32 m.

REMARKS

The very limited, partly broken material prevents any detailed taxonomic assessment. The investigated specimen belongs most probably to the species *L. anatina* Lamarck, 1801, already recorded from that region (Zezina 1985; Emig 1997).

Superfamily DISCINOIDEA Gray, 1840
Family DISCINIDAE Gray, 1840

Genus *Pelagodiscus* Dall, 1908

TYPE SPECIES. — *Discina atlantica* King, 1868, by original designation (Dall 1908: 440).

Pelagodiscus atlanticus (King, 1868)
(Fig. 2)

Discina atlantica King, 1868: 170.

Discinisca atlantica – Davidson 1888: 200-202, pl. 26, figs 18-22.

Pelagodiscus atlanticus – Dall 1908: 440. — Thomson 1927: 130, 131, fig. 37. — Helmcke 1940: 230-234. — Cooper 1973c: 10, pl. 5, fig. 36. — Foster 1974: 39, 40, fig. 13. — Zezina 1975: 903-909, figs 1-7; 1981: 8; 1985: 107; 1987: 555. — Lee 1987: 51, 52, fig. 1c-f. — Laurin 1997: 417. — Álvarez & Emig 2005: 103, fig. 56a-h.

MATERIAL EXAMINED. — **Wallis and Futuna.** MUSORSTOM 7, Combe Bank, stn CP 621, 20 specimens. — Stn CP 623, 4 specimens.

DEPTH RANGE. — 1280-1300 m.

MEASUREMENTS. — See Table 1.

TABLE 1. — Measurements (in mm) of *Pelagodiscus atlanticus* (King, 1868) from Wallis and Futuna, MUSORSTOM 7.

Station No.	Length	Width	Figure
CP 621	4.1	3.7	–
CP 621	3.7	3.4	Fig. 1C
CP 621	3.5	3.6	Fig. 1A
CP 623	3.9	3.8	Fig. 1D

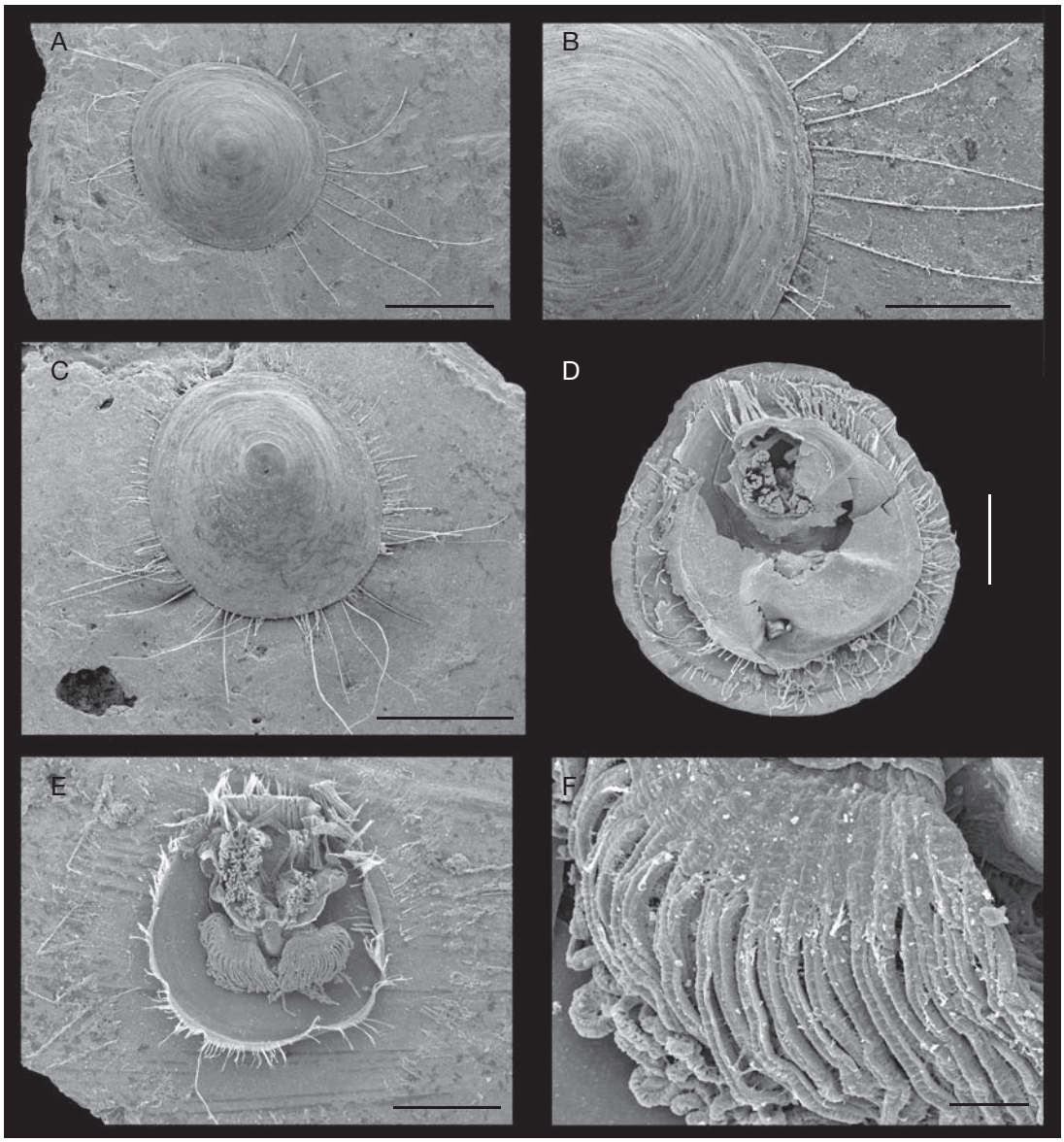

FIG. 2. — *Pelagodiscus atlanticus* (King, 1868), Wallis and Futuna, MUSORSTOM 7: **A**, **B**, dorsal view and enlargement (B) to show details of setae (MNHN BRA-3056), stn CP 621, 1280-1300 m; **C**, dorsal view (MNHN BRA-3057), stn CP 621, 1280-1300 m; **D**, ventral view of complete specimen (MNHN BRA-3058), stn CP 623, 1280-1300 m; **E**, **F**, inner view of ventral valve with soft tissue, visible traces of dorsal valve and dorsal setae, and enlargement (F) of lophophore (MNHN BRA-3059), stn CP 623, 1280-1300 m. Scale bars: A, C, 2 mm; B, D, E, 1 mm; F, 100 µm.

REMARKS

Pelagodiscus atlanticus is one of the most widespread brachiopods, being known from the Atlantic, Pacific and Indian oceans, as well as from northern and southern hemispheres (Emig 1997). The shell is small, oval to subcircular, very thin, chitinophosphatic; the surface smooth with numerous concentric growth lines. The apex is near the valve centre. This species is characterized by its dorsal mantle-edge with numerous setae, short around posterior margin

TABLE 2. — Measurements (in mm) of *Novocrania* sp., from Wallis and Futuna, MUSORSTOM 7.

Station No.	Length	Width	Figure
DW 1333	6.0	7.2	Fig. 3B, C
DW 1333	5.2	5.9	–
DW 1333	3.5	4.0	Fig. 3A
DW 1333	2.8	3.3	–

and very long around anterior margin (Fig. 2C). Although having a very wide depth range from 366 to 6000 m (Zezina 1985), *P. atlanticus* occurs more often below 1000 m and is regarded as a very deep-water species.

Subphylum CRANIIFORMEA
Popov, Bassett, Holmer & Laurie, 1993
Class CRANIATA
Williams, Carlson, Brunton,
Homler & Popov, 1996
Order CRANIIDA Waagen, 1885
Superfamily CRANIOIDEA Menke, 1828
Family CRANIIDAE Menke, 1828

Genus *Novocrania* Lee & Brunton, 2001

TYPE SPECIES. — *Patella anomala* Müller, 1776, by original designation (Lee & Brunton 1986: 150).

Novocrania sp.
(Fig. 3A-C)

MATERIAL EXAMINED. —**Wallis and Futuna.** MUSORSTOM 7, Wallis, stn DW 604, 1 dorsal valve. **Fiji.** MUSORSTOM 10, Bligh Water, stn DW 1333, 9 dorsal valves. — Stn DW 1334, 1 dorsal valve.

DEPTH RANGE. — 200-420 m.

MEASUREMENTS. — See Table 2.

DESCRIPTION

The investigated material consists of only dorsal valves. Shell small (maximum length: 6 mm), subcircular in outline with posterior margin nearly straight. Dorsal valve conical with the beak situated posterocentrally. Surface irregular with variably developed concentric growth lines; fine pustules are visible on some specimens. Interior valve with narrow rim. Posterior adductor muscle scars large and circular. Anterior adductor muscle scars relatively small, not reaching the margin, elevated above the inner surface. Brachial protractor scars prominent. No median ridge or septum.

REMARKS

Several species of craniids have been recognized in the southern Pacific. The investigated specimens differ from the New Zealand *Novocrania huttoni* (Thomson, 1916) which possesses radial ornamentation (Thomson 1916; Lee 1987). *Novocrania indonesiensis* (Zezina, 1981), is similar externally, but differs from the Fiji material in having muscle impressions indistinct and differently arranged; its posterior adductor scars are smaller, and anterior adductor muscle scars are not elevated. Externally, the specimens are also similar to *N. lecointei* (Joubin, 1901) but they differ from the latter species in much smaller size and larger and more distinct muscle scars (Foster 1974).

The absence of the septum excludes the studied specimens from the genus *Craniscus* Dall, 1871. However, the new data from molecular analyses of extant craniids show clearly that the recent species *Craniscus japonicus* (Adam, 1863) belong to a *Neoancistrocrania*-like cluster (Cohen *et al*. 2008), and in consequence *Craniscus* should be restricted to the Upper Jurassic-Lower Cretaceous. The molecular results are also confirmed by the morphological observations, as recent specimens assigned to *Craniscus* lack the prominent median ridge seen in the Jurassic type species *Crania tripartita* von Münster, 1840 (see Lee & Brunton 1986). Dall (1920) assigned the recent brachiopod *Crania japonica* to *Craniscus* and this mistaken attribution has been repeated by all subsequent authors (see discussion in Cohen *et al*. 2008). Logan & Long (2001) already doubted whether recent *Crania japonica* Adams, 1863 should have been assigned to the essentially Upper Jurassic and Lower Cretaceous genus.

Subphylum RHYNCHONELLIFORMEA
Williams, Carlson, Brunton, Holmer &
Popov, 1996

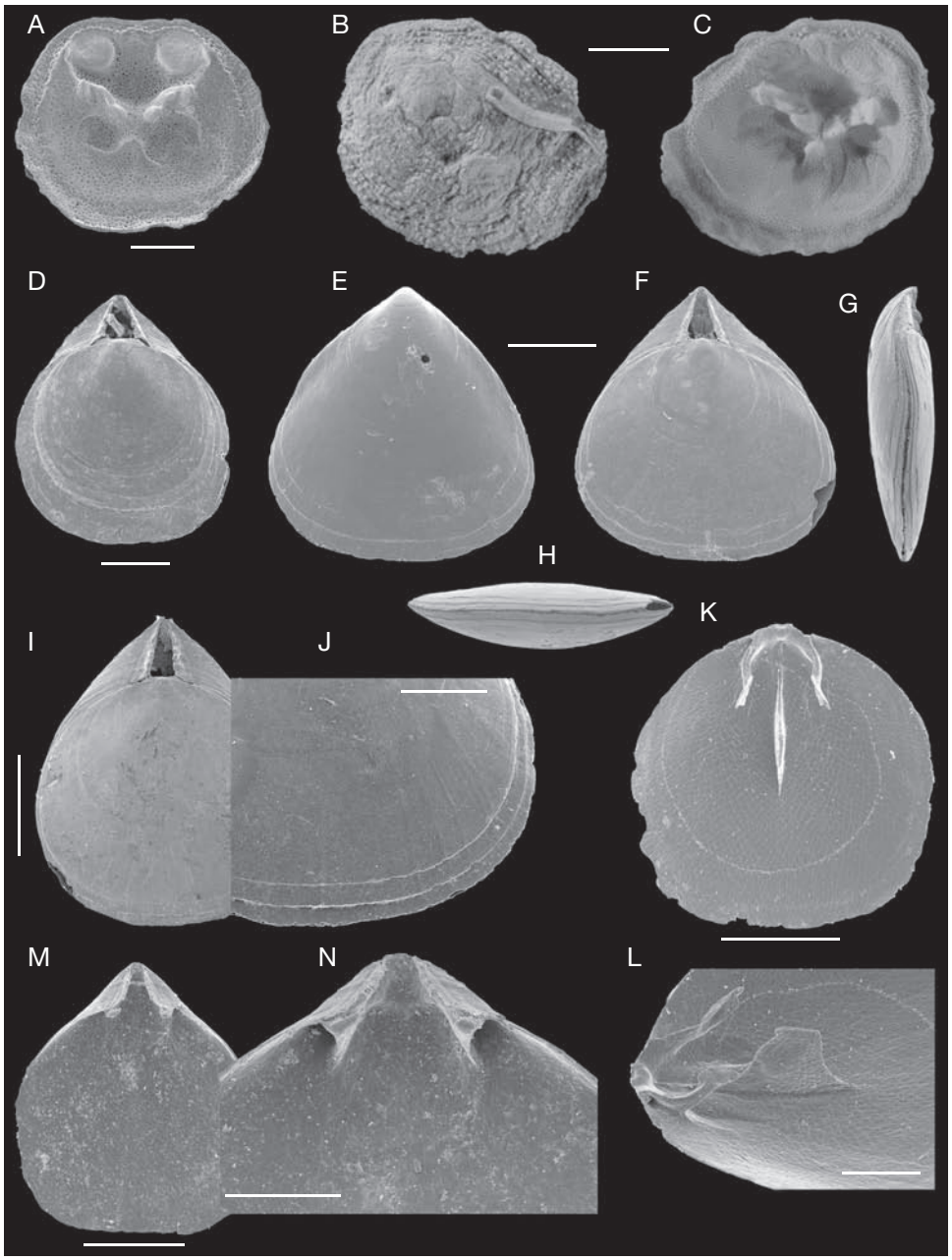

FIG 3. — **A**-**C**, *Novocrania* sp. Fiji, Bligh Water, MUSORSTOM 10, stn DW 1333, 200-215 m: **A**, inner view of dorsal valve (MNHN BRA-3062); **B**, **C**, outer and inner views of dorsal valve (MNHN BRA-3063); **D**-**N**, *Cryptopora maldivensis* Muir-Wood, 1959, Fiji, Bligh Water, MUSORSTOM 10; **D**, dorsal view of young specimen (MNHN BRA-3064), stn DW 1314, 656-660 m; **E**-**H**, ventral, dorsal, lateral and anterior views of complete specimen (MNHN BRA-3065), stn CP 1341, 500-614 m; **I**, **J**, dorsal view of complete specimen (I) and enlarged anterior part (J) to show radial ornamentation (MNHN BRA-3066), stn CP 1341, 500-614 m; **K**, **L**, inner and lateral views of dorsal valve (MNHN BRA-3067), stn CP 1332, 640-687 m; **M**, **N**, inner view of ventral valve (M) and enlargement (N) of posterior part tilted to show dental plates (MNHN BRA-3068), stn CP 1332, 640-687 m. All SEM, except B and C. Scale bars: A, E-I, K, M, 1 mm; B, C, 2 mm; D, J, L, N, 500 µm.

TABLE 3. — Measurements (in mm) of *Cryptopora maldivensis* Muir-Wood, 1959 from Fiji, MUSORSTOM 10.

Station No.	Length	Width	Thickness	Figure
DW 1314	1.8	1.5	0.5	Fig. 3D
CP 1331	2.6	2.3	0.6	–
CP 1332	3.7	3.3	1.0	–
CP 1332	3.3	2.7	0.8	–
CP 1341	3.3	3.1	0.8	Fig. 3E-H
CP 1353	1.6	1.3	0.4	–

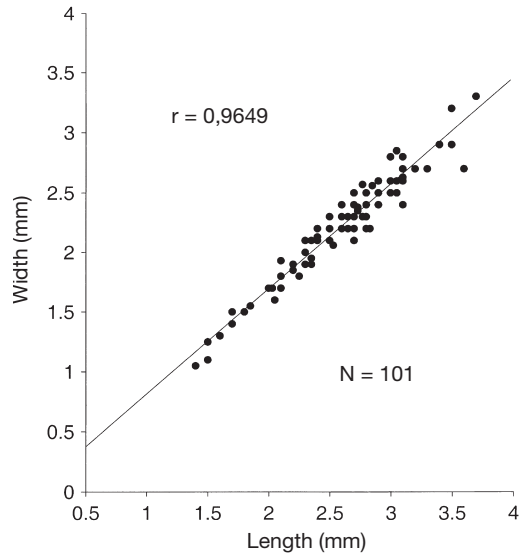

FIG. 4. — Intraspecific variation in *Cryptopora maldivensis* Muir-Wood, 1959. Scatter diagram plotting length/width. **N**, number of specimens.

Class RHYNCHONELLATA Williams, Carlson, Brunton, Holmer & Popov, 1996
Order RHYNCHONELLIDA Kuhn, 1949
Superfamily DIMERELLOIDEA Buckman, 1918
Family CRYPTOPORIDAE Muir-Wood, 1955

Genus *Cryptopora* Jeffreys, 1869

TYPE SPECIES. — *Cryptopora gnomon* Jeffreys, 1869, by monotypy (Jeffreys 1869: 136).

Cryptopora maldivensis Muir-Wood, 1959 (Figs 3D-N)

Cryptopora maldivensis Muir-Wood, 1959: 293, 294, text-fig. 2; pl. 5, figs 1, 3-7. — Zezina 1985: 113.

MATERIAL EXAMINED. — **Wallis and Futuna.** MUSORSTOM 7, Wallis, stn DW 601, 1 complete specimen.
Fiji. MUSORSTOM 10, Bligh Water, stn DW 1314, 2 complete specimens. — Stn CP 1330, 3 complete specimens. — Stn CP 1331, 4 complete specimens. — Stn CP 1332, 13 complete specimens. — Stn DW 1333, 1 complete specimen. — Stn DW 1334, 1 complete specimen. — Stn CP 1341, 60 complete specimens. — Stn DW 1345, 6 complete specimens. — Viti Levu, stn CP 1353, 19 complete specimens. — Stn CP 1354, 1 complete specimen. — Stn DW 1384, 2 complete specimens. — Stn CP 1390, 6 complete specimens.

DEPTH RANGE. — 200-963 m.

MEASUREMENTS. — See Table 3; see also Figure 4.

DESCRIPTION
Shell very small (maximum observed length is 3.7 mm), variable in outline from subtriangular to elongate oval, very thin and translucent. Surface iridescent, smooth, apart from very fine, widely spaced capillae better visible on the anterior half (Fig. 3J); growth lines numerous. The secondary layer fibres are readily visible on the surface and form a mosaic. Shell very weakly biconvex. Anterior commissure rectimarginate. Beak high and pointed with sharp beak ridges. Foramen large, triangular, hypothyrid, bordered by two narrow, elevated deltidial plates. Ventral valve interior with short teeth supported by distinct divergent dental plates (Fig. 3N). Dorsal valve interior with very high but short median septum, small cardinal process in form of depression, and slender crura of maniculiform type (Fig. 3K, L).

REMARKS
Cryptopora maldivensis is one of the commonest species (about 115 specimens) in the investigated material. The studied specimens are consistent with the description given by Muir-Wood (1959), differing only in smaller size; the type material reaches about 5 mm.

In outline and type of the deltidial plates *C. maldivensis* is similar to *C. gnomon* but it differs in being less convex and rectimarginate, while *C. gnomon* is sulcate (Cooper 1959). The shell of *C. gnomon* also lacks capillae.

This is the first record of *Cryptopora* from Fiji, and Wallis and Futuna islands although this genus was identified in the Pliocene deposits of Fiji (Cooper 1978). *Cryptopora maldivensis* was not found on the Lau Ridge.

Superfamily PUGNACOIDEA
Rzhonsnitskaya, 1956
Family BASILIOLIDAE Cooper, 1959

Genus *Basiliola* Dall, 1908

TYPE SPECIES. — *Hemithyris beecheri* Dall, 1895, by original designation (Dall 1908: 442).

Basiliola lucida (Gould, 1862)
(Fig. 5A-G)

Rhynchonella lucida Gould, 1862: 120.

Neohemithyris lucida – Yabe & Hatai 1934a: 587. — Hatai 1940: 210, pl. 1, fig. 44; pl. 6, figs 106, 107.

Basiliola lucida – Cooper 1959: 27, pl. 13, figs 6-23. — Zezina 1985: 115. — Laurin 1997: 419, figs 1a-c, 2a-e, 42a-c.

MATERIAL EXAMINED. — **Fiji.** BORDAU 1, Lau Ridge, stn DW 1469, 58 complete specimens, 6 ventral valves, 6 dorsal valves. — Stn DW 1472, 3 complete specimens. — Stn DW 1497, 2 complete specimens. — Stn CP 1506, 1 complete specimen.

DEPTH RANGE. — 262-377 m.

MEASUREMENTS. — See Table 4.

REMARKS
Basiliola lucida is an easily recognisable basiliolid species by its small size and elongate outline (Hatai 1940; Cooper 1959; Laurin 1997). The shell is smooth with indistinct growth lines, dorsibiconvex and strongly uniplicate. The foramen is small, submesothyrid; deltidial plates conjunct. The teeth are short but wide, corrugated, while the dental sockets are deep with grooves corresponding to those on the teeth. The dorsal interior has subfalciform crura distally serrate and narrow outer hinge plates. No cardinal process is present.

TABLE 4. — Measurements (in mm) of *Basiliola lucida* (Gould, 1862) from Fiji, BORDAU 1.

Station No.	Length	Width	Thickness	Figure
DW 1469	13.3	12.2	8.6	–
DW 1472	12.8	11.3	8.0	Fig. 5A-D
DW 1472	12.1	11.0	8.2	–
DW 1472	11.9	10.8	7.8	–

Basiliola lucida differs from *B. beecheri* in smaller size and much narrower hinge plates.

Basiliola roddai Cooper, 1978 from the Pliocene-Pleistocene deposits of Fiji is very close to *B. lucida*. It differs in being more strongly and narrowly uniplicate and in having a more convex dorsal valve (Cooper 1978).

This is the first record of this species from the Fiji region, from the Lau Ridge.

Basiliola beecheri (Dall, 1895)
(Fig. 5H-L)

Hemithyris beecheri Dall, 1895: 717, pl. 31, figs 1-4.

Basiliola beecheri – Dall 1908: 442. — Cooper 1959: pls 11b, 14a. — Zezina 1985: 115. — Laurin 1997: 420, 421, figs 3, 4, 42 d-k. — Bitner 2006b: 17, fig. 1a-d.

MATERIAL EXAMINED. — **Fiji.** MUSORSTOM 10, Viti Levu, stn DW 1376, 1 complete specimen.
BORDAU 1, Lau Ridge, stn CP 1394, 1 complete specimen, 1 ventral valve, 1 dorsal valve. — Stn DW 1408, 1 ventral valve. — Stn CP 1409, 1 complete specimen. — Stn CP 1412, 21 complete specimens, 1 ventral valve. — Stn DW 1432, 12 complete specimens, 1 dorsal valve. — Stn DW 1464, 1 complete young specimen.

DEPTH RANGE. — 285-561 m.

MEASUREMENTS. — See Table 5.

REMARKS
Basiliola beecheri was already recorded from the Fiji region, but was represented by only two specimens and internal structures were not investigated (Bitner 2006b). This medium-sized, strongly dorsibiconvex species has corrugated teeth supported by dental plates close to the valve wall. Its inner socket ridges are

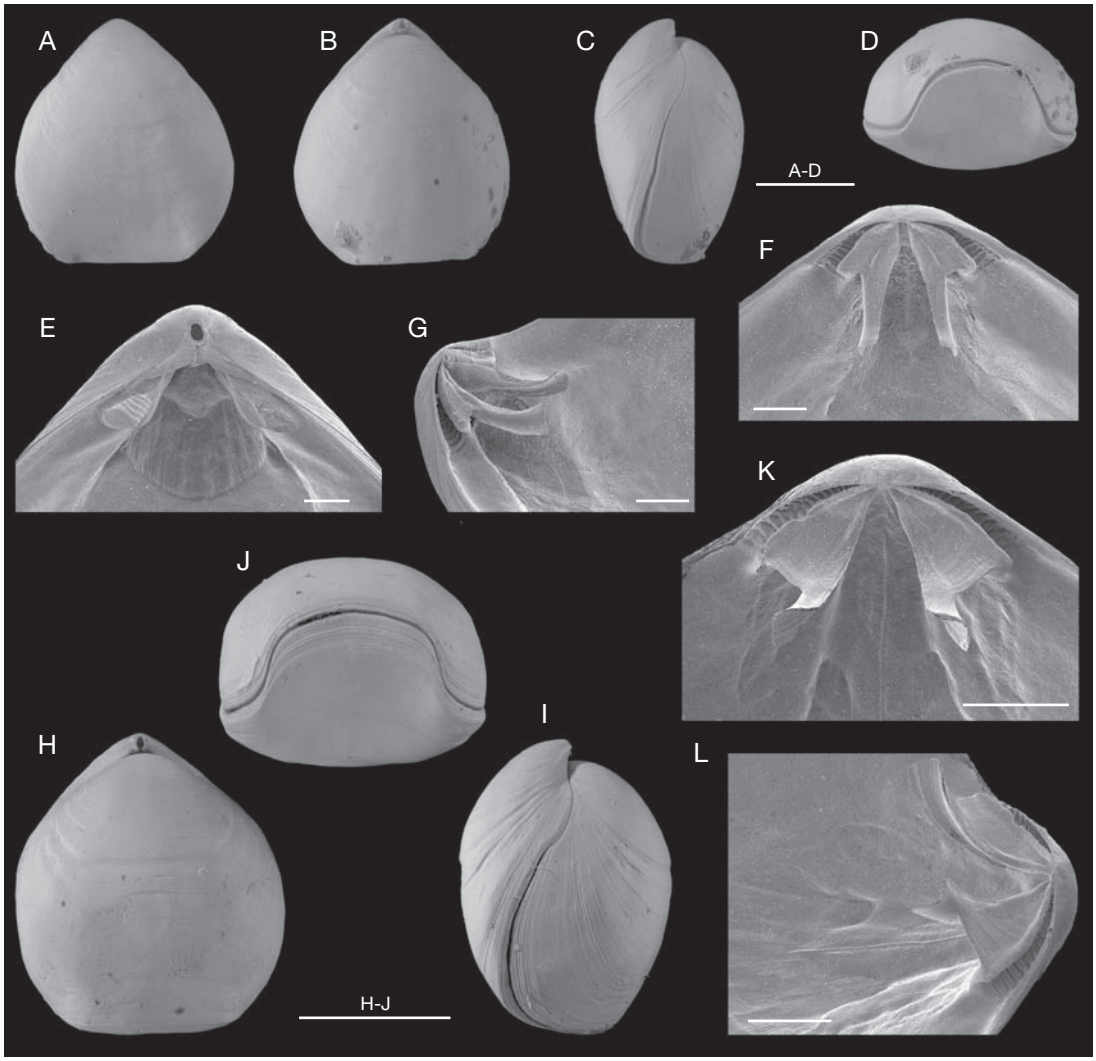

Fig. 5. — **A**-**G**, *Basiliola lucida* (Gould, 1862), Fiji, Lau Ridge, BORDAU 1: **A**-**D**, ventral, dorsal, lateral and anterior views of complete specimen (MNHN BRA-3069), stn DW 1472, 262-266 m; **E**, SEM micrograph of inner view of ventral valve, posterior part (MNHN BRA-3070), stn CP 1469, 314-377 m; **F**, **G**, SEM micrographs of posterior part of dorsal valve interior (MNHN BRA-3071), stn CP 1469, 314-377 m; **H**-**L**, *Basiliola beecheri* (Dall, 1895), Fiji, Lau Ridge; **H**-**J**, dorsal, lateral and anterior views of complete specimen (MNHN BRA-3072), stn CP 1412, 400-407 m; **K**, **L**, SEM micrographs of posterior part of dorsal valve interior (MNHN BRA-3073), stn CP 1394, 416 m. Scale bars: A-D, 0.5 cm; E-G, 1 mm; H-J, 1 cm; K , L, 2 mm.

long. No cardinal process is present. The outer hinge plates are broad, and crura are of subfalciform type (Fig. 5K, L). The muscle scars are distinct. *Basiliola beecheri* can easily be distinguished from *B. lucida* by its larger size and much broader hinge plates.

The Miocene *Basiliola strasfogeli* Cooper, 1978 from Fiji is similar in size to *B. beecheri* but differs in being more transversely rounded.

Order TEREBRATULIDA Waagen, 1883
Suborder TEREBRATULIDINA Waagen, 1883
Superfamily Dyscolioidea Fischer & Oehlert, 1890

TABLE 5. — Measurements (in mm) of *Basiliola beecheri* (Dall, 1895) from Fiji, MUSORSTOM 10 (stn DW 1376) and BORDAU 1.

Station No.	Length	Width	Thickness	Figure
DW 1376	19.8	20.3	16.9	–
DW 1394	21.1	23.4	–	–
DW 1394	18.9	18.5	15.1	–
DW 1409	17.5	16.8	11.8	–
DW 1412	19.6	17.8	14.0	Fig. 5H-J

TABLE 6. — Measurements (in mm) of *Abyssothyris wyvillei* (Davidson, 1878) from Fiji, MUSORSTOM 10 (stn CP 1361) and BORDAU 1 (stn CP 1409).

Station No.	Length	Width	Thickness	Figure
CP 1361	9.7	10.5	6.1	Fig. 6I-L
CP 1361	9.8	9.8	5.8	–
CP 1409	9.3	9.7	6.3	–

Family DYSCOLIIDAE Fischer & Oehlert, 1890
Subfamily AENIGMATHYRIDINAE Cooper, 1983

Genus *Abyssothyris* Thomson, 1927

TYPE SPECIES. — *Terebratula wyvilli* Davidson, 1878, by original designation (Thomson 1927: 190).

Abyssothyris wyvillei (Davidson, 1878)
(Fig. 6I-L)

Terebratula Wyvilli Davidson, 1878: 436.

Terebratula Wyvillii – Davidson 1880: 27, pl. 2, figs 7, 9.

Liothyris Wyvillii – Davidson 1886: 15, 16, pl. 2, figs 10-14 (not 8, 9).

Terebratula wywillei – Blochmann 1908: 625.

Abyssothyris wyvillei – Cooper 1982: 8, pl. 2, figs 13-17; 1983: pl. 2, figs 1-4. — Zezina 1985: 147; 1998: 70-71. — Foster 1989: 282, 283, figs 9.1-9.3, 10.1-10.10. — Laurin 1997: 432-434, figs 19, 20, 43m-r. — Bitner 2006b: 18-20, fig. 1f-m.

MATERIAL EXAMINED. — **Fiji.** MUSORSTOM 10, Viti Levu, stn CP 1361, 2 complete specimens.
BORDAU 1, Lau Ridge, stn DW 1408, 3 complete specimens. — Stn CP 1409, 1 complete specimen. — Stn CP 1413, 1 complete specimen.

DEPTH RANGE. — 550-1091 m.

MEASUREMENTS. — See Table 6.

REMARKS
Abyssothyris wyvillei was reported from the Fiji Islands by Bitner (2006b). This small, smooth species is characterized by its deeply unisulcate anterior commissure, and cardinalia with a distinct half-elliptical cardinal process, long inner socket ridges and well-developed fulcral plates. The outer hinge plates are triangular and moderately wide. The loop is very short, rounded anteriorly with a transverse band weakly medially folded (Fig. 6L). The crural processes are short and bluntly pointed.

The specimens from Fiji are most similar to those from the New Caledonia region (Laurin 1997). They differ from other specimens hitherto described in having smaller foramen (Cooper 1982, 1983; Foster 1989).

Externally *A. wyvillei* is very similar to another species, *Nipponithyris lauensis* n. sp., but these species can be easily distinguished by their internal structures.

The specimens from the Miocene of Fiji described by Cooper (1978) as *Abyssothyris briggsi* are close in size and outline to *A. wyvillei* but they differ from the recent species in the much narrower loop.

Genus *Xenobrochus* Cooper, 1981

TYPE SPECIES. — *Gryphus africanus* Cooper, 1973b, by original designation (Cooper 1981: 19).

Xenobrochus rotundus n. sp.
(Fig. 6A-H)

TYPE MATERIAL. — **Fiji.** BORDAU 1, stn DW 1469, holotype (MNHN BRA-3075; Fig. 6A-D). — Same data, 2 paratypes (MNHN BRA-3076-3077; Fig. 6E-H).

TYPE LOCALITY. — Fiji Islands, Lau Ridge, BORDAU 1, stn DW 1469, 19°40.01'S, 178°10.24'W, 314-377 m.

ETYMOLOGY. — From the Latin *rotundus*, round, referring to rounded outline.

DIAGNOSIS. — *Xenobrochus* rounded in outline with small foramen, prominent cardinal process, outer hinge plates rudimentary to absent, and transverse band anteriorly convex with a slight median fold.

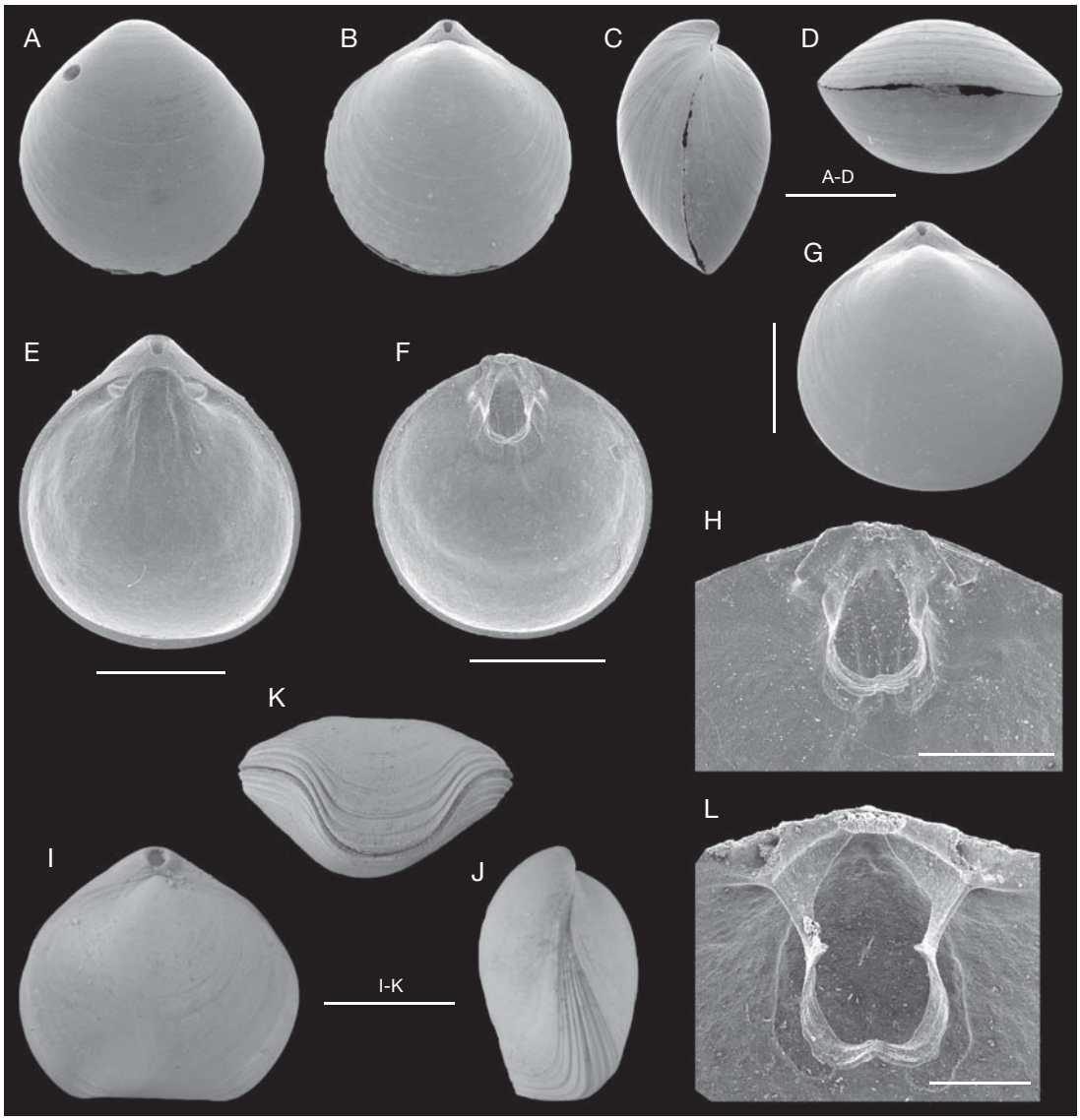

FIG. 6. — **A**-**H**, *Xenobrochus rotundus* n. sp., Fiji, Lau Ridge, BORDAU 1, stn DW 1469, 314-377 m, SEM: **A**-**D**, ventral, dorsal, lateral and anterior views of complete specimen, holotype (MNHN BRA-3075); **E**, **F**, inner views of ventral and dorsal valves, paratype (MNHN BRA-3076); **G**, **H**, dorsal view of complete specimen (G) and enlargement of dorsal interior (H) to show brachial skeleton, paratype (MNHN BRA-3077); **I**-**L**, *Abyssothyris wyvillei* (Davidson, 1878), complete specimen (MNHN BRA-3074), Fiji, Viti Levu, MUSORSTOM 10, CP 1361; **I**-**K**, dorsal, lateral and anterior views; **L**, SEM micrograph of dorsal interior to show cardinalia and brachidium. Scale bars: A-G, 2 mm; H, L, 1 mm; I-K, 0.5 cm.

MATERIAL EXAMINED.**Wallis and Futuna.** MUSORSTOM 7, Futuna, stn DW 516, 1 complete specimen. — Wallis, stn DW 610, 1 complete specimen, 1 ventral valve. — Stn DW 612, 1 ventral valve.
Fiji. BORDAU 1, Lau Ridge, stn DW 1469, 7 complete specimens. — Stn DW 1496, 3 complete specimens.

DEPTH RANGE. — 255-550 m.

MEASUREMENTS. — See Table 7.

DESCRIPTION

Shell small (maximum observed length is 9.4 mm), rounded in outline and strongly biconvex. Shell surface smooth with numerous indistinct growth lines. Lateral commissure is slightly ventrally curved; anterior commissure rectimarginate. Beak suberect with a small mesothyrid foramen. Symphytium small and wholly visible. Pedicle collar short. Teeth wide, short. Inner socket ridges erect. Cardinal process broad, transversely semi-elliptical. Outer hinge plates rudimentary to absent. The crural processes are short, bluntly pointed and run upward, nearly parallel to each other. Loop very short; transverse band anteriorly convex, rounded with a weak median fold. Muscle scars well visible.

REMARKS

The investigated specimens display all the characters, such as small size, smooth surface, short loop with transverse band anteriorly convex, typical of the genus *Xenobrochus* (Cooper 1981). Until now seven species have been assigned to this genus (Cooper 1981, 1983; Hiller 1986, 1994a, b), and specimens from Fiji differ from all of them in rounded outline and much smaller foramen. From *X. africanus* (Cooper, 1973), *X. australis* Cooper, 1981 and *X. naudei* Hiller, 1994, *X. rotundus* n. sp. differs in having rounded transverse band with a slight median fold; the first three species have angular transverse band. In *X. translucidus* (Dall, 1920), *X. agulhasensis* (Helmcke, 1938), *X. africanus* and *X. naudei* outer hinge plates, although narrow, are distinct (Cooper 1973b; Hiller 1986, 1994a), while in the studied specimens outer hinge plates are rudimentary to absent. *Xenobrochus indianensis* (Cooper, 1973), having similar loop with a median fold and rudimentary outer hinge plates, has a more incurved beak with partly concealed symphytium. In the specimens from Fiji the symphytium is wholly visible. In turn, *X. anomalus* Cooper, 1981 from the waters around Marion Island is characterized by the extravagantly developed tubular pedicle collar (Cooper 1981; Hiller 1994b), a feature not observed in the specimens described here.

TABLE 7. — Measurements (in mm) of *Xenobrochus rotundus* n. sp. from Wallis and Futuna, MUSORSTOM 7 (stn DW 516 and DW 610) and Fiji, BORDAU 1.

Station No.	Length	Width	Thickness	Figure
DW 516	9.4	7.8	–	–
DW 610	7.5	6.7	4.5	–
DW 1469 (paratype)	5.0	4.7	3.0	Fig. 6G, H
DW 1469 (holotype)	4.7	4.2	2.8	Fig. 6A-D
DW 1469 (paratype)	4.7	4.0	3.1	Fig. 6E, F
DW 1469	7.0	6.0	4.7	–
DW 1469	6.0	5.4	4.2	–

Superfamily TEREBRATULOIDEA Gray, 1840
Family TEREBRATULIDAE Gray, 1840
Subfamily DALLITHYRIDINAE Katz & Popov, 1974
Genus *Dallithyris* Muir-Wood, 1959

TYPE SPECIES. — *Dallithyris murrayi* Muir-Wood, 1959, by original designation (Muir-Wood 1959: 305).

Dallithyris pacifica Bitner, 2006 (Fig. 7J-L)

Dallithyris pacifica Bitner, 2006b: 20-22, fig. 2a-j.; Bitner 2007: 495, 496, figs 1i-k, 2c, d.

MATERIAL EXAMINED. — **Fiji.** MUSORSTOM 10, Bligh Water, stn CP 1331, 8 complete specimens, 2 ventral valves. — Stn CP 1332, 9 complete specimens. — Stn CP 1335, 1 complete specimen. — Stn CC 1336, 4 complete specimens.
BORDAU 1, Lau Ridge, stn DW 1432, 1 young complete specimen. — Stn DW 1465, 1 young complete specimen.

DEPTH RANGE. — 290-799 m.

MEASUREMENTS. — See Table 8.

REMARKS

Dallithyris pacifica was already recorded from the Fiji region (for detailed description, see Bitner 2006b, 2007). This species differs from two other recent *Dallithyris* species, *D. murrayi* Muir-Wood, 1959 and *D. fulva* (Blochmann, 1906), in being smaller, triangular in outline and having rectimarginate anterior commissure (Muir-Wood 1959; Cooper 1983). Recently *D. pacifica* was also found in the

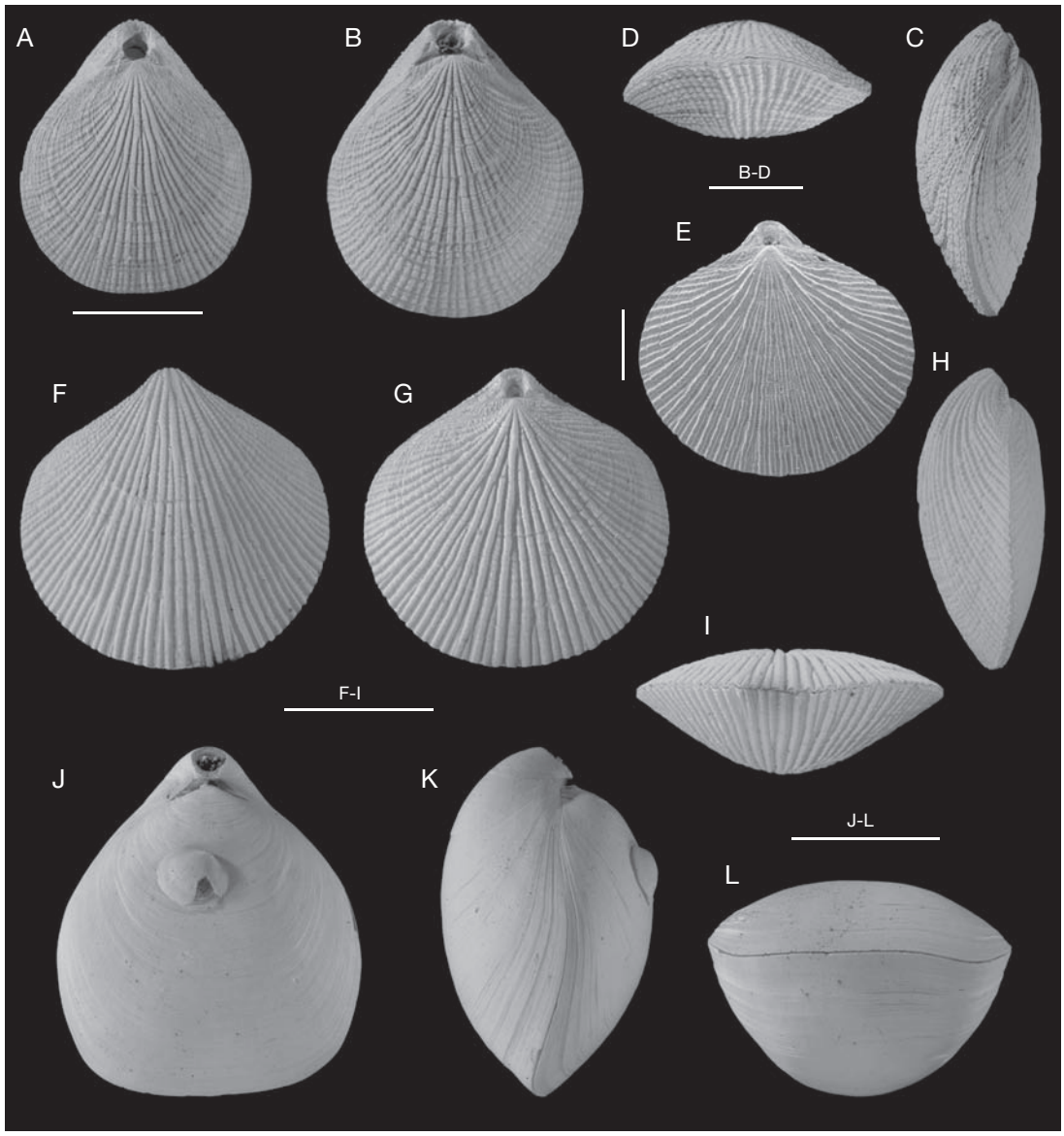

FIG. 7. — **A**-**D**, *Terebratulina japonica* (G. B. Sowerby, 1846), Fiji: **A**, dorsal view of complete specimen (MNHN BRA-3079), Lau Ridge, BORDAU 1, stn DW 1413, 669-676 m; **B**-**D**, dorsal, lateral and anterior views of complete specimen (MNHN BRA-3080), Bligh Water, MUSORSTOM 10, stn CP 1330, 567-699 m; **E**-**I**, *Terebratulina australis* Bitner, 2006, Fiji, Lau Ridge BORDAU 1; **E**, dorsal view of young complete specimen (MNHN BRA-3081), SEM, stn DW 1479, 450-460 m; **F**-**I**, ventral, dorsal, lateral and anterior views of complete specimen (MNHN BRA-3082), stn DW 1485, 700-707 m; **J**-**L**, *Dallithyris pacifica* Bitner, 2006, dorsal, lateral and anterior views of complete specimen (MNHN BRA-3078), Fiji, Bligh Water, MUSORSTOM 10, stn DW 1331, 694-703 m. Scale bars: A-D, F-I, 0.5 cm; E, 2 mm; J-L, 1 cm.

region of the Austral Islands, French Polynesia (Bitner 2007).

Dallithyris was also recognized in the Neogene deposits of Fiji (Cooper 1978). The fossil specimens are much smaller than *D. pacifica*, however, like the recent material they are characterized by the subtriangular outline and rectimarginate commissure.

TABLE 8. — Measurements (in mm) of *Dallithyris pacifica* Bitner, 2006 from Fiji, MUSORSTOM 10.

Station No.	Length	Width	Thickness	Figure
CP 1331	24.8	21.3	15.2	Fig. 7J-L
CP 1331	24.3	20.1	13.8	–
CP 1331	19.6	17.2	11.9	–
DW 1332	27.6	23.6	17.1	–
CC 1336	21.7	17.6	13.5	–

In her recent paper Zezina (2005) synonymised three genera: *Dallithyris*, *Stenosarina* Cooper, 1977 and *Dolichozygus* Cooper, 1983. However, in the opinion of the present author those genera display sufficient differences to be separated. Both *Dallithyris* and *Stenosarina* have similar loops with a broad transverse band which possesses a strong median fold, but the loop in *Stenosarina* is much narrower than that in *Dallithyris* (see Bitner 2006b: fig. 2j, k). The crural bases in *Dallithyris* are poorly defined, while those in *Stenosarina* are elevated along the inner margins of the outer hinge plates. In turn, the transverse band in *Dolichozygus* lacks that sharply arched fold present in both former genera. Thus, in the present paper *Dallithyris* is still considered as a separate genus, as in the new edition of the *Treatise* (see Lee & Smirnova 2006).

Superfamily CANCELLOTHYRIDOIDEA Thomson, 1926
Family CANCELLOTHYRIDIDAE Thomson, 1926
Subfamily CANCELLOTHYRIDINAE Thomson, 1926

Genus *Terebratulina* d'Orbigny, 1847

TYPE SPECIES. — *Anomia retusa* Linnaeus, 1758, by subsequent designation (Brunton *et al.* 1967: 176).

Terebratulina japonica (G. B. Sowerby, 1846) (Fig. 7A-D)

Terebratula japonica G. B. Sowerby, 1846: 91.

Terebratulina japonica – Davidson 1886: 34, pl. 3, figs 7-11. — Dall 1920: 304, 305. — Hatai 1940: 225-228, pl. 8, figs 14, 16. — Zezina 1985: 128. — Bitner 2006b: 22, 23, figs 3, 4a-g.

TABLE 9. — Measurements (in mm) of *Terebratulina japonica* (G. B. Sowerby, 1846) from Fiji, BORDAU 1 (stn DW 1413) and MUSORSTOM 10.

Station No.	Length	Width	Thickness	Figure
CP 1330	16.6	14.7	7.1	–
CP 1330	15.1	13.0	6.3	Fig. 7B-D
CP 1330	12.4	10.0	5.3	–
DW 1377	13.1	9.6	6.8	–
DW 1413	10.8	9.1	4.7	Fig. 7A

MATERIAL EXAMINED. — **Fiji.** MUSORSTOM10, Bligh Water, stn CP 1330, 9 complete specimens. — Stn DW 1333, 3 complete immature specimens. — Stn DW 1345, 2 complete immature specimens. — Viti Levu, stn CP 1363, 2 complete immature specimens. — Stn DW 1365, 3 young complete specimens. — Stn DW 1377, 4 complete specimens. — Stn DW 1383, 11 complete specimens.
BORDAU 1, Lau Ridge, stn CP 1393, 1 complete specimen. — Stn CP 1394, 24 complete specimens. — Stn CP 1397, 3 complete specimens. — Stn CP 1404, 1 complete specimen. — Stn CP 1412, 1 complete specimen. — Stn CP 1413, 15 complete specimens, 1 ventral valve. — Stn DW 1421, 1 immature complete specimen. — Stn DW 1439, 1 complete specimen. — Stn DW 1440, 2 complete specimens. — Stn DW 1450, 1 complete specimen. — Stn DW 1451, 7 complete specimens. — Stn DW 1453, 3 complete specimens. — Stn CP 1460, 9 complete specimens. — Stn DW 1472, 2 young complete specimens. — Stn DW 1486, 2 complete specimens. — Stn DW 1488, 1 complete specimen. — Stn CP 1490, 1 complete specimen. — Stn CP 1491, 2 complete specimens. — Stn DW 1498, 3 complete specimens. — Stn CP 1506, 1 complete specimen.
SUVA 2, Suva Lagoon, stn BS 18, 1 complete specimen.

DEPTH RANGE. — 83-820 m.

MEASUREMENTS. — See Table 9.

REMARKS
This is a common species found in 28 stations. Its presence was already noted from the Fiji region (Bitner 2006b). *Terebratulina japonica* is a medium-sized species, ornamented by numerous, fine ribs. The ring of the loop is subquadrate in outline (see Bitner 2006b: fig. 4f, g). *Terebratulina waimanensis* Ladd, 1934 described from the Miocene deposits of Fiji shows a great similarity in size and ornamentation to *T. japonica*.

TABLE 10. — Measurements (in mm) of *Terebratulina australis* Bitner, 2006 from Fiji, BORDAU 1.

Station No.	Length	Width	Thickness	Figure
DW 1479	11.3	10.9	4.8	–
DW 1479	11.1	10.2	5.1	–
DW 1479	7.4	7.7	2.9	Fig. 7E
DW 1485	10.0	10.3	4.2	Fig. 7F-I

Terebratulina australis Bitner, 2006
(Fig. 7E-I)

Terebratulina australis Bitner 2006b: 25-27, fig. 5d-j.

MATERIAL EXAMINED. — **Fiji.** BORDAU 1, Lau Ridge, stn DW 1417, 1 dorsal valve. — Stn DW 1479, 3 complete specimens, 1 dorsal valve. — Stn DW 1485, 1 complete specimen.

DEPTH RANGE. — 353-707 m.

MEASUREMENTS. — See Table 10.

REMARKS

This species was already recorded from the Fiji region (Bitner 2006b). It is very rare in the investigated material. *Terebratulina australis* can be easily distinguished from any other *Terebratulina* species by its rounded outline, short hinge margin and a very small foramen. The shell surface is covered with numerous distinct ribs that increase mostly by bifurcation. The posterior part of the shell is thickened with well-visible muscle scars. The dorsal valve interior with high, narrow inner socket ridges, short crura and a broad ring sharply arched (see Bitner 2006b: fig. 5i, j).

Terebratulina reevei Dall, 1920
(Fig. 8)

Terebratulina reevei Dall, 1920: 305, 306. — Cooper 1973a: 379, 380, pl. 42, figs 19-33. — Zezina 1981: 14; 1985: 130. — Laurin 1997: 427, figs 12a-c, 43d-f. — Bitner 2006b: 23-25, fig. 4h-l.

MATERIAL EXAMINED. — **Fiji.** MUSORSTOM 10, Bligh Water, stn CP 1330, 1 complete immature specimen. — Viti Levu, stn DW 1383, 1 complete young specimen. BORDAU 1, Lau Ridge, stn CP 1394, 3 complete specimens. — Stn CP 1395, 2 complete specimens. — Stn DW 1439, 1 complete specimen. — Stn DW 1451, 2 complete specimens. — Stn DW 1496, 1 complete immature specimen. — Stn DW 1494, 2 complete specimens.
SUVA 2, Suva Lagoon, stn BS 18, 3 complete specimens.

TABLE 11. — Measurements (in mm) of *Terebratulina reevei* Dall, 1920 from Fiji, SUVA 2 (stn BS 18) and BORDAU 1.

Station No.	Length	Width	Thickness	Figure
DW 1394	10.0	7.6	4.7	Fig. 8E-G
DW 1394	9.6	6.8	4.2	Fig. 8A-D
CP 1395	9.3	6.9	3.2	–
DW 1451	9.7	7.6	4.2	–
BS 18	6.4	5.7	3.1	–
BS 18	4.8	4.3	2.3	–

DEPTH RANGE. — 83-669 m.

MEASUREMENTS. — See Table 11.

REMARKS

Terebratulina reevei was already reported from the Fiji region (Bitner 2006b). This species is characterized by its coarsely ribbed ornamentation (Cooper 1973a; Laurin 1997). The anterior commissure is from uniplicate to rectimarginate. The loop forms a broad ring slightly folded anteriorly.

Terebratulina reevei differs from *T. japonica* in being smaller and in having less numerous granulated ribs. It can be also easily distinguished from *T. australis* that has rounded outline, numerous fine ribs and small pedicle opening.

Family CHLIDONOPHORIDAE Muir-Wood, 1959
Subfamily EUCALATHINAE Muir-Wood, 1965

Genus *Eucalathis* Fischer & Oehlert, 1890

TYPE SPECIES. — *Terebratulina murrayi* Davidson, 1878 by original designation (Fischer & Oehlert 1890: 72).

Eucalathis rugosa Cooper, 1973
(Fig. 9)

Eucalathis rugosa Cooper, 1973a: 388, 389, text-fig. 2, pl. 43, figs 1-9. — Zezina 1985: 135; 1987: 556. — d'Hondt 1987: 35. — Laurin 1997: 428, 429, figs 13a-c, 14.

