

The Genus *Enixotrophon* (Gastropoda: Muricidae: Pagodulinae): an Update on Species from the Tropical Indo-West Pacific

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Abstract: Fifteen species of *Enixotrophon* collected during expeditions of the Tropical Deep-Sea Benthos programme are reported from the Indo-West Pacific. All are illustrated using the holotypes and material collected during more than 30 years. The species were collected in the bathyal zone, living specimens occurring in depths from 198 to 1,280 m, with a majority between 250 and 800 m. One new combination, *Enixotrophon pistillum* (Barnard, 1959), is introduced; *Trophon johannthielei* Barnard, 1959 and *Trophonopsis ziczac* Tiba, 1981 are synonymised with *E. pulchellus* (Schepman, 1911). New geographical distribution data are presented for *E. lochi* (Marshall & Houart, 2011), *E. pistillum*, *E. planispinus* (E.A. Smith, 1906), *E. plicilaminatus* (Verco, 1909), *E. pulchellus* (Schepman, 1911) and *E. sansibaricus* (Thiele, 1925). Six species are recorded from the New Caledonia region, *E. lochi*, *E. multigradus* (Houart, 1990), *E. obtuseliratus* (Schepman, 1911), *E. plicilaminatus* (Verco, 1909), *E. procerus* (Houart, 2001) and *E. pulchellus* (Schepman, 1911). *E. karubar* n. sp. is described from Indonesia and one subadult specimen collected in the Mozambique Channel during the MAINBAZA expedition remains unidentified (*Enixotrophon* sp. cf. *E. sansibaricus*).

Keywords: Muricidae, *Enixotrophon*, expeditions, Tropical Indo-West Pacific

Introduction

Several species assigned to the muricid genus *Enixotrophon* Iredale, 1929 were collected during expeditions organized by MNHN/IRD and associated institutions and illustrated in recent papers by Houart (1990, 1995, 1997, 2001), Houart & Héros (2008) and Houart & Tröndlé (2008), but a few have then been misidentified while others remained unidentified so far.

Marshall & Houart (2011) in a review of deep-sea gastropods from the New Zealand region, Australia and the Tasman Sea, correctly identified a few of these at the species level, but they were then assigned to *Pagodula* Monterosato, 1884, a genus now restricted to species living mainly in the West and East Atlantic Ocean. *Pagodula* was also used in Barco *et al.* (2012) for all the species assigned in *Pagodula* and *Enixotrophon*. *Enixotrophon* was considered a synonym of *Pagodula* in both papers. It was reinstated and separated from *Pagodula* by Barco *et al.* (2015) using molecular phylogenetic analysis.

New material and localities were later added in papers dealing with species collected during expeditions off Papua New Guinea (Houart & Héros, 2016), in the East and South China Seas and off Taiwan (Houart & Buge, 2022) and from the Walters Shoal in the Indian Ocean (Houart, in

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press).

Barco *et al.* (2015) assigned some 41 species to the genus *Enixotrophon*, many from the Tropical Indo-Pacific. Fifteen of these are commented on here, including new combinations, new species and undetermined species. See also Discussion.

Material and Methods

Material

Specimens of *Enixotrophon* were collected during expeditions of the *Tropical Deep-Sea Benthos* programme; see Bouchet *et al.* (2008) for the context of the programme and <https://expeditions.mnhn.fr/> for station lists and associated information (*e.g.*, permits, participants) of the individual research cruises

BIOCAL, 1985, (doi.org/10.17600/85002911), MUSORSTOM 4, 1985 (doi.org/10.17600/85009111), MUSORSTOM 5, 1986 (doi.org/10.17600/86006611), BIOGEOCAL, 1987 (doi.org/10.17600/87001811), KARUBAR, 1991, MUSORSTOM 7, 1992 (doi.org/10.17600/92005111), BATHUS 2, 1993 (doi.org/10.17600/93000360), SMIB 8, 1993 (doi.org/10.17600/93000640), BATHUS 4, 1994 (doi.org/10.17600/9410003), MUSORSTOM 8, 1994 (doi.org/10.17600/94100040), MUSORSTOM 9, 1997 (doi.org/10.17600/97100020), CORAIL 2, 1998 (dx.doi.org/10.17600/88002911), MUSORSTOM 10, 1998 (doi.org/10.17600/98100080), BORDAU 1, 1999 (doi.org/10.17600/99100020), Taiwan 2000, SALOMON 1, 2001 (doi.org/10.17600/1100090), BENTHAUS, 2002 (doi.org/10.17600/2100100), NORFOLK 2, 2003 (doi.org/10.17600/3100030), SALOMON 2, 2004 (doi.org/10.17600/4100090), EBISCO, 2005 (doi.org/10.17600/5100080), PANGLAO 2005, SALOMONBOA 3, 2007 (dx.doi.org/10.17600/7100070), CONCALIS, 2008 (<http://dx.doi.org/10.17600/8100010>), MAINBAZA, 2009, TARASOC, 2009 (doi.org/10.17600/9100040), ATIMO VATAE, 2010 (doi.org/10.17600/10110040), BIOPAPUA, 2010 (doi.org/10.17600/10100040), PAPUA NIUGINI, 2012 (doi.org/10.17600/18000841), KAVIENG 2014 (doi.org/10.17600/14004400), KANACONO, 2016 (doi.org/10.17600/16003900), BIOMAGLO, 2017 (doi.org/10.17600/17004000), MD208, WALTERS SHOAL, 2017 (doi.org/10.17600/17002700), KAVALAN, 2018, KANADEEP 2, 2019 (doi.org/10.17600/18000883).

In most cases this material has never been listed. A few records have been published in some of the papers cited below, but often without the catalogue numbers now assigned to them.

I thought it was appropriate to compile a complete, updated list of the material deposited at the MNHN within a single revision. The material studied is housed there, unless otherwise stated.

Morphological analysis

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, details of axial and spiral sculpture, the aperture, the siphonal canal, and when available, the characters of the operculum and radula. The shells were measured with a digital calliper to the nearest 0.5 mm.

The terminology used to describe the spiral cords follows Merle (2001, 2005). The method used to determine diameter and height, and to count the number of protoconch whorls, follows Bouchet & Kantor (2004); the size of the protoconch was determined using a 0.1 mm ocular micrometer.

The morphology of the radula is described starting from the rachidian tooth, followed by the lateral teeth. The species description is based on the holotype and paratypes. The bathymetric ranges are the inner values of the recorded depths: the deepest minimum and the shallowest maximum of each recorded depth range (Bouchet *et al.*, 2008).

Radula

In Pagodulinae the radula shows a typical muricine shape with the rachidian tooth bearing a major triangular central cusp, two small lateral denticles on each side and two lateral cusps slightly smaller than the central one. The rachidian base is subrectangular, broad, anteriorly concave and has no marginal cusps. Lateral teeth are sickle-shaped and approximately the same size as the central tooth (Fig. 6E–H).

In contrast, Trophoninae have an ocenebrine-like radula with marginal cusps and the partial fusion of the lateral denticles with the internal margin of the lateral cusps.

Protoconch

Species in *Enixotrophon* have either a multispiral protoconch of 2–2.5 whorls with a small first whorl indicating planktotrophic development, or a paucispiral protoconch of 1.5–1.75 whorls indicating non-planktotrophic larval development. Only one of the species reviewed here, *E. veronicae* (Marshall, 1999) has a multispiral protoconch (Fig. 5V).

Abbreviations

Specimens: dd – empty shell(s); lv – live collected specimen(s); sp – specimen (lv or dd); juv – juvenile specimen(s); ad – adult specimen(s).

Station data: CC – (chalut à crevettes) shrimp trawl; CP – (chalut à perche) beam trawl; DE – epibenthic dredge; DW – Warén dredge; DR – rock dredge.

Repositories

AMS – The Australian Museum, Sydney, Australia; MNHN – Muséum national d’Histoire naturelle, Paris, France; NMNZ – Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand; RH – collection of the author; SAM – South Australian Museum, Adelaide, Australia; SAMC – South African Museum, Cape Town, South Africa; USNM – National Museum of Natural History, Washington, D.C., U.S.A.; ZMA – Zoologisch Museum, Universiteit van Amsterdam, the Netherlands. (now in Naturalis Biodiversity Center, Leiden, the Netherlands); ZMB – Museum für Naturkunde der Humboldt Universität zu Berlin, Zoologisches Museum, Germany.

Terminology used here to describe the spiral cords of the convex part of the teleoconch whorl (after Merle 2001, 2005)

P1 – shoulder cord; P2–P6 – primary cords of the convex part of the teleoconch whorl; s1–s6 – secondary cords of the convex part of the teleoconch whorl (example: s1 = secondary cord between P1 and P2; s2 = secondary cord between P2 and P3, etc.).

Taxonomy

Family **Muricidae** Rafinesque, 1815

Subfamily **Pagodulinae** Barco, Schiaparelli, Houart & Oliverio, 2012

Genus ***Enixotrophon*** Iredale, 1929

Type species by original designation: *Trophon carduelis* R. B. Watson, 1883; Recent, eastern Australia, Tasman Sea and New Zealand.

Enixotrophon atanua (Houart & Tröndlé, 2008)
(Figs 1A–D; 6E)

Pagodula atanua Houart & Tröndlé, 2008: 85, figs 16, 134–139.

Poirieria (Pagodula) atanua — Merle *et al.*, 2011: 159, pl. 130, figs 6a–b.

Enixotrophon atanua — Barco *et al.*, 2015: 487.

Type material: Holotype MNHN-IM-2000-20180.

Type locality: French Polynesia, Marquesas, Nuku Hiva, 8°57.9'S, 140°15.8'W, 708–738 m.

Material examined: **French Polynesia, Marquesas**, MUSORSTOM 9, Nuku Hiva, stn DR1255, 9°38.5'S, 139°48.4'W, 416–440 m, MNHN-IM-2008-2883, 1 dd, stn DW1281, 7°47.8'S, 140°20.8'W, 450–455 m, MNHN-IM-2008-2881 and MNHN-IM-2008-2884, 7 lv & dd; stn CP1302, 8°56.7'S, 140°15.3'W, 478–502 m, MNHN-IM-2008-2882, 1 dd; stn CP1307, 8°57.9'S, 140°15.8'W, 708–738 m, lv (holotype).

Distribution: French Polynesia, Marquesas, Nuku Hiva Island, living at 455–708 m.

Remarks: Two adult specimens were originally studied, the holotype and an additional, lightly damaged empty shell. Seven juvenile shells (Fig. 1D) were also examined at that time and considered conspecific. No other specimens have been collected since its description.

***Enixotrophon karubar* n. sp.**

(Fig. 5J–R)

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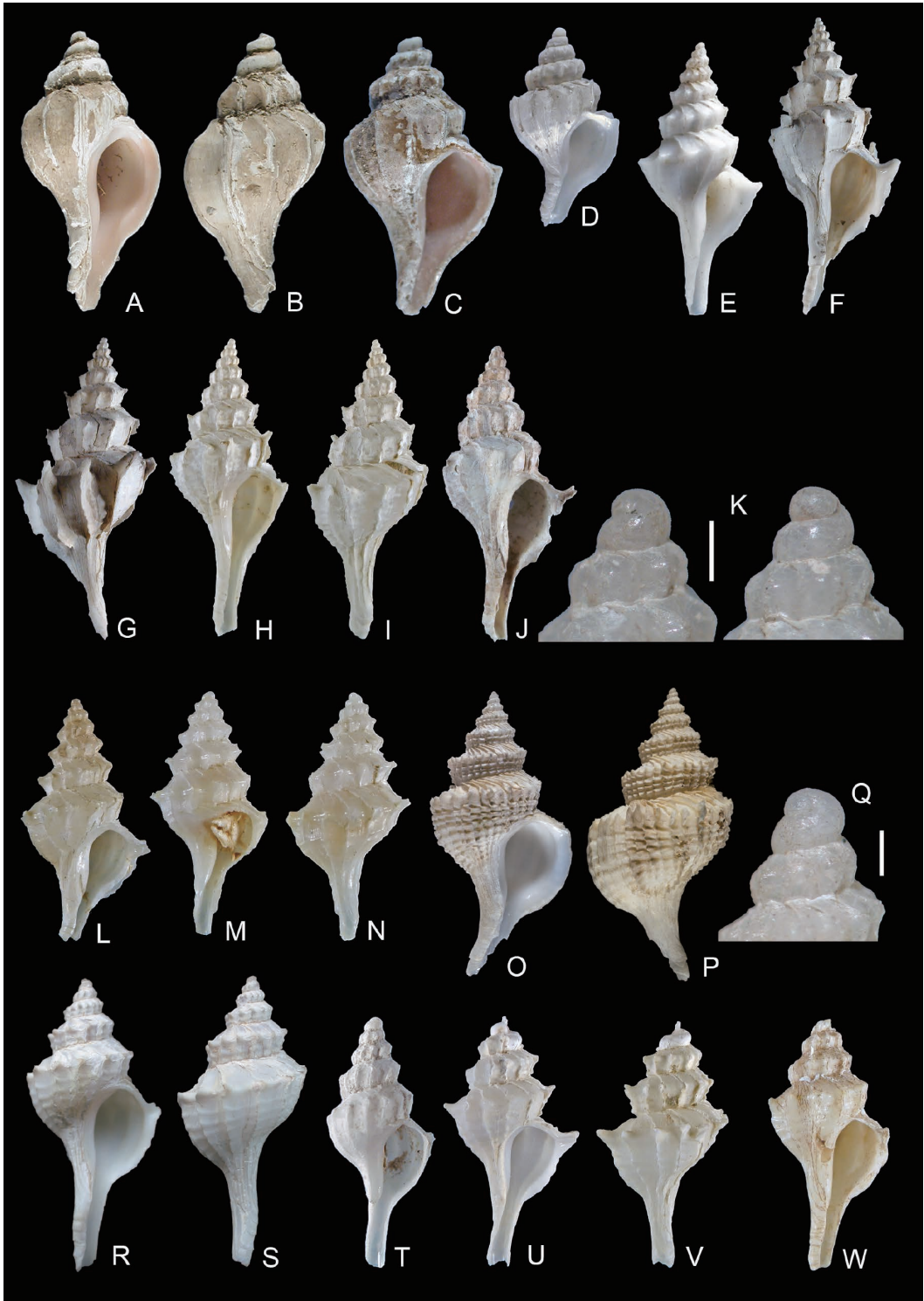
Trophonopsis plicilaminatus — Houart, 1997: 291, figs 9–10 (not *Trophon plicilaminatus* Verco, 1909).

Type material: Holotype MNHN-IM-2000-38614; 4 paratypes MNHN-IM-2014-2436; 1 paratype MNHN-IM-2014-2435; 1 paratype MNHN-IM-2014-2437; 1 paratype RH.

Type locality: Indonesia, Tanimbar Islands, 08°42'S, 131°53'E, 356–368 m.

Material examined: **Indonesia**, KARUBAR, Tanimbar Islands, stn CP69, 08°42'S, 131°53'E, 356–368 m, holotype MNHN-IM-2000-38614, 1 lv; 4 paratypes MNHN-IM-2014-2436 (dd); 1 paratype RH (dd); 1 paratype MNHN-IM-2014-2437 (dd); Kai Islands, stn CC21, 05°14'S, 133°00'E, 688–694 m; 1 paratype MNHN-IM-2014-2435 (dd). **Philippines**, PANGLAO 2005, stn DW2347, 09°29'N, 123°54'E, 233–198 m, MNHN-IM-2012-1684, 1 dd; stn CP2384, 08°46'N, 123°16'E, 624–647 m, MNHN-IM-2012-1687, 2 dd, juv; stn CP2399, 09°32'N, 123°42'E, 342–309

Fig. 1. A–D. *Enixotrophon atanua* (Tröndlé & Houart, 2008), French Polynesia, MUSORSTOM 9; A–B, Marquesas, Nuku Hiva, 708–738 m, holotype MNHN-IM-2000-20180, 26.7 mm; C, Marquesas, Nuku Hiva, 478–502 m, MNHN-IM-2008-2882, 23.7 mm; D, Marquesas, Motu One Hatutaa, 450–455 m, MNHN-IM-2008-2881, 7.9 mm. **E–N.** *Enixotrophon lochi* (Marshall & Houart, 2011); E, Australia, New South Wales, off Clarence River, 412 m, holotype AMS C.463437, 16.8 mm (photo courtesy B. A. Marshall); F–G, Mozambique, MAINBAZA, stn CP3140, Inhambane transect, 886–898 m, MNHN-IM-2012-41642, 32.7 mm; H–J, Fiji, BORDAU 1, stn CP1458, 1,216–1,226 m (H–I, MNHN-IM-2008-1061, 33.2 mm; J, MNHN-IM-2008-1063, 43.2 mm); K, protoconch, BIOGEOCAL, stn CP260, MNHN-IM-2012-9351; L, New Caledonia, BIOGEOCAL, Loyalty Basin, stn CP260, 1,820–1,980 m, MNHN-IM-2012-9351, 13.7 mm; M–N, Coral Sea, CORAIL 2, Landsdowne-Fairway, stn DE13, 700–705 m, MNHN-IM-2012-9349, 11.1 mm. **O–Q.** *Enixotrophon multigradus* (Houart, 1990); O–P, New Caledonia, MUSORSTOM 4, stn CC177, 540–600 m, holotype MNHN-IM-2000-167, 27.4 mm (photo M. Caballer); Q, protoconch, paratype RH. **R–W.** *Enixotrophon obtuseliratus* (Schepman, 1911), R–S, Indonesia, Flores Sea, 247 m, 247 m, lectotype ZMA 3.11.075, 31.9 mm; T, Indonesia, Sulawesi, between Kepulauan (Postillon Is) and Sumbawa, 794 m, paralectotype ZMA 3.11.076; U–V, New Caledonia, BIOGEOCAL, stn CP260, Loyalty Basin, 1,820–1,980 m, MNHN-IM-2012-9351, 13.3 mm; W, New Caledonia, NORFOLK 2, stn DW2144, Ile des Pins, 1,004–1,009 m, MNHN-IM-2010-4901, 13.2 mm. Scale bars = 500 µm.



m, MNHN-IM-2012-1686, 1 dd, juv.

Distribution: Indonesia, Tanimbar and Kai Islands, living at 356 m and Philippines, Bohol Sea, empty shells in 198–624 m.

Description: Shell medium sized for genus, up to 16.45 mm in length (holotype). Length/width ratio 1.7–2.1. Slender, lanceolate, broadly ovate, spinose, lightly built. Subsutural ramp broad, weakly sloping, weakly concave on early whorls, weakly convex on last whorl.

Shell uniformly white.

Spire high with 1.5 protoconch whorls and up to 6 moderately broad, angular, strongly shouldered, spinose teleoconch whorls. Suture of whorls impressed. Protoconch small, whorls rounded, weakly damaged, eroded or absent in type material.

Axial sculpture of teleoconch whorls consisting of narrow lamellae, strongly concave between spiral cords, more strongly developed at shoulder angulation, producing moderately long, broadly open spines. First teleoconch whorl damaged or weakly eroded in all specimens, second whorl with 10–12 lamellae, third and fourth with 10–13, penultimate and last whorls with 9–12 lamellae. Spiral sculpture of first to penultimate teleoconch whorls with visible P1 and P2 primary cords. Last whorl with P1–P3, P1 and P2 more widely spaced than P2 and P3. Occasional with additional s3 secondary cord. Intersection of axial lamellae and primary spiral cords giving rise to broadly open spinelets, more obvious and longer on P1 cord.

Aperture large, broadly ovate. Columellar lip narrow, smooth, rim completely adherent to shell. Outer lip smooth within. Siphonal canal long, straight, broadly open, smooth.

Operculum unknown.

Etymology: Named after the KARUBAR expedition that took place in 1991 off the Kai, Aru and Tanimbar islands in Indonesia.

Remarks: This new species was illustrated as *Trophonopsis plicilaminatus* by Houart (1997: 291, figs 9–10) and was thought by Marshall & Houart (2011: 106) to be a possible adult specimen of *E. sansibaricus*.

Additional specimens have later been collected in the Philippines (Fig. 5Q).

All the shells collected in Indonesia and the Philippines have 4 to 6 teleoconch whorls, also with only two visible spiral cords on the early whorls, as seen in *E. sansibaricus*, but with 3 or rarely 4 spiral cords on the last teleoconch whorl as opposed to only 2 in *E. sansibaricus*. They differ further from *E. sansibaricus* in having a comparatively narrower, more elongate protoconch (Fig. 5F vs 5R) with a narrower first whorl, narrower early teleoconch whorls and a broader, more strongly bent subsutural ramp.

Enixotrophon karubar n. sp. differs from *E. plicilaminatus* (Fig. 3A–L), with which it was originally confused, in having more widely spaced P1 and P2 primary spiral cords and a shorter and more angular last teleoconch whorl with 3 primary spiral cords instead of 5 or 6 in *E. plicilaminatus*.

No really intact protoconch could be examined in the type material. The holotype has a partly eroded one (Fig. 5O) but specimens collected in the Philippines have a smooth, paucispiral protoconch of 1.5 whorls with a first whorl of 30 µm width and a last whorl of 50 µm width. The protoconch of *E. sansibaricus* is broader, more rounded, and has a 40 µm wide first whorl.

Enixotrophon lochi (Marshall & Houart, 2011)

(Fig. 1E–N)

Pagodula lochi Marshall & Houart, 2011: 103, figs 6, 11A–C.

Pagodula obtuselirata — Houart & Héros, 2008: 464, fig. 5G [not *Enixotrophon obtuseliratus* (Schepman, 1911)].

Poirieria (Pagodula) obtuselirata — Merle *et al.*, 2011: 159, pl. 130, figs 7–11 [not *Enixotrophon*

obtuseliratus (Schepman, 1911)].
Enixotrophon lochi — Barco *et al.*, 2015: 487.

Type material: Holotype AMS C.463437.

Type locality: Australia, New South Wales, off Clarence River, 29°41'S, 153°45'E, 412 m.

Material examined: **Fiji**, MUSORSTOM 10, stn CP 1331, 17°02'S, 178°02'E, 694–703 m, MNHN-IM-2008-1066, 1 dd, juv; stn CP 1361, 18°00'S, 178°54'E, 1,058–1,091 m, MNHN-IM-2008-1064, 7 dd; MNHN-IM-2008-1065, 13 lv & dd; BORDAU 1, stn CP 1458, 17°22'S, 179°28'W, 1,216–1,226 m, MNHN-IM-2008-1063, 5 dd, MNHN-2008-1361, 1 lv; stn DW 1494, 18°55'S, 178°29'W, 240–319 m, MNHN-IM-2008-1062, 1 dd, juv. **New Caledonia**, BIOGEOCAL, stn CP260, 21°00'S, 166°58'E, 1,820–1,980 m, MNHN-IM-2021-8744, 1 dd; EBISCO, stn CP2647, 21°31'S, 162°26'E, 747 m, 1 dd, MNHN-IM-2012-20954. **Coral Sea**, CORAIL 2, stn DE13, 21°03'S, 160°55'E, 700–705 m, MNHN-IM-2012-9349, 1 dd. **Papua New Guinea, New Ireland**, KAVIENG 2014, stn CP4421, 02°23'S, 150°37'E, 470–525 m, MNHN-IM-2018-12556, 1 dd; stn CP4421, 02°23'S, 150°37'E, 470–525 m, MNHN-IM-2013-58098, 1 lv; stn CP4421, 02°23'S, 150°37'E, 470–525 m, MNHN-IM-2013-43629, 1 lv; stn CP4434, 02°19'S, 150°47'E, 1,200–1,066 m, MNHN-IM-2013-58244, 1 lv; stn CP4434, 02°19'S, 150°47'E, 1,200–1,066 m, MNHN-IM-2013-58260, 1 lv; stn CP4437, 02°23'S, 150°37'E, 416–535 m, MNHN-IM-2013-58299, 1 lv; stn CP4446, 02°15'S, 150°14'E, 450–474 m, MNHN-IM-2013-58387, 1 lv. **South Madagascar**, ATIMO VATAE, stn CP3596, Sud Pointe Barrow, 25°39'S, 44°16'E, 986–991 m, MNHN-IM-2012-41641, 1 dd. **Mozambique**, MAINBAZA, stn CP3140, Inhambane transect, 23°33'S, 36°02'E, 886–898 m, MNHN-IM-2012-41642, 1 dd; stn CC3156, Bazaruto transect, 21°46'S, 36°35'E, 1,810–1,820 m, MNHN-IM-2012-41643, 1 dd.

Distribution: Fiji; New Caledonia (new record); Coral Sea; Papua New Guinea (new record); New South Wales, Australia; South Madagascar (new record); Mozambique Channel (new record); living at 405–1,216 m.

Remarks: *Enixotrophon lochi* was confused with *E. obtuseliratus* (Schepman, 1911) in several papers (see Marshall & Houart, 2011). It differs from *E. obtuseliratus* in having a much higher and a more narrowly angulate spire, a narrower protoconch (width 500 µm *versus* 800 µm) and a comparatively shorter siphonal canal. It was already known from New South Wales (type locality) and from Fiji (Houart & Héros, 2008: 464, fig. 5G, as *Pagodula obtuselirata*).

Enixotrophon multigradus (Houart, 1990)
 (Figs 10–Q, 6F–G)

Trophon multigradus Houart, 1990: 212, figs 13, 18–19, 24–25.
Enixotrophon multigradus — Barco *et al.*, 2015: 487.

Type material: Holotype MNHN-IM-2000-167.

Type locality: Off northern New Caledonia, 18°55'S, 163°10'E, 540–600 m.

Material examined: **New Caledonia**, MUSORSTOM 4, stn. CP169, 18°54'S, 163°11'E, 590 m, 2 lv (paratypes AMS & NMNZ); stn. CC177, 18°55'S, 163°10'E, 540–600 m, 1 lv (holotype MNHN); stn. DW197, 18°51'S, 163°21'E, 550 m, MNHN-IM-2000-166, 1 dd (paratype); stn. CP199, 18°50'S, 163°14'E, 595 m, 1 lv (paratype RH). BIOCAL, stn. DW48, 23°00'S, 167°29'E, 775 m, MNHN-IM-2012-9379, 9 spm; stn. DW49, 23°03'S, 167°32'E, 825–830 m, MNHN-IM-2012-9380, 2 spm; stn. DW53, 23°09'S, 167°43'E, 975–1,005 m, MNHN-IM-2012-9382, 1 spm. BATHUS 4, stn CP909, 18°58'S, 163°10'E, 516–558 m, MNHN-IM-2012-9376, 1 dd; stn DW915, 18°51'S, 163°17'E, 580–575 m, MNHN-IM-2012-9375, 2 dd; stn DW918, 18°49'S, 163°16'E, 613–647 m, MNHN-IM-2012-9373, 1 dd; stn DW919, 18°50'S, 163°17'E, 660–610 m, MNHN-IM-2012-9377,

7 dd; stn DW920, 18°45'S, 163°17'E, 610–620 m, MNHN-IM-2012-9371, 2 dd; stn CP921, 18°47'S, 163°17'E, 613–610 m, MNHN-IM-2012-9383, 1 lv, 1 dd; stn CP923, 18°52'S, 163°24'E, 582–470 m, MNHN-IM-2012-9372 and MNHN-IM-2012-9374, 1 lv, 2 dd; stn CP930, 18°51'S, 163°24'E, 530–520 m, MNHN-IM-2012-9370, 1 dd. SMIB 8, stn DW191, 22°57'S, 167°19'E, 580–564 m, MNHN-IM-2012-9381, 1 dd. CONCALIS, stn CP2992, 17°59'S, 163°0'E, MNHN-IM-2009-6365, 730–746 m, 1 dd; KANACONO, stn DW4670, 22°58'S, 167°24'E, MNHN-IM-2018-4967, 612–680 m, 5 dd; stn DW4690, 22°59'S, 167°29'E, MNHN-IM-2018-4968, 4 dd.

Distribution: North and south New Caledonia, living at 520–610 m.

Remarks: *Enixotrophon multigradus* is known only from New Caledonia. It differs from the other species in having a broad last teleoconch whorl with 20 to 32 narrow, low, lamellae. Typical specimens of *E. pulchellus* (Schepman, 1911) also have fine lamellae on the last whorl, but only 12 to 18, while the shell is clearly narrower.

***Enixotrophon obtuseliratus* (Schepman, 1911)**

(Fig. 1R–W)

Trophon obtuseliratus Schepman, 1911: 338, pl. 21, fig. 1; pl. 24, fig. 5; Van Der Bijl *et al.*, 2010, 75, pl. 21, fig. 1 (original plate).

Trophonopsis obtuseliratus — Houart, 1995: 463, figs 40–41.

Pagodula obtuselirata — Houart, 2001: fig. 42; Marshall & Houart, 2011: 102, figs 11G, H.

Enixotrophon obtuseliratus — Barco *et al.*, 2015: 487.

Not *Pagodula obtuselirata* — Houart & Héros, 2008: 464, fig. 5G; Merle *et al.*, 2011: Pl. 130 figs 7–11 [= *Enixotrophon lochi* (Marshall & Houart, 2011)].

Not *Poirieria (Pagodula) obtuselirata* — Merle *et al.*, 2011: Pl. 130, figs 7–11 [= *Enixotrophon lochi* (Marshall & Houart, 2011)].

Type material: Lectotype [selected by Marshall & Houart (2011)] ZMA 3.11.075 [(now Naturalis Biodiversity Center (Leiden, Netherlands)].

Type locality: Flores Sea, Indonesia, 08°27'S, 122°54'5"E, 247 m.

Distribution: Flores Sea, Indonesia and New Caledonia, living at 247–1,820 m.

Material examined: New Caledonia, BIOGEOCAL, stn CP260, Bassin des Loyauté, 21°00'S, 166°58'E, 1,820–1,980 m, MNHN-IM-2012-9351, 1 lv; NORFOLK 2, stn DW2144, Ile des Pins, 23°09'S, 167°27'E, 1,004–1,009 m, MNHN-IM-2021-8745, 4 dd; KANADEEP 2, stn. CP5093, 23°31'S, 168°27'E, 2,010–2,018 m, 1 dd.

Remarks: *Enixotrophon obtuseliratus* was confused with *E. lochi* by Houart & Héros (2008) and Merle *et al.* (2011). The shell of *E. obtuseliratus* has a shorter spire with broader first teleoconch whorls, increasing more rapidly in width than in *E. lochi*, a longer siphonal canal and a comparatively broader aperture.

Both species (one specimen of each) were recorded syntopically in New Caledonia (BIOGEOCAL, stn CP260) in 1,820–1,890 m, but only *E. obtuseliratus* was dredged alive (Fig. 1U–V). The specimen of *E. lochi* was empty and somewhat worn (Fig. 1L).

***Enixotrophon obtusus* (Marshall & Houart, 2011)**

(Fig. 2A–C)

Pagodula obtusa Marshall & Houart, 2011: 104, figs 6, 11D–F, 12B.

Enixotrophon obtusus — Barco *et al.*, 2015: 487.

Enixotrophon obtusus — Houart & Héros, 2016: 11, pl. 3, figs 1–2.

Type material: Holotype NMNZ M.287814.

Type locality: Norfolk Ridge, west of Cape Reinga, 34°17.8'S, 168°21.5'E, living at 1,251–1,268 m.

Material examined: Papua New Guinea, BIOPAPUA, stn DW3720, Vitiaz Strait, 06°03'S, 147°35'E, 520–523 m, MNHN-IM-2015-3726, 5 lv, 3 dd, juv. PAPUA NIUGINI, stn CP3994, Vitiaz Strait, north of Cape King William, 06°00'S, 147°35'E, 648–652 m, MNHN-IM-2015-3725, 2 dd, juv; stn CP3995, Vitiaz Strait, north of Cape King William, 06°00'S, 147°36'E, 706–715 m, MNHN-IM-2015-3723, 2 lv, 1 dd, juv; MNHN-IM-2013-9663, 1 lv, juv.

Distribution: West Norfolk Ridge, southern Norfolk Ridge, Three Kings Rise, Kermadec Ridge, and off northern and eastern North Island, New Zealand, living at 707–1,251 m (Marshall & Houart, 2011); Papua New Guinea, Vitiaz Strait, living at 523–706 m (Houart & Héros, 2016).

Remarks: *Enixotrophon obtusus* is similar to *E. lochi* (Marshall & Houart, 2011), but differs in having a larger protoconch (width 730–750 µm versus 630–650 µm) and a lower spire and in being larger relative to the number of teleoconch whorls (Marshall & Houart, 2011). Only juveniles not exceeding 9 mm were collected during the BIOPAPUA and PAPUA NIUGINI expeditions.

Marshall & Houart (2011: 105) mention the Fiji Islands in the geographical distribution. This is a *lapsus* because no specimens of *E. obtusus* from this location have been found, either in the literature or in collections.

***Enixotrophon petalospeira* Houart & Buge, 2022**

(Fig. 2D–E)

Enixotrophon petalospeira Houart & Buge, 2022: 8, figs 5, 12K–M.

Type material: Holotype MNHN-IM-2000-37080.

Type locality: South Taiwan, 22°20'N, 120°03'E, 720–766 m.

Material examined: Taiwan 2000, stn CP20, 22°20'N, 120°03'E, 720–766 m, 1 lv (type material).

Distribution: South Taiwan, living at 720 m.

Remarks: A single specimen was collected alive south of Taiwan. Although being superficially close to *Enixotrophon ziczac* (Tiba, 1981), now synonymised here with *E. pulchellus*, *E. petalospeira* differs from that species in having a higher and broader spire with more flattened whorls, broader early teleoconch whorls, a broader, more strongly sloping and more concave subsutural ramp, rounder axial ribs with knobs at intersection with spiral cords, rather than small, broad, open spinelets as observed in *E. pulchellus*, a broader siphonal canal and P1–P5 spiral cords. See also under *E. pistillum* (Barnard, 1959).

***Enixotrophon pistillum* (Barnard, 1959) comb. nov.**

(Figs 2F–L; 6A)

Trophon pistillum Barnard, 1959: 206, fig. 44f; Houart, 1987: 36, figs 15, 33, 47.

Trophonopsis pistillum — Houart *et al.*, 2010: 247, text fig.

Type material: Holotype SAMC A8842.

Type locality: South Africa, off Cape Natal, Durban, 440 fms (805 m), dd.

Material examined: Mozambique, MAINBAZA, stn CP3138, Maputo transect, 25°13'S, 35°21'E, 700–707 m, MNHN-IM-2012-41645, 6 lv & dd; stn CP3141, Inhambane transect, 23°33'S, 35°55'E, 684–698 m, MNHN-IM-2012-41646, 5 lv & dd; stn CC3152, Zambeze transect, 19°34'S, 36°45'E, 443–445 m, MNHN-IM-2012-41644, 1 dd (new localities).

Distribution: South Africa, off Durban and Mozambique (new record), from 25°13'S to 11°30'S, living at 698–700 m.

Remarks: Study of the shell morphology of additional specimens from the Mozambique Channel has led me to include this species in the genus *Enixotrophon*.

The holotype of *Trophon pistillum* is badly damaged, but the protoconch, although chipped away from the rest of the shell, could be examined (Fig. 6A). The holotype was illustrated by Houart (1987: fig. 15) and by Houart *et al.* (2010: 247). It is here also illustrated (Fig. 2F–G) for a better comparison with the specimens from the Mozambique Channel. The shell is small, the largest specimen being 8.5 mm in length with five teleoconch whorls and thus probably adult. The protoconch is rounded, consisting of 1.25–1.50 whorls. The last teleoconch whorl bears 13–16 axial lamellae and four or five nodose spiral cords [P1, s1, P2, P3, (P4)]. P4, when present, is usually very narrow and low, then only visible on the apertural varix. The secondary cord s1 starts from the third or fourth whorl.

Enixotrophon pistillum differs from juvenile specimens of *E. pulchellus* (= *Trophon johannthielei*) (see below) in having a comparatively larger shell with more numerous teleoconch whorls, a more strongly sloping shoulder ramp, a broader and higher P1 spiral cord with broader nodes and more widely spaced P1 and P2 cords with s1 starting from the third or fourth teleoconch whorls.

Enixotrophon pistillum also resembles the recently discovered *E. petalospeira* from Taiwan. However, *E. pistillum* differs in having a smaller shell, a shorter, less elongate spire, a less sloping subsutural ramp and more widely spaced P1 and P2 spiral cords with a secondary s1 cord starting from third or fourth teleoconch whorl, as opposed to P1–P3 cords on early teleoconch whorls and equidistant primary P1–P4 spiral cords on the last whorl in *E. petalospeira*.

Enixotrophon planispina (E.A. Smith, 1906)
(Fig. 2M–T)

Trophon (Boreotrophon) planispina E. A. Smith, 1906: 168; 1909: pl. 22, fig. 3.

Trophon carduelis — Houart, 1997: 291, figs 7–8 [not *Enixotrophon carduelis* (Watson, 1882)].

Enixotrophon planispinus — Barco *et al.*, 2015: 487.

Type material: Holotype Zoological Survey of India, M.3772/1.

Type locality: West of Burma (Republic of the Union of Myanmar), Bay of Bengal, 17°7'30"N, 94°05'30"E, 419 fms (766 m) (Investigator, stn 327).

Fig. 2. A–C. *Enixotrophon obtusus* (Marshall & Houart, 2011); A, West Norfolk Ridge, west of Cape Reinga, 1,251–1,268 m, holotype NMNZ M.287814, 20.4 mm (photo courtesy B. A. Marshall); B–C, Papua New Guinea, PAPUA NIUGINI, stn CP3995, Vitiaz Strait, north of Cape King William, 706–715 m, MNHN-IM-2013-9663, 8.1 mm. **D–E.** *Enixotrophon petalospeira* Houart & Buge, 2022, Taiwan, TAIWAN 2000, stn CP20, South China Sea, 720 m, holotype MNHN-IM-2000-37080, 9.8 mm. **F–L.** *Enixotrophon pistillum* (Barnard, 1959); F–G, South Africa, off Cape Natal, Durban 440 fms (805 m), holotype SAMC A8842, 4.1 mm (photo courtesy A. Marais); H–I, Mozambique, MAINBAZA, stn CP3138, Maputo transect, 700–707 m, MNHN-IM-2012-41645, 6.0 mm; J, protoconch, MAINBAZA, stn CP3141; K–L, Mozambique, MAINBAZA, stn CP3141, Inhambane transect, 684–698 m, MNHN-IM-2012-41646, 7.0 mm. **M–T.** *Enixotrophon planispinus* (E. A. Smith, 1906); M–N, West of Burma, Bay of Bengal, 419 fms (766 m), holotype Zoological Survey India n° M3772/1, 36.4 mm, scan of a black and white photo (photo courtesy Surya Rao); O–P, Indonesia, KARUBAR, stn CC21, Kai Islands, 688–694 m, MNHN-IM-2016-1224, 22.6 mm; Q–S, Indonesia, KARUBAR, stn CP20, Kai Islands, 769–809 m, MNHN-IM-2016-1223, Q–R. 19.6 mm; S, 21.9 mm; T, protoconch, KARUBAR, stn CP20, MNHN-IM-2016-1223. Scale bars = 500 µm.



Material examined: **Indonesia.** KARUBAR, Kai Islands (new record), stn CP20, 05°15'S, 132°59'E, 769–809 m, MNHN-IM-2016-1223, 2 Iv, 1 dd; stn CC21, 05°14'S, 133°00'E, 688–694 m, MNHN-IM-2016-1224, 2 dd (see remarks).

Distribution: Bay of Bengal, west of Myanmar and Indonesia, Kai Islands (new record), living at 766–769 m.

Remarks: Five specimens were reported from Indonesia by Houart (1997), wrongly identified as *Trophon carduelis*. The shells have somewhat less expanded axial lamellae than observed in the holotype (Fig. 2M–N) but otherwise are similar in having a very high spire, broad, flattened axial lamellae, a narrow siphonal canal and no apparent spiral sculpture.

A specimen from KARUBAR station CC21, originally illustrated by Houart (1997) has been misplaced. There is currently only one specimen left from this station.

***Enixotrophon plicilaminatus* (Verco, 1909)**
(Fig. 3A–L)

Trophon plicilaminatus Verco, 1909: 335, pl. 24, figs 1, 2.

Trophonopsis plicilaminatus — Houart 1995: 462, figs 37 & 39 (only).

Pagodula plicilaminata — Houart, 2001: fig. 41; Marshall & Houart, 2011: 106, fig. 11M.

Poirieria (Pagodula) plicilaminata — Merle *et al.*, 2011: 159, pl. 131, figs 1–4.

Enixotrophon plicilaminatus — Barco *et al.*, 2015: 487.

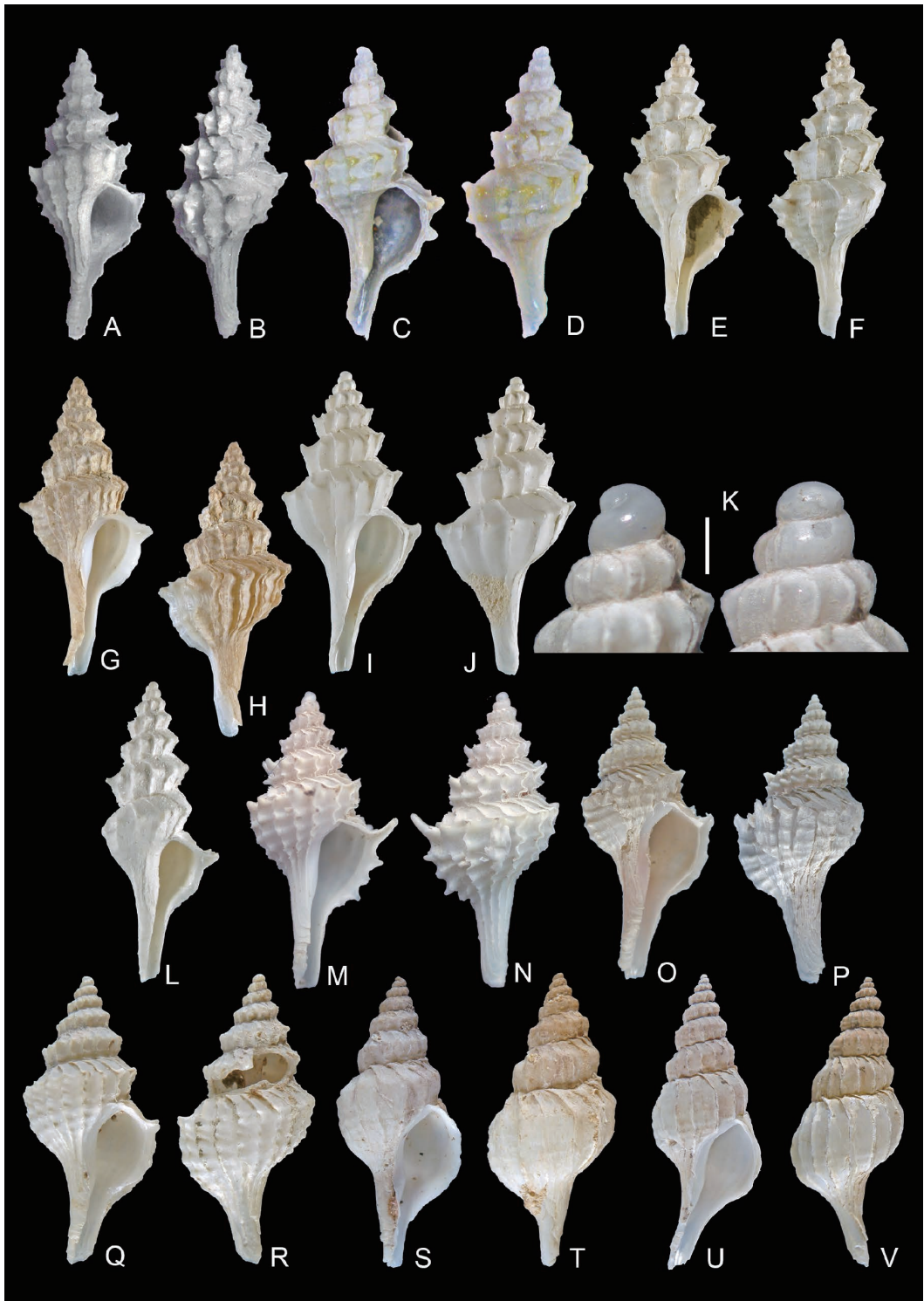
Not *Trophonopsis plicilaminatus* — Houart, 1997: 291, figs 9–10 (= *Enixotrophon karubar* n. sp.).

Type material: Holotype SAM D13486. The holotype was lost between November 1988 and early 2001 (R. Hamilton-Bruce, pers. comm. June 2009 and Shirley Sorokin, March 2021). The paratype AMS C.31093 represents a distinct still unnamed species (Marshall & Houart, 2011: 106, fig. 11N).

Type locality: South Australia, off Beachport, 150 fms (274 m).

Material examined: **Wallis & Futuna**, MUSORSTOM 7, stn DW620, 12°34'S, 178°11'W, 1,280 m, MNHN-IM-2012-9327, 3 dd; stn CP621, 12°35'S, 178°12'W, 1,300–1,280 m, MNHN-IM-2012-9323, 7 dd; stn CP622, 12°35'S, 178°11'W, 1,280–1,300 m, MNHN-IM-2012-9320, 3 lv & dd; stn CP623, 12°34'S, 178°15'W, 1,300–1,280 m, MNHN-IM-2012-9328, 3 dd; stn CP626, 11°54'S, 179°32'W, 597–600 m, MNHN-IM-2012-9325, 1 dd. **Fiji**, MUSORSTOM 10, stn DW1314, 17°16'S, 178°15'E, 656–660 m, MNHN-IM-2008-1075, 4 dd, MNHN-IM-2012-9334, 1 dd; stn CP1330, 17°10'S, 177°56'E, 567–699 m, MNHN-IM-2008-1071, 5 dd; stn CP1331, 17°02'E, 178°02'E, 694–703 m, MNHN-IM-2008-1670, 6 lv & dd, MNHN-IM-2012-9344, 2 ad,

Fig. 3. A–L. *Enixotrophon plicilaminatus* (Verco, 1909); A–B, South Australia, off Beachport, 150 fms (274 m), holotype SAM D13486, 14.4 mm (lost, see text), scan of a black and white photo; C–D, South Australia, off Beachport, 110 fms (201 m), SAM D68017, 11.2 mm (photo courtesy S. Sorokin); E–F, Solomon Is, SOLOMON 1, stn CP1808, 611–636 m, MNHN-IM-2012-9322, 17.8 mm; G–H, Fiji, MUSORSTOM 10, Bligh Water, stn CC1336, 797–799 m, MNHN-IM-2008-1070, 21.9 mm; I–J, New Caledonia, BIOCAL, stn CP57, 1,490–1,620 m, MNHN-IM-2012-9447, 16 mm; K, protoconch, SALOMON 1, stn CP1808, MNHN-IM-2012-9322; L, Coral Sea, MUSORSTOM 5, stn DW322, 975 m, MNHN-IM-2012-9444, 14.2 mm. **M–V.** *Enixotrophon pulchellus* (Schepman, 1911); M–N, Indonesia, Halmahera Sea, 411 m, lectotype ZMA 3.11.081, 15.7 mm; O–P, Austral Archipelago, BENTHAUS, 783–1,000 m, MNHN-IM-2010-23393, 30.5 mm; Q–R, Tuamotu Archipelago, TARASOC, stn DW3378, Kaukura, 887–890 m, MNHN-IM-2007-39346, 14.7 mm; S–T, Society Islands, TARASOC, stn DW3451, Raiatea, 440–490 m, MNHN-IM-2014-2482, 24.5 mm; U–V, Society Islands, TARASOC, stn DW3462, Moorea, 1,000–1,145 m, MNHN-IM-2007-38609, 26.5 mm. Scale bar = 500 µm.



1 juv, lv & dd, MNHN-IM-2012-9345, 1 dd, juv; stn CP1332, 16°56'S, 178°08'E, 640–687 m, MNHN-IM-2012-9337, 4 dd, juv; stn CC1336, 16°58'S, 177°58'S, 797–799 m, MNHN-IM-2008-1070, 1 lv, MNHN-IM-2008-1074, 6 dd, MNHN-IM-2012-9343, 7 dd, juv; stn CC1337, 17°03'S, 177°47'E, 635–670 m, MNHN-IM-2012-9335, 2 dd; stn DW1345, 17°15'S, 178°30'E, 660–663 m, MNHN-IM-2008-1073, 3 dd; MNHN-IM-2012-9338, 1 dd, juv, MNHN-IM-2012-9339, 2 dd, juv; stn CP1353, 17°31'S, 178°53'E, 879–897 m MNHN-IM-2012-9342, 3 dd, juv; stn CP1353, 17°31'S, 178°53'E, 879–897 m, MNHN-IM-2008-1072, 9 lv & dd, MNHN-IM-2012-9346, 13 dd, juv; stn CP 1354, 17°43'S, 178°55'E, 959–963 m, MNHN-IM-2008-1076, 1 dd, MNHN-IM-2012-9341, 4 dd, juv. **Vanuatu**, MUSORSTOM 8, stn CP956, 20°33'S, 169°36'E, 1,175–1,210 m, MNHN-2010-4900, 1 lv, MNHN-IM-2012-9326, 1 dd; stn CP992, 18°52'S, 168°55'E, 775–748 m, MNHN-IM-2012-9324, 2 dd; stn CP993, 18°49'S, 168°54'E, 780–783 m, MNHN-IM-2012-9329, 2 dd; stn CC996, 18°52'S, 168°56'E, 764–786 m, MNHN-IM-2012-9330, 1 dd. **New Caledonia**, BIOCAL, stn DW33, 23°11'S, 167°10'E, 675–680 m, MNHN-IM-2012-9448, 1 dd, juv; stn CP57, 23°44'S, 166°58'E, 1,490–1,620 m, MNHN-IM-2012-9447, 2 dd; stn CP61, 24°11'S, 167°34'E, 1,070–1,070 m, MNHN-IM-2012-9445, 4 dd, ad, 1 dd, juv; stn DW70, 23°26'S, 167°53'E, 965–965 m, MNHN-IM-2012-9446, 4 dd. **NORFOLK 2**, stn DW2046, 23°44'S, 168°01'E, 785–810 m, MNHN-IM-2010-4902, 6 dd; stn DW2144, 23°09'S, 167°27'E, 1,004–1,009 m, MNHN-2010-4901, 23 dd; MNHN-IM-2012-9241, 12 dd, juv. **KANACONO**, stn CP4752, 23°17'S, 167°55'E, 893–971 m, MNHN, 1 dd. **Solomon Islands**, SALOMON 1, stn DW1773, 08°11'S, 160°40'E, 331–397 m, MNHN-IM-2012-9332, 1 lv; stn CP1795, 09°19'S, 160°23'E, 442–451 m, MNHN-2012-9321, 25 dd; stn CP1806, 09°38'S, 160°50'E, 621–708 m, MNHN-2012-9340, 1 lv; stn CP1808, 9°46'S, 160°53'E, 611–636 m, MNHN-IM-2012-9322, 7 lv & dd; stn DW1827, 09°59'S, 161°06'E, 804–936 m, MNHN-IM-2012-9336, 2 dd, juv; stn CP1858, 09°37'S, 160°42'E, 435–461 m, MNHN-IM-2012-9331, 2 dd, MNHN-IM-2012-9333, 5 dd. **SALOMON 2**, stn DW2225, 06°38'S, 156°13'E, 500–519 m, MNHN-IM-2012-9151, 1 lv; stn CP2226, 06°39'S, 156°14'E, 520–490 m, MNHN-IM-2012-9149, 1 dd. **SALOMONBOA 3**, stn CP2849, 09°36'S, 160°46'E, 448–523 m, MNHN-IM-2012-9150, 8 lv & dd; stn CP2858, 09°40'S, 160°45'E, 650–725 m, MNHN-IM-2012-9148, 25 lv & dd. **Coral Sea**, MUSORSTOM 5, stn DW322, 21°19'S, 158°00'E, 975 m, MNHN-IM-2012-9444, 2 dd, MNHN-IM-2012-9449, 3 dd.

Distribution: Fiji and Wallis & Futuna (new localities); Vanuatu (new record); New Caledonia; Solomon Islands (new record); Coral Sea; South Australia, off Beachport, (type locality); living at 397–1,280 m.

Remarks: Verco (1909: 335) designated the original shell as being the type “*Type in 150 fathoms off Beachport; in 200 fathoms, 2 good*”. It is here considered as being the holotype following ICZN Art. 73.1.1 that states “If an author when establishing a new nominal species-group taxon states in the original publication that one specimen, and only one, is the holotype, or “the type”, or uses some equivalent expression, that specimen is the holotype fixed by original designation.”

As indicated above, this holotype was lost, together with other material sometime between 1988 and 2001. Fortunately I had the opportunity to study it and to take photos when I borrowed the shell early in the eighties (Fig. 3A–B) and thus able to compare it with recently collected material.

From the two paratypes collected in 365.8 m (200 fms) one was exchanged with the Australian Museum Sydney by J.C. Verco in 1910 (label of AMS specimen C31093). As noted by Marshall & Houart (2011: 106) this specimen represents a distinct, still unnamed species which differs from the holotype in having a broader protoconch, weaker spiral sculpture, simpler axial lamellae, a lower spire and a broader siphonal canal. What happened to the second paratype is unknown to me.

A third specimen collected off Beachport and identified by Verco was located in SAM (S. Sorokin in litt.) (Fig. 3C–D).

For differences with *E. pulchellus* see under that species.

Enixotrophon procerus (Houart, 2001)
(Fig. 4O–W)

Pagodula procera Houart, 2001: 266, figs 39–40.

Poirieria (Pagodula) procera — Merle *et al.*, 2011: 159, pl. 131, figs 5–7.

Enixotrophon procerus — Barco *et al.*, 2015: 487.

Enixotrophon procerus — Houart & Héros, 2016: 11, pl. 3, figs 3–5; Houart & Buge, 2022, 7, figs 4, 12G–J.

Type material: Holotype MNHN-IM-2000-349.

Type locality: BATHUS2, Stn CP743, South of New Caledonia, 22°36'S, 166°26'E, 713–950 m.

Material examined: **South of New Caledonia**, BATHUS 2, stn CP743, 22°36'S, 166°26'E, 713–950 m, 12 lv & dd (type material). **Papua New Guinea**, BIOPAPUA, stn CP3709, off Madang, 04°58'S, 145°52'E, 640–675 m, MNHN-IM-2015-3739, 6 lv & dd; stn CP3731, off Mambare Bay, 07°50'S, 148°04'E, 895–1,150 m, MNHN-IM-2015-3737, 1 dd, juv. **PAPUA NIUGINI**, stn CP3965, southeast of Sek Island, 05°06'S, 145°53'E, 980–985 m, MNHN-IM-2015-3732, 1 dd, juv; stn CP3985, north of Long Island, 05°09'S, 147°02'E, 805–865 m, MNHN-IM-2015-3728, 1 dd; stn CP4032, Cape Croisiles, 04°52'S, 145°50'E, 610–620 m, MNHN-IM-2015-3730, 1 lv; stn CP4033, Cape Croisiles, 04°52'S, 145°53'E, 780–780 m, MNHN-IM-2015-3731, 1 dd; stn CP4038, east Kotakot, 04°27'S, 145°34'E, 800–840 m, MNHN-IM-2015-3729, 1 lv; stn CP4058, northeast Sissano, 02°55'S, 142°11'E, 535–540 m, MNHN-IM-2015-3736, 5 lv, juv; stn CP4067, Dogreto Bay, 03°17'S, 142°59'E, MNHN-IM-2015-3727, 680–740 m, 1 lv; stn CP4068, west of Tarawai Island, 03°11'S, 143°06'E, 360–380 m, MNHN-IM-2015-3733, 1 lv; stn CP4069, west of Tarawai Island, 03°11'S, 143°04'E, MNHN-IM-2015-3734, 510–560 m, 1 lv; stn DW4073, southeast of Vokeo Island, 03°18'S, 144°05'E, 700–940 m, MNHN-IM-2015-3735, 1 dd. **South China Sea**, DongSha 2014, stn CP4130, 20°16'N, 116°08'E, 795–822 m, 1 lv.

Distribution: South New Caledonia; Papua New Guinea; South China Sea; living at 380–800 m.

Remarks: *Enixotrophon procerus* differs from the other species in having a narrower shell with a very high spire and a short, narrow siphonal canal.

It differs from its closest congener, *E. plicilaminatus*, which also has a high spired shell, in having narrower spire whorls, more heavily angular and more centrally keeled teleoconch whorls, a smaller, less elongate last whorl and fewer cords on the last teleoconch whorls, 1–3 in *E. procerus* as opposed to 3–5 in *E. plicilaminatus*.

Enixotrophon pulchellus (Schepman, 1911)
(Figs 3M–V; 4A–N; 6H–I)

Trophon pulchellus Schepman, 1911: 339, pl. 21, fig. 2a, b; Houart, 1987: 35, figs 13, 14, 36, 55; Van Der Bijl *et al.*, 2010, 78, pl. 21, fig. 2 (original plate).

Pagodula pulchella — Houart & Tröndlé, 2008: 85, figs 132–133; Houart *et al.*, 2010: 245, text fig.; Marshall & Houart, 2011: 106, figs 4, 11J.

Enixotrophon pulchellus — Barco *et al.*, 2015: 487.

Enixotrophon pulchellus — Houart & Héros, 2016: 12, pl. 3, figs 6a–b.

Trophon johannthielei Barnard, 1959: 206, fig. 44b.

Trophonopsis ziczac Tiba, 1981: 106, pl. 34, figs 4–8.

Type material: *Trophon pulchellus*: lectotype (the specimen illustrated by Schepman, 1911: pl. 21, fig. 2a, b) selected by Marshall & Houart (2011), ZMA 3.11.081 (now *Naturalis Biodiversity Center* (Leiden, Netherlands)).

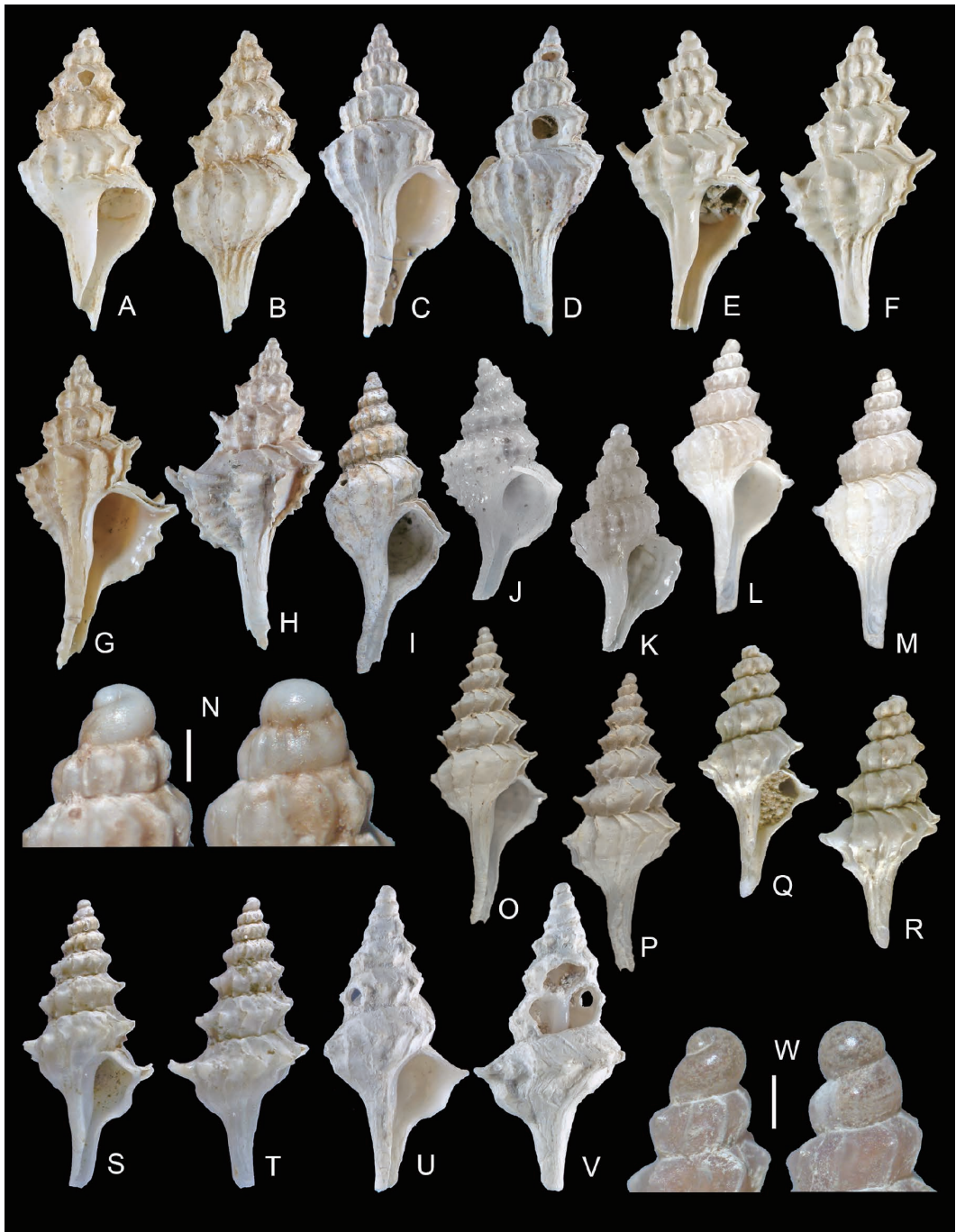
Trophon johannthielei: holotype SAMC A8844.

Type locality: *Trophon pulchellus*: Indonesia, Halmahera Sea, 0°59.1'S, 129°48.0'E, 411 m [Siboga stn 159].

Trophon johannthielei: off East London, South Africa, in 400–450 fms (732–823 m) (dd).

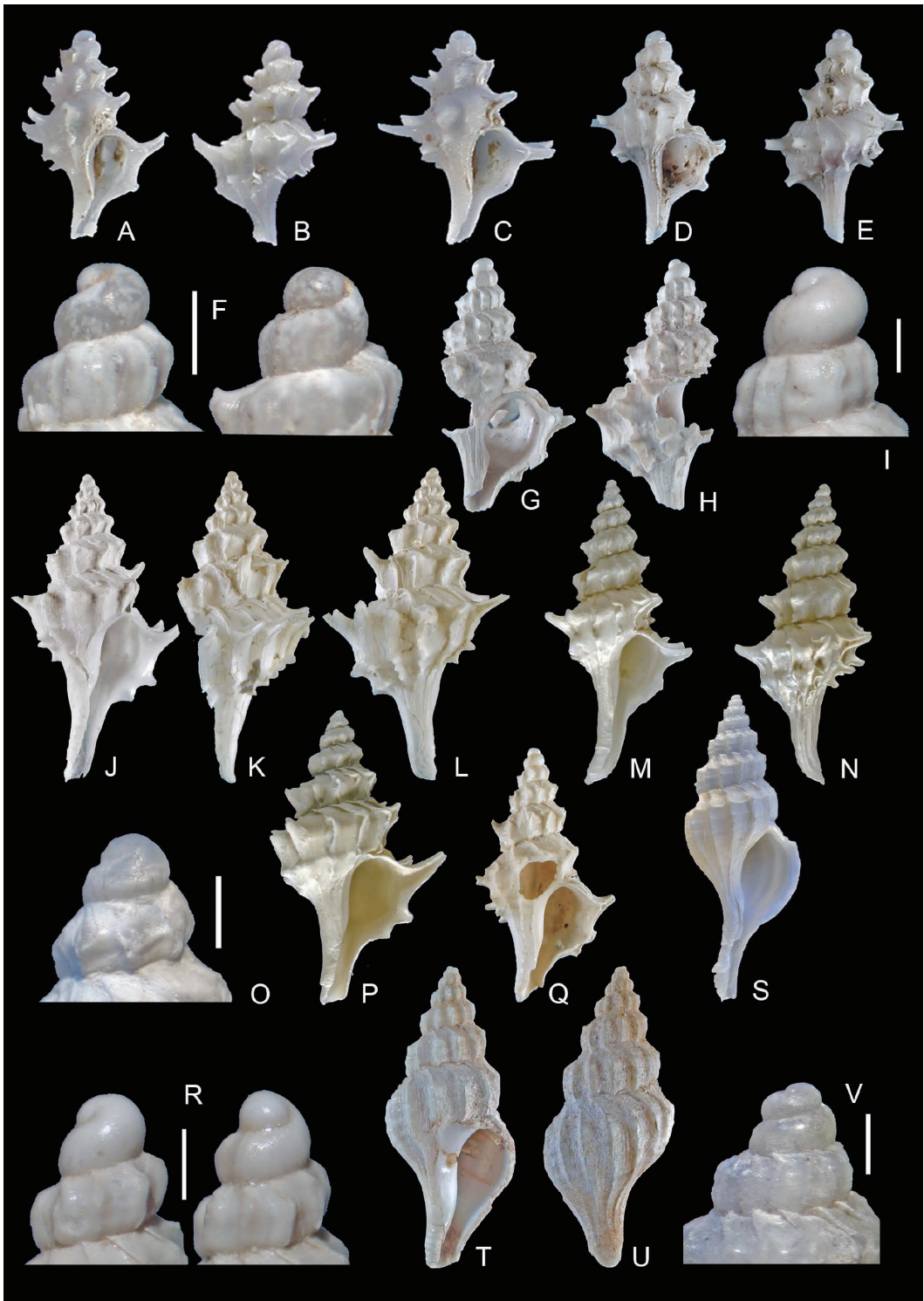
Material examined: **Marquesas**, MUSORSTOM 9, stn CP1270, 7°56'S, 140°43'W, 497–508 m, MNHN-IM-2008-2879, 1 lv. **Austral Islands**, BENTHAUS, stn DW1863, 27°39'S, 144°16'W, 650–684 m, MNHN-IM-2010-23397, 1 dd; stn DW1889, 27°37'S, 144°16'W, 600–620 m, MNHN-IM-2008-2880, 8 lv & dd; stn DW1890, 27°39'S, 144°16'W, 800–822 m, MNHN-IM-2010-23395, 1 dd; stn CP1891, 27°37'S, 144°15'W, 800–850 m, MNHN-IM-2010-23394, 1 dd; stn CP1909, 27°39'S, 144°15'W, 783–1,000 m, MNHN-IM-2010-23393, 1 lv; stn DW1923, 27°01'S, 146°05'W, 360–840 m, 1 lv. **Tarava Seamounts**, TARASOC, stn DW3311, 19°12'S, 151°33'W, 571–586 m, MNHN-IM-2014-2511, 1 dd, juv; stn DW3314, 19°14'S, 151°39'W, 803–815 m, MNHN-IM-2014-2516, 4 lv & dd; stn DW3318, 19°15'S, 151°31'W, 557–569 m, MNHN-IM-2012-20963, 4 dd, juv; stn DW3324, 19°15'S, 151°34'W, 554–630 m, MNHN-IM-2012-20965, 6 dd, ad & juv; stn DW3327, 18°45'S, 152°16'W, 747–836 m, MNHN-IM-2014-2497, 1 dd; stn DW3328, 18°46'S, 152°15'W, 788–836 m, MNHN-IM-2014-2512, 1 dd, juv; stn DW3330, 18°45'S, 152°16'W, 717–794 m, MNHN-IM-2014-2506, 3 dd, juv; stn DW3331, 18°45'S, 152°17'W, 766 m, MNHN-IM-2014-2518, 1 dd; stn DW3333, 18°45'S, 152°18'W, 795–975 m, MNHN-IM-2014-2503, 8 dd; stn DW3336, 18°23'S, 154°06'W, 573–619 m, MNHN-IM-2014-2504, 2 dd, juv; stn DW3340, 18°24'S, 154°09'W, 787–798 m, MNHN-IM-2012-20966, 4 dd, juv.; Tuamotu Archipelago, stn DW3349, 15°05'S, 148°03'W, 992–981 m, MNHN-IM-2012-20964, 4 dd, juv; stn DW3353, 15°56'S, 147°05'W, 802–905 m, MNHN-IM-2014-2513, 1 dd; stn DW3373, 15°41'S, 146°54'W, 507–607 m, MNHN-IM-2014-2450, 5 dd, juv; MNHN-IM-2014-2508, 3 dd; stn DW3374, 15°39'S, 146°54'W, 703–790 m, MNHN-IM-2014-2498, 4 dd; stn DW3377, 15°38'S, 146°53'W, 780–825 m, MNHN-IM-2014-2521, 5 dd; stn DW3378, 15°38'S, 146°51'W, 887–890 m, MNHN-IM-2007-39345, 1 lv, MNHN-IM-2007-39346, 1 lv; MNHN-IM-2014-2525, 3 dd; stn DW3380, 15°39'S, 146°56'W, 970–1,060 m, MNHN-IM-2014-2526, 2 dd; Society Islands, stn DW3416, 16°35'S, 151°44'W, 914 m, MNHN-IM-2007-38506, 1 lv; stn DW3419, 16°31'S, 151°48'W, 798–830 m, MNHN-IM-2014-2524, 1 lv; stn DW3420, 16°46'S, 151°04'W, 550 m, MNHN-IM-2014-2500, 1 dd; stn DW3421, 16°46'S, 151°04'W, 782–847 m, MNHN-IM-2014-2501, 1 dd, stn DW3425, 16°43'S, 151°03'W, 557 m, MNHN-IM-2007-38636, 1 lv; MNHN-IM-2014-2499, 1 dd; stn DW3426, 16°41'S, 151°03'W, 801–874 m, MNHN-IM-2007-38906, 1 lv; MNHN-IM-2014-2514, 1 dd; stn DW3429, 16°43'S, 150°38'W, 493–540 m, MNHN-IM-2014-2492, 1 dd; stn DW3433, 16°41'S,

Fig. 4. A–N. *Enixotrophon pulchellus* (Schepman, 1911); A–B, New Caledonia, BATHUS 3, Norfolk Ridge, stn DW810, 850–900 m, MNHN-IM-2012-9348, 15.2 mm; C–D, Papua New Guinea, BIOPAPUA, submarine mounts off Bougainville, stn DW3748, 398–399 m, MNHN-IM-2015-3712, 13.6 mm; E–F, Philippines, PANGLAO 2005, Bohol/Sulu seas sill, stn CP2361, 516–543 m, MNHN-IM-2012-1688, 10.1 mm; G–H, Philippines, PANGLAO 2005, Bohol/Sulu seas sill, stn CP2362, 679–740 m, MNHN-IM-2012-1685, 18.8 mm; I, East China Sea, KAVALAN, stn DW4174, 476–502 m, MNHN, 14.2 mm; J, Mozambique, Zavora/Bazaruto, 420–460 m, RH, 8.3 mm; K, Mozambique Channel, BIOMAGLO, stn DW4814, 694–733 m, MNHN, 7.7 mm; L–M, *Trophonopsis ziczac* Tiba, 1981, Japan, Honshu, Kii Peninsula, off Kushimoto, 200–250 m, holotype, Rikuzen-Takata City Museum, M32412, 12 mm (photo courtesy K. Hasegawa); N, protoconch, TARASOC, stn DW3377, MNHN-IM-2014-2521. O–W. *Enixotrophon procerus* (Houart, 2001); O–P, BATHUS 2, stn CP743, south of New Caledonia, 713–950 m, holotype MNHN-IM-2000-349 (photo M. Caballer); Q–R, Papua New Guinea, BIOPAPUA, stn CP3731, off Mambare Bay, 895–1,150 m, MNHN-IM-2015-3737, 8.9 mm; S–T, Papua New Guinea, PAPUA NIUGINI, stn CP4067, Dogreto Bay, 680–740 m, MNHN-IM-2015-3727, 11.1 mm; U–V, South China Sea, DongSha 2014, stn CP4130, 795–822 m, IM-2013-50291, 9.7 mm; W, protoconch, paratype RH. Scale bars = 500 µm.



151°03'W, 1,013–1,158 m, MNHN-IM-2012-20962, 8 lv & dd; stn DW3436, 16°43'S, 151°26'W, 430–430 m, MNHN-IM-2007-38539, 1 lv, MNHN-IM-2007-38540, 1 lv; MNHN-IM-2014-2495, 9 lv & dd; stn CP3437, 16°41'S, 151°26'W, 440–560 m, MNHN-IM-2007-38637, 1 lv; stn CP3439, 16°43'S, 151°25'W, 800 m, MNHN-IM-2014-2505, 4 dd, ad & juv; stn DW3440, 16°40'S, 151°25'W, 650–800 m, MNHN-IM-2014-2510, 2 dd; stn DW3442, 16°41'S, 151°26'W, 550–615 m, MNHN-IM-2014-2493, 3 lv & dd; stn DW3447, 16°42'S, 151°31'W, 620–700 m, MNHN-IM-2014-2494, 2 lv; stn CP3448, 16°41'S, 151°32'W, 800–810 m, MNHN-IM-2012-20961, 13 lv & dd; stn CP3450, 16°40'S, 151°32'W, 755–705 m, MNHN-IM-2014-2490, 3 dd; stn DW3451, 16°53'S, 151°21'W, 490–440 m, MNHN-IM-2014-2482, 4 lv & dd; stn DW3452, 16°51'S, 151°19'W, 600–705 m, MNHN-IM-2014-2520, 1 lv; stn DW3457, 16°45'S, 151°24'W, 520–572 m, MNHN-IM-2014-2489, 6 dd; stn DW3460, 17°28'S, 149°50'W, 660–680 m, MNHN-IM-2014-2523, 1 lv; stn DW3461, 17°27'S, 149°49'W, 844–877 m, MNHN-IM-2014-2527, 2 dd; stn DW3462, 17°27'S, 149°50'W, 1,000–1,145 m, MNHN-IM-2007-38609, 1 lv; MNHN-IM-2014-2488, 2 dd; stn CP3464, 17°34'S, 149°54'W, 460 m, MNHN-IM-2014-2519, 1 dd; stn DW3465, 17°34'S, 149°54'W, 800–870 m, MNHN-IM-2014-2509, 1 dd; stn DW3467, 17°34'S, 149°54'W, 800–830 m, MNHN-IM-2014-2496, 1 lv; stn DW3472, 17°28'S, 149°55'W, 680–705 m, MNHN-IM-2014-2515, 1 dd; stn DW3474, 17°28'S, 149°50'W, 720–720 m, MNHN-IM-2014-2491, 9 lv & dd; stn DW3477, 17°30'S, 149°44'W, 860–812 m, MNHN-IM-2014-2507, 1 lv; stn CP3480, 17°32'S, 149°45'W, 900–880 m, MNHN-IM-2007-38337, 1 lv; stn DW3486, 17°48'S, 149°22'W, 660–920 m, MNHN-IM-2014-2487, 2 dd; stn DW3487, 17°47'S, 149°21'W, 400–440 m, MNHN-IM-2014-2485, 1 dd; stn DW3490, 17°48'S, 149°23'W, 720–1,000 m, MNHN-IM-2014-2484, 2 lv & dd; stn CP3494-DW3495, 17°28'S, 149°26'W, 556 m - 17°27'S, 149°27'W, 796–859 m, MNHN-IM-2014-2517, 3 dd; stn DW3497, 17°43'S, 149°14'W, 365–850 m, MNHN-IM-2014-2483, 2 dd; stn DW3499, 17°41'S, 149°17'W, 550–700 m, MNHN-IM-2014-2522, 1 lv; stn DW3500, 17°38'S, 149°17'W, 680–630 m, MNHN-IM-2014-2486, 2 dd; accidental mixing, no stn, no coordinates, MNHN-IM-2014-2502, 4 lv & dd. **New Caledonia**, BATHUS 3, Norfolk Ridge, stn DW810, 23°40'S, 167°59'E, 850–900 m, MNHN-IM-2012-9348, 1 dd. **KANADEEP 2**, stn CP5096, 23°38'S, 167°53'E, 1,077–1,084 m, 3 dd. **Papua New Guinea**, BIOPAPUA, stn CP3689, 02°16'S, 147°29'E, 679–685 m, MNHN-IM-2012-19980, 9 lv; stn CP3722, Vitiaz Strait, 06°01'S, 147°35'E, 608–625 m, MNHN-IM-2012-19979 and MNHN-IM-2015-3713, 7 dd; stn DW3745, 05°33'S, 154°00'E, 369–377 m, MNHN-IM-2009-23036, 1 lv; stn DW3748, 05°37'S, 154°01'E, 398–399 m, MNHN-IM-2015-3712, 1 dd. **South Philippines**, PANGLAO 2005, stn CP2361, 08°53'N, 123°34'E, 516–543 m, MNHN-IM-2012-1688, 1 dd; stn CP2362, 08°57'N, 123°33'E, 740–679 m, MNHN-IM-2012-1674, 1 dd, MNHN-IM-2012-1685, 1 dd. **East China Sea**, KAVALAN, stn DW4174, 25°24'N, 122°30'E, 476–502 m, MNHN, 1 dd. **Mozambique**, MAINBAZA, stn CC3151, Zambeze transect, 19°34'S, 36°45'E, 352–357 m,

Fig. 5. A–F. *Enixotrophon sansibaricus* (Thiele, 1925); A–C, Zanzibar Channel, syntypes ZMB Moll-109313. A–B. 3.9 mm; C. 3.8 mm; D–E, Mozambique Channel, MAINBAZA, stn CC3171, Maputo transect, 771–776 m, MNHN-IM-2012-41543, 5.1 mm; F, protoconch, RH. **G–I.** *Enixotrophon* sp. cf. *E. sansibaricus*; Mozambique Channel, MAINBAZA, stn CP3141, Inhambane transect, 684–698 m, MNHN, 7.4 mm; I, protoconch. **J–R.** *Enixotrophon karubar* n. sp.; J–L, Indonesia, KARUBAR, stn CP69, Tanimbar Islands, 356–368 m, holotype MNHN-IM-2000-38614, 16.5 mm; M–N, Indonesia, KARUBAR, Stn CC21, Kai Islands, 688–694 m, paratype MNHN-IM-2014-2435, 13 mm; O, protoconch, holotype MNHN-IM-2000-38614; P, Indonesia, Tanimbar Is, KARUBAR, Stn CP69, 356–368 m, paratype MNHN-IM-2014-2436, 13.4 mm; Q, Philippines, PANGLAO 2005, stn DW2347, Bohol Sea, off Pamilacan Island, 198–233 m, MNHN-IM-2012-1684, 7.9 mm; R, Protoconch, PANGLAO 2005, stn DW2347. **S–V.** *Enixotrophon veronicae* (Pastorino, 1999); S, Off southern Chile, living at 742 m, holotype USNM 880195 (photo courtesy USNM); T–U, MD208, Walters Shoal, stn CP4907, 880 m, MNHN, 34.3 mm; V, protoconch, MD208, Walters Shoal, stn CP4911. Scale bars = 500 µm.



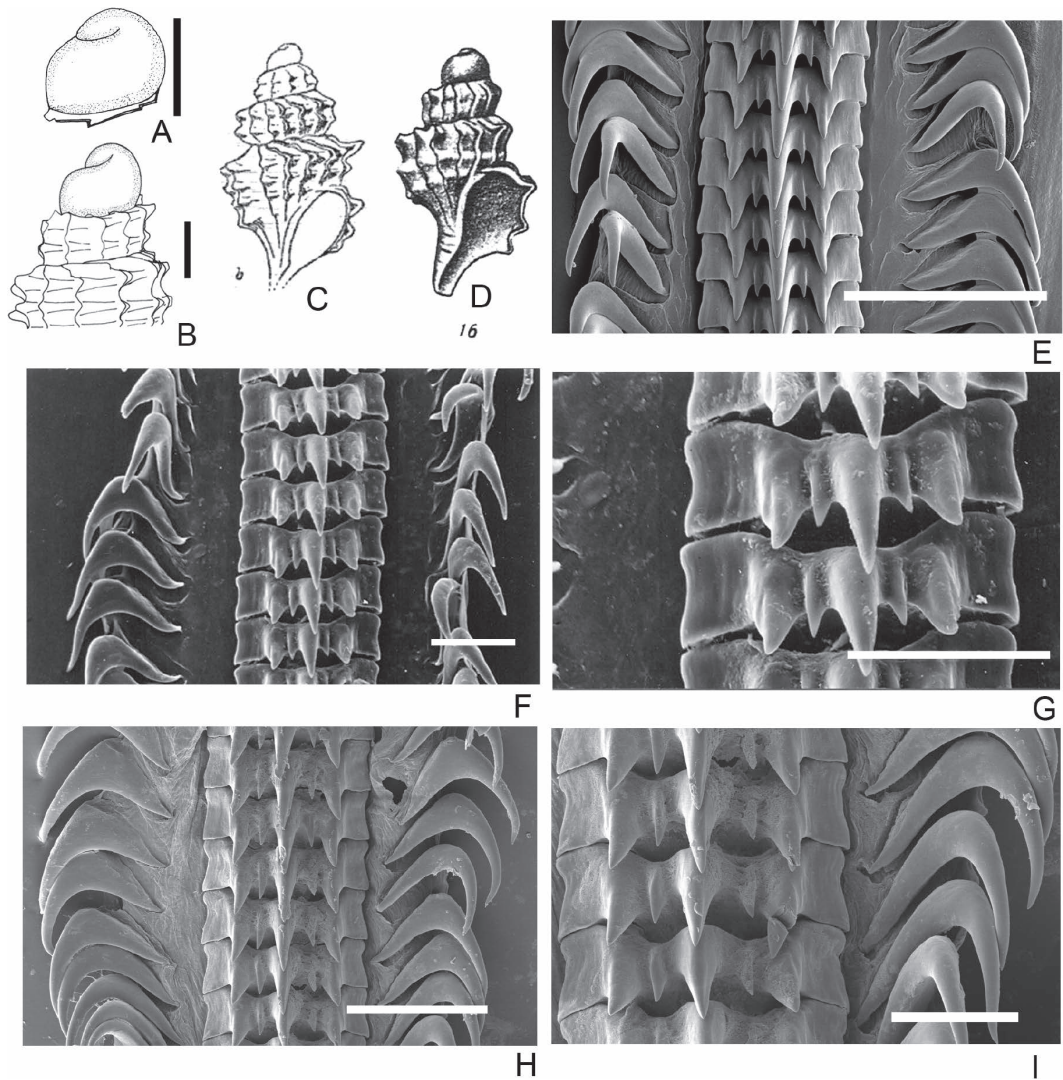


Fig. 6. **A.** Protoconch of *Enixotrophon pistillum* (holotype) (drawing from the author), scale = 500 μ m. **B–C.** *Trophon johannthielei* Barnard, 1959, off East London, 400–450 fms (732–823 m); B, holotype SAM A8844 (drawing from the author), scale = 1 mm; C, drawing reproduced from Barnard (1959: 205, fig. 44b). **D.** *Trophon* sp. juv. [reproduced from Thiele (1925: 170, pl. 30, fig. 16)]. **E.** Radula of *Enixotrophon atanua*. Musorstom 9, stn CP1307, scale 100 μ m (SEM courtesy A. Warén). **F–G.** Radula of *E. multigradus*, MUSORSTOM 4, CC177, 50 μ m (SEM courtesy P. Bouchet). **H–I.** Radula of *E. pulchellus*, TARASOC, stn CP3438; F, 50 μ m; G, 25 μ m (SEM courtesy A. Warén).

MNHN-IM-2012-41545, 1 dd, juv; stn CC3152, Zambeze transect, 19°34'S, 36°45'E, 443–445 m, MNHN-IM-2012-41544, 8 dd, juv; stn CC3153, Zambeze transect, 19°35'S, 36°46'E, 518–524 m, MNHN-IM-2012-41547, 5 dd, juv; stn CC3171, Maputo transect, 25°59'S, 34°42'E, 771–776 m, MNHN-IM-2012-41543, 13 dd. **Mozambique Channel**, BIOMAGLO, stn DW4814, 11°30'S, 47°29'E, 694–733 m, MNHN, 5 dd, juv; stn DW4815, 11°30'S, 47°29'E, 898–1,012 m, MNHN, 1 dd, juv; stn DW4835, 12°26'S, 43°56'E, 763–769 m, MNHN, 4 dd, juv; stn DW4847, 12°41'S, 44°57'E, 738–763 m, MNHN, 1dd, juv; stn DW4863, 12°30'S, 44°56'E, 606–610 m, 1 dd, juv; stn

DW4874, 12°42'S, 45°19'E, 708–887 m, 5 dd, juv.

Distribution: French Polynesia; New Caledonia; Papua New Guinea; Indonesia; Philippines (new record); Kii Peninsula, Japan; East China Sea; Mozambique Channel (new record); East London, South Africa, living at 430–1,013 m (no living specimen were collected in South Africa, the Mozambique Channel, the Philippine Islands, the East China Sea).

Remarks: Barnard (1959: 206, fig. 44b) described *Trophon johannthielei* based on an illustration by Thiele (1925: 170, pl. 30, fig. 16) who figured a juvenile shell as “*Trophon sp.*” (refigured here Fig. 6D) and on a second juvenile specimen of 5 mm high, dredged off East London, South Africa (Fig. 6C). This specimen (actually the holotype) was unfortunately damaged after its description but retained the protoconch and the two first teleoconch whorls for a length of 3.2 mm. It was illustrated by Houart (1987: 35, fig. 14 and is refigured here Fig. 6B). It was then already tentatively synonymised with *Enixotrophon pulchellus* Schepman, 1911 and again in Houart *et al.* (2010: 245).

Examination of several other specimens of a juvenile Trophoninae collected during the MAINBAZA and BIOMAGLO expeditions in the Mozambique Channel tend to prove this synonymy. All the shells are juveniles with only 2 or 3 teleoconch whorls (Fig. 4K) and fit the shell named *T. johannthielei*. This was also an opportunity to compare it more carefully with *E. pulchellus*. They are not separable after a careful study of the protoconch and the first two or three teleoconch whorls. *Trophon johannthielei* is here considered conspecific with *E. pulchellus*. However a genetic analysis of East African specimens would be welcome.

Enixotrophon pistillum, also collected during the MAINBAZA expedition, differs from the juvenile specimens of *E. pulchellus* in having a comparatively higher shell with more numerous teleoconch whorls with a more strongly sloping shoulder ramp, broader and higher P1 with broader nodes, and with more widely spaced P1 and P2, with s1 starting from third of fourth teleoconch whorl.

Enixotrophon pulchellus has a rather variable shell morphology (see also below). It differs usually from *E. plicilaminatus* in having a shorter spire, though not in some extreme forms (Fig. 3U–V), a comparatively broader and more extended last teleoconch whorl and a broader aperture. All other characters, namely the number and shape of the axial lamellae, the form and strength of the spiral cords, the length of the siphonal canal and the width and shape of the subsutural ramp cannot be used to separate the two species.

The extreme variability of *E. pulchellus* is illustrated by the numerous specimens collected in French Polynesia. They show alternately typical shells, identical to the lectotype (Fig. 3M–R), and others that differ significantly from it (Fig. 3S–V). However, they are conspecific, as demonstrated by a molecular phylogenetic analysis (Zuccon, in litt.). Specimens from the Philippines also identified here as *E. pulchellus* (Fig. 4E–H) differ from the typical shell in having fewer axial lamellae, 9–10 in the Philippines vs 12 in the lectotype and from 11 to 18 in French Polynesia. However given the high degree of polymorphism of that species, they are considered to be conspecific.

After examination of this new material, the possibility of a synonymy between *E. pulchellus* and *E. ziczac* (Tiba, 1981) mentioned by Houart and Buge (2022: 10) is no longer in doubt. The shell of the holotype of *Trophonopsis ziczac* (Fig. 4L–M) can no longer be distinguished by any morphological character when compared to *E. pulchellus*. I therefore consider it as a new junior synonym of *E. pulchellus*.

Enixotrophon sansibaricus (Thiele, 1925)
(Fig. 5A–F)

Trophon sansibaricus Thiele, 1925: 170, pl. 18, fig. 17; Houart, 1987: figs 10, 11, 29, 56.
Pagodula sansibarica — Houart *et al.*, 2010: 245, text fig.

Poirieria (Pagodula) sansibarica — Merle *et al.*, 2011: Pl. 131, figs 9–12.

Enixotrophon sansibaricus — Barco *et al.*, 2015: 487.

Type material: Four syntypes ZMB/Moll.109313.

Type locality: Zanzibar Channel (Sansibar-Kanal), Valdivia st. 245, 05°28'S, 39°19'E, 463 m.

Material examined: **Mozambique**, MAINBAZA, stn CC3154, Zambeze transect, 19°36'S, 36°47'E, 636 m, MNHN-IM-2012-41542, 1 lv, juv; stn CC3171, Maputo transect, 25°59'S, 34°42'E, 771–776 m, MNHN-IM-2012-41543, 13 lv & dd, juv.

Distribution: South Africa, Transkei, Zanzibar Channel, Mozambique Channel (new record), living at 463–771 m.

Remarks: The species was described from young specimens, with shells reaching a maximum of three teleoconch whorls.

Enixotrophon sansibaricus was also recorded in South Africa, Transkei, two specimens, off Rame Head, 31°56.1'S, 29°26.5'E, 410–430 meters, stones, some sand, NM C5873 and C 5876. (Houart, 1987: 32, fig. 10; Houart *et al.*, 2010: 245), but there too, the specimens collected are juveniles with only 2 or 3 teleoconch whorls.

A shell illustrated as *Trophonopsis plicilaminatus* by Houart (1997: 291, figs 9–10) from Indonesia was thought to be a possible adult specimen of *E. sansibaricus* by Marshall & Houart (2011: 106) but is here described as a new species (see *Enixotrophon karubar* n. sp.).

Enixotrophon sp. cf. *E. sansibaricus* (Thiele, 1925)

(Fig. 5G–I)

Material examined: **Mozambique**, MAINBAZA, stn CP3141, Inhambane transect, 23°33'S, 35°55'E, 684–698 m, MNHN, 1 dd, juv.

Remarks: A single, damaged specimen with 4 teleoconch whorls, collected in the Mozambique Channel, has 3 spiral cords (P1–P3) starting from the first teleoconch whorl. By this it differs significantly from *E. sansibaricus* and *E. karubar* n. sp. It is here considered a separate species but more specimens are needed to compare and describe it properly.

Enixotrophon veronicae (Pastorino, 1999)

(Fig. 5S–V)

Trophon veronicae Pastorino, 1999: 169, figs 1–12.

Pagodula veronicae — Marshall & Houart, 2011: 110, figs 12F, 13I–N, 14; Houart in press.

Enixotrophon veronicae — Barco *et al.*, 2015: 487.

Type material: Holotype USNM 880195.

Type locality: Off southern Chile, 46°00'S, 83°59'W, living at 742 m.

Material examined: **Walters Shoal**, MD208, stn CP4905, 33°32'S, 44°00'E, 1,000–1,052 m, MNHN-IM-2013-66427, 1 lv, MNHN-IