

Description of three new species of *Leptotrophon* Houart, 1995 (Gastropoda: Muricidae: Trophoninae) from New Caledonia

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KEYWORDS. Mollusca, Gastropoda, Muricidae, *Leptotrophon*, new species.

ABSTRACT. Three new species of the genus *Leptotrophon* Houart, 1995 are described from New Caledonia and compared with nine species, all from the New Caledonia area.

INTRODUCTION

The genus *Leptotrophon* Houart, 1995 was originally described to contain two species from New Caledonia formerly classified in *Poirieria* (*Paziella*) by the first author (Houart, 1986) and additional species studied by Houart (1995). Species of *Leptotrophon* live in the bathyal zone, between 255 and 775 m depth. The shells are small, usually not reaching more than 15 mm in length. There are currently 30 extant *Leptotrophon* species of which 25 are from the New Caledonian region. The five remaining species were described by Pimenta et al. (2008) from Canopus Bank, Brazil, in 240–260 m, by Houart (1997) from the Kai Islands, Indonesia, in 212–221 m, by Verco (1909) from off Cape Jaffa, South Australia, in 165 m and from Tasmania in 73–128 m (May & Macpherson, 1958), by Houart (2017) from Budibudi Island, in the Solomon Sea, in 380–411 m, and by Houart & Héros (2012) from the Solomon Islands, in 570–756 m. Three additional species from New Caledonia are described herein, increasing the number of New Caledonian species to 28.

Material and Methods

The material studied here was collected during the KANACONO expedition (doi.org/10.17600/16003900) between 9 and 29 August 2016, in southern New Caledonia.

No specimens of the new *Leptotrophon* species were preserved in alcohol for molecular studies.

Additional material illustrated for comparison or further information is held in the MNHN and in the research collection of the first author.

Morphological analyses

The characters used to describe shell morphology address the general aspect of the shell including its

shape, size, and colour, the shape of the spire, including the number and features of the protoconch and teleoconch whorls, details of the suture and of the subsutural ramp, the structure and pattern of the intritacalx, details of axial and spiral sculpture, the aperture, and the siphonal canal.

The method used to determine diameter and height, and to count the number of protoconch whorls, follows Bouchet & Kantor (2004) as shown in Fig. 1. Unless otherwise indicated, species descriptions are based on the holotype and paratypes. The bathymetric ranges given are the inner values of the recorded depths: the deepest minimum and the shallowest maximum of each recorded depth range.

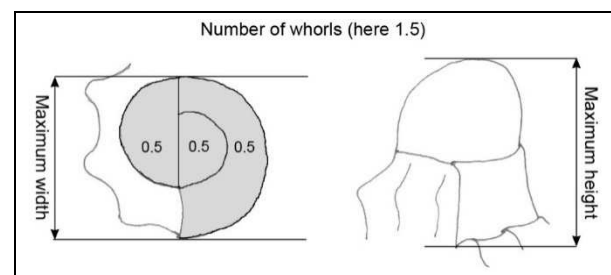


Figure 1. Method for determining diameter, height, and the number of protoconch whorls. Here *Leptotrophon spinacutus* (Houart, 1986).

Abbreviations

Repository

MNHN: Muséum national d'Histoire naturelle, Paris, France

RH: Collection of the first author

Station number prefixes

CP: Chalut à perche (beam trawl)

DW: Drague Warén (Warén dredge)

***Leptotrophon penelaevis* n. sp.**

Figs 2A–G; 3

Specimens

dd: empty shell(s)

lv: live collected specimen(s)

Terminology used to describe the spiral cords and the apertural denticles (after Merle 2001, 2005). Variable features are given in parentheses (Fig. 2G, J, R).

Ab: abapical: away from shell apex toward base along axis or slightly oblique to it; abapertural: away from shell aperture; Ad: adapical: toward shell apex along axis or slightly oblique to it; adapertural: toward shell aperture; P: primary spiral cord; s: secondary spiral cord.

Subsutural area

abis: abapical infrasutural secondary cord; IP: infrasutural primary cord; adis: adapical infrasutural secondary cord.

Convex part of teleoconch whorl

P1: shoulder cord; P2–P4: other abapical primary cords; s1–s3: Secondary cords (example: s1 - secondary cord between P1 and P2; s2 - secondary cord between P2 and P3, etc.).

Siphonal canal

ADP: adapertural primary cord on the siphonal canal; MP: median primary cord on the siphonal canal; ABP: abapertural primary cord on the siphonal canal; abs: abapertural secondary cord on the siphonal canal.

Aperture

D1 to D3: abapical denticles;

ID: infrasutural denticle.

SYSTEMATICS

Family **Muricidae** Rafinesque, 1815

Subfamily **Trophoninae** Cossmann, 1903

Genus ***Leptotrophon*** Houart, 1995

Type species by original designation: *Leptotrophon caroae* Houart, 1995, New Caledonia.

Type material. New Caledonia, KANACONO stn DW4670, 22°58' S, 167°24' E, 612–680 m, holotype MNHN-IM-2000-36570, lv; 1 paratype MNHN-IM-2000-36571 lv; 1 paratype RH, dd.

Type locality. New Caledonia, southwest of Île des Pins, 22°58' S, 167°24' E, 612–680 m.

Distribution. New Caledonia, southwest of Île des Pins, living at 612 m.

Description. Shell medium sized for the genus, up to 11.0 mm in length at maturity. Length/width ratio 2.2 (holotype 11.0 x 5.1 mm, length/width ratio 2.15). Slender, lanceolate, broadly ovate. Very weakly spinose, lightly built. Subsutural ramp broad, weakly sloping, very lightly convex or straight, smooth except some shallow growth striae.

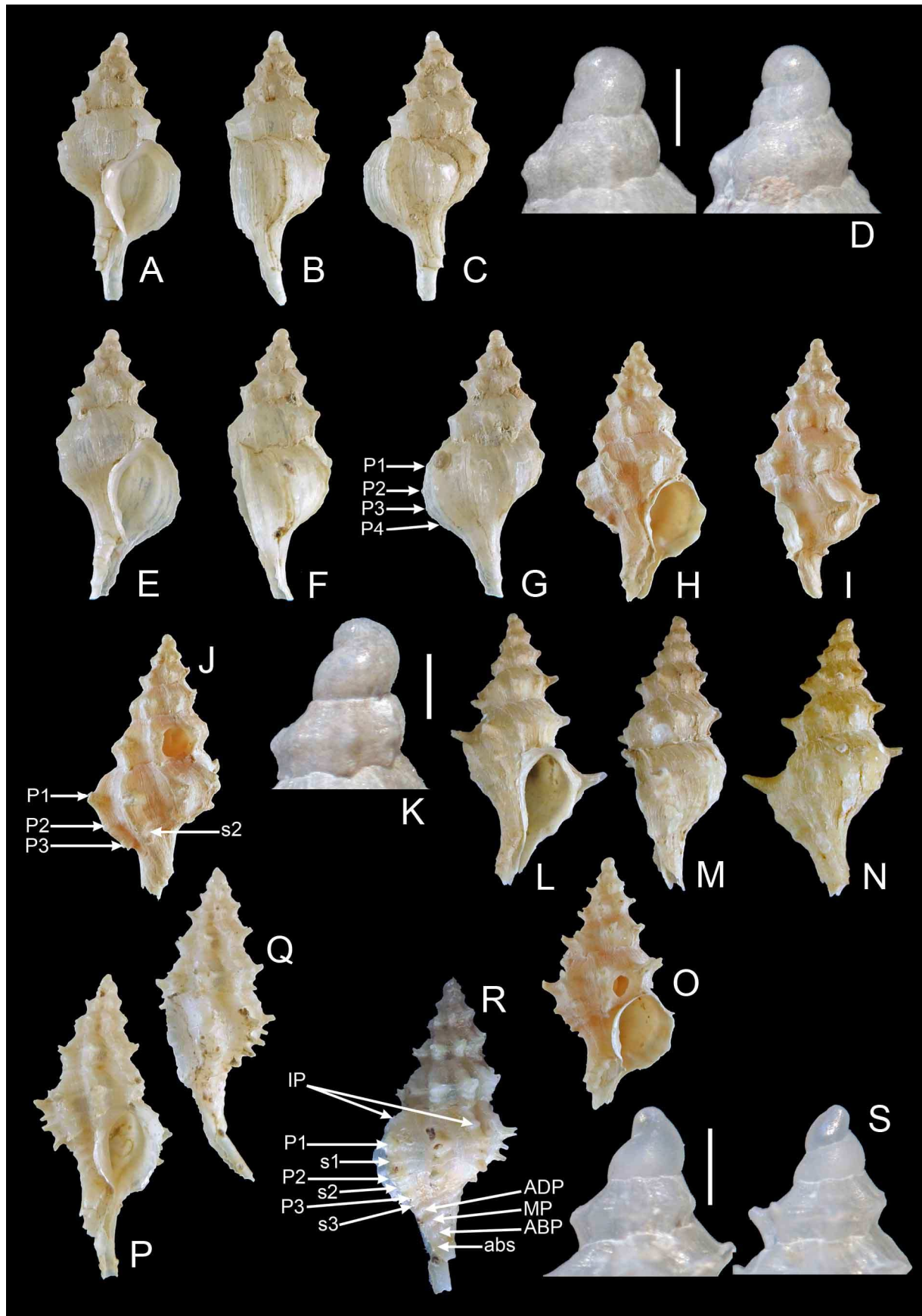
Shell entirely bluish white, covered by a thin, white, uniform intritacalx, almost completely gone in the live collected specimens, absent in the dead collected one. Aperture glossy white within.

Spire high with 1.50–1.75 protoconch whorls. Teleoconch of up to 4 broad, strongly convex, shouldered, very weakly spinose whorls. Suture of whorls impressed. Protoconch small, weakly elongate, whorls rounded, smooth, width 700–800 µm, height 1000 µm, terminal lip shallow, delicate, thin, lightly curved.

Axial sculpture of teleoconch whorls consisting of fairly high, weakly lamellate, broad ribs, increasing in width from first to last whorl. First teleoconch whorl with 8 ribs, second with 7–9, third with 7 or 8, last whorl with 6 or 7 ribs. Spiral sculpture of low, very weak, narrow, smooth, primary cords, more obvious on intersection with axial ribs, forming small, low knobs and occasionally low spinelets. First and second whorls with visible P1, third with P1 and P2, P2 partly obscured by next teleoconch whorl. Last whorl with low P1–P4, occasionally with very low, almost indistinct s1 and s2.

Figure 2 (scale bars 500 µm)

A–G. *Leptotrophon penelaevis* n. sp. New Caledonia, southwest of Île des Pins, KANACONO, stn DW4670, 22°58' S, 167°24' E, 612–680 m. A–D. Holotype MNHN-IM-2000-36570, 11.0 mm; D. Protoconch; E–G. Paratype MNHN-IM-2000-36571, 10.5 mm. **H–O.** *Leptotrophon angulatus* n. sp. New Caledonia, north of Île des Pins, KANACONO, stn DW4681, 22°23' S, 167°23' E, 480–490 m; H–K Holotype MNHN-IM-2000-36572, 10.2 mm, K. Protoconch; O. Paratype RH, 9.7 mm; L–N. south of Île des Pins, KANACONO, stn DW4748, 23°05' S, 167°44' E, 700–740 m, paratype MNHN-IM-2000-36575, 11.6 mm. **P–S.** *Leptotrophon prolatus* n. sp. P–R. New Caledonia, west of Île des Pins, KANACONO, stn DW4651, 22°42' S, 167°14' E, 295–300 m, holotype MNHN-IM-2000-36576, 12.3 mm; S. Protoconch, New Caledonia, southwest of Île des Pins, KANACONO, stn DW4711, 22°47' S, 167°24' E, 335–338 m, paratype MNHN-IM-2000-36578.



Aperture large, broad. Columellar lip broad, strongly flaring, smooth; except weak, narrow knob abapically, rim partially strongly erect, a small portion adherent at adapical extremity. Anal notch shallow, broad. Outer lip expanded, thin, erect, smooth within except strong, low, narrow denticle abapically. Siphonal canal moderately long, narrow compared to shell width, straight, open, smooth; except flattened axial lamellae. Operculum unknown, animal dried inside shell.

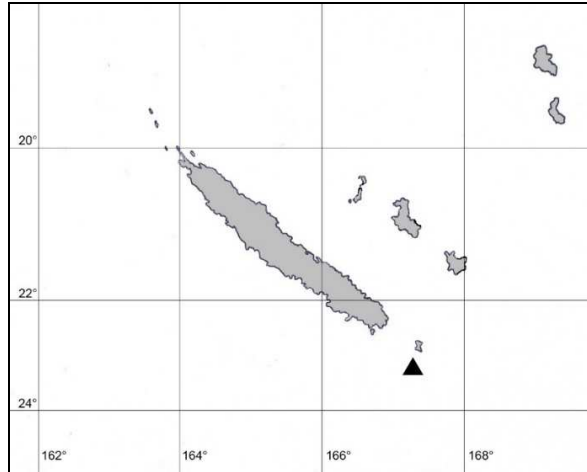


Figure 3. Distribution of *Leptotrophon penelaevis* n. sp.

▲ Type locality

Remarks. *Leptotrophon alis* Houart, 2001 (Fig. 4D–G), described from northern New Caledonia, differs in having a more spiny shell with a narrower, more strongly ovate aperture and a less raised columellar lip. It also has narrower axial ribs and a broader, shorter siphonal canal, 23–25% of total shell length in *L. alis* as opposed to 27–29% in *L. penelaevis* n. sp. *Leptotrophon surprisensis* Houart, 1995 (Fig. 4K–N), also from northern New Caledonia differs from *L. penelaevis* n. sp. in having a broader shell, a comparatively lower but more acute spire, a more strongly shouldered last teleoconch whorl, a broader aperture and a broader, straighter siphonal canal.

Leptotrophon fusiformis (Fig. 4H–J), described from the Solomon Sea, is a spineless species that differs obviously from *L. penelaevis* n. sp. in having a broader last teleoconch whorl, a higher spire, a comparatively shorter siphonal canal, 16–20% of total shell length, rounder axial ribs and definitely more obvious spiral sculpture.

These three species all have a rounded protoconch, as in *L. penelaevis* n. sp., but differ in many other shell characters as noted above.

Etymology. Latin adjective, from *pene*: almost and *laevis*: smooth. In reference to the almost smooth shell surface.

***Leptotrophon angulatus* n. sp.**

Figs 2H–O; 5

Type material. New Caledonia, KANACONO stn DW4681, 22°23' S, 167°23' E, 480–490 m, dd, holotype MNHN-IM-2000-36572, 1 paratype MNHN-IM-2000-36573, 1 paratype RH; stn DW4748, 23°05' S, 167°44' E, 700–740 m, dd, 2 paratypes MNHN-IM-2000-36574, MNHN-IM-2000-36575.

Type locality. New Caledonia, north of Île des Pins, 22°23' S, 167°23' E, 480–490 m, empty shell.

Distribution. New Caledonia, north and south of Île des Pins, empty shells at 490–700 m.

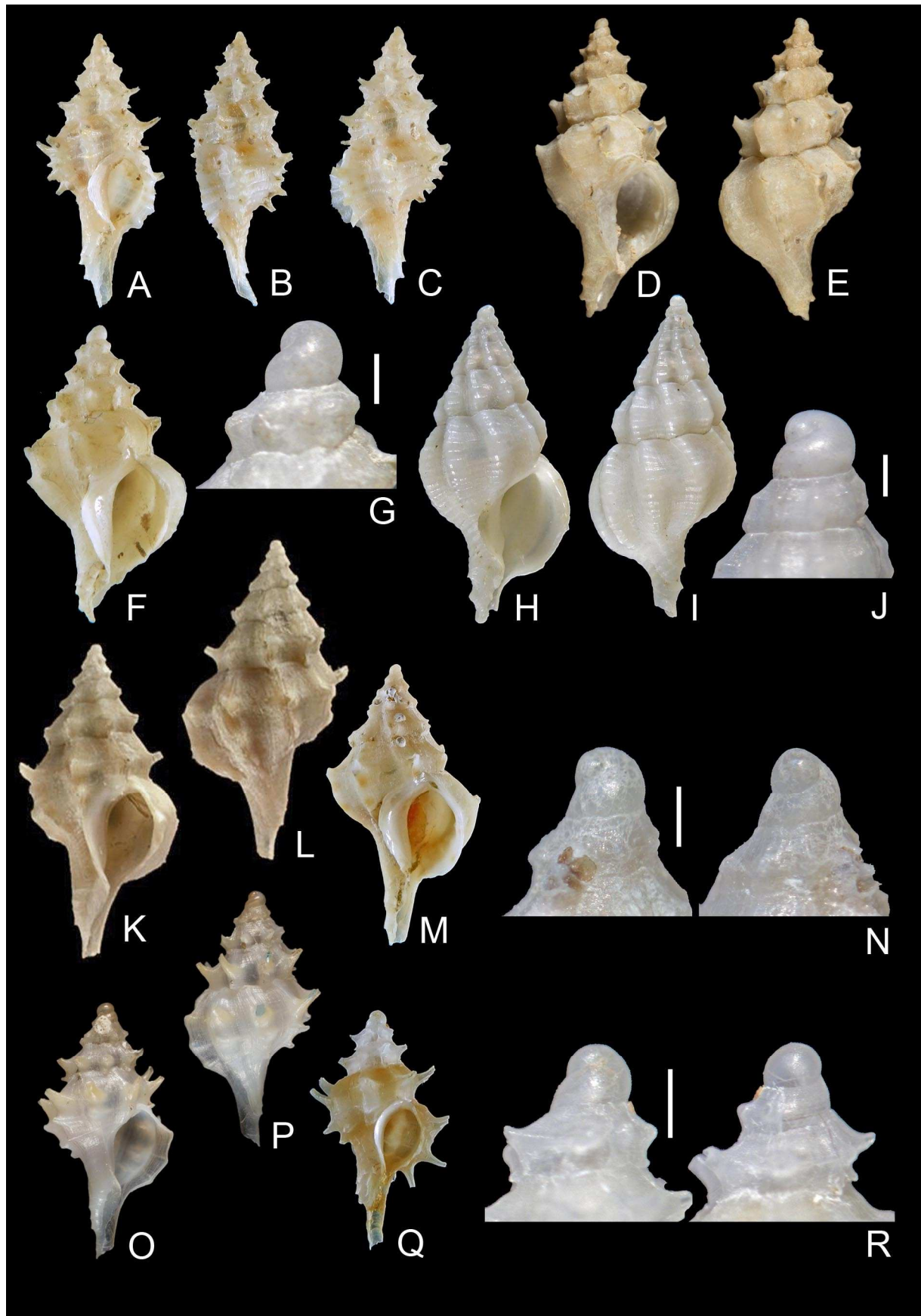
Description. Shell medium sized for the genus, up to 11.6 mm in length at maturity (paratype MNHN-IM-2000-36575, stn 4748). Length/width ratio 1.9–2.1 (holotype 10.2 x 5.1 mm, length/width ratio 2.0). Lanceolate, broad, weakly spinose, lightly built. Subsutural ramp broad, strongly sloping, weakly convex, smooth except for axial lamellae.