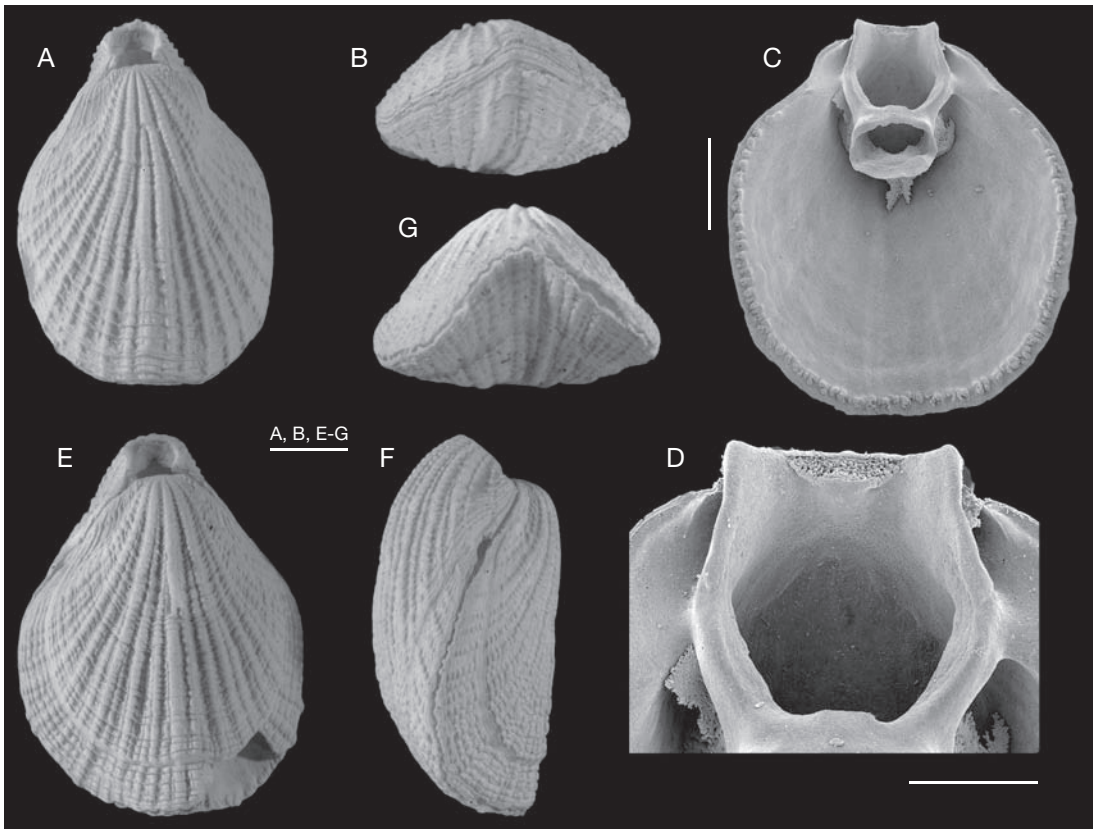

FIG. 8. — *Terebratulina reevei* Dall, 1920, Fiji, Lau Ridge, MUSORSTOM 10, stn CP 1394, 416 m: **A**-**D**, complete specimen (MNHN BRA-3083); **A**, **B**, dorsal and anterior views; **C**, **D**, SEM micrograph of dorsal interior to show brachidium and details of cardinalia; **E**-**G**, dorsal, lateral and anterior views of complete specimen (MNHN BRA-3084). Scale bars: A-C, E-G, 2 mm; D, 1 mm.

MATERIAL EXAMINED. — **Wallis and Futuna.** MUSORSTOM 7, Wallis, stn DW 601, 1 complete specimen, 1 dorsal valve.
Fiji. MUSORSTOM 10, Viti Levu, stn DW 1384, 4 complete specimens.

DEPTH RANGE. — 260-305 m.

MEASUREMENTS. — See Table 12.

TABLE 12. — Measurements (in mm) of *Eucalathis rugosa* Cooper, 1973 from Wallis and Futuna, MUSORSTOM 7 (stn DW 601) and Fiji, MUSORSTOM 10 (stn DW 1384).

Station No.	Length	Width	Thickness	Figure
DW 601	2.4	2.2	1.3	Fig. 8C-F
DW 1384	2.9	2.5	1.5	–
DW 1384	2.5	2.1	1.3	Fig. 8A, B
DW 1384	2.1	1.9	1.1	Fig. 8G-I

DESCRIPTION

Shell very small (maximum length 2.9 mm), subquadrate to broadly triangular in outline, biconvex. Shell surface covered with 8-10 strongly granulated ribs; single intercalated ribs are also present. Beak fairly long, suberect. Foramen large, triangular, bordered by two narrow, obliquely elevated deltidial plates. Anterior commissure rectimarginate. Teeth short but wide. Pedicle collar well-developed. Dorsal valve interior with high inner socket ridges and weakly developed cardinal process. Crura very short with blunt crural processes. Loop short with relatively broad descending branches. Inner margin of both valves crenulated.

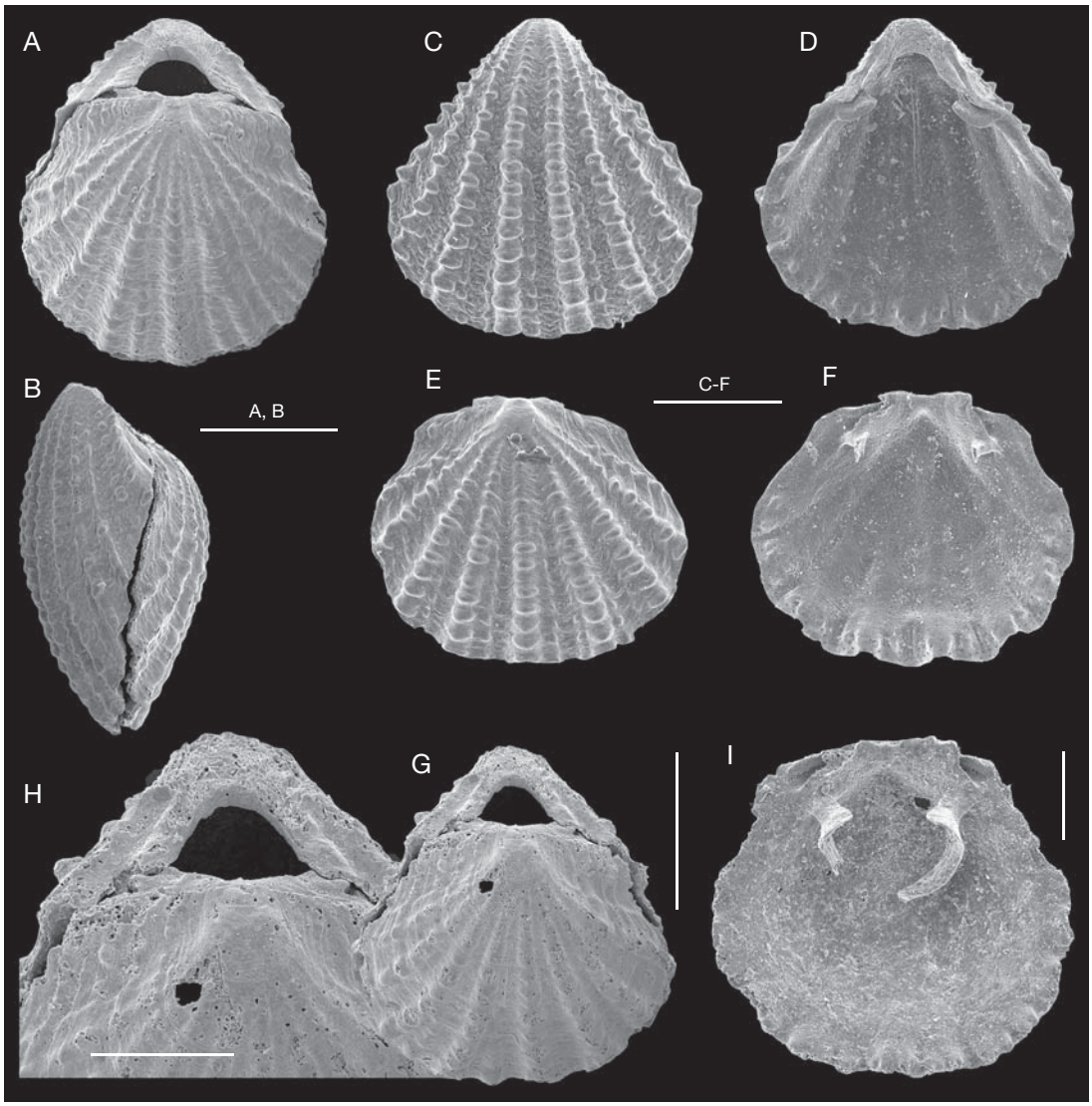

FIG. 9. — *Eucalathis rugosa* Cooper, 1973: **A**, **B**, dorsal and lateral views of complete specimen (MNHN BRA-3085), Fiji, Viti Levu, MUSORSTOM 10, stn DW 1384, 260-305 m; **C**-**F**, complete specimen (MHNH BRA-3060), Wallis and Futuna, MUSORSTOM 7, stn DW 601, 350 m; **C**, **D**, outer and inner views of ventral valve; **E**, **F**, outer and inner views of dorsal valve; **G**-**I**, complete specimen (MNHN BRA-3086), Fiji, Viti Levu, MUSORSTOM 10, stn DW 1384, 260-305 m; **G**, **H**, dorsal view (G) and enlargement of posterior part (H); **I**, interior of dorsal valve with slightly broken brachidium. All SEM. Scale bars: A-G, 1 mm; H, I, 500 µm.

REMARKS

The investigated specimens are consistent in size, strong ornamentation and beak characters with *Eucalathis rugosa*. They differ, however, in having short intercalated ribs and broader descending branches. In the strong costation *E. rugosa* is similar to *E. rotundata* Cooper, 1981, differing, however, in outline and beak characters.

In the Pacific Ocean this species was already recorded from Philippines and New Caledonia

(Cooper 1973a; d'Hondt 1987; Laurin 1997). Zezina (1987) mentioned the presence of *E. rugosa* in the Mozambique Channel, Indian Ocean. The occurrence of this species in the region of the Fiji and Wallis and Futuna Islands extends its geographic range farther to the east.

The genus *Eucalathis* is well-known in the south-western Pacific (Cooper 1973a; Dawson 1991; Laurin 1997; Bitner 2006a) but this is its first record from the Fiji and Wallis and Futuna regions.

Suborder TEREBRATELLIDINA Muir-Wood, 1955
Superfamily KINGENOIDEA Elliott, 1948
Family AULACOTHYROPSIDAE Dagys, 1972
Subfamily BABUKELLINAE MacKinnon, Smirnova & Lee, 2006

Genus *Fallax* Atkins, 1960

TYPE SPECIES. — *Fallax dalliniformis* Atkins, 1960, by original designation (Atkins 1960: 72).

Fallax neocaledonensis Laurin, 1997 (Fig. 10H-J)

Campages furcifera – d'Hondt 1987: 37, pl. 1, figs 1-4.

Fallax neocaledonensis Laurin, 1997: 444-448, figs 31-34, 46a-o. — Bitner 2006b: 27, fig. 5a-c.

Laurinia neocaledonensis – Zezina 2005: 31, 32.

MATERIAL EXAMINED. — **Fiji.** BORDAU 1, Lau Ridge, stn CP 1458, 1 complete specimen.

DEPTH RANGE. — 1216-1226 m.

MEASUREMENTS. — Length 15.5 mm, width 14.4 mm, thickness 10.2 mm.

REMARKS

Fallax neocaledonensis was originally described from the New Caledonia region where it is one of the most common species (Laurin 1997; and pers. obs.). However, in the studied material it is very rare, although it has already been reported from the Fiji region (Bitner 2006b). *Fallax neocaledonensis* is characterized by its widely triangular outline. Although externally similar to the dallinine brachiopods, it is easily distinguishable internally by the presence of distinct dental plates.

The specimens described earlier from the New Caledonia region by d'Hondt (1987) as *Campages furcifera* Hedley, 1905, after examination of internal structures, appeared to possess distinct dental plates, which exclude them from *Campages*. On the contrary, they display all the characters typical of *F. neocaledonensis* and have been synonymised with the latter species in the present paper.

Recently Zezina (2005) transferred the species *F. neocaledonensis* into a new genus *Laurinia*, based on the absence of spicules in the specimens investigated by her from the Norfolk Ridge, New Caledonia, because spicules are observed in *Fallax*. It seems doubtful whether absence of spicules in a genus characterized by weak spiculation is sufficient to create a new genus.

Genus *Septicollarina* Zezina, 1981

TYPE SPECIES. — *Septicollarina hemiechinata* Zezina, 1981 by original designation (Zezina 1981: 16).

Septicollarina sp. (Fig. 16A)

MATERIAL EXAMINED. — **Fiji.** BORDAU 1, Lau Rigde, stn CP 1409, 1 complete specimen.

DEPTH RANGE. — 557-558 m.

MEASUREMENTS. — Length 11.1 mm, width 12.2 mm, thickness 7.7 mm.

DESCRIPTION

Shell of medium size, thin, transversely pentagonal, strongly ventribiconvex. Shell surface smooth with scarcely visible radial capillae. Anterior commissure strongly unisulcate. Beak short, incurved with well-defined beak ridges. Foramen large, circular, permesothyrid; deltidial plates minute. Ventral valve interior with strong, well-developed dental plates and wide pedicle collar supported by a short median septum. Dorsal valve interior with a long medium septum, high posteriorly and low anteriorly, and

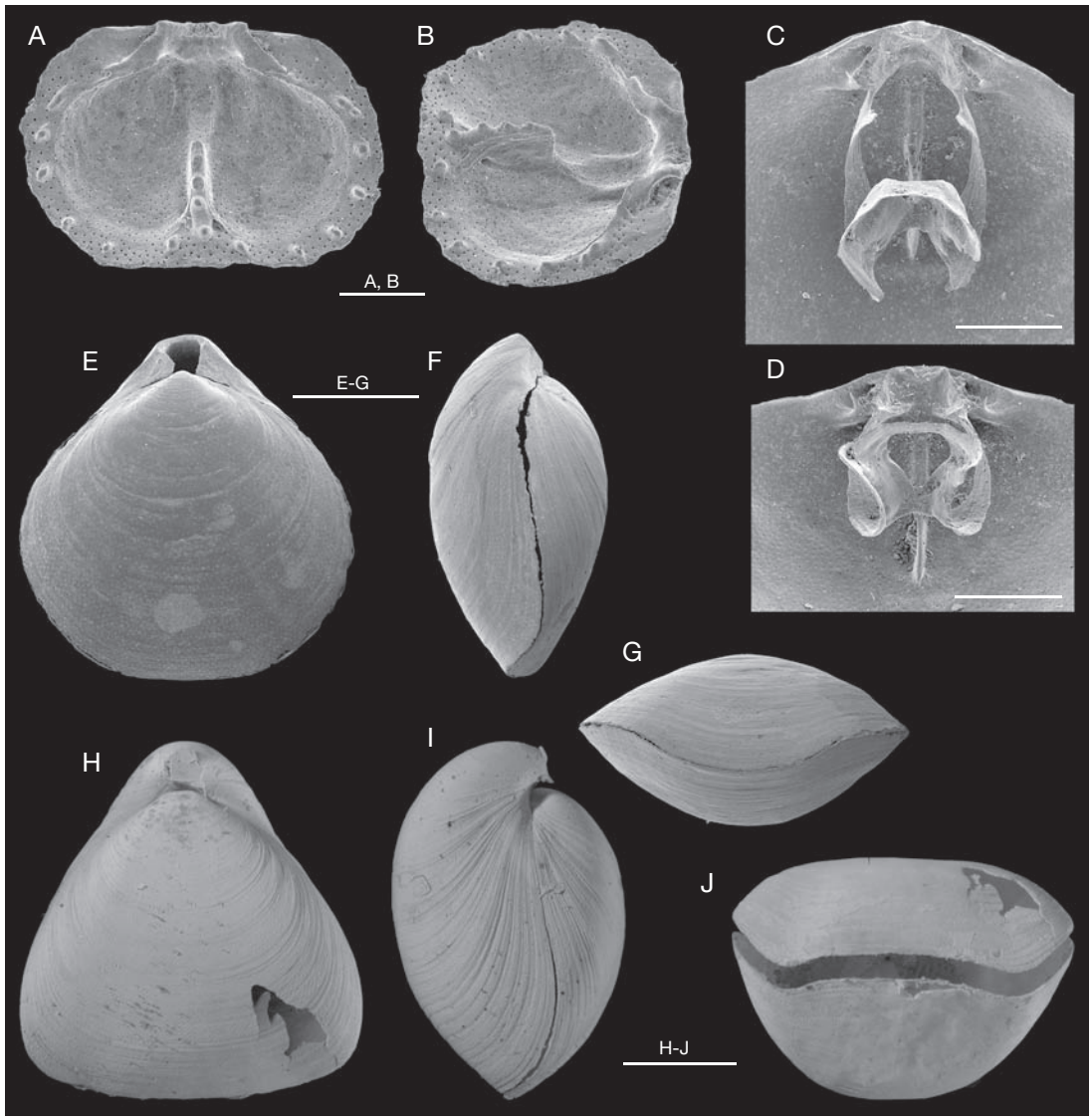

Fig. 10. **A**, **B**, *Argyrotheca* sp., inner and lateral views of dorsal valve (MNHN BRA-3091), SEM, Fiji, Bligh Water, MUSORSTOM 10, stn DW 1334, 251-257 m; **C**-**G**, *Frenulina sanguinolenta* (Gmelin, 1791), SEM; **C**, **D**, inner and tilted views of dorsal valve (MNHN BRA-3089), Fiji, Beqa Lagoon, SUVA 4, stn DW 09, 37-41 m; **E**-**G**, dorsal, lateral and anterior views of complete specimen (MNHN BRA-3090), Fiji, Lau Ridge, BORDAU 1, stn DW 1451, 400-460 m; **H**-**J**, *Fallax neocaledonensis* Laurin, 1997, dorsal, lateral and anterior views of complete specimen (MNHN BRA-3087), Fiji, Lau Ridge, BORDAU 1, stn CP 1458, 1216-1226 m. Scale bars: A, B, 500 µm; C, D, 1 mm; E-G, 2 mm; H-J, 0.5 cm.

inner hinge plates attached to the septum, forming septalium. No cardinal process observed. Crura very thin and relatively long. Loop partly broken but narrow descending branches, which bend to become broad ascending branches, are visible; transverse band not preserved.

Remarks

The investigated specimen displays all the characters of the genus *Septicollarina* (Zezina 1981, 1990). Until now two species of this genus have been described: *S. hemiechinata* Zezina, 1981 from off Java, and *S. oceanica* Zezina, 1990 from the Eastern

Pacific. The specimen from Fiji is nearly twice as large as these species, although the specimen from off Java may be young because its gonads were not developed (Zezina 1981). The Fiji material differs in being strongly unisulcate and having an incurved beak. From *S. hemiechinata* the specimen differs also in having a longer ventral septum which in *S. hemiechinata* is equal to the length of the pedicle collar. The very limited material and not fully preserved brachidium allow determination only to the generic level.

Superfamily LAQUEOIDEA Thomson, 1927
Family FRENULINIDAE Hatai, 1938
Subfamily FRENULININAE Hatai, 1938

Genus *Frenulina* Dall, 1895

TYPE SPECIES. — *Anomia sanguinolenta* Gmelin, 1791 by original designation (Dall 1895: 724).

Frenulina sanguinolenta (Gmelin, 1791)
(Fig. 10C-G)

Anomia sanguinolenta Gmelin, 1791: 3347.

Megerlia sanguinea – Davidson 1887: 108-111, pl. 20, figs 1-8.

Frenulina sanguinolenta – Dall 1920: 336, 337. — Hatai 1940: 327-329, pl. 4, figs 42, 44-47, 49, 50, 52-54. — Cooper 1973b: 21, 22, pl. 6, figs 1-3; pl. 8, figs 12-16. — Zezina 1985: 168. — Emig 1987: 169, pl. 2.V.1, figs b, c. — d'Hondt 1987: 38. — Saito 1996: 492, fig. 5. — Laurin 1997: 450, 451, fig. 47h-j. — Bitner 2006a: 420-422, figs 2d-m, 3a-f; 2006b: 28.

