

New species of Muricidae (Gastropoda) and additional or noteworthy records from the western Pacific

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ABSTRACT

KEY WORDS
Gastropoda,
Muricidae,
New Caledonia,
Coral Sea,
Solomon Islands,
Vanuatu,
Taiwan,
new species,
new data,
new combinations.

Fourteen species of Muricidae referable to the (sub)genera *Promurex* Ponder & Vokes, 1988, *Pygmaepterys* Vokes, 1978, *Murexsul* Iredale, 1915, *Pazinotus* Vokes, 1970, *Prototyphis* Ponder, 1972, *Ponderia* Houart, 1986, *Gemixystus* Iredale, 1929, *Leptotrophon* Houart, 1995 and *Scabrotrophon* McLean, 1996 are reported from New Caledonia, the Solomon Islands and Taiwan, to depths down to 1750 m. Five new species are described: *Favartia* (*Pygmaepterys*) *lifouensis* n. sp. from New Caledonia with range extension to the Solomon Islands, *Pazinotus chionodes* n. sp. and *Gemixystus calcareus* n. sp. from New Caledonia, *Leptotrophon wareni* n. sp. from the Solomon Islands and *Favartia* (*Pygmaepterys*) *circinata* n. sp. from Taiwan.

RÉSUMÉ

Nouvelles espèces de Muricidae (Gastropoda) et signalisations additionnelles ou intéressantes pour le Pacifique occidental.

MOTS CLÉS
Gastropoda,
Muricidae,
Nouvelle-Calédonie,
mer de Corail,
îles Salomon,
Vanuatu,
Taiwan,
espèces nouvelles,
données nouvelles,
combinaisons nouvelles.

Quatorze espèces de Muricidae appartenant aux (sous-)genres *Promurex* Ponder & Vokes, 1988, *Pygmaepterys* Vokes, 1978, *Murexsul* Iredale, 1915, *Pazinotus* Vokes, 1970, *Prototyphis* Ponder, 1972, *Ponderia* Houart, 1986, *Gemixystus* Iredale, 1929, *Leptotrophon* Houart, 1995 et *Scabrotrophon* McLean, 1996 sont mentionnées de Nouvelle-Calédonie, des îles Salomon et de Taiwan, jusqu'à une profondeur de 1750 m. Cinq espèces nouvelles sont décrites: *Favartia* (*Pygmaepterys*) *lifouensis* n. sp. de Nouvelle-Calédonie avec une distribution s'étendant jusqu'aux îles Salomon, *Pazinotus chionodes* n. sp. et *Gemixystus calcareus* n. sp. de Nouvelle-Calédonie, *Leptotrophon wareni* n. sp. des îles Salomon et *Favartia* (*Pygmaepterys*) *circinata* n. sp. de Taiwan.

INTRODUCTION

More than 50 expeditions conducted by MNHN and IRD (formerly ORSTOM) have been spread all over the tropical Indo-West Pacific since 1976, leading to the discovery of hundreds new species of marine organisms in which Mollusca occupy a significant place, and was the subject of many reports in the voluminous series of Deep-Sea Benthos (formerly “Résultats des campagnes MUSORSTOM”) and in numerous other publications (Bouchet *et al.* 2008). The Muricidae collected during these cruises are studied since early in the 1980s (Houart 1983). Since then a high number of new species have been described from the reported material, mostly from the tropical Pacific, while numerous range extensions have been signalized. The present paper deals with 14 species of which five are new. Five have seen their range extended to New Caledonia (*Murexsul merlei* Houart & Héros, 2008 and *Prototyphis gracilis* Houart & Héros, 2008) and to Solomon Islands (*Pazinotus brevisplendoris* Houart, 1985, *Pazinotus falcatifformis* (Thiele, 1925) and *Scabrotrophon inspiratum* Houart, 2003). Two species are new combinations: *Leptotrophon minirotundus* (Houart, 1986) and *Leptotrophon segmentatus* (Verco, 1909). The radula is illustrated for the first time for *Scabrotrophon inspiratum*. The classification is maintained in a conservative way (Houart 2010), waiting for future study of the molecular characters when more and adequate material will be available (Barco *et al.* 2010).

MATERIAL AND METHODS

The present report deals with species collected during nine expeditions: BATHUS 1 and 3 (1993), ATELIER LIFOU 2000 (all New Caledonia), EBISCO (2005) (Coral Sea), MUSORSTOM 8 (1994) (Vanuatu), SALOMON 1 (2001), SALOMON 2 (2004), and SALOMONBOA 3 (2007) (all Solomon Islands), TAIWAN 2002 (Taiwan).

All the material belongs to MNHN otherwise mentioned.

ABBREVIATIONS

Repositories

coll. RH	collection Roland Houart;
IRD	Institut de Recherche pour le Développement (formerly ORSTOM: Office de la Recherche scientifique et technique Outre-Mer);
MNHN	Muséum national d’Histoire naturelle, Paris;
NMMBM	National Museum of Marine Biology and Aquarium, Checheng, Pingtung, Taiwan;
ZMB	Museum für Naturkunde der Humboldt Universität zu Berlin, zoologisches Museum, Berlin.

Field work

CP	chalut à perche (Beam trawl);
DW	drague Warén (Warén dredge).

Specimens

dd	empty shell;
lv	live-taken specimen.

Terminology used to describe the spiral cords and apertural denticles (after Merle 1999 and 2001)

Terminology in parentheses: erratic feature (Fig. 3C).	
abis	abapical infrasutural secondary cord (on subsutural ramp);
ABP	abapertural primary cord on the siphonal canal;
adis	adapical infrasutural secondary cord (on subsutural ramp);
ADP	adapertural primary cord on the siphonal canal;
ads	adapertural secondary cord on the siphonal canal;
EABP	extreme abapertural primary cord on the siphonal canal (e.g., EABP2 = between EABP1 and EABP3);
IP	infrasutural primary cord on subsutural ramp;
MP	median primary cord on the siphonal canal;
P	primary cord;
P1	shoulder cord;
P2-P6	primary cords of the convex part of the teleoconch whorl;
s	secondary cord;
s1-s6	secondary cords of the convex part of the teleoconch whorl (e.g., s1 = secondary cord between P1 and P2; s2 = secondary cord between P2 and P3, etc.);
SP	subsutural cord.
Aperture	
D1-D6	abapical denticles;
ID	infrasutural denticle.

SYSTEMATICS

Family MURICIDAE Rafinesque, 1815
Subfamily MURICINAE Rafinesque, 1815
Genus *Murex* Linnaeus, 1758

Subgenus *Promurex* Ponder & Vokes, 1988

TYPE SPECIES (by original designation). — *Murex antelmei* Viader, 1938, Recent, Mauritius.

Murex (Promurex) protocrassus Houart, 1990
(Fig. 4A, B)

Murex (Murex) protocrassus Houart, 1990: 330, figs 1-3, 26.

TYPE MATERIAL. — Holotype MNHN 0939.

NEW MATERIAL EXAMINED. — Coral Sea. EBISCO: stn CP2492, Capel Bank, 24°44'S, 159°41'E, 285 m, 1 dd (MNHN).

TYPE LOCALITY. — Coral Sea, Chesterfields, 19°40'S, 158°32'E, 305-310 m [MUSORSTOM 5: stn DC345].

DISTRIBUTION. — Coral Sea, bathymetric range unknown for living specimens. This is the 4th known specimen; all were collected as shells only. This record extends the geographical distribution southwards. The type material range is 19°36'-19°42'S, 158°30'-158°32'E.

REMARKS

The shell of *Murex protocrassus* is similar to those of the various subspecies of *M. brevispina* (*M. brevispina brevispina* Lamarck, 1822, *M. brevispina macgillivrayi* Dohrn, 1862, *M. brevispina senilis* Jousseaume, 1874, and *M. brevispina ornamentalis* Ponder & Vokes, 1988) but differs from them in its more numerous axial ridges on the early teleoconch whorls and in its more spinose siphonal canal. Other differences are its large and broad protoconch, which indicates intracapsular larval development, and the absence of a labral tooth.