Light tan, aperture paler.

Spire high with 1.5 protoconch whorls and teleoconch of up to 5 broad, weakly convex, angulate, strongly shouldered, spinose whorls. Suture of whorls impressed. Protoconch small, weakly elongate, whorls rounded, smooth, width 600 µm, height 700 µm, terminal lip eroded.

Figure 4 (scale bars 500 µm)

A–C. *Leptotrophon prolatus* n. sp., New Caledonia, west of Île des Pins, KANACONO, stn DW4651, 22°46' S, 167°19' E, 348–350 m, paratype MNHN-IM-2000-36577, 9.6 mm. **D–G.** *Leptotrophon alis* Houart, 2001, D–E. North New Caledonia, Grand Passage, 18°50' S, 163°17' E, 610–660 m, holotype MNHN-IM-2000-1064, 11.6 mm (photo M. Caballer); F–G. New Caledonia, 18°50' S, 163°17' E, 610–660 m, paratype RH, 10.1 mm. **H–J.** *Leptotrophon fusiformis* Houart, 2017, H–I. Solomon Sea, Budibudi Island, north of Laughlan Archipelago, 09°11' S, 153°55' E, 380–411 m, holotype MNHN-IM-2013-45607, 16.2 mm; J. Protoconch, same locality, paratype RH. **K–N.** *Leptotrophon surprisensis* Houart, 1995. K–L. North New Caledonia, Grand Passage, 18°54' S, 163°19' E, 530 m, holotype MNHN-IM-2000-247, 15.0 mm (photo B. Fontaine); M. New Caledonia, 18°56' S, 163°22' E, 444–452 m, RH, 12.1 mm; N. Protoconch, New Caledonia, 19°04' S, 163°27' E, 270–264 m, RH. **O–R.** *Leptotrophon coriolis* Houart, 1995. Coral Sea, Chesterfield Plateau, 19°53' S, 158°40' E, 410 m, holotype MNHN-IM-2000-141, 7.7 mm (photo M. Caballer); Q–R. New Caledonia, south of Île des Pins, KANACONO, stn DW4716, 22°52' S, 167°28' E, 430–439 m, MNHN, 5.4 mm; R. Protoconch.



Axial sculpture of teleoconch whorls consisting of low, narrow, spinose ribs. Seven ribs on first whorl, 7 or 8 on second and third, 8 on fourth and 7 or 8 on last whorl. Spiral sculpture of low, weak, rounded, narrow, primary cords and very low s2 secondary cord. First and second teleoconch whorls with visible P1, fourth or third and fourth whorls with P1 and P2, P2 partly covered by next whorl. Last whorl with P1, (s1), P2, s2, P3. Cords weakly decreasing in strength abapically. Crossing of axial ribs and spiral cords giving rise to short, acute, open spines. Spines on P1 cord longest, decreasing in length on abapical cords. Aperture large, broad, roundly ovate. Columellar lip broad, strongly flaring, with 3 narrow denticles abapically, lip partially erect, a small portion adherent at adapical extremity. Anal notch shallow, broad. Outer apertural lip erect, smooth, with very weak, narrow, elongate D2 and D3 denticles within. Siphonal canal short, broad, straight, open, smooth; except for flattened axial ribs.

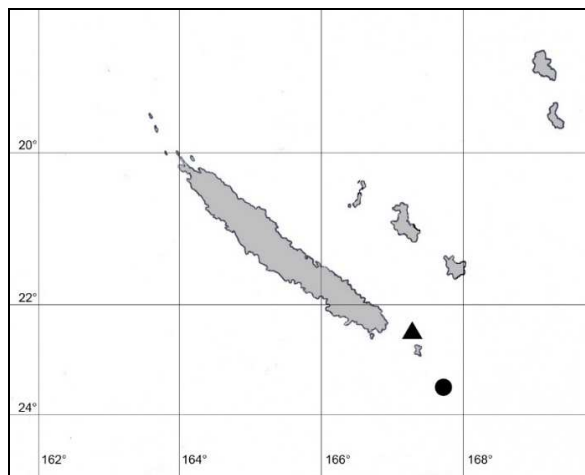


Figure 5. Distribution of *Leptotrophon angulatus* n. sp.

- ▲ Type locality
- Other locality

Remarks. The shells were collected dead and slightly damaged but the differences observed from the other *Leptotrophon* species leave no doubt that they belong to an undescribed species.

Leptotrophon alis (Fig. 4D–G) has a lower spire and broader teleoconch whorls with a less sloping subsutural ramp. It also has a less obvious spiral sculpture and low, flat, spiral threads on the siphonal canal, not observed in *L. angulatus* n. sp.

Leptotrophon coriolis Houart, 1995 (Fig. 4O–R) also has a rounded, small protoconch. However the shell is rounder with a lower spire, a comparatively broader last teleoconch whorl, a narrower, less sloping subsutural ramp and a narrower siphonal canal.

Leptotrophon minispinosus Houart, 1995 (Fig. 6A–D) has a narrower shell with a higher spire, a more strongly sloping subsutural ramp, a smaller, more ovate aperture and narrow, inconspicuous spiral threads on the siphonal canal.

Leptotrophon surprisensis (Fig. 4K–N) has a broader, less spiny shell with a lower spire, a broader last teleoconch whorl which is more strongly constricted adapically, broader, more obvious axial ribs and no apparent spiral cords except P1 and occasionally P2.

Etymology. Latin adjective *angulatus*: angular, in reference to the strongly angular shell.