MATERIAL EXAMINED. — **Fiji.** BORDAU 1, Lau Rigde, stn CP 1394, 1 complete specimen. — Stn DW 1451, 1 complete specimen. — Stn DW 1453, 2 complete specimens.
SUVA 2, Suva Lagoon, stn BS 43, 1 complete specimen.
SUVA 4, Beqa Lagoon, stn DW 08, 1 complete specimen. — Stn DW 09, 2 complete specimens.

DEPTH RANGE. — 26-510 m.

MEASUREMENTS. — See Table 13.

TABLE 13. — Measurements (in mm) of *Frenulina sanguinolenta* (Gmelin, 1791) from Fiji, SUVA 2 (stn BS 43), SUVA 4 (stn DW 09) and BORDAU 1.

Station No.	Length	Width	Thickness	Figure
CP 1394	6.0	5.3	3.5	–
DW 1451	5.4	5.0	2.7	–
DW 1453	6.8	5.5	3.9	–
DW 1453	5.0	4.6	2.7	–
BS 43	4.9	4.9	2.1	–
DW 09	5.1	4.9	2.8	Fig. 10E-G

REMARKS
Although common and widely distributed in the western Pacific (Davidson 1887; Thomson 1918, 1927; Dall 1920; Jackson & Stiasny 1937; Hatai 1940; Richardson 1973a, b, 1979; Zezina 1985; Emig 1987; d'Hondt 1987; Saito 1996; Laurin 1997; Bitner 2006a, c), *Frenulina sanguinolenta* is rare in the material from Fiji, and has been found only in seven stations (see also Bitner 2006b). It is an easily recognisable species by its small, sulcate shell and red colour pattern.

Superfamily MEGATHYRIDOIDEA Dall, 1870
Family MEGATHYRIDIDAE Dall, 1870

Genus *Argyrotheca* Dall, 1900

TYPE SPECIES. — *Terebratula cuneata* Risso, 1826, by original designation (Dall 1900: 44).

Argyrotheca sp.
(Fig. 10A, B)

MATERIAL EXAMINED. — **Fiji.** MUSORSTOM 10, Bligh Water, stn DW 1334, 1 complete specimen, 1 ventral valve, 1 dorsal valve.

DEPTH RANGE. — 251-257 m.

MEASUREMENTS. — Length 1.7 mm, width 1.9 mm, thickness 0.9 mm.

DESCRIPTION
Shell minute, subquadrate, wider than long, biconvex with the ventral valve more convex. Surface smooth to covered with very weakly marked ribs. Anterior commissure with a shallow sulcus on the

TABLE 14. — Measurements (in mm) of *Amphithyris buckmani* Thomson, 1918 from Fiji, MUSORSTOM 10.

Station No.	Length	Width	Thickness	Figure
CP 1309	3.6	3.1	0.9	Fig. 11J
CP 1331	5.1	5.3	1.7	–
CP 1331	2.6	2.8	0.7	–
CP 1331	4.2	4.5	1.3	Fig. 11E
CP 1332	4.8	5.6	1.4	Fig. 11H
CP 1332	4.8	4.5	1.2	Fig. 11F
CP 1353	1.3	1.25	0.4	–

dorsal valve. Foramen large, triangular, hypothyrid, bordered by two narrow deltidial plates. Pedicle collar wide, supported by a septum. Dorsal valve interior with deep sockets and a high triangular median septum that begins at the mid-length and slopes anteriorly with four serrations (Fig. 10B). Anterior ends of descending branches join the median septum. The internal margin of the valve is covered with tubercles.

REMARKS

The limited material, found only in one station, prevents more detailed taxonomic determination. The genus *Argyrotheca* is uncommon in the Pacific. In Australia it is represented by two species (Blochmann 1910, 1914). The South Australian species *Argyrotheca australis* (Blochmann, 1910) differs from the Fiji specimens in being much larger and having ribbed ornamentation. The studied specimens are also easily distinguishable from the species from off Tasmania, *A. mayi* Blochmann, 1914 which is triangular in outline and lacks tubercles on the inner margin.

In size, outline, ornamentation and the presence of tubercles on the inner margin the specimens from Fiji are similar to those from Bikini Atoll described as *Argyrotheca* sp. by Cooper (1954), and later, after obtaining a larger sample, as *Argyrotheca arguta* by Grant (1983).

The specimens described herein display also, both externally and internally, similarities to the common Mediterranean and Atlantic species, *A. cordata* (Risso, 1826). The latter species has been recently discovered in the Red Sea (Logan *et al*. 2005).

Superfamily PLATIDIOIDEA Thomson, 1927
Family PLATIDIIDAE Thomson, 1927
Subfamily PLATIDIINAE Thomson, 1927

Genus *Amphithyris* Thomson, 1918

TYPE SPECIES. — *Amphithyris buckmani* Thomson, 1918 by original designation (Thomson 1918: 20).

Amphithyris buckmani Thomson, 1918
(Fig. 11)

Amphithyris buckmani Thomson, 1918: 22, pl. 15, fig. 9; pl. 16, fig. 35. — Bitner 2006b: 28-30, fig. 6a-f.

MATERIAL EXAMINED. — **Fiji.** MUSORSTOM 10, Bligh Water, stn CP 1309, 11 complete specimens. — Stn DW 1314, 3 complete specimens. — Stn CP 1316, 1 complete specimen. — Stn CP 1330, 1 complete specimen. — Stn CP 1331, 143 complete specimens, 4 dorsal valves. — Stn CP 1332, 212 complete specimens, 1 dorsal valve. — Stn DW 1333, 5 complete specimens. — Stn DW 1334, 3 complete specimens. — Stn CP 1335, 8 complete specimens. — Stn CC 1336, 6 complete specimens. — Stn CP 1341, 17 complete specimens. — Stn DW 1345, 3 complete specimens, 1 ventral valve. — Viti Levu, stn CP 1353, 36 complete specimens. — Stn CP 1354, 25 complete specimens. — Stn DW 1359, 2 complete specimens. — Stn CP 1360, 1 complete specimen. — Stn CP 1369, 7 complete specimens, 3 ventral valves, 2 dorsal valves. BORDAU 1, Lau Ridge, stn CP 1392, 3 complete specimens. — Stn CP 1394, 1 complete specimen. — Stn CP 1396, about 160 complete specimens attached to the rock. — Stn CP 1398, 1 complete specimen. — Stn CP 1413, 2 complete specimens.

DEPTH RANGE. — 183-963 m.

MEASUREMENTS. — See Table 14; see also Figure 12.

REMARKS

Amphithyris buckmani, already recorded from Fiji (Bitner 2006b), is the commonest species (more than 600 specimens) in the studied material. This species is easily recognisable by its very small size, radially ornamented and convex ventral valve, smooth and flat dorsal valve, and large amphithyrid foramen. The specimens in the new material are slightly larger than those previously described from Fiji. The outline is very variable, from transversely oval to subcircular and subtriangular. The shell can be asymmetrical,

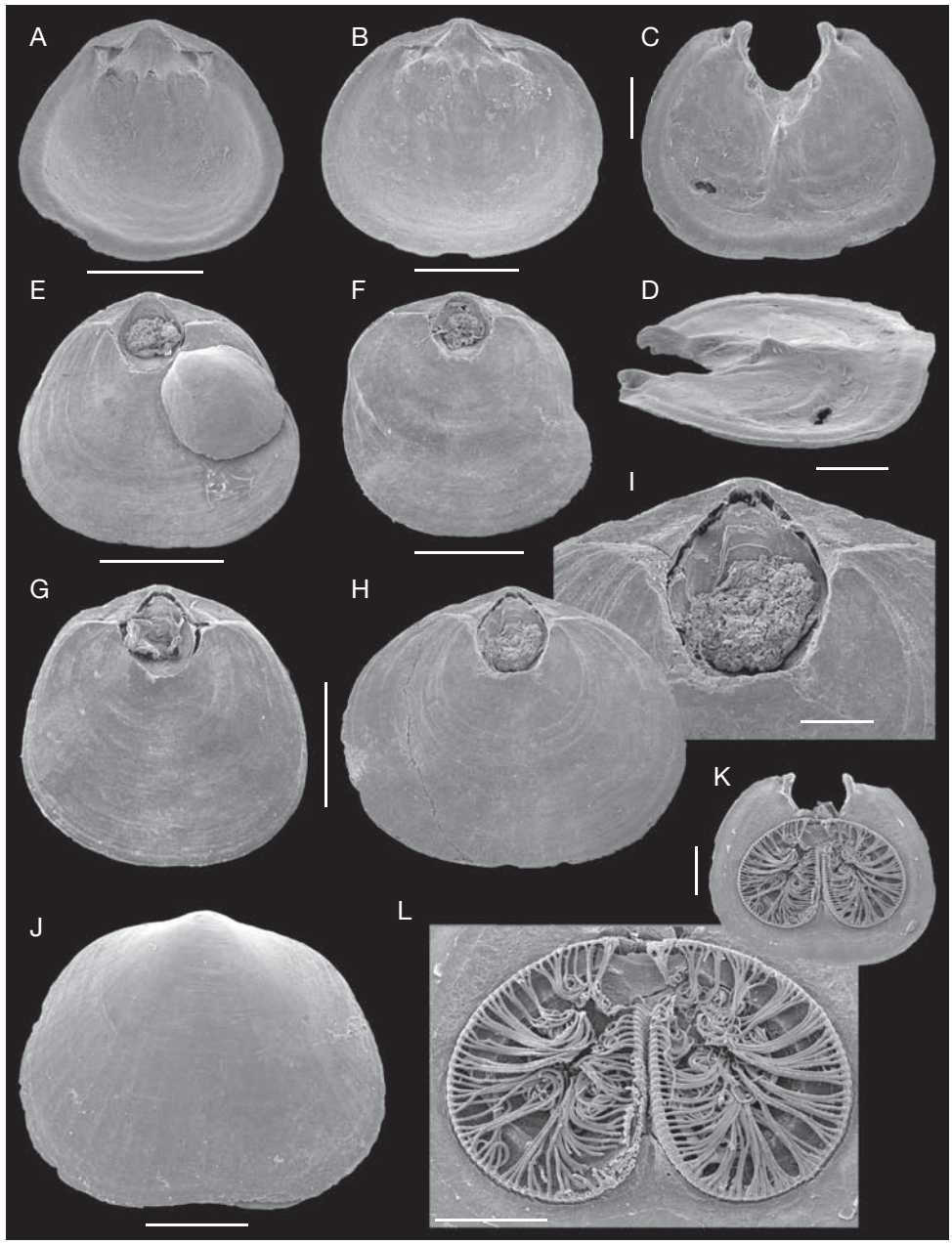

FIG. 11. — *Amphithyris buckmani* Thomson, 1918, Fiji: **A**, **B**, inner views of ventral valves (MNHN BRA-3092, 3093); **A**, Bligh Water, CP 1332, 640-687 m; **B**, Viti Levu, MUSORSTOM 10, stn CP 1369, 392-433 m; **C**, **D**, inner and oblique views of dorsal valve (MNHN BRA-3094), Bligh Water, MUSORSTOM 10, stn CP 1332, 640-687 m; **E**, dorsal view of complete specimen (MNHN BRA-3095), Bligh Water, MUSORSTOM 10, stn CP 1331, 694-703 m, visible young individual attached; **F**, **G**, dorsal views of complete specimens (MNHN BRA-3096, 3097), Bligh Water, MUSORSTOM 10, stn CP 1332, 640-687 m; **H**, **I**, dorsal view of complete specimen (MNHN BRA-3098) and enlargement of posterior part, Bligh Water, MUSORSTOM 10, stn CP 1332, 640-687 m; **J**, ventral view of complete specimen (MNHN BRA-3099), Bligh Water, MUSORSTOM 10, stn CP 1309, 843-887 m; **K**, **L**, Inner view of dorsal valve (MNHN BRA-3100) with preserved schizolophous lophophore and enlargement of lophophore, Bligh Water, MUSORSTOM 10, stn CP 1331, 694-703 m. All SEM. Scale bars: A, B,E-H, 2 mm; C, D, J-L, 1 mm; I, 500 µm.

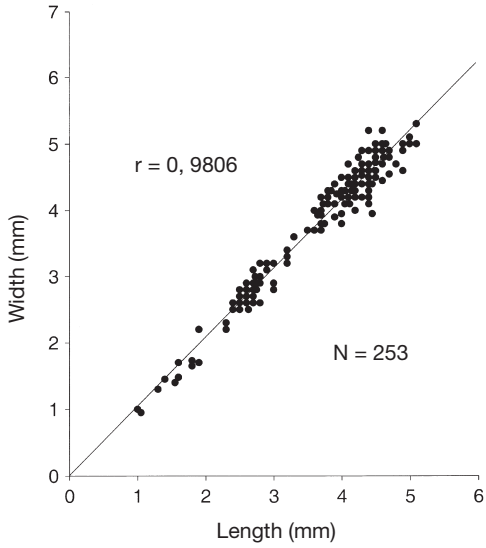

FIG. 12. — Intraspecific variation in *Amphithyris buckmani* Thomson, 1918. Scatter diagram plotting length / width. **N**, number of specimens.

depending in shape on the substrate (Fig. 11F) as *A. buckmani* lives closely attached to the substrate by a very short pedicle. The dorsal valve interior with high inner socket ridges and short, very low median septum. The schizolophous lophophore remains fused to the body wall (Fig. 11K, L).

Amphithyris buckmani differs from two known other *Amphithyris* species, *A. hallettensis* Foster, 1974 and *A. richardsonae* Campbell & Fleming, 1981, in larger size and radial ornamentation of the ventral valve (Foster 1974; Campbell & Fleming 1981).

Subfamily PHANEROPORINAE Zezina, 1981

Genus *Leptothyrella* Muir-Wood, 1965

TYPE SPECIES. — *Leptothyris ignota* Muir-Wood, 1959 by original designation (Muir-Wood 1959: 308).

Leptothyrella fijiensis n. sp.
(Fig. 13)

TYPE MATERIAL. — **Fiji.** Bligh Water, MUSORSTOM 10, stn CP 1332, holotype (MNHN BRA-3101; Fig. 13B-E). — Fiji, MUSORSTOM 10, Bligh Water, stn CP 1332 and Viti Levu, stn CP 1354, 4 paratypes (MNHN BRA-3102-3104, 3106; Fig. 13F-L).

TABLE 15. — Measurements (in mm) of *Leptothyrella fijiensis* n. sp from Fiji, MUSORSTOM 10.

Station No.	Length	Width	Thickness	Figure
DW 1314	1.6	1.1	0.4	Fig. 13A
CP 1330	3.0	2.5	0.9	–
CP 1332 (paratype)	3.8	3.2	1.1	Fig. 13L
CP 1332	4.4	3.6	1.4	–
CP 1332 (holotype)	3.3	2.8	1.0	Fig. 13B-E
CP 1353	1.1	0.8	0.3	–

TYPE LOCALITY. — Fiji Islands, Bligh Water, MUSORSTOM 10, 16°56.17'S, 178°07.86'E, 640-687 m.

ETYMOLOGY. — From the geographical name "Fiji", type locality of the species.

DIAGNOSIS. — *Leptothyrella* having rows of small tubercles at both sides of the beak, short, recessive dental plates, and descending branches attached to the rod-like septum.

MATERIAL EXAMINED. — **Fiji.** MUSORSTOM 10, Bligh Water, stn CP 1309, 1 ventral valve. — Stn DW 1314, 2 complete specimens. — Stn CP 1330, 1 complete specimen. — Stn CP 1331, 1 complete specimen. — Stn CP 1332, 82 complete specimens, 1 ventral valve, 1 dorsal valve. — Stn CP 1341, 23 complete specimens. — Stn DW 1345, 3 complete specimens. — Viti Levu, stn CP 1353, 62 complete specimens, 1 ventral valve, 1 dorsal valve. — Stn CP 1354, 34 complete specimens. — Stn CP 1363, 1 complete specimen. — Stn CP 1366, 1 complete specimen. — Stn CP 1369, 2 complete specimens. — Stn DW 1384, 1 complete specimen.

DEPTH RANGE. — 144-963 m.

MEASUREMENTS. — See Table 15; see also Figure 14.

DESCRIPTION

Shell small (maximum observed length 4.4 mm), elongate oval in outline with greatest width at about midlength; dorsal valve often subcircular. Shell surface smooth, except for weakly defined concentric growth lines, and coarsely punctate. Both valves are weakly biconvex. Anterior commissure rectimarginate. Beak high, truncated by

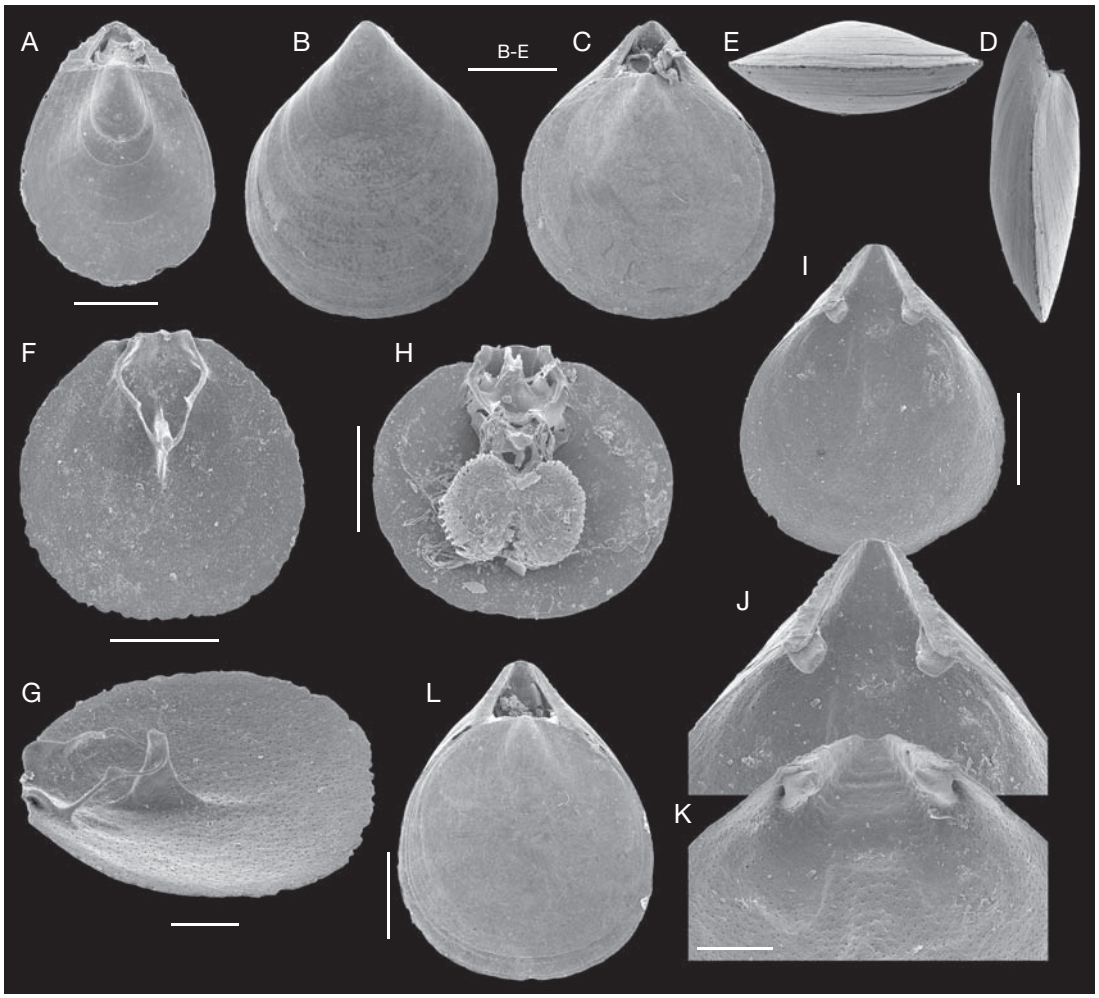

FIG. 13. — *Leptothyrella fijiensis* n. sp., Fiji: **A**, dorsal view of complete young specimen (MNHN BRA-3105), Bligh Water, MUSORSTOM 10, stn DW 1314, 656-660 m; **B**-**E**, ventral, dorsal, lateral and anterior views of complete specimen, holotype (MNHN BRA-3101), Bligh Water, MUSORSTOM 10, stn CP 1332, 640-687 m; **F**, **G**, inner and lateral views of dorsal valve, paratype (MNHN BRA-3102), Bligh Water, MUSORSTOM 10, stn CP 1332, 640-687 m; **H**, inner view of dorsal valve with preserved lophophore, paratype (MNHN BRA-3103), Viti Levu, CP 1354, 959-963 m; **I**-**K**, inner view of ventral valve, paratype (MNHN BRA-3104), Bligh Water, MUSORSTOM 10, stn CP 1332, 640-687 m, enlargement of posterior part (J), and tilted to show dental plates (K); **L**, dorsal view of complete specimen (MNHN BRA-3106), Bligh Water, MUSORSTOM 10, stn CP 1332, 640-687 m. All SEM. Scale bars: A, G, J, K, 500 µm; B-F, H, I, L, 1 mm.

a large, triangular hypothyrid foramen bordered by very narrow deltidial plates; beak ridges strong. At both sides of the beak there are two rows of small tubercles (Fig. 13J). Pedicle collar sessile. Teeth small supported by short, thick dental plates (Fig. 13K). Dorsal valve interior with a high median septum with rod-like extremity. Inner socket ridges high but narrow. No cardinal process or hinge plates are present. Crura very long and slender; crural processes very weakly developed. Descending branches attached to the septum; ascending branches absent. Lophophore zygolophous, heavily spiculate (Fig. 13H).

REMARKS

The genus *Leptothyrella* was originally described from the Indian Ocean by Muir-Wood (1959); however the re-examination of the type material has shown that her

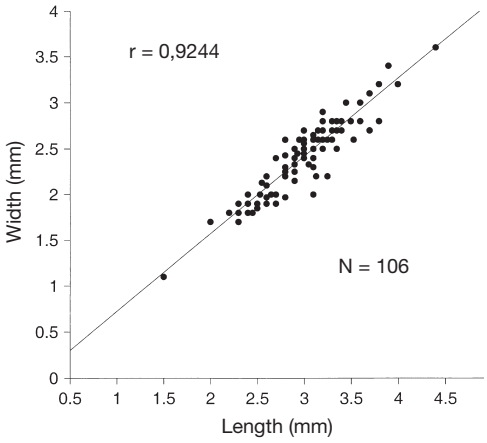

FIG. 14. — Intraspecific variation in *Leptothyrella fijiensis* n. sp. Scatter diagram plotting length/width. **N**, number of specimens.

description contains several errors (D. MacKinnon, pers. comm.). Dental plates, not seen by Muir-Wood (1959) are present in the type material. Muir-Wood (1959) also misidentified the lophophore of *Leptothyrella* as spirolophous when it is zygolophous. In 1981 Zezina created a new genus *Phaneropora*, with type species *P. galatheae* Zezina, 1981 from the SW Pacific (Fig. 15), because based on Muir-Wood's (1959) original description she recognized that *Leptothyrella* and *Phaneropora* are distinct genera. The characters distinguishing *Phaneropora* from *Leptothyrella*, according to Zezina (1981), were the presence of dental plates and zygolophous lophophore. However, she also included into *Phaneropora* the species from the Atlantic described by Davidson (1880), *Magasella incerta* which resembles *P. galatheae* (see Zezina 1981: 18) but differs in the loop development. The loop of *P. galatheae* possesses a gap between the crura and the septal pillar (see Fig. 15C-E); at the distal extremity of each of the crura there is a prominent flattened area that is the rudiment of a descending branch (Fig. 15F). In turn, the species from the Atlantic has continuous, from crura to the septum, descending branches (Davidson 1887; Logan 1983, 1998; Gaspard 2003; Álvarez & Emig 2005). In the revised edition of the *Treatise*, MacKinnon & Lee (2006a: 2227) transferred *Phaneropora incerta* into *Leptothyrella*, making the absence or presence of descending branches the main criterion to separate the genera *Leptothyrella* and *Phaneropora*. In other characters those two taxa are very similar and there is still uncertainty about their status, and only a study of their genetic relationship would help in resolving this problem.

Until now only two species of *Leptothyrella* have been recognized: *L. ignota* (Muir-Wood, 1959) from the western Indian Ocean and *L. incerta* (Davidson, 1880) from the Atlantic. The newly described species, *L. fijiensis* n. sp. is the third one known. It differs from the type species, *L. ignota* in slightly smaller size, more rounded outline and distinctly tuberculate beak ridges. Its valves are equally convex, while in *L. ignota* the convexity of the ventral valve is slightly greater than that of the dorsal valve (Muir-Wood 1959).

The Atlantic *L. incerta* differs from *L. fijiensis* n. sp. in lacking tubercles along the sides of the beak and in having strong dental plates (Davidson 1887; Logan 1983, 1998; Gaspard 2003; Álvarez & Emig 2005). Also its crura are more massive than those in the Fiji specimens.

The bathymetric range of *L. fijiensis* n. sp. is from 144 to 963 m. The species *L. incerta* and *L. ignota* have much wider depth range, 312-5300 m (Logan 1983, 1988, 1998; Zezina 2000; Gaspard 2003; Álvarez & Emig 2005) and 850-2881 m (Muir-Wood 1959; Hiller 1986), respectively. The depth of the related species *P. galatheae* is also very wide, from 225 to 3493 m (Zezina 1981, 1987; Foster 1989; Laurin 1997).

Superfamily TEREBRATELLOIDEA King, 1850
Family DALLINIDAE Beecher, 1893
Subfamily DALLININAE Beecher, 1893

Genus *Dallina* Beecher, 1893

TYPE SPECIES. — *Terebratula septigera* Lovén, 1846 by original designation (Beecher 1893: 382).

Dallina triangularis Yabe & Hatai, 1934
(Fig. 16B-G)

Dallina triangularis Yabe & Hatai, 1934b: 662, figs 31-35. — Hatai 1940: 320, pl. 7, figs 22-27.

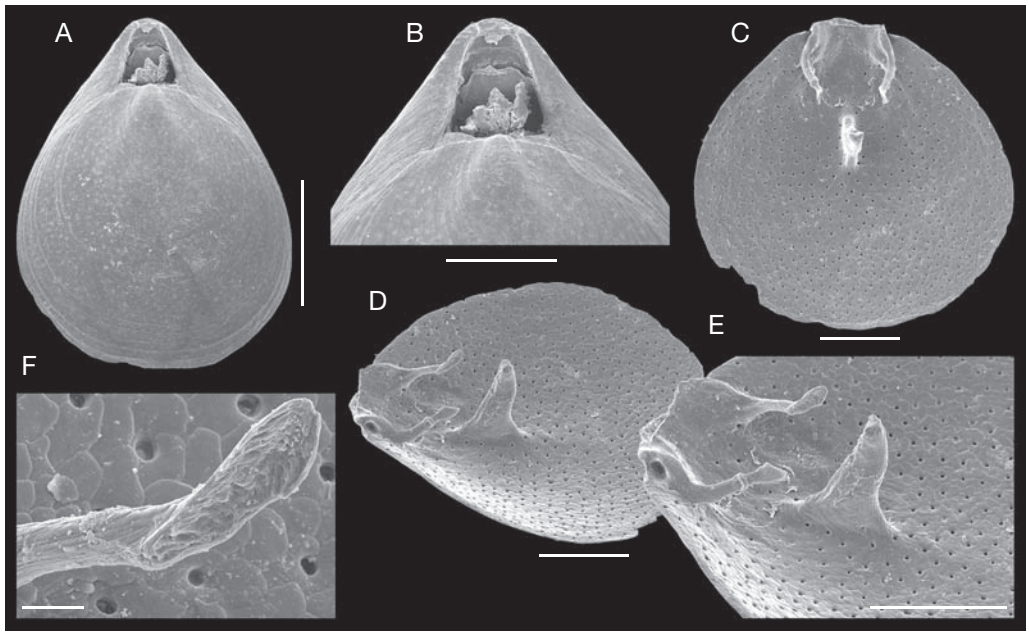

FIG. 15. — *Phaneropora galatheae* Zezina, 1981, New Caledonia, Norfolk Ridge, BATHUS 3, stn CP 844, 908 m: **A**, **B**, dorsal view of complete specimen (MNHN BRA-3107), and enlargement (B) of the posterior part to show details of the beak; **C**-**F**, inner and lateral views of the dorsal valve (MNHN BRA-3108), and enlargement (F) of the rudiment of a descending branch. All SEM. Scale bars: A, 1 mm; B-E, 500 µm; F, 50 µm.

MATERIAL EXAMINED. — **Fiji.** BORDAU 1, Lau Ridge, stn CP 1394, 1 young complete specimen. — Stn CP 1409, 2 complete specimens. — Stn CP 1458, 1 complete specimen.

DEPTH RANGE. — 260-1226 m.

MEASUREMENTS. — See Table 16.

TABLE 16. — Measurements (in mm) of *Dallina triangularis* Yabe & Hatai, 1934 from Fiji, BORDAU 1.

Station No.	Length	Width	Thickness	Figure
CP 1409	21.9	20.9	14.9	Fig. 16E-G
CP 1409	20.5	18.5	13.4	Fig. 16B-D
CP 1458	19.6	17.2	13.1	–

REMARKS

The investigated specimens correspond in size and outline with those described as *Dallina triangularis* from off Japan (Hatai 1940). The shell is of medium size, thin, ventribiconvex, triangular in outline, widest at anterior part. The anterior commissure is broadly paraplicate. The beak is erect to suberect with a large, circular permesothyrid foramen. The symphytium is small. The ventral valve interior with small teeth without dental plates and very short pedicle collar. The inner and outer hinge plates are separated by distinct crural bases. The median septum is very long, high posteriorly and very low anteriorly. The loop is teloform, not attached to the septum, with long slender descending branches and broad ascending branches. The loops in the investigated specimens are so delicate that it has not been possible to remove the tissues without breaking the loop.

Dallina triangularis differs from other species occurring in the western Pacific, *D. raphaelis* (Dall, 1870), *D. obessa* Yabe & Hatai, 1934 and *D. elongata* Hatai, 1940, in being smaller, having triangular outline and thinner shell (Hatai 1940; Foster 1989). *Dallina obessa* is also more convex.

The Miocene species *Dallina vitilevensis* Ladd, 1934 from Fiji is smaller than the investigated specimens and is more elongate (Ladd 1934:

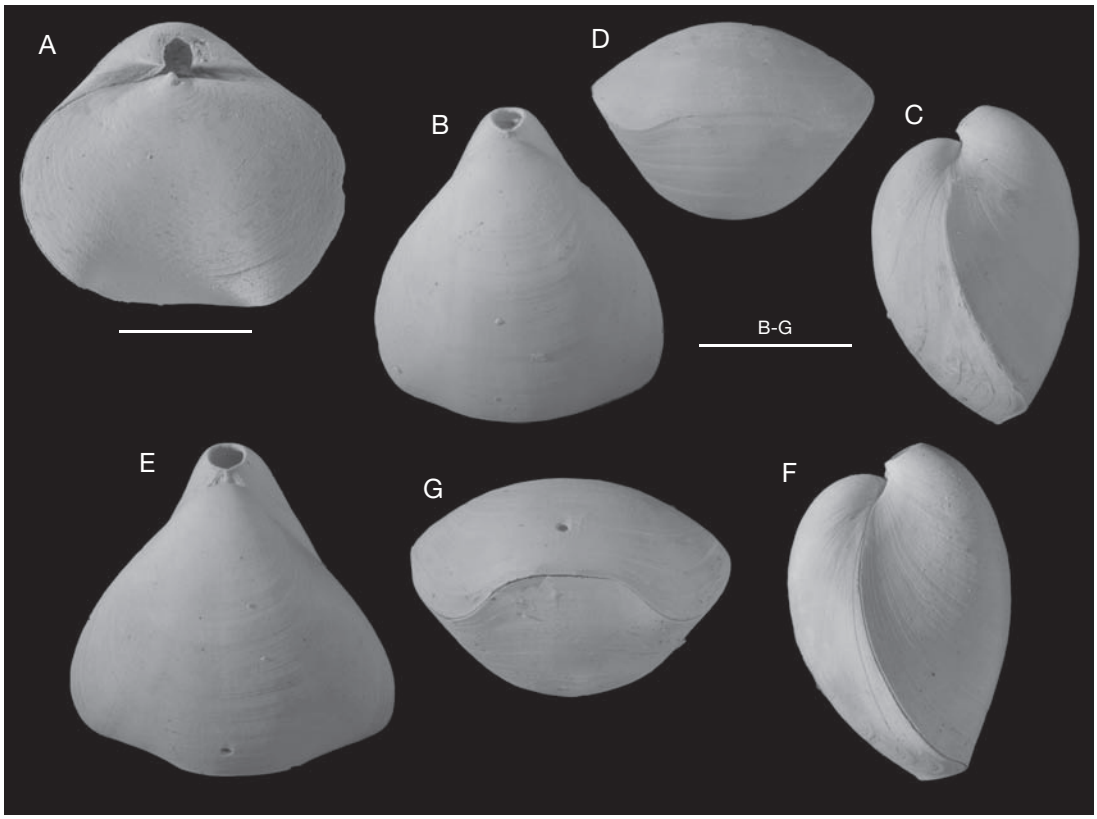

FIG. 16. — **A**, *Septicollarina* sp., Fiji, Lau Ridge, BORDAU 1, stn CP 1409, 557-558 m, dorsal view of complete specimen (MNHN BRA-3088); **B**-**G**, *Dallina triangularis* Yabe & Hatai, 1934, Fiji, Lau Ridge, BORDAU 1, stn CP 1409, 557-558 m, dorsal, lateral and anterior views of complete specimens (MNHN BRA-3109, 3110). Scale bar: A: 0.5 cm; B-G: 1 cm.

pl. 24, figs 4-7). The systematic position of the Neogene specimens from Fiji assigned by Cooper (1978) to the genus *Dallina* is doubtful. Cooper (1978: pl. 1, fig. 26) observed well-developed dental plates which are absent, according to him, in larger specimens. Examination of early growth stages of the *Dallina* type species, *D. septigera* (Lovén, 1846), confirms the absence of dental plates through all the stages of development (see MacKinnon & Lee 2006b: 2242), thus the specimens with dental plates cannot be assigned to *Dallina*.

Dallina triangularis is very rare in the Fiji collection and this is the first record of *Dallina* from off the Fiji Islands.

Subfamily NIPPONITHYRIDINAE Hatai, 1938

Genus *Nipponithyris* Yabe & Hatai, 1934

TYPE SPECIES. — *Nipponithyris nipponensis* Yabe & Hatai, 1934 by original designation (Yabe & Hatai 1934a: 588).

Nipponithyris lauensis n. sp.
(Fig. 17)

TYPE MATERIAL. — **Fiji.** Lau Ridge, BORDAU 1, stn DW 1485, holotype (MNHN BRA-3111; Fig. 17D-G). — Same data, stn DW 1408, DW 1432, DW 1485, 4 paratypes (MNHN BRA-3112-3115; Fig. 17A-C, H-M).

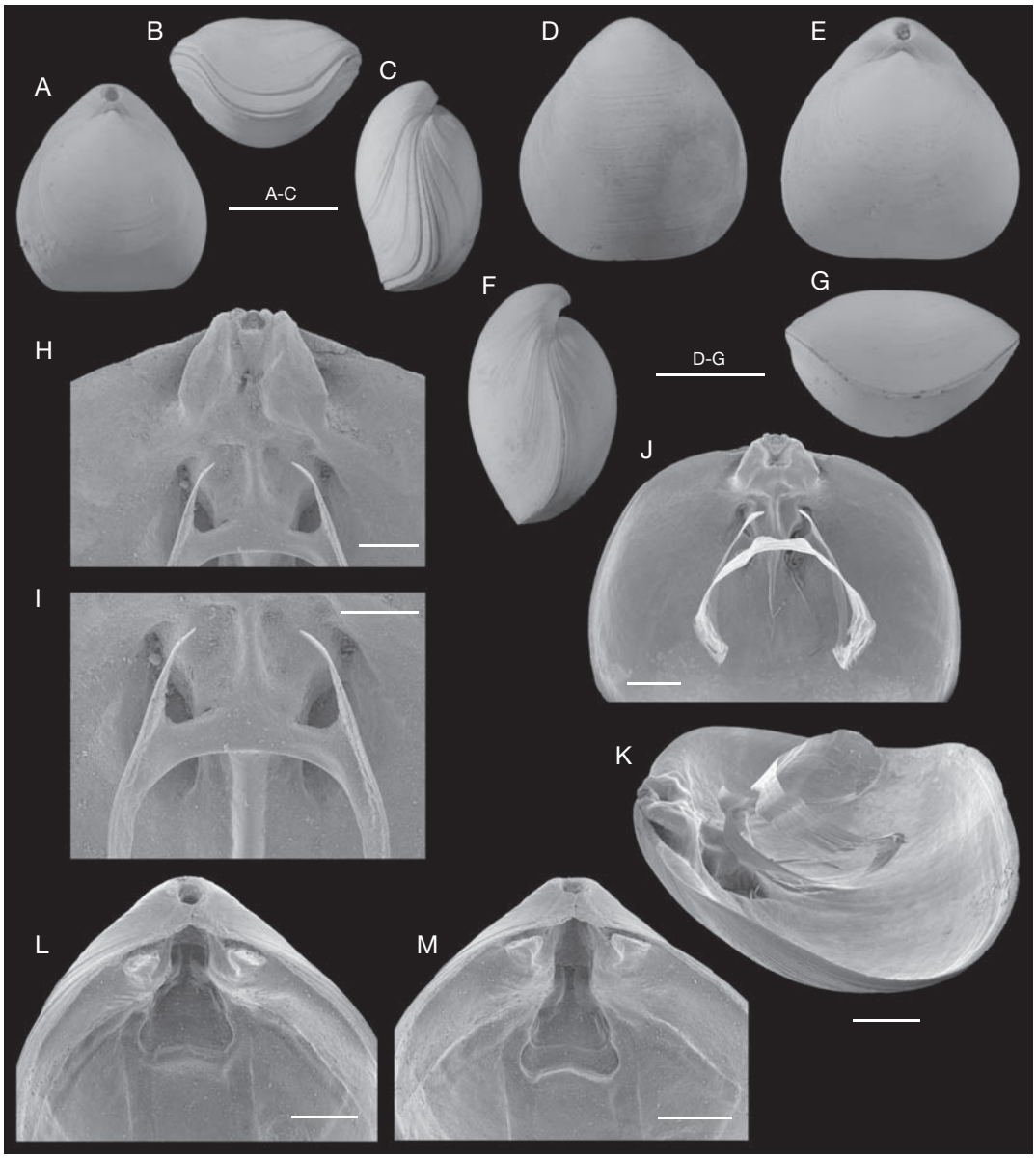

FIG. 17. — *Nipponithyris lauensis* n. sp., Fiji, Lau Ridge, BORDAU 1: **A**-**C**, dorsal, anterior and lateral views of complete specimen, paratype (MNHN BRA-3112), stn DW 1485, 700-707 m; **D**-**G**, ventral, dorsal, laterial and anterior views of complete specimen, holotype (MNHN BRA-3111), stn DW 1485, 700-707 m; **H**, **I**, posterior part of dorsal valve interior, and enlargement (I) to show details of connecting band and crural processes, paratype (MNHN BRA-3113), SEM, stn DW 1432, 477-493 m; **J**, **K**, dorsal and side views of interior of dorsal valve to show brachial loop, paratype (MNHN BRA-3114), SEM, stn DW 1408, 550-561 m; **L**, **M**, inner views of ventral valve, tilted (M) to show swollen bases and grooves to accommodate inner socket ridges, paratype (MNHN BRA-3115), SEM, stn DW 1432, 477-493 m. Scale bars: A-G, 0.5 cm; H, I, 1 mm; J-M, 2 mm.