Due to the lack of the labral tooth it cannot be classified in *Murex s.s.* It is therefore included in *Promurex* as in Merle *et al.* (2011).

The French fossil *Murex spinicosta* Bronn, 1831 (Fig. 4C), another species without a labral tooth, was classified in *Promurex* by Ponder & Vokes (1988: 15), and was illustrated by Landau *et al.* (2007).

Subfamily MURICOPSINAE
Radwin & D'Attilio, 1971
Genus *Favartia* Jousseaume, 1880

Subgenus *Pygmaepterys* Vokes, 1978

TYPE SPECIES (by original designation). — *Murex alfredensis* Bartsch, 1915, Recent, South Africa.

Favartia (Pygmaepterys) lifouensis n. sp.
(Fig. 1A-D, K, L)

TYPE MATERIAL. — Holotype (dd) MNHN 24174; 5 paratypes (dd) MNHN 24175-24177; 1 paratype (dd) coll. RH.

MATERIAL EXAMINED. — New Caledonia. ATELIER LIFOU 2000: stn 1423, Loyalty Islands, Lifou, Baie du Santal, off Peng, 20°54'S, 167°07'E, 12 m, 1 dd, paratype MNHN 24175. — Stn 1442, Lifou, Baie du Santal, Aimé Martin Cape, 20°46'S, 167°02'E, 47 m, 1 dd, paratype coll. RH. — Stn 1445, Lifou, east of Baie du Santal, 20°51'S, 167°10'E, 10-12 m, 1 dd, paratype MNHN 24176. — Stn 1461, Lifou, Baie du Santal, Shelter Reef, 20°54'S, 167°02'E, 100-120 m, 1 dd, holotype MNHN 24174. — BATHUS 1: stn DW692, east coast, 20°35'S, 164°59'E, 140-150 m, 3 dd, paratypes MNHN 24177. Solomon Islands. SALOMONBOA 3: stn DW2840, W San Cristobal, 10°25'S, 161°22'E, 121-180 m, 1 dd, MNHN. — Stn DW2841, 10°26'S, 161°23'E, 142-160 m, 1 dd, MNHN.

TYPE LOCALITY. — Loyalty Islands, Lifou, Baie du Santal, Récif Shelter, 20°54'S, 167°02'E, 100-120 m [ATELIER LIFOU 2000: stn 1461].

DISTRIBUTION. — Currently known from New Caledonia, probably living in 10-47 m and from W San Cristobal, Solomon Islands, dredged dead in 12-142 m.

DESCRIPTION

Shell large for the subgenus, height up to 11.5 mm at maturity, height/width ratio 1.7-2.0. Slender, biconical, broadly-ovate, squamous. Subsutural ramp narrow, weakly sloping, weakly concave. Shell white or light tan, occasionally darker coloured P5 or from P5 to tip of siphonal canal, with light brown blotches on subsutural area and above anal notch. Aperture white.

Spire high with 1.5 protoconch whorls (Fig. 1K, L) and up to five broadly convex, weakly angulate, shouldered whorls. Suture of teleoconch whorls

adpressed. Protoconch large, broad, whorls rounded. Diameter of protoconch (holotype) 700 μm . Terminal lip thin, weakly raised, almost straight.

Axial sculpture of teleoconch whorls consisting of moderately high, narrow, webbed varices. First whorl with 6 or 7 varices, second to penultimate with 5 or 6, last whorl with 5 varices. Other axial sculpture of numerous, low, obvious growth lamellae. Spiral sculpture of low, broad, squamous primary cords and narrow, squamous, occasionally shallow secondary cords and threads. First teleoconch whorl with visible P1 and P2, P1 weaker; 2nd whorl with P1, s1, P2; 3rd with adis, IP, abis, P1, s1, P2, (P3), s1 similar in strength to P1; 4th whorl of subadult paratypes with adis, IP, abis, P1, s1, P2, P3, P4, (s4), P5, (s5), P6, s6, ADP, MP, ABP; last whorl of holotype with adis, IP, abis, P1, s1, P2, P3, P4, P5, P6, ADP, MP, ABP, ads and two or three additional abapical threads; s1 broader than P1, P2-P4 broadest, P5 and next cords decreasing in strength abapically. Presence of several narrow, squamous threads between and on spiral cords. Spiral cords extending on axial varices, forming webbed varices.

Aperture moderately large, narrow, ovate. Columellar lip narrow, with 2 or 3 small denticles abapically; abapical two denticles closely spaced. Rim partially weakly erect, adherent at adapical extremity, with weak or obsolete, low parietal tooth at adapical extremity. Anal notch deep, narrow. Outer lip weakly erect, crenulated, with strong, broad denticles within: ID, D1 (occasionally split), D2-D5. Siphonal canal medium sized, broad, weakly dorsally recurved, open.

Operculum and radula unknown.

REMARKS

There are 14 species of *Pygmaepterys* in the tropical Indo-West Pacific. Three of them have only three axial varices on the last teleoconch whorl, two other species are very small and are geographically restricted

to South Africa, while another three species live in the vicinity of the Gulf of Aden and Oman. These eight species do not need to be discussed further here because of their very different shell morphology.

Favartia funafutiensis (Hedley, 1899) has a different protoconch morphology, in that it is conical with 2+ whorls, and weakly and narrowly keeled abapically.

The five remaining species are *F. avatea* Houart & Tröndlé, 2008, *F. bellini* (D'Attilio & Myers, 1985), *F. isabelae* Houart & Rosado, 2008, *F. kurodai* Nakamigawa & Habe, 1961 and *F. philcloveri* (Houart, 1984).

Favartia lifouensis n. sp. differs from *F. avatea* (Fig. 1E, F) in having a more strongly shouldered shell with a more weakly sloping subsutural area, a higher and narrower spire, a comparatively broader protoconch, an adpressed suture instead of the impressed one in *F. avatea*, fewer axial varices, 5 on the last whorl and 6 or 7 on previous whorls in *P. lifouensis* vs 6 on the last whorl and 7-9 on previous whorls in *F. avatea*, and weaker, more numerous apertural denticles.

It differs from *F. bellini* (Fig. 1G, H) in having a less shouldered and more ovate shell, narrower, more conspicuous and higher spiral cords and a comparatively broader aperture with smaller denticles.

Favartia isabelae, *F. kurodai* and *F. philcloveri* also differ in many ways, including shell height and width, and protoconch, spiral sculpture and aperture morphology.

Favartia (Pygmaepterys) circinata n. sp. (Fig. 1I, J, M)

TYPE MATERIAL. — Holotype (lv) NMMBM 005342.

MATERIAL EXAMINED. — Only known from the holotype.

FIG. 1. — **A-D, K-L**, *Favartia (Pygmaepterys) lifouensis* n. sp.: **A, B**, New Caledonia, Loyalty Islands, Lifou, Baie du Santal, Shelter Reef, ATELIER LIFOU 2000: stn 1461, 20°54'S, 167°02'E, 100-120 m, holotype MNHN 24174, h 11.5 mm; **C, D**, New Caledonia, Loyalty Islands, Lifou, E of Baie du Santal, Mepinyo, ATELIER LIFOU 2000: stn 1445, 20°51'S, 167°10'E, 10-12 m, paratype MNHN 24176, h 8.4 mm; **K**, protoconch of the holotype; **L**, protoconch of the illustrated paratype; **E, F**, *Favartia (Pygmaepterys) avatea* Houart & Tröndlé, 2008, French Polynesia, Austral Archipelago, Rimatara, BENTHAUS: stn DW2015, 22°38'S, 152°50'W, 250-280 m, holotype MNHN 20172, h 11.2 mm; **G, H**, *Favartia (Pygmaepterys) bellini* (D'Attilio & Myers, 1985), Philippines, paratype SDMNH 83067a, h 11.3 mm; **I, J, M**, *Favartia (Pygmaepterys) circinata* n. sp.: **I, J**, SE coast of Taiwan, TAIWAN 2002: stn DW149, 22°19'N, 121°29'E, 258 m, holotype NMMBM 005342, h 11.6 mm; **M**, protoconch of the holotype. Scale bars: K-M, 500 μm .



TYPE LOCALITY. — SE coast of Taiwan, 22°19'N, 121°29'E, 258 m [NO *Ocean Researcher 1*, TAIWAN 2002: stn DW149, Chan, Cosel & Richer-IRD coll., 20/V/2002].

DISTRIBUTION. — Known only from SE Taiwan at the type locality.

ETYMOLOGY. — From Latin “circinata”: rounded, convex, because of the broadly-ovate last teleoconch whorl.

DESCRIPTION

Shell large for the subgenus, height 11.6 mm at maturity, height/width ratio 1.7. Biconical, broadly-ovate, lightly built, weakly squamous. Subsutural ramp narrow, weakly sloping, weakly concave. Protoconch and 1st teleoconch whorl blackish brown, gradually lighter coloured, from greyish brown on 2nd whorl to light tan on last teleoconch whorl. Outer apertural edge finely surrounded with dark brown line as well as base of axial varices, remnants of previous positions of the aperture. Brown line not extended on siphonal canal. Aperture white within.

Spire high with 1.5 protoconch whorls (Fig. 1M) and five broadly convex, weakly shouldered teleoconch whorls. Suture of teleoconch whorls impressed. Protoconch small, whorls rounded. Diameter 500 µm. Terminal lip shallow, delicate, weakly curved.

Axial sculpture of teleoconch whorls consisting of low, weak, webbed varices, each with a weak shoulder spine. Other axial sculpture of numerous growth lamellae. Spiral sculpture of low, narrow, squamous primary cords and numerous squamous threads. First to 3rd teleoconch whorls with visible SP, P1 and P2, 4th whorl with SP, P1-P3, last whorl with SP, P1-P5, s5, P6, ADP, MP, ABP and numerous squamous threads on and between spiral cords. Spiral cords extending on varices, forming small, broad, open spinelets joined by squamous webbing, more obvious on high, narrow apertural varix. P2-P5 strongest, P1 weakly narrower and lower, P6 small, narrow, ADP and ABP low, narrow, MP higher and broader, same strength as P1.

Aperture moderately large, ovate. Columellar lip narrow with two small knobs abapically. Rim partially weakly erect, adherent at apical extremity. Anal notch deep, broad. Outer lip weakly erect, smooth, with five strong, broad denticles within:

IP, D1-D2 fused, D3, D4, D5. D1-D2 denticle largest. Siphonal canal short, broad, straight, open. Operculum and radula unknown.

REMARKS

This species is unique in *Pygmaepterys* and differs in many ways from all the other known species by its shell morphology and colour. The secondary spiral structure is apparently absent between primary cords P1-P5; however, examination of new material will probably show that some of the threads are in fact secondary cords of the same magnitude as some of the threads.

Genus *Murexsul* Iredale, 1915

TYPE SPECIES (by original designation). — *Murex octogonus* Quoy & Gaimard, 1832, Recent, New Zealand.

Murexsul merlei Houart & Héros, 2008 (Figs 4F-I; 5A)

Murexsul merlei Houart & Héros, 2008: 454, fig. 4E-G.

TYPE MATERIAL. — Holotype (dd) MNHN 20006.

NEW MATERIAL EXAMINED (all MNHN). — **Coral Sea** (new record). EBISCO: stn DW2564, NW Bellona, 20°25'S, 158°41'E, 333-386 m, 1 dd. — Stn DW2617, Lansdowne, 20°06'S, 160°22'E, 427-505 m, 1 dd. — Stn DW2632, S Lansdowne, 21°05'S, 160°45'E, 297-378 m, 1 lv (SEM of the radula, Fig. 5A). — Stn CP2640, 20°46'S, 160°58'E, 300-319 m, 1 lv, 1 dd (Fig. 4F-I). **Vanuatu** (new record). MUSORSTOM 8: stn DW967, 20°19'S, 169°53'E, 295-334 m, 1 dd.

TYPE LOCALITY. — Tonga, N Ha'apai group, 19°03'S, 174°19'W, 523-806 m [BORDAU 2: stn DW1595].

DISTRIBUTION. — Tonga, Fiji, Coral Sea, and Vanuatu, living in 314-319 m, empty shells in 319-523 m. *Murexsul merlei* was previously known from the holotype and 2 paratypes, described from Tonga and Fiji, dredged alive at 314-377 m. The bathymetric range in Coral Sea for living specimens is similar to that recorded in Fiji.

REMARKS

The colour of the Coral Sea material is similar to that of the holotype, having the protoconch and

the first teleoconch whorl light brown and the tip of the siphonal canal dark brown. The shell from Vanuatu is 19 mm in height, while the largest shell examined from Tonga (holotype) is only 14.6 mm in height.

The radula (Fig. 5A) was not previously illustrated and is typical for the muricopsine subfamily with a short central projecting cusp, two long lateral denticles situated between the central and lateral cusps, and short marginal cusps.

Genus *Pazinotus* Vokes, 1970

TYPE SPECIES (by original designation). — *Eupleura stimpsonii* Dall, 1889, Recent, western Atlantic.

Pazinotus brevisplendoris (Houart, 1985) (Fig. 2J)

Poirieria (*Pazinotus*) *brevisplendoris* Houart, 1985: 163, figs 6, 6B.

TYPE MATERIAL. — Holotype (dd) MNHN 1040.

NEW MATERIAL EXAMINED. — **Solomon Islands** (new record). SALOMON 1: stn DW1758, 8°49'S, 159°52'E, 180-187 m, 1 dd (MNHN).

TYPE LOCALITY. — Northeastern Madagascar, 20°51'S, 55°36'E, 290-300 m [MD32 REUNION: stn CP129].

DISTRIBUTION. — Mozambique, northeastern Madagascar and Solomon Islands, bathymetric range unknown for living specimens, empty shells in 187-290 m.

REMARKS

Pazinotus brevisplendoris was described from Mozambique and had not been recorded subsequently from any other locality. The specimen collected in the Solomon Islands was an empty shell, weakly damaged and faded, of a light tan colour. The colour of *P. brevisplendoris* from Mozambique is reddish-brown or light pink. *Pazinotus brevisplendoris* differs from *P. smithi* (Schepman, 1911), known only from the holotype collected in the Philippines, in having a last teleoconch whorl that is broader compared to the early whorls than in *P. smithi*, in having less adapically recurved

shoulder spines and in having a different spiral cord morphology, narrower primary cords and a less smooth shell with secondary spiral cords or numerous striae vs smooth in *P. smithi*. The primary spiral sculpture in *P. smithi* consists of smooth, low and broad P1-P6 only vs P1, P2, (S2), P3, P4, P5, s5, P6, ADP in *P. brevisplendoris* with more closely spaced but relatively narrower P5, P6 and ADP.

Pazinotus chionodes n. sp. (Fig. 2A, B, M)

TYPE MATERIAL. — Holotype (dd) MNHN 24178 and 1 paratype (dd) MNHN 24179.

MATERIAL EXAMINED. — Only known from the type material.

TYPE LOCALITY. — Coral Sea, off New Caledonia, S Lansdowne, 20°47'S, 161°01'E, 289-294 m [EBISCO: stn DW2639, Bouchet, Lozouet, Warén, Richer-IRD coll., 22/X/2005].

DISTRIBUTION. — Known only from the Coral Sea at the type locality.

ETYMOLOGY. — From ancient Greek "chionodes": snow white.

DESCRIPTION

Shell medium sized for the genus, holotype 10.1 mm in height, height/width ratio 1.41. Broadly-ovate, lightly built. Subsutural ramp weakly sloping on early whorls, more strongly sloping on last whorl, especially between penultimate and last (apertural) varix, weakly convex. Shell entirely white.

Spire high with 1.5 protoconch whorls (Fig. 2M) and teleoconch of 4.5 broad, convex, strongly shouldered whorls. Protoconch small, whorls rounded, smooth, glossy. Diameter (holotype) 600 µm. Terminal lip delicate, thin, weakly curved.