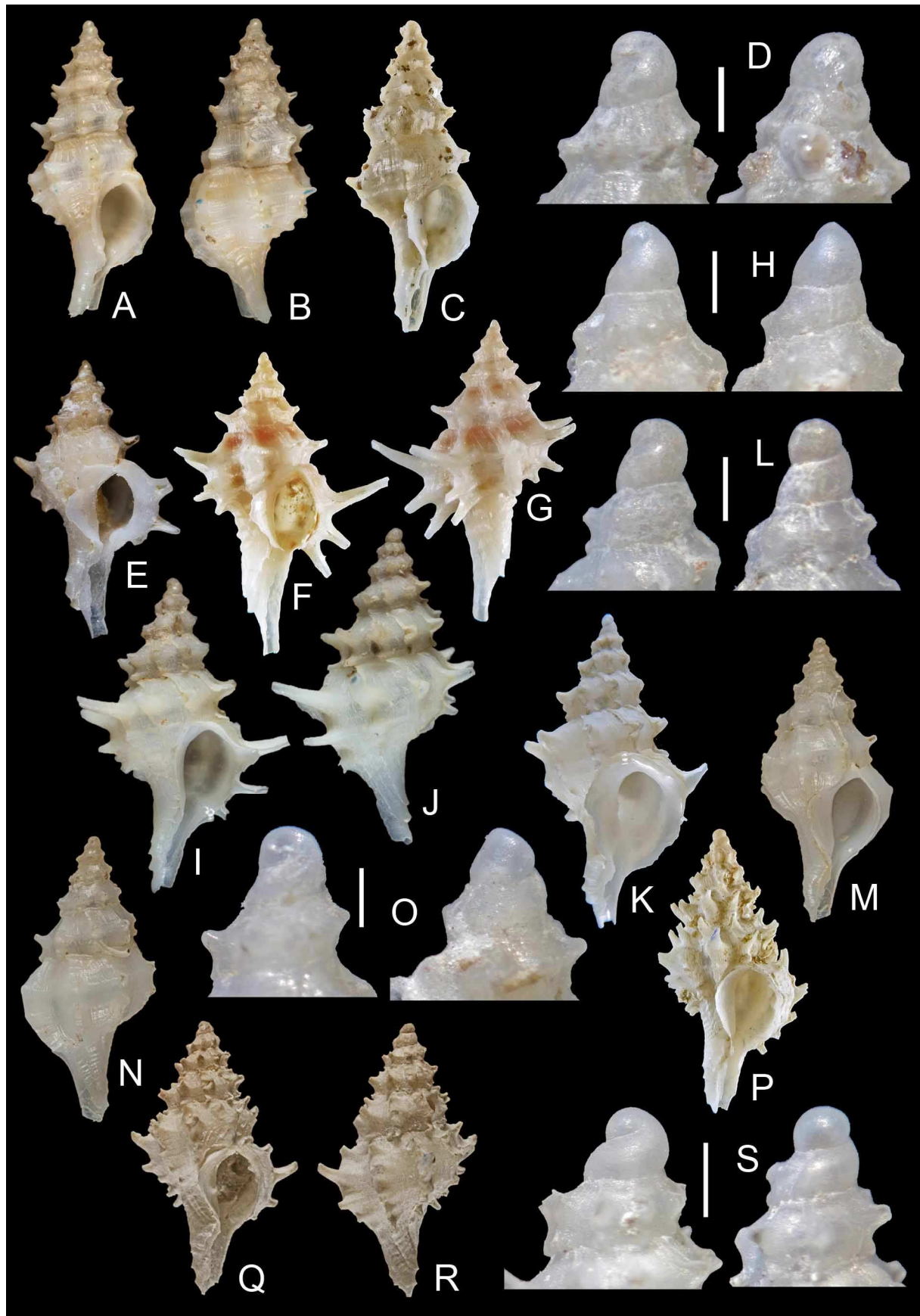
***Leptotrophon prolatus* n. sp.**

Figs 2P–S; 4A–C; 7

Type material. New Caledonia, KANACONO stn DW4651, 22°42' S, 167°14' E, 295–300 m, holotype MNHN-IM-2000-36576, lv; 1 paratype MNHN-IM-2000-36577, lv; stn DW4703, 22°46' S, 167°19' E, 348–350 m, 1 paratype RH, lv; stn DW4711, 22°47' S, 167°24' E, 335–338 m, 2 paratypes MNHN-IM-2000-36578, MNHN-IM-2000-36579, lv.

Figure 6 (scale bars 500 µm)

A–D. *Leptotrophon minispinosus* Houart, 1995. A–B. North New Caledonia, Grand Passage, 19°04' S 163°27' E, 260 m, holotype MNHN-IM-2000-182, 11.1 mm (photo M. Caballer); C. North New Caledonia, Grand Passage, 19°04' S, 163°27' E, 260 m, paratype RH; D. Protoconch. **E–H.** *Leptotrophon acerapex* (Houart, 1986). E. South New Caledonia, 22°46' S 167°12' E, 390–400 m, holotype MNHN-IM-2000-2, 9.5 mm (photo M. Caballer); F–G. South New Caledonia, Île des Pins, 22°51' S, 167°12' E, 408–436 m, 11.8 mm, RH; H. Protoconch, South New Caledonia, 22°58' S, 167°33' E, 410–440 m, RH. **I–L.** *Leptotrophon charcoti* Houart, 1995. I–J. South New Caledonia, 23°05' S, 167°45' E, 680–700 m, holotype MNHN-IM-2000-69, 13.0 mm (photo M. Caballer); K. South New Caledonia, 23°10' S, 167°10' E, 675–680 m, RH, 12.5 mm; L. Protoconch, South New Caledonia, 22°59' – 23°00' S, 168°21' – 168°23' E, 491–558 m, RH. **M–O.** *Leptotrophon protocarinatus* Houart, 1995. M–N. North New Caledonia, Surprise Atoll, 18°15' S, 162°59' E, 300–350 m, holotype MNHN-IM-2000-941, 10.8 mm (photo M. Caballer); O. Protoconch; **P–S.** *Leptotrophon spinacutus* (Houart, 1986). P. South New Caledonia, 22°19' S, 166°11' E, 490–500 m, RH, 10.5 mm; Q–R. South New Caledonia, 22°30' S, 166°24' E, 250–350 m, holotype MNHN-IM-2000-266, 9.5 mm (photo M. Caballer); S. Protoconch, New Caledonia, Norfolk Ridge, 24°55' S, 168°22' E, 508–532 m, RH (juvenile).



Other material. KANACONO, stn DW4690, 22°59' S, 167°29' E, 800 m, 1 dd; stn CP4673, 22°47' S, 167°27' E, 244–285 m, 2 dd; stn DW4703, 22°46' S, 167°19' E, 348–350 m, 3 dd; stn DW4706, 22°47' S, 167°24' E, 345–355 m, 2 dd; stn DW4711, 22°47' S, 167°24' E, 335–338 m, 15 dd.

Type locality. New Caledonia, west of Île des Pins, 22°42' S, 167°14' E, 295–300 m.

Distribution. New Caledonia, west to southwest of Île des Pins, living at 300–348 m.

Description. Shell medium sized or large for the genus, up to 12.3 mm in length at maturity (holotype). Length/width ratio 2.1–2.2 (holotype 12.3 x 5.7 mm, length/width ratio 2.15). Slender, lanceolate, narrowly ovate, spinose, lightly built. Subsutural ramp broad, strongly sloping, weakly convex.

Shell entirely white.

Spire very high, acute, with 2 protoconch whorls and up to 5 broad, weakly convex, narrow, angulate, strongly shouldered, spinose teleoconch whorls. Suture of whorls weakly adpressed. Protoconch small, elongate, acute. First whorl keeled adapically, last whorl rounded, otherwise smooth. Width 700 µm, height 900 µm. Terminal lip small, shallow, thin.

Axial sculpture of teleoconch whorls consisting of high, strong, narrow, spinose ribs, 7 or 8 from first to third whorl, 7–9 on penultimate whorl, 6 or 7 on last whorl. Spiral sculpture of high, strong, rounded, narrow, smooth, primary cords and narrower secondary cords. First and second whorls with visible P1 and P2 almost completely covered by next whorl; third whorl starting shallow IP; fourth with IP, P1, (s1), P2; last teleoconch whorl with IP, (adis), P1, s1, P2, s2, P3, s3, ADP, MP, ABP, (abs). P1–P3 almost equal in strength, s2 and s3 weak, P1, s1, P2 and P3 forming acute, narrow, moderately long, open spines at intersection with axial ribs.

Aperture large, roundly ovate. Columellar lip broad, strongly flaring, smooth, rim partially erect, a small portion adherent adapically. Anal notch shallow, broad. Outer apertural lip thin, erect, smooth within or with weak, elongate denticles corresponding to ID, D1, D2 and D3, occasionally split. Siphonal canal long, broad adapically, tapered abapically, straight, open, with ADP, MP and ABP, shallow, rounded, spiral cords.

Operculum not examined, animal dried in shell.

Remarks. *Leptotrophon acerapex* (Houart, 1986) (Fig. 6E–H) has a similar acute protoconch and lives in the same geographical area, but *L. acerapex* differs consistently in having a broader shell and siphonal canal, in lacking the IP subsutural primary cord and the secondary s1 cord and in having broader, stouter and usually longer P1–P3 spines.

Leptotrophon charcoti Houart, 1995 (Fig. 6I–L) has a different protoconch, acute, but rounded, a broader

shell with a broader aperture, usually with small knobs on abapical part of the columellar lip, and lacks the additional IP and s1 spiral cords observed in *Leptotrophon prolatus* n. sp.

Leptotrophon minispinosus (Fig. 6A–D) has IP and s1 spiral cords, but they are only shallow and very narrow, usually inconspicuous. It has a rounded protoconch instead of the extremely acute one in *Leptotrophon prolatus* n. sp.

Leptotrophon protocarinatus Houart, 1995 (Fig. 6M–O), as indicated by its name, has a carinate protoconch different from that of *Leptotrophon prolatus* n. sp. *L. protocarinatus* also lacks the IP and s1 spiral cords, has a more angular shell, usually with an additional P4 spiral cord.

Finally, *Leptotrophon spinacutus* (Fig. 6P–S) also has the IP and s1 cords, but also additional P4 and occasionally s4 cords, absent in *Leptotrophon prolatus* n. sp. It also has a broader shell with broader spiral cords and spines, and a low, rounded protoconch. *Leptotrophon spinacutus* and *L. prolatus* n. sp. are syntopic at KANACONO stn DW4711.

All other *Leptotrophon* species are obviously different and do not need to be compared here.

Etymology. Latin adjective *prolatus*: extended, elongated. In reference to the elongate shell.

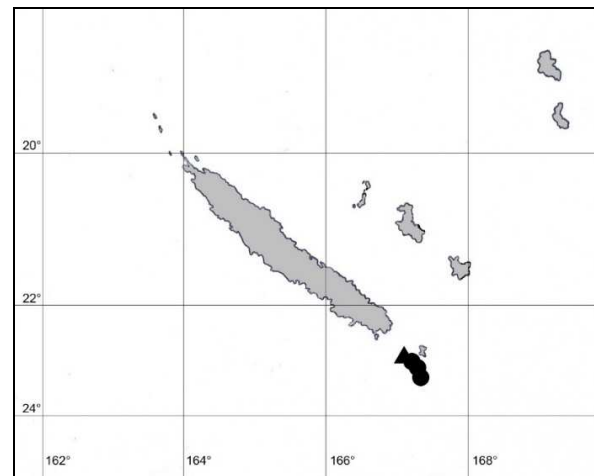


Figure 7. Distribution of *Leptotrophon prolatus* n. sp.

- ▲ Type locality
- Other localities

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