TYPE LOCALITY. — Fiji Islands, Lau Ridge, BORDAU 1, stn DW 1485, 19°02.69'S, 178°29.80'W, 700-707 m.

ETYMOLOGY. — Referring to the geographic name "Lau Ridge", type locality of the species.

DIAGNOSIS. — *Nipponithyris* of medium size, strongly unisulcate, posterior part strongly thickened, teeth with

TABLE 17. — Measurements (in mm) of *Nipponithyris lauensis* n. sp. from Fiji, BORDAU 1.

Station No.	Length	Width	Thickness	Figure
DW 1408	13.6	12.3	8.7	–
CP 1409	13.0	11.2	7.9	–
CP 1409	12.3	11.1	7.5	–
DW 1432	8.0	7.9	4.5	–
DW 1432	7.5	7.6	4.3	–
DW 1458	12.2	10.3	6.9	–
DW 1458	11.5	10.4	6.3	–
DW 1485 (holotype)	11.1	10.5	6.6	Fig. 17D-G
DW 1485 (paratype)	9.6	8.3	5.6	Fig. 17A-C
DW 1485	10.7	9.9	5.5	–

swollen bases, no crura, loop trabelacur with long, slender descending branches and broad transverse band.

MATERIAL EXAMINED. — **Fiji.** MUSORSTOM 10, Viti Levu, stn CP 1354, 1 complete specimen. — Stn CP 1361, 1 complete specimen.
BORDAU 1, Lau Ridge, stn DW 1408, 12 complete specimens, 1 dorsal valve. — Stn CP 1409, 3 complete specimens. — Stn DW 1432, 33 complete specimens. — Stn CP 1458, 2 complete specimens. — Stn DW 1485, 3 complete specimens.

DEPTH RANGE. — 477-1226 m.

MEASUREMENTS. — See Table 17.

DESCRIPTION

Shell of medium size with maximum length 13.6 mm, rounded pentagonal, longer than wide, smooth and moderately ventribiconvex. Lateral commissures dorsally curved; anterior commissure from moderately to strongly unisulcate. Beak low, erect to slightly incurved with weakly defined beak ridges. Foramen small, circular, mesothyrid to permesothyrid. Deltidial plates conjunct forming a well-developed, visible symphytium. Posterior part of both valves strongly thickened, making the articulation of the shell very strong. Pedicle collar short. Ventral delthyrial cavity very narrow. Teeth short but strong with swollen bases, below which there are excavated grooves for the reception of the inner socket ridges that are narrow but massive. In the dorsal valve the dental sockets are very deep. Cardinal process semi-elliptical, prominent. Hinge plates are overgrown with secondary thickening (Fig. 17H). Crura absent; crural processes long, needle-like and curved inward (see Fig. 17H, I). Median septum highest at the point of the union with lateral connecting bands and extending anteriorly as a low ridge. Loop trabecular; descending branches long and slender, attached to the septum by the connecting bands (Fig. 17I); ascending branches and a transverse band broad. Muscle scars deeply impressed in both valves.

REMARKS

The genus *Nipponithyris* is characterized by its rounded pentagonal outline and smooth, sulcate shell which is strongly thickened posteriorly (Yabe & Hatai 1934a; Hatai 1940; Cooper 1973b; Laurin 1997). The studied specimens display all those characters, thus indicating their attribution to *Nipponithyris* but they differ from *N. nipponensis* Yabe & Hatai, 1934 and *N. afra* Cooper, 1973 in the absence of crura (see Hatai 1940; Cooper 1973b; Laurin 1997). None of the investigated specimens shows any sign of the development of the crura but their crural processes are long and needle-like, contrary to the short and bluntly pointed crural processes in *N. nipponensis* and *N. afra* (Cooper 1973b). Externally, in size and strong sulcation, *N. lauensis* n. sp. is close to *N. afra*, known from the Indian Ocean (Cooper 1973b; Hiller 1996) and the Loyalty Islands, SW Pacific (Laurin 1997).

Nipponithyris lauensis n. sp. displays also, both externally and internally, a great similarity to the species from off Vietnam, *Holobrachia vietnamica* described by Zezina (2001). Both those species are characterized by the absence of crura. *Holobrachia vietnamica* possesses, however, dental plates which differentiate this species from the Fiji material and any *Nipponithyris* species.

The specimens under study are also similar to *N. fijiensis* (Elliott, 1961) from the Upper Miocene-Lower Pliocene deposits of Fiji (Cooper 1978). This latter species was originally described from the Neogene of Fiji by Elliott (1961) under the name *Abyssothyris fijiensis*. However, examination of the internal structure (Cooper 1978) revealed that it possesses a median septum that eliminates it from assignment to *Abyssothyris*. Although indicating similarity to

Nipponithyris, Cooper (1978) created for this material a new genus: *Dicrosia*. In the revised edition of the *Treatise*, *Dicrosia* is treated as a synonym of *Nipponithyris* (MacKinnon & Lee 2006b).

Genus *Campages* Hedley, 1905

TYPE SPECIES. — *Campages furcifera* Hedley, 1905 by original designation (Hedley 1905: 43).

Campages ovalis n. sp.
(Fig. 18)

TYPE MATERIAL. — **Fiji.** Lau Ridge, BORDAU 1, stn DW 1469, holotype, (MNHN BRA-3116; Fig. 18A, B). — Same data, 3 paratypes (MNHN BRA-3117-3119; Fig. 18C-J).

TYPE LOCALITY. — Fiji, Lau Ridge, BORDAU 1, stn DW 1469, 19°40.01'S, 178°10.24'W, 314-377 m.

ETYMOLOGY. — From the Latin *oval*, referring to the oval outline of the shell.

DIAGNOSIS. — *Campages* of small size, elongate oval in outline, strongly biconvex, rectimarginate, descending branches slender, hood very broad.

MATERIAL EXAMINED. — **Wallis and Futuna.** MUSORSTOM 7, Futuna, stn DW 513, 1 complete specimen.
Fiji. BORDAU 1, Lau Ridge, stn DW 1410, 1 young complete specimen. — Stn DW 1440, 1 complete specimen. — Stn DW 1469, 19 complete specimens, 2 ventral valves, 1 dorsal valve. — Stn DW 1485, 2 complete specimens.

DEPTH RANGE. — 190-410 m.

MEASUREMENTS. — See Table 18.

TABLE 18. — Measurements (in mm) of *Campages ovalis* n. sp. from Fiji, BORDAU 1.

Station No.	Length	Width	Thickness	Figure
DW 1469 (holotype)	8.0	6.8	5.3	Fig. 18A, B
DW 1469 (paratype)	8.1	7.3	5.1	Fig. 18C-E
DW 1469	7.4	6.1	5.5	–
DW 1469	7.1	6.3	4.3	–
DW 1469	6.2	5.7	3.9	–
DW 1469	5.8	5.2	3.5	–

DESCRIPTION
Shell small, oval in outline, densely punctate, subtransparent and strongly biconvex. Shell surface smooth with indistinct growth lines. Lateral commissures straight; anterior commisure rectimarginate. Beak suberect; no beak ridges are developed. Foramen small, circular, mesothyrid to permesothyrid. Deltidial plates conjunct forming a symphytium. Pedicle collar short. Teeth small without dental plates (Fig. 18F, G). Cardinal process large, transverse, kidney-shaped. Inner socket ridges long. Outer hinge plates well-developed; inner hinge plates fused to the median septum forming septalium (Fig. 18J). Crural bases weakly differentiated. Median septum, constituting half of the valve length, is high posteriorly, sloping rapidly to become very low anteriorly. Crura long, slender with short, sharply pointed crural processes. Loop diploform; descending branches narrow, parallel; hood extremely broad (Fig. 18H, I). Muscle scars strongly defined on both valves.

REMARKS
The specimens show internally all the characters typical of *Campages*. The genus *Jaffaia* Thomson, 1927 which has a very similar loop is distinguishable from *Campages* by the presence of beak ridges and absence of pedicle collar. The Fiji material differs from other *Campages* species in having a relatively small foramen and elongate-oval outline, while typical *Campages* is subtriangular. In the revised edition of the *Treatise*, Logan (2007) listed seven species of *Campages*, six of which are known from off Japan (Dall 1920; Hatai 1940). Cooper (1970), in his revision of the genera *Campages* and *Japanithyris* Thomson, 1927, suggested that *C. basilanica* Dall, 1920, *C. mariae* (Adams, 1860) and *C. pacifica* Hatai, 1940 might be synonymous. All those species, as well as *C. furcifera* Hedley, 1905 are much larger than the investigated specimens and their anterior commissure has broad to strong folding (Cooper 1970). *Campages philippinensis* Cooper, 1970 is of similar size but differs from the studied material in having distinct growth

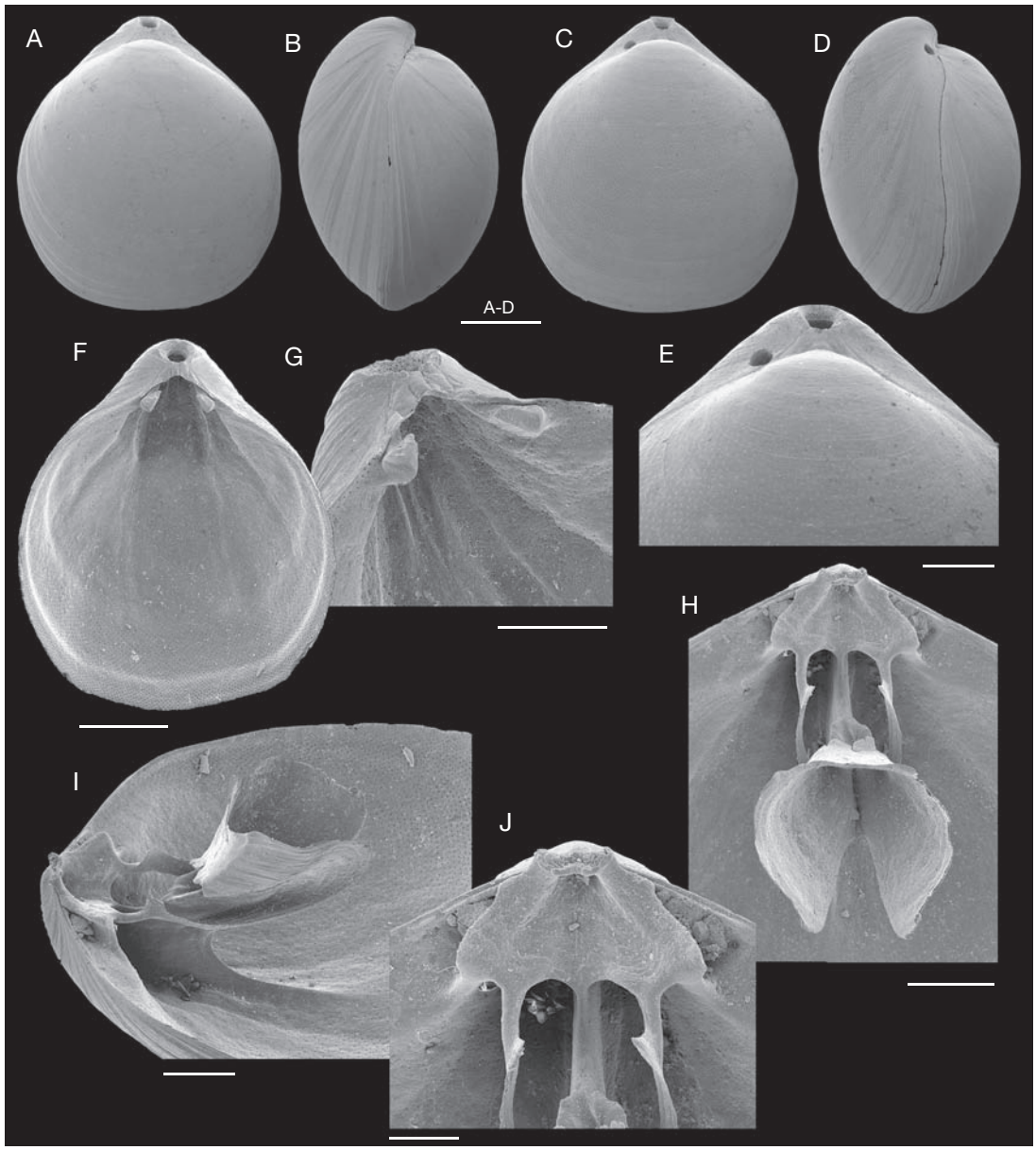

FIG. 18. — *Campages ovalis* n. sp., Fiji, Lau Ridge, BORDAU 1, stn DW 1469, 314-377 m: **A**, **B**, dorsal and lateral views of complete specimen, holotype (MNHN BRA-3116); **C**-**E**, dorsal and lateral views of complete specimen, and enlargement (E) of posterior part, paratype (MNHN BRA-3117); **F**, **G**, inner view of ventral valve and enlargement (G) of posterior part, titled to show teeth without dental plates, paratype (MNHN BRA-3118); **H**-**J**, dorsal and side views of interior of dorsal valve to show brachial loop, and enlargement (J) of cardinalia, paratype (MNHN BRA-3119). All SEM. Scale bars: A-D, F, 2 mm; E, G-I, 1 mm; J, 500 µm.

lines and the ventral valve several times deeper than the dorsal one (Cooper 1970); the shell of *C. ovalis* n. sp. is nearly equally biconvex. *Campages nipponensis* (Yabe & Hatai, 1935) is similar in size to the investigated material but differs in having prominent growth lines (Yabe & Hatai 1935; Hatai

1940). In size, the specimens from Fiji are also close to *C. dubius* (Hatai, 1940) from off Japan, differing in having much smaller foramen and less elongate outline.

Superfamily KRAUSSINOIDEA Dall, 1870
Family KRAUSSINIDAE Dall, 1870

Genus *Megerlia* King, 1850

TYPE SPECIES. — *Anomia truncata* Linnaeus, 1767, by original designation (King 1850: 145).

Megerlia truncata (Linnaeus, 1767)
(Fig. 19D, E)

Anomia truncata Linnaeus, 1767: 1152, no. 229.

Megerlia truncata – Logan 1979: 68-72, text-fig. 21, pl. 9, figs 1-23. — Bitner 1990: 145-147, text-fig. 10, pl. 2, figs 6-9; pl. 7, figs 3-6; pl. 8, figs 1-7. — Bitner 2007: 496, 498, fig. 3I, J.

Megerlia gigantea – Cooper 1981: 27, 28, pl. 6, figs 1-26. — d'Hondt 1987: 38, 39.

Megerlia echinata – Laurin 1997: 452, 453, figs 38, 39. — Gaspard 2003: 299, 300, fig. 5 (1-8).

MATERIAL EXAMINED. — **Wallis and Futuna.** MUSORSTOM 7, Wallis, stn DW 525, 1 complete specimen, 1 ventral valve.

DEPTH RANGE. — 500-600 m.

MEASUREMENTS. — Length 4.8 mm, width 5.6 mm, thickness 1.4 mm.

REMARKS

This species is very rare and was found in only one station near Wallis Island. Although a widespread species, *Megerlia truncata* is rare in the Pacific, reported until now only from New Caledonia (Laurin 1997) and the Austral Islands, French Polynesia (Bitner 2007).

Megerlia gigantea (Deshayes, 1863) appears to be a synonym of *M. truncata* (see discussion in Bitner 2007).

Order THECIDEIDA Elliott, 1958
Superfamily THECIDEOIDEA Gray, 1840

Family THECIDELLINIDAE Elliott, 1953
Subfamily THECIDELLININAE Elliott, 1953

Genus *Thecidellina* Thomson, 1915

TYPE SPECIES. — *Thecidium barretti* Davidson, 1864 by original designation (Thomson 1915: 462).

Thecidellina maxilla (Hedley, 1899)
(Fig. 19A-C)

Thecidea maxilla Hedley, 1899: 508-510, fig. 57.

Thecidellina maxilla – Dall 1920: 283. — Thomson 1927: 140. — Cooper 1954: 317, pl. 81, figs 1-10. — Zezina 1985: 208. — Laurin 1997: 453, 454, fig. 40a, b. — Lee & Robinson 2003: 350-352, figs 28-35. — Bitner 2007: 498, 499, fig. 3a-h.

Thecidellina cf. *T. maxilla* – Cooper 1964: 1118, pl. 301, figs 15, 16, 18, 19.

MATERIAL EXAMINED. — **Wallis.** MUSORSTOM 7, stn DW 604, 1 ventral valve.
Fiji. MUSORSTOM 10, Bligh Water, stn DW 1333, 1 complete specimen, 4 dorsal valves.
BORDAU 1, Lau Ridge, stn DW 1463, 1 ventral valve.

DEPTH RANGE. — 200-420 m.

MEASUREMENTS. — Length 6.0 mm, width 4.3 mm.

REMARKS

Thecidella maxilla is widely distributed in the Pacific Ocean (Thomson 1927; Cooper 1954; Pajaud 1970; Laurin 1997; Lee & Robinson 2003; Bitner 2007). This is a small species that reaches 6 mm of length in the investigated material. The interarea is triangular with distinct transverse growth lines and no trace of a pseudodeltidium. No septum is observed in the ventral valve. The dorsal valve is subcircular with long median septum. The rim is strongly tuberculate.

Thecidella maxilla is a shallow water species (Lee & Robinson 2003). The material from Fiji, collected at the depth of 200-420 m is dead and might have been redeposited from shallower water.

The specimens of *Thecidellina* sp. from the Miocene of Fiji, illustrated by Cooper (1978) are very close to *T. maxilla*.

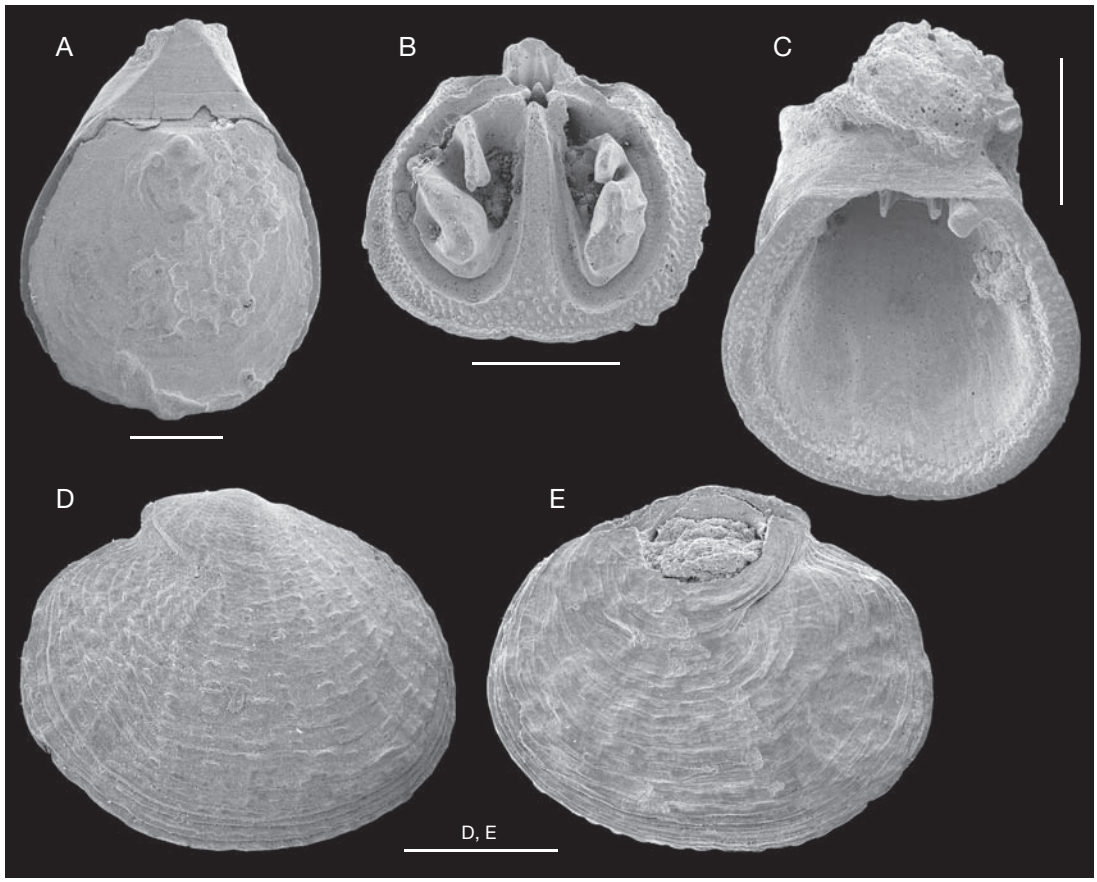

FIG. 19. — **A**-**C**, *Thecidellina maxilla* (Hedley, 1899), Fiji; **A**, dorsal view of complete specimen (MNHN BRA-3120), Bligh Water; MUSORSTOM 10, stn DW 1333, 200-215 m; **B**, inner view of dorsal valve (MNHN BRA-3121), Bligh Water, MUSORSTOM 10, stn DW 1333, 200-215 m; **C**, inner view of ventral valve (MNHN BRA-3122), Lau Ridge, BORDAU 1, stn DW 1463, 300-400 m; **D**, **E**, *Megerlia truncata* (Linnaeus, 1767), Wallis and Futuna, ventral and dorsal views of complete specimen (MNHN BRA-3061), MUSORSTOM 7, stn DW 525, 500-600 m. All SEM. Scale bars: A, 1 mm; B-E, 2 mm.

DISCUSSION

Since 1976 the French research institutions have organized about 50 oceanographic expeditions to the Indo-West-Pacific in order to survey the major archipelagos, sampling in the bathymetric range from about 100 m to more than 2000 m. The brachiopods described herein come from two nearby archipelagos, Fiji and Wallis and Futuna, and were collected during three French cruises, MUSORSTOM 7, MUSORSTOM 10 and BORDAU 1. Twenty-four species belonging to 21 genera have been recognized in this collection of recent brachiopods. Among them four species have been described as new: *Xenobrochus rotundus* n. sp., *Leptothyrella fijiensis* n. sp., *Nipponithyris lauensis* n. sp. and *Campages ovalis* n. sp. The brachiopods collected in the region of Wallis and Futuna during the French cruise MUSORSTOM 7 are represented by eight species belonging to eight genera (see Table 19). All of them are recorded for the first time from this region. In the Fiji region the brachiopods are represented by 22 species belonging to 19 genera (Table 19). They were collected during two cruises, MUSORSTOM 10 and BORDAU 1, carried out in two separate areas, around the islands and along the Lau Ridge. Those

two regions have nine species in common but six species present in the vinicity of the Viti Levu and Vanua Levu Islands are not identified in the Lau Ridge, and seven species present in the Lau Ridge have not been found around Fiji (see Table 19). Except *Lingula*, all the genera have been reported for the first time either in the previous elaboration (Bitner 2006b) or in the present paper. Although the studied material is very rich in specimens, the species *Rhynchonella grayi* (now *Basiliolella grayi*) described from Fiji by Woodward (1855) was not found. Two genera, *Pelagodiscus* and *Megerlia*, found in the Wallis and Futuna region have not been recognized in the material from Fiji, while 13 genera noted from Fiji have not been found in the material from the Wallis and Futuna Islands (Table 19).

When compared to 30 species occurring in the New Caledonia region (d'Hondt 1987; Emig 1988; Laurin 1997; Bitner 2006c), the biodiversity of the Fiji fauna with its 22 species is only slightly lower. The number of species from Fiji is also smaller than that in the New Zealand region with about 32 species (Richardson 1981; Dawson 1991; Lee & Robinson 2003; Lüter 2005). In terms of biogeographic affinities, the Fiji brachiopods display a great similarity to those from New Caledonia and New Zealand, having eleven and eight genera in common, respectively.

The brachiopods from the Wallis and Futuna region are much less diversified, containing only eight species and eight genera. However, five of those genera are in common with the faunas from New Caledonia and New Zealand.

Brachiopods are known also from the Late Tertiary of Fiji and consist of forms closely related to the recent fauna of the region. All eight genera found in the Neogene deposits have their representatives in the recent fauna (Ladd 1934; Elliott 1961; Cooper 1978). Among rhynchonellids, *Cryptopora* and two species of *Basiliola* were recognized in the Neogene of Fiji (Cooper 1978). *Cryptopora* is rare in the Western Pacific but is reported from off Australia, New Zealand and New Caledonia (Logan 2007) but it is not known in the recent fauna of Japan nor as a fossil in the Japanese Tertiary (Hatai 1940; Cooper 1978). The Tertiary terebratulids are represented by *Abyssothyris*, *Dallithyris*, *Terebratulina*, *Dallina* and *Nipponithyris*. *Thecidellina* found in the Neogene of Fiji seems to be similar to *T. maxilla* recorded today.

TABLE 19. — List of the brachiopod species identified in the Wallis and Futuna, Fiji and Lau Ridge regions.

Species	Wallis and Futuna	Fiji	Lau Ridge
Lingula sp.		x	
Pelagodiscus altanticus	x		
Novocrania sp.	x	x	
Cryptopora maldivensis	x	x	
Basiliola beecheri		x	x
Basiliola lucida			x
Dallithyris pacifica		x	x
Abyssothyris wyvillei		x	x
Xenobrochus rotundus n. sp.	x		x
Terebratulina japonica		x	x
Terebratulina reevei		x	x
Terebratulina australis			x
Eucalathis rugosa	x	x	
Fallax neocaledonensis			x
Septicollarina sp.			x
Frenulina sanguinolenta		x	x
Argyrotheca sp.		x	
Amphithyris buckmani		x	x
Leptothyrella fijiensis n. sp.		x	
Dallina triangularis			x
Nipponithyris lauensis n. sp.		x	x
Campages ovalis n. sp.	x		x
Megerlia truncata	x		
Thecidellina maxilla	x	x	x

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APPENDIX

Station list

Station	Location	Depth	Species
Fiji MUSORSTOM 10			
Bligh Water			
CP 1309	17°32.05'S, 178°53.24'E	843-887 m	*Amphithyris buckmani* *Leptothyrella fijiensis* n. sp.
DW 1314	17°16.15'S, 178°14.85'E	656-660 m	*Cryptopora maldivensis* *Amphithyris buckmani* *Leptothyrella fijiensis* n. sp.
CP 1316	17°14.84'S, 178°21.99'E	478-491 m	*Amphithyris buckmani*
CP 1330	17°09.50'S, 177°56.32'E	567-699 m	*Cryptopora maldivensis* *Terebratulina japonica* *Terebratulina reevei* *Amphithyris buckmani* *Leptothyrella fijiensis* n. sp.
CP 1331	17°02.45'S, 178°01.84'E	694-703 m	*Cryptopora maldivensis* *Dallithyris pacifica* *Amphithyris buckmani* *Leptothyrella fijiensis* n. sp.
CP 1332	16°56.17'S, 178°07.86'E	640-687 m	*Cryptopora maldivensis* *Dallithyris pacifica* *Amphithyris buckmani* *Leptothyrella fijiensis* n. sp.
DW 1333	16°50.36'S, 178°12.55'E	200-215 m	*Novocrania* sp. *Cryptopora maldivensis* *Terebratulina japonica* *Amphithyris buckmani* *Thecidellina maxilla*
DW 1334	16°51.37'S, 178°13.95'E	251-257 m	*Novocrania* sp. *Cryptopora maldivensis* immature *Terebratulina* *Argyrotheca* sp. *Amphithyris buckmani*
CP 1335	16°52.76'S, 178°03.05'E	729-753 m	*Dallithyris pacifica* *Amphithyris buckmani*
CC 1336	16°58.05'S, 177°58.39'E	797-799 m	*Dallithyris pacifica* *Amphithyris buckmani*
CP 1341	16°52.51'S, 177°43.66'E	500-614 m	*Cryptopora maldivensis* *Amphithyris buckmani* *Leptothyrella fijiensis* n. sp.
DW 1345	17°14.92'S, 178°29.50'E	660-663 m	*Cryptopora maldivensis* *Terebratulina japonica* *Amphithyris buckmani* *Leptothyrella fijiensis* n. sp.
Viti Levu			
CP 1353	17°30.90'S, 178°53.36'E	879-897 m	*Cryptopora maldivensis* *Amphithyris buckmani* *Leptothyrella fijiensis* n. sp.
CP 1354	17°42.60'S, 178°54.98'E	959-963 m	*Cryptopora maldivensis* *Amphithyris buckmani* *Leptothyrella fijiensis* n. sp. *Nipponithyris lauensis* n. sp.

Station	Location	Depth	Species
DW 1359	17°49.67'S, 178°47.78'E	183-188 m	*Amphithyris buckmani*
CP 1360	17°59.57'S, 178°48.20'E	402-444 m	*Amphithyris buckmani*
CP 1361	18°00.00'S, 178°53.71'E	1058-1091 m	*Abyssothyris wyvillei* *Nipponithyris lauensis* n. sp.
CP 1363	18°12.39'S, 178°33.01'E	144-150 m	*Terebratulina japonica* *Leptothyrella fijiensis* n. sp.
DW 1365	18°12.73'S, 178°32.38'E	295-302 m	*Terebratulina japonica*
CP 1366	18°12.36'S, 178°33.06'E	149-168 m	immature *Terebratulina* *Leptothyrella fijiensis* n. sp.
CP 1369	18°11.13'S, 178°23.44'E	392-433 m	*Amphithyris buckmani* *Leptothyrella fijiensis* n. sp.
DW 1376	18°18.67'S, 178°09.07'E	497-504 m	*Basiliola beecheri*
DW 1377	18°18.40'S, 178°02.47'E	233-248 m	*Terebratulina japonica*
DW 1383	18°18.40'S, 178°02.60'E	230-251 m	*Terebratulina japonica* *Terebratulina reevei*
DW 1384	18°18.50'S, 178°05.83'E	260-305 m	*Cryptopora maldivensis* immature *Terebratulina* *Eucalathis rugosa* *Leptothyrella fijiensis* n. sp.
CP 1390	18°18.59'S, 178°05.10'E	234-361 m	*Cryptopora maldivensis*
BORDAU 1			
Lau Ridge			
CP 1392	16°49.30'S, 179°54.70'E	545-651 m	*Amphithyris buckmani*
DW 1393	16°45.17'S, 179°59.17'E	426-487 m	*Terebratulina japonica*
CP 1394	16°45.19'S, 179°59.19'E	416 m	*Basiliola beecheri* *Terebratulina japonica* *Terebratulina reevei* *Frenulina sanguinolenta* *Dallina triangularis* *Amphithyris buckmani*
CP 1395	16°45.13'S, 179°59.20'E	423-500 m	*Terebratulina reevei*
CP 1396	16°38.98'S, 179°57.16'W	591-596 m	*Amphithyris buckmani*
CP 1397	16°32.60'S, 179°51.90'W	674-688 m	*Terebratulina japonica*
CP 1398	16°21.80'S, 179°55.70'W	907-912 m	*Amphithyris buckmani*
CP 1404	16°39.87'S, 179°35.70'E	180 m	*Terebratulina japonica*
DW 1408	16°01.91'S, 179°29.75'W	550-561 m	*Basiliola beecheri* *Abyssothyris wyvillei* *Nipponithyris lauensis* n. sp.
CP 1409	16°01.88'S, 179°29.83'W	557-558 m	*Basiliola beecheri* *Abyssothyris wyvillei* *Nipponithyris lauensis* n. sp. *Dallina triangularis* *Septicollarina* sp.
DW 1410	16°05.51'S, 179°27.76'W	400-410 m	*Campages ovalis n. sp.* n. sp.
CP 1412	16°05.52'S, 179°28.05'W	400-407 m	*Basiliola beecheri* *Terebratulina japonica*
CP 1413	16°10.24'S, 179°24.25'W	669-676 m	*Abyssothyris wyvillei* *Terebratulina japonica* *Amphithyris buckmani*
DW 1417	16°27.07'S, 178°55.19'W	353 m	*Terebratulina australis*
DW 1421	17°07.95'S, 178°59.25'W	403-406 m	*Terebratulina japonica*
DW 1432	17°19.90'S, 178°44.25'W	477-493 m	*Basiliola beecheri* *Dallithyris pacifica* *Nipponithyris lauensis* n. sp.
DW 1439	11°10.58'S, 178°44.11'W	173-180 m	*Terebratulina japonica* *Terebratulina reevei*

Station	Location	Depth	Species
DW 1440	17°10.51'S, 178°42.93'W	190-308 m	*Terebratulina japonica* *Campages ovalis n. sp.* n. sp.
DW 1450	16°44.45'S, 179°58.50'E	327-420 m	*Terebratulina japonica*
DW 1451	16°44.74'S, 179°59.53'E	400-460 m	*Terebratulina japonica* *Terebratulina reevei* *Frenulina sanguinolenta*
DW 1453	16°45.03'S, 179°59.30'E	414-510 m	*Terebratulina japonica* *Frenulina sanguinolenta*
CP 1458	17°21.52'S, 179°28.00'W	1216-1226 m	*Fallax neocaledonensis* *Dallina triangularis* *Nipponithyris lauensis* n. sp.
CP 1460	18°47.06'S, 178°47.29'W	750-767 m	*Terebratulina japonica*
DW 1463	18°10.10'S, 178o44.34'W	300-400 m	*Thecidellina maxilla*
DW 1464	18°08.67'S, 178°37.68'W	285-300 m	*Basiliola beecheri*
DW 1465	18°08.74'S, 178°38.63'W	290-300 m	*Dallithyris pacifica* *Terebratulina* sp.
DW 1469	19°40.01'S, 178°10.24'W	314-377 m	*Basiliola lucida* *Xenobrochus rotundus* n. sp. *Terebratulina reevei* *Campages ovalis* n. sp.
DW 1470	19°39.59'S, 178°10.27'W	316-323 m	immature *Terebratulina*
DW 1472	19°40.48'S, 178°10.24'W	262-266 m	*Basiliola lucida* *Terebratulina japonica*
DW 1479	20°58.05'S, 178°44.94'W	450-460 m	*Terebratulina australis*
DW 1485	19°02.69'S, 178°29.80'W	700-707 m	*Terebratulina australis* *Nipponithyris lauensis* n. sp.
DW 1486	19°00.58'S, 178°25.99'W	395-540 m	*Terebratulina japonica*
DW 1488	19°01.33'S, 178°25.16'W	500-516 m	*Terebratulina japonica*
CP 1490	18°50.60'S, 178°32.13'W	785-820 m	*Terebratulina japonica*
CP 1491	18°50.02'S, 178°27.07'W	777-787 m	*Terebratulina japonica*
DW 1494	18°54.95'S, 178°29.23'W	240-319 m	*Terebratulina reevei*
DW 1496	18°43.50'S, 178°23.30'W	335-350 m	*Xenobrochus rotundus* n. sp.
DW 1497	18°43.52'S, 178°24.54'W	335-350 m	*Basiliola lucida*
DW 1498	18°40.60'S, 178°28.47'W	300-307 m	*Terebratulina japonica*
CP 1506	18°08.92'S, 178°37.41'W	294-300 m	*Basiliola lucida* *Terebratulina japonica*
CP 1507	18°09.03'S, 178°37.90'W	255-290 m	immature *Terebratulina*
SUVA 2			
Viti Levu, Suva Lagoon			
BS 18	18°11.41'S, 178°28.20'E	83 m	*Terebratulina japonica* *Terebratulina reevei*
BS 43	17°51.60'S, 177°13.41'E	26 m	*Frenulina sanguinolenta*
CP 65	17°47.90'S, 177°12.77'E	32 m	*Lingula* sp.
SUVA 4			
Viti Levu, Beqa Lagoon			
DW 08	18°22.3'S, 178°02.4'E	28-30 m	*Frenulina sanguinolenta*
DW 09	18°21.4'S, 178°06.3'E	37-41 m	*Frenulina sanguinolenta*
Wallis & Futuna			
MUSORSTOM 7			
DW 513	14°13.5'S, 178°10.8'W	260-300 m	*Campages ovalis* n. sp.
DW 516	14°13.5'S, 178°11.6'W	441-550 m	*Xenobrochus rotundus* n. sp.
DW 525	13°10.6'S, 176°14.7'W	500-600 m	*Megerlia truncata*
DW 601	13°18.7'S, 176°17.2'W	350 m	*Cryptopora maldivensis* Terebratulid indet. *Eucalathis rugosa*

Station	Location	Depth	Species
DW 604	13°21.4'S, 176°08.3'W	415-420 m	*Novocrania* sp.
			Thecidellina maxilla
DW 610	13°21.5'S, 176°08.9'W	286 m	*Xenobrochus rotundus* n. sp.
DW 612	13°21.4'S, 176°08.9'W	255 m	*Xenobrochus rotundus* n. sp.
CP 621	12°35.0'S, 178°11.5'W	1280-1300m	*Pelagodiscus atlanticus*
CP 623	12°34.2'S, 178°15.1'W	1280-1300 m	*Pelagodiscus atlanticus*