Axial sculpture of teleoconch whorls consisting of high, narrow, broadly lamellate varices, each with broad, open shoulder spine. Last (apertural) varix shoulder spine broader, long. Preceding varices with narrowly open shoulder spine. Abapical spines long, very broad, connected to each other with narrow, broadly expanded lamellar flange,

extending from last varix of preceding whorl to tip of siphonal canal. Last whorl with four varices, early whorls with five. Spiral sculpture of low, very weak, narrow, smooth primary and secondary cords. First teleoconch whorls with visible weakly defined P1 ending as lightly abapically bent shoulder spine. P2 more weakly defined, occasionally with very weak s1 between P1 and P2. Spiral sculpture of last whorl with weak, narrow, low P1-P6 and ADP, MP, ABP. Spiral sculpture occasionally more apparent on abapertural side of lamellate varices. Very weak, quite indiscernible, irregular, secondary cords.

Aperture large, ovate. Columellar lip narrow with three strong knobs abapically. Last abapical knob high and strong. Rim weakly detached abapically. Anal notch shallow, broad. Outer lip erect, smooth, with weak IP and five strong denticles within: D1-D5; D1 strongest, D3-D4 weakest, D2 and D5 of approximately similar strength. Siphonal canal short, broad, dorsally recurved at tip (partially broken in both specimens examined), narrowly open.

Operculum and radula unknown.

REMARKS

There are six known Recent species of *Pazinotus* in the tropical Indo-West Pacific: *P. brevisplendoris* (Houart, 1985), *P. falcatifformis* (Thiele, 1925), *P. kilburni* (Houart, 1987), *P. sibogae* (Schepman, 1911), *P. smithi* (Schepman, 1911) and *P. spectabilis* Houart, 1991. None of these is particularly close to *P. chionodes* n. sp. except *P. falcatifformis* (Fig. 2K, L), which differs from *P. chionodes* n. sp. in having a more triangular outline, a less expanded varical flange, 5 lamellate varices on the last teleoconch whorl, and in having a comparatively narrower aperture.

Pazinotus falcatifformis (Thiele, 1925) (Fig. 2K, L)

Murex falcatifformis Thiele, 1925: 168, pl. 18, fig. 10.

TYPE MATERIAL. — Holotype dd, ZMB.

NEW MATERIAL EXAMINED (all MNHN). — **Solomon Islands** (new record). SALOMON 2: stn DW2234, Choiseul Island, Oldham Deep, 6°51'S, 156°24'E, 182-277 m, 1 dd. — SALOMONBOA 3: stn CP2809, E Malaita, 9°19'S, 161°27'E, 788-1042 m, 1 dd (Fig. 2K, L).

TYPE LOCALITY. — North of Nias Island, Sumatra, Indonesia, 1°48'N, 97°6'E, 141 m.

DISTRIBUTION. — Indonesia, Philippines (Houart 2008), Fiji (Houart & Héros 2008) and Solomon Islands, living in 290-300 m (Houart & Héros 2008), shells in 141-788 m.

REMARKS

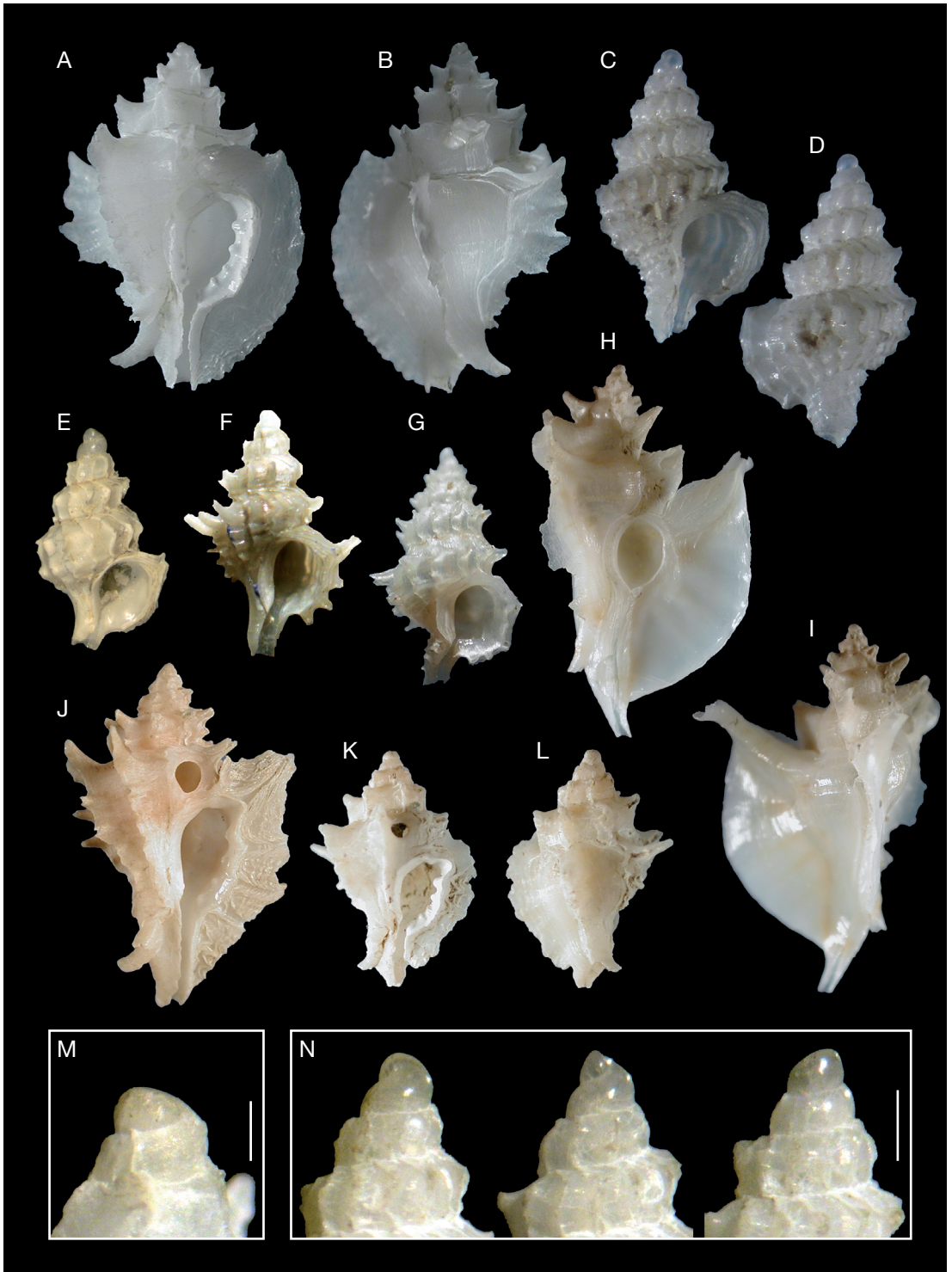
Pazinotus falcatifformis was described from Indonesia. Other specimens are known from Aliguay Islands, Sulu Sea, Philippines (Houart 2008), Fiji (Houart & Héros 2008) and now the Solomon Islands. The holotype is larger but with more numerous teleoconch whorls, it also has longer, more acute shoulder spines than in other examined material, but other shell characters (paucispiral protoconch, angulate aperture, spines connected by a broad webbing, number of varices, ontogeny and morphology of the spiral cords) are similar to those of specimens from the other localities.

Subfamily TRIPTEROTYPHINAE
D'Attilio & Hertz, 1988

Genus *Prototypis* Ponder, 1972

TYPE SPECIES (by original designation). — *Typhis angasi* Crosse, 1863, Recent, Australia.

FIG. 2. — **A, B, M**, *Pazinotus chionodes* n. sp.; **A, B**, New Caledonia, S Lansdowne Bank, EBISCO: stn DW2639, 20°47'S, 161°01'E, 289-294 m, holotype MNHN 24178, h 10.1 mm; **M**, protoconch of the holotype; **C, D, N**, *Gemixystus calcareus* n. sp.; **C, D**, Chesterfield Reefs, EBISCO: stn DW2603, 19°36'S, 158°43'E, 568-570 m, holotype MNHN 24180, h 5.4 mm; **N**, three views of the protoconch of the holotype; **E**, *Gemixystus stimuleus* (Hedley, 1907), Australia, New South Wales, Sydney, 35 km E of Narrabeen, 146 m, holotype AMS C25797, h 3.3 mm; **F**, *Gemixystus rippingalei* (Houart, 1998), Australia, Queensland, E of Lady Musgrave Island, paratype coll. RH, h 3.7 mm; **G**, *Gemixystus leptos* (Houart, 1995), South New Caledonia, 230-290 m, coll. RH, h 5.1 mm; **H, I**, *Ponderia magna* Houart, 1988, Coral Sea, Chesterfield Plateau, EBISCO: stn DW2612, 19°35'S, 158°41'E, 392 m, MNHN, h 19.6 mm; **J**, *Pazinotus brevisplendoris* Houart, 1985, Solomon Islands, SALOMON 1: stn DW1758, 8°49'S, 159°52'E, 180-187 m, MNHN, h 14.4 mm; **K, L**, *Pazinotus falcatifformis* (Thiele, 1925), Solomon Islands, E Malaita, SALOMONBOA 3: stn CP2809, 09°19'S, 161°27'E, 788-1042 m, MNHN, h 7.1 mm. Scale bars: M, N, 500 µm.



Prototyphis gracilis Houart & Héros, 2008
(Fig. 4D, E)

Prototyphis gracilis Houart & Héros, 2008: 473, fig. 7B-E.

TYPE MATERIAL. — Holotype (dd) MNHN 20010.

NEW MATERIAL EXAMINED. — Coral Sea (new record). EBISCO: stn DW2496, Capel Bank, 24°46'S, 159°43'E, 400-418 m, 1 dd (MNHN).

TYPE LOCALITY. — Fiji, Somosomo Strait, 16°45'S, 179°59'E, 416 m [BORDAU 1: stn CP1394].

DISTRIBUTION. — Coral Sea and Fiji, bathymetric range unknown for living specimens, empty shells in 416-418 m.

REMARKS

The shell collected in Coral Sea is considerably larger than the 23.5 mm holotype from Fiji, until now the only specimen known. This specimen is 32.8 mm high with a badly broken siphonal canal. However, it has one or probably 1.5 teleoconch whorls more than the holotype, which explains this large size. It is otherwise similar to the holotype although with a slightly weaker axial sculpture on the last teleoconch whorl.

Genus *Ponderia* Houart, 1986

TYPE SPECIES (by original designation). — *Typhis zealandica* Hutton, 1873, fossil and Recent, New Zealand.

Ponderia magna Houart, 1988
(Fig. 2 H, I)

Ponderia magna Houart, 1988: 192, figs 11, 12, 20.

TYPE MATERIAL. — Holotype (dd) MNHN 0210.

NEW MATERIAL EXAMINED (all MNHN). — Coral Sea. EBISCO: stn DW2606, Chesterfield Reefs, 19°36'S, 158°42'E, 442-443 m, 2 dd. — Stn DW2607, 19°33'S, 158°40'E, 400-413 m, 1 lv & 3 dd. — Stn DW2609, 19°33'S, 158°40'E, 431-436 m, 1 dd. — Stn DW2612, 19°35'S, 158°41'E, 392 m, 1 lv, 1 dd (Fig. 2H, I).

TYPE LOCALITY. — Coral Sea, Chesterfields Reefs, 355 m, 19°54'S, 158°38'E [MUSORSTOM 5: stn DC378].

DISTRIBUTION. — Coral Sea, Chesterfield Reefs, living in 392-410 m, empty shells in 355-431 m.

REMARKS

These are the first records of *Ponderia magna* since its description. The coordinates and depth are quite similar to those of the original material which was also collected in the Coral Sea, Chesterfield Reefs, during the MUSORSTOM 5 cruise.

Subfamily TROPHONINAE Cossmann, 1903

REMARKS

The subfamily Trophoninae is polyphyletic, based on molecular data, with the genus *Leptotrophon* Houart, 1995 correctly placed in the Trophoninae (Barco *et al.* 2010). However, *Gemixystus* Iredale, 1929 and *Scabrotrophon* McLean, 1996 have not yet been included in phylogenetic analyses and are here included conservatively in Trophoninae, pending future phylogenetic study.

Genus *Gemixystus* Iredale, 1929

TYPE SPECIES (by original designation). — *Trophon laminatus* Petterd, 1884, Recent, southeastern Australia.

Apixystus Iredale, 1929 (type species by original designation: *Trophon stimuleus* Hedley, 1907, Recent, eastern Australia).

REMARKS

Iredale (1929: 185) separated *Gemixystus* from *Apixystus* because of their different protoconch morphology, *Gemixystus* having an "angulate apex" compared to the "smooth rounded apex" of *Apixystus*. However, such differences in Muricidae are now considered to be a useful tool at the specific level only. The two taxa were recognized as congeneric by Houart (2004).

Gemixystus calcareus n. sp.
(Fig. 2C, D, N)

TYPE MATERIAL. — Holotype (dd) MNHN 24180.

MATERIAL EXAMINED. — Only known from the holotype.

TYPE LOCALITY. — Coral Sea, Chesterfield Reefs, 19°36'S, 158°43'E, 568-570 m [EBISCO: stn DW2603, Bouchet, Lozouet, Warén, Richer-IRD coll., 18/X/2005].

DISTRIBUTION. — Known only from the Chesterfield Reefs at the type locality.

ETYMOLOGY. — From Latin “calcareus”: chalk-white.

DESCRIPTION

Shell medium-sized for the genus, height 5.4 mm, height/width ratio 1.7. Broadly-ovate, lightly built, lamellate. Subsutural ramp narrow, weakly sloping, weakly convex. Shell entirely chalk-white.

Spire high with 1.6 protoconch whorls (Fig. 2N) and 4.2 broad, weakly shouldered teleoconch whorls. Suture of teleoconch whorls impressed, partially obscured by small axial lamellae of following whorl. Protoconch comparatively large, broad, weakly acuminate with broad keel adapically, otherwise smooth. Diameter 500 μm . Terminal lip delicate, thin, weakly curved.

Axial sculpture of teleoconch whorls consisting of low, narrow, frilled lamellae, each with short, broad, open spinelets occurring at crossings of axial lamellae with spiral cords. Spines more conspicuous on P1. First whorl with 8 lamellae, 2nd with 13, 3rd with 16 and 4th with 20. Apertural lamella strongly erect, broad. Spiral sculpture of low, broad, rounded primary cords: P1-P3 visible on 1st to 3rd whorl with slightly visible, very narrow P2. P3 partially covered by following whorl. Last teleoconch whorl with P1-P5, ADP, MP. P1-P5 equidistant, P1 slightly larger, P2 narrow. ADP and MP narrower, MP low.

Aperture broad, rounded. Columellar lip narrow, smooth. Lip adherent at adapical extremity. Anal notch obsolete. Outer lip strongly erect with five weak, elongate denticles within: D1-D5. D4 and D5 narrower, more strongly elongate within. Siphonal canal short, narrow, straight, open, with ADP and MP and low axial lamellae over whole length.

REMARKS

The genus *Gemixystus* was revised by Houart (2004) and contains six fossil and eight Recent species.

None of the fossil species is closely related to the new species and of the eight Recent species, only three need to be compared here: *Gemixystus leptos* (Houart, 1995) from southern Queensland, Australia, to the Chesterfield Reefs, *Gemixystus rippingalei*

(Houart, 1998) from Queensland, Australia, and *Gemixystus stimuleus* (Hedley, 1907), from southern Queensland and Sydney, New South Wales, Australia, type species of *Apixystus*.

Gemixystus calcareus n. sp. differs from the quite similar *G. stimuleus* (Fig. 2E) in having a comparatively larger shell with twice as large a protoconch, more numerous axial lamellae, 20 vs 11 or 12 on last whorl and 16 vs 13-15 on penultimate whorl. The spiral sculpture also differs, *G. calcareus* n. sp. having P1-P5, ADP and MP on last teleoconch whorl vs P1-P3 in *G. stimuleus*, which has no spiral sculpture on the siphonal canal.

Gemixystus calcareus n. sp. also differs from *G. rippingalei* (Fig. 2F) in having a comparatively larger shell, *G. rippingalei* reaching only 4.4 mm in height and having a longer siphonal canal, a less spiny shell and a different spiral sculpture morphology, that is, a last whorl with closely spaced P1-P4 and a smooth siphonal canal.

Finally, *G. calcareus* n. sp. differs from *G. leptos* (Fig. 2G) in having a comparatively broader, but otherwise similar protoconch, a less shouldered and less spiny shell with more numerous axial lamellae, 20 vs 10 or 11 on 4th whorl and 16 vs 11 on penultimate whorl, while having fewer lamellae on first whorl, 8 vs 10 or 11 in *G. leptos*. The spiral sculpture morphology also differs, *G. leptos* having two broad, broadly spaced P1 and P2 and two small, narrow, closely spaced P3 and P4. The siphonal canal is smooth in *G. leptos* or with a very shallow and narrow MP only.

Genus *Leptotrophon* Houart, 1995

TYPE SPECIES (by original designation). — *Leptotrophon caroae* Houart, 1995, Recent, New Caledonia.

Leptotrophon minirobundus

(Houart, 1986) n. comb.

(Fig. 3K)

Trophon (*Trophonopsis*) *minirobundus* Houart, 1986: 438, figs 4, 4a-b.

TYPE MATERIAL. — Holotype (dd) MNHN 24616.

NEW MATERIAL EXAMINED (all MNHN). — **New Caledonia**. BATHUS 3: stn DW836, Norfolk Ridge, 23°02'S, 166°59'E, 295-306 m, 1 dd. — Stn DW838, Norfolk Ridge, 23°01'S, 166°56'E, 400-402 m, 1 dd.

TYPE LOCALITY. — New Caledonia, 22°30'S, 166°24'E, 250-350 m.

DISTRIBUTION. — New Caledonia, bathymetric range unknown for living specimens, empty shells in 306-400 m.

REMARKS

Examination of additional and more mature material since the original description and comparison with the type species and other species of *Leptotrophon* leads us to place *Trophon minirotundus* in *Leptotrophon* based solely on shell characters. The species has never been collected alive.

Leptotrophon wareni n. sp.
(Fig. 3A-D)

TYPE MATERIAL. — Holotype (dd) MNHN 24181 and 3 paratypes (dd) MNHN 24182-24184.

TYPE LOCALITY. — Solomon Islands, 8°16'S, 160°40'E, 570-756 m [NO *Alis*, SALOMON 1: stn DW1772, Bouchet, Dayrat, Warén & Richer-IRD coll, 28/IX/2001].

MATERIAL EXAMINED. — **Solomon Islands**. SALOMON 1: stn DW1772, 8°16'S, 160°40'E, 570-756 m, 1 dd, holotype MNHN 24181. — Stn DW1824, 9°49'S, 160°56'E, 298-318 m, 1 dd, paratype MNHN 24182. — Stn DW1825, 9°51'S, 160°58'E, 340-391 m, 1 dd, paratype MNHN 24183. — SALOMONBOA 3: stn DW2790, N Malaita, 8°19'S, 160°37'E, 314-586 m, 1 dd, paratype MNHN 24184.

DISTRIBUTION. — Solomon Islands, known only from the four stations listed above, empty shells in 318-570 m.

ETYMOLOGY. — Named in honour of Anders Warén (Swedish Museum of Natural History, Stockholm), in recognition of his collaboration over many years in

extracting, mounting and scanning hundreds of muricid radulae and shells for analysis of microsculpture.

DESCRIPTION

Shell medium sized for the genus, height 11.8 mm, height/width ratio 2-2.4. Slender, lanceolate, narrow, nodose. Subsutural ramp broad, strongly sloping, weakly concave. Shell entirely white.

Spire very high with 1.5 protoconch whorls (Fig. 3D) and five angulate, narrow, shouldered, nodose whorls. Suture weakly adpressed. Protoconch large, broad, whorls rounded, smooth. Diameter (holotype) 900 µm. Terminal lip shallow, weakly curved.

Axial sculpture of teleoconch whorls consisting of low, broad, rounded varices, each with short, blunt spinelets. First teleoconch whorl with 8 or 9 varices, 2nd with 6-8, 3rd with 7 or 8, 4th and 5th (last) with 7. Spiral sculpture of low, broad primary cords. First to antepenultimate whorl with visible P1 and P2, penultimate (4th) whorl with P1, P2 and P3; P3 partially covered with following whorl. Last whorl with weakly defined IP, most conspicuous on axial varices, P1, P2, s2, P3-P6, ADP, MP, ABP, EABP1 (EABP2, EABP3) (Fig. 3C). Spiral cords decreasing in strength and more closely spaced abapically. Intersection of axial varices and spiral cords with small, strong, blunt spinelets. P1 and P2 with strongest spines. Other spiral sculpture consisting of numerous, narrow striae.

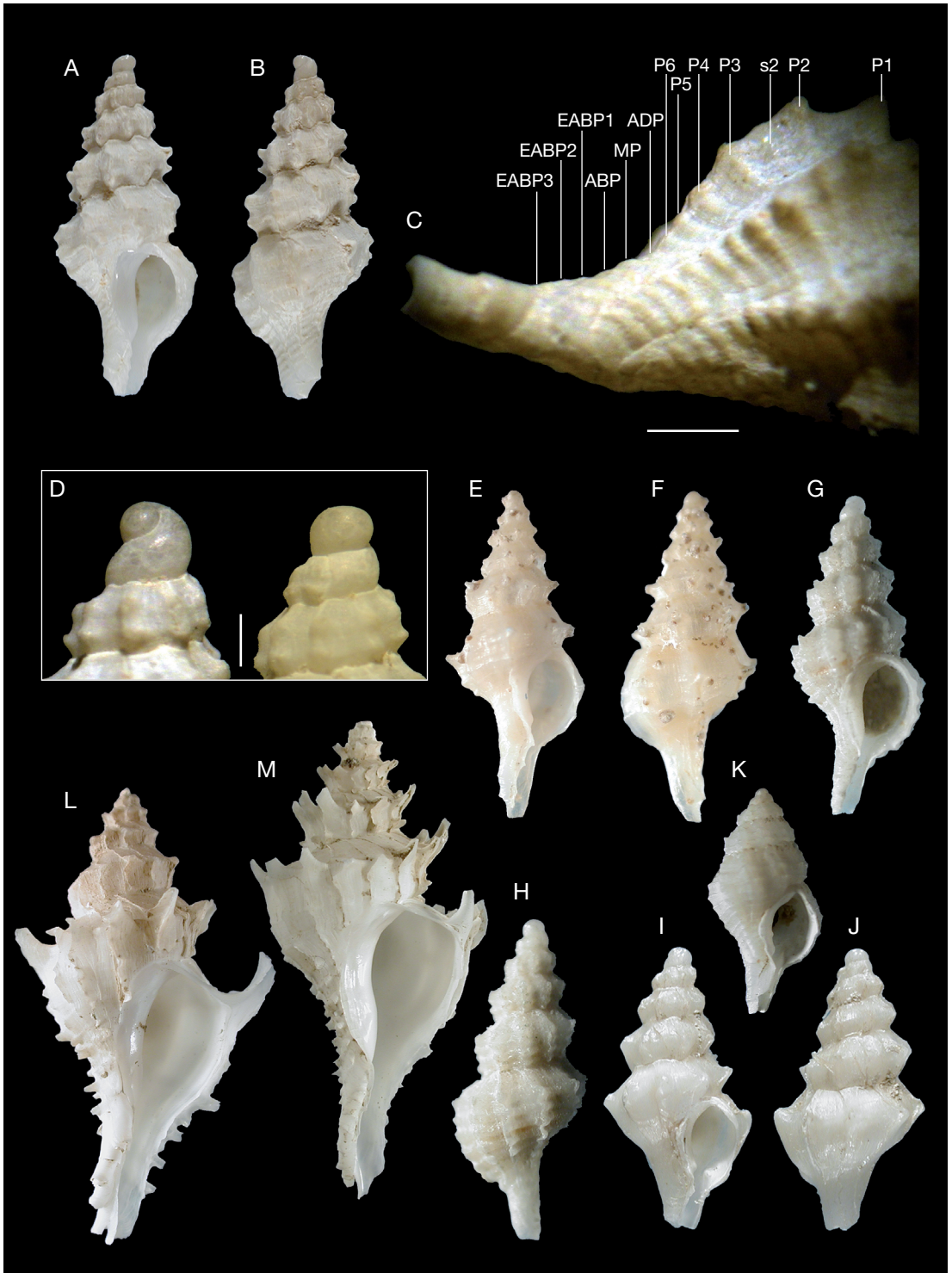
Aperture small, ovate. Columellar lip narrow, smooth, rim adherent. Anal notch shallow, broad. Outer lip erect, smooth within. Siphonal canal short, narrow, weakly dorsally recurved, open.

Operculum and radula unknown.

REMARKS

The genus *Leptotrophon* currently includes 28 Recent species, a majority of them (25) described from New Caledonia and neighbouring localities. One species was

FIG. 3. — **A-D**, *Leptotrophon wareni* n. sp.; **A, B**, Solomon Islands, SALOMON 1: stn DW1772, 8°16'S, 160°40'E, 570-756 m, holotype MNHN 24181, h 11.8 mm; **C**, spiral cords morphology; **D**, two views of the protoconch; **E, F**, *Leptotrophon minispinosus* Houart, 1995, New Caledonia, MUSORSTOM 4: stn DW184, 19°04'S, 163°27'E, 260 m, paratype coll. RH, h 11.1 mm; **G, H**, *Leptotrophon segmentatus* (Verco, 1909), South Australia, 65 km S of Cape Wiles, 174-183 m, coll. RH, h 8.5 mm; **I, J**, *Leptotrophon coralensis* Houart, 1995, Coral Sea, Chesterfield Reefs, S Lansdowne Bank, EBISCO: stn CP2627, 21°04'S, 160°49'E, 711-736 m, MNHN, h 7.3 mm; **K**, *Leptotrophon minirotundus* Houart, 1985, New Caledonia, BATHUS 3: stn DW836, 23°02'S, 166°59'E, 295-306 m, MNHN, h 6.5 mm; **L, M**, *Scabrotrophon inspiratum* Houart, 2003; **L**, Solomon Islands, SALOMON 1: stn CP1781, 8°31'S, 160°38'E, 1036-1138 m, MNHN, h 36.4 mm; **M**, Solomon Islands, S Malaita, SALOMONBOA 3: stn CP2817, 9°55'S, 161°33'E, 1136-1750 m, MNHN, h 38.9 mm. Scale bars: C, 1000 µm, D, 500 µm.



described from Indonesia, and another from Brazil. *Leptotrophon segmentatus* (Verco, 1909) (Fig. 3G, H) from South Australia is here included for the first time in *Leptotrophon*, based on shell morphology.

Leptotrophon wareni n. sp. can be usefully compared with only three species: *L. segmentatus*, *L. coralensis* Houart, 1995 and *L. minispinosus* Houart, 1995. All other species differ in many distinct ways.

Leptotrophon wareni n. sp. differs from *L. segmentatus* in having a narrower shell with a less acute spire, more widely spaced and lower spiral cords, more numerous and narrower spiral cords on the siphonal canal, and an aperture with adherent inner lip, contrasting with the widely flaring lip of *L. segmentatus*.

It differs from *L. coralensis* (Fig. 3I, J) and *L. minispinosus* (Fig. 3E, F), two species also with very high spires, in having a more nodose, less shouldered shell, broader axial varices, and in having more numerous visible spiral cords on early teleoconch whorls, *L. coralensis* and *L. minispinosus* having only one visible spiral cord (P1) from 1st to 4th teleoconch whorls in adult specimens, while the subsutural ramp in these species is also broader and more strongly sloping.

Leptotrophon coralensis Houart, 1995
(Fig. 3I-J)

Leptotrophon coralensis Houart, 1995: 483, figs 70, 71, 120, 121.

TYPE MATERIAL. — Holotype (dd) MNHN 1022.

NEW MATERIAL EXAMINED. — **Coral Sea**. EBISCO: stn CP2627, Chesterfield Reefs, S Lansdowne, 21°04'S, 160°49'E, 711-736 m, 1 dd (MNHN).

TYPE LOCALITY. — Lansdowne-Fairway Ridge, 21°01'S, 160°57'E, 650-660 m [CORAIL 2: stn DE14].

DISTRIBUTION. — Coral Sea, Chesterfields Reefs, bathymetric range for living specimens unknown, empty shells in 660-711 m.

REMARKS

This is the first record of *Leptotrophon coralensis* since its description and the second known specimen. It seems to be one of the rarest species of *Leptotrophon* from New Caledonia. The coordinates and depth are quite similar to those of the original material, which was also collected in the Coral Sea, Chesterfield Reefs at 21°01'S, 160°57'E, in 650-660 m. The holotype and this additional specimen were both dead collected. The additional specimen closely matches the original description but due to its broken siphonal canal is not as high as the holotype, the height of which is 9.5 mm.

Genus *Scabrotrophon* McLean, 1996

TYPE SPECIES (by original designation). — *Trophon maltzani* Kobelt & Küster, 1878, northeastern Pacific.

Scabrotrophon inspiratum Houart, 2003
(Figs 3L, M; 5B)

Scabrotrophon inspiratum Houart, 2003: 87, figs 1, 3-7.

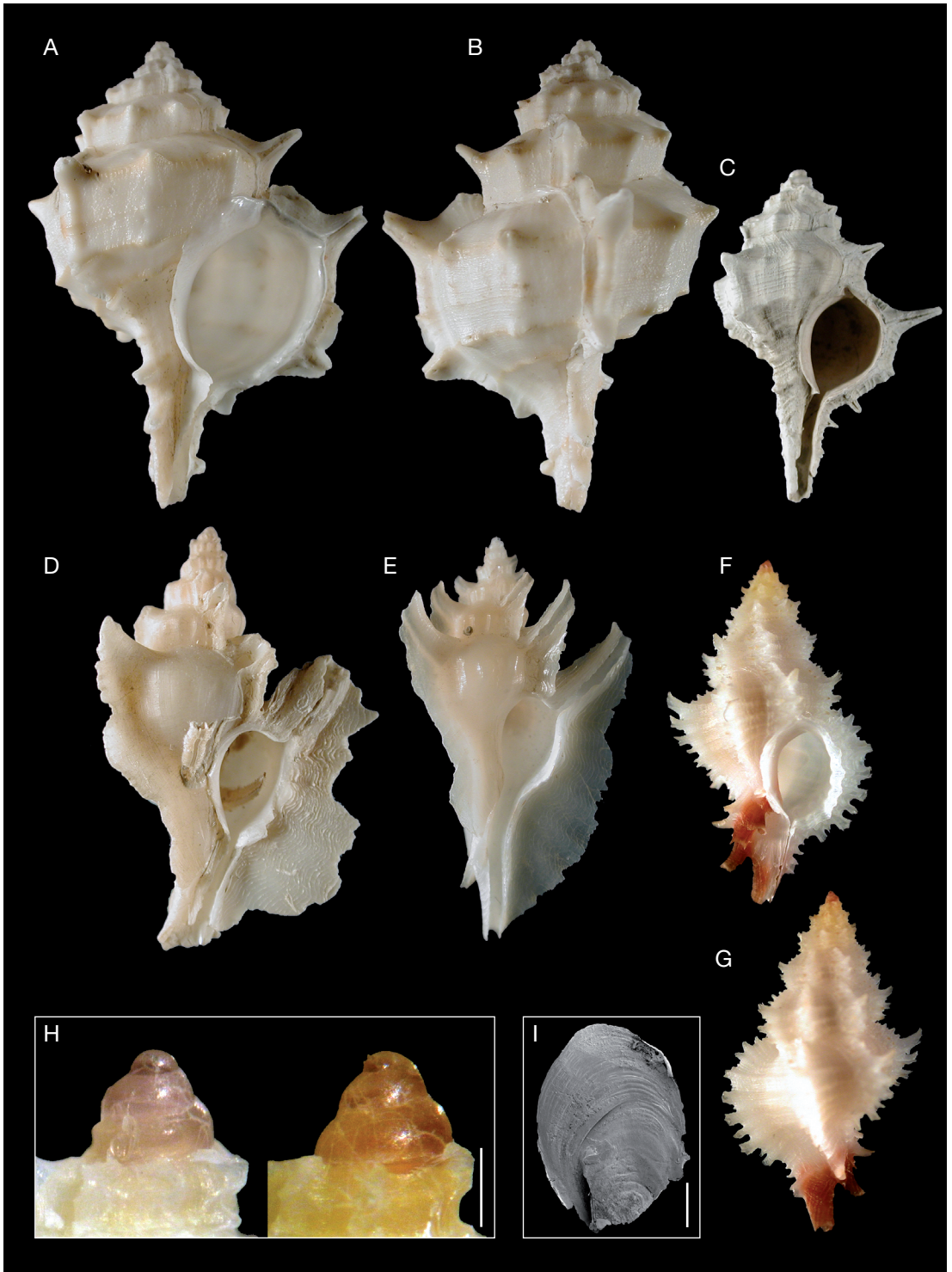
TYPE MATERIAL. — Holotype (dd) MNHN 3632.

NEW MATERIAL EXAMINED (all MNHN). — **Solomon Islands** (new record). SALOMON 1: stn CP1764, 8°37'S, 160°1'E, 1327-1598 m, 1 dd (juv.). — Stn CP1781, 8°31'S, 160°38'E, 1036-1138 m, 1 lv, 1 dd (juv.) (Fig. 3L). — SALOMON 2: stn CP2189, SE Santa Isabel Island, 8°20'S, 160°2'E, 660-854 m, 1 dd. — Stn CP2230, N Choiseul Island, 6°28'S, 156°24'E, 837-945 m, 1 dd. — SALOMONBOA 3: stn CP2817, S Malaita, 9°55'S, 161°33'E, 1136-1750 m, 1 lv (Fig. 3M).

TYPE LOCALITY. — Vanuatu, 14°49'S, 167°15'E, NE of Espiritu Santo Island, 1360 m [MUSORSTOM 8: stn CP1110].

DISTRIBUTION. — Vanuatu, dead collected in 1360 m and Solomon Islands, living specimens in 1136-1138 m, empty shells in 854-1327 m. The present records extend

FIG. 4. — **A, B**, *Murex (Promurex) protocrassus* Houart, 1990, Coral Sea, Capel bank, EBISCO: stn CP2492, 24°44'S, 159°41'E, 285 m, MNHN, h 63.1 mm; **C**, *Murex (Promurex) spinicosta* Bronn, 1831, Piacenza, Italy, Lugagnano, Lower Pliocene, coll. RH, h 33.2 mm; **D, E**, *Prototyphis gracilis* Houart & Héros, 2008; **D**, Coral Sea, Capel bank, EBISCO: stn DW2496, 24°46'S, 159°43'E, 400-418 m, MNHN, h 32.6 mm; **E**, Fiji, Somosomo Strait, BORDAU 1: stn CP1394, 16°45'S, 179°59'E, 416 m, holotype MNHN 20010, h 23.5 mm; **F-I**, *Murexsul merlei* Houart & Héros, 2008; **F, G**, Coral Sea, S Lansdowne Bank, EBISCO: stn DW2640, 20°46'S, 160°58'E, 300-319 m, MNHN, h 18.2 mm; **H**, two views of the protoconch; **I**, operculum. Scale bars: H, I, 500 µm.



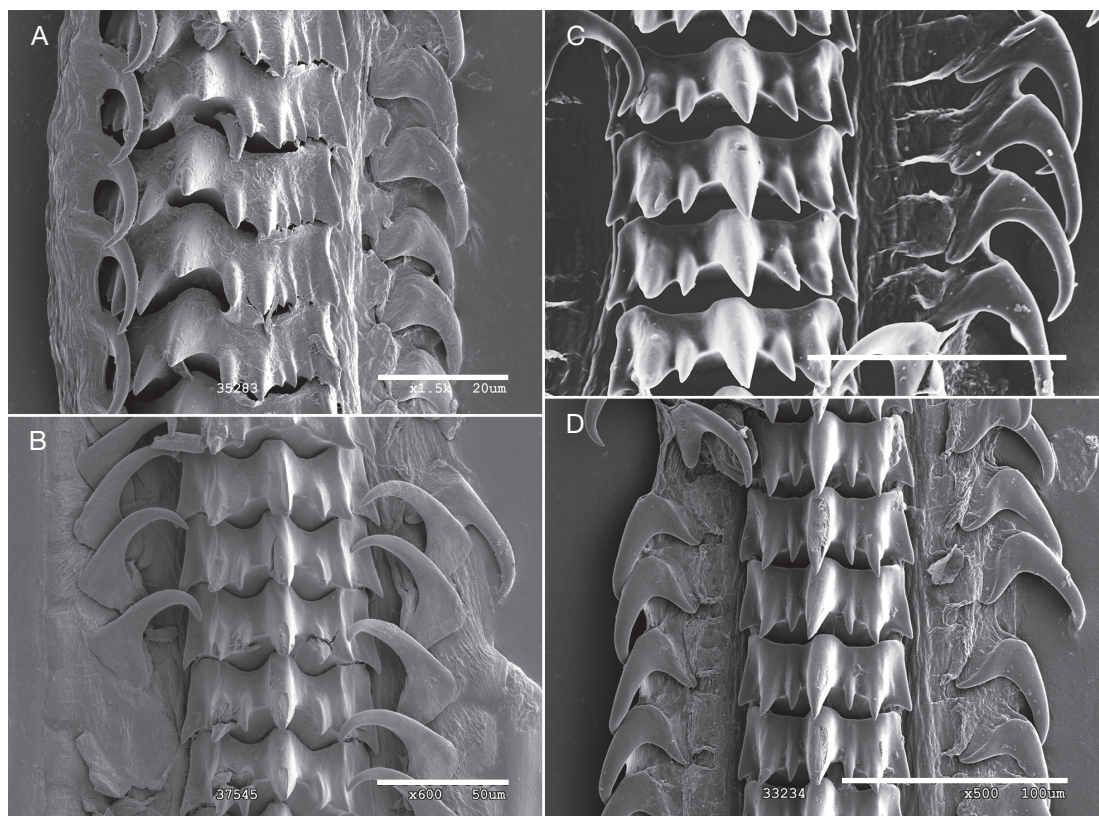


FIG. 5. — **A**, radula of *Murexsul merlei* Houart & Héros, 2008; **B**, radula of *Scabrotrophon inspiratum* Houart, 2003; **C**, radula of *Scabrotrophon maltzani* (Kobelt & Küster, 1878), Alaska, Tutka Bay, intertidal, coll. RH; **D**, radula of *Scabrotrophon undocostata* (Golikov & Sirenko, 1992), Kurile Islands, Simushir Island, 47°02'N, 152°15'E, 150 m, coll. RH. Scale bar: C, 100 µm.

its geographical distribution further north but also provide information about the bathymetrical range of living specimens.

REMARKS

The largest specimen examined was dead collected and is 46.1 mm high. The operculum and the radula were also examined.

The operculum is light brown, strongly ovate with an extreme apical nucleus. The radula (Fig. 5B) is trophonine with a short, broad central cusp and a short lateral denticle with a weakly longer and broader lateral cusp on each side. It is quite similar to the radula of *S. maltzani* (Fig. 5C) and *S. undocostata* (Golikov & Sirenko, 1992) from the Kurile Islands (Fig. 5D).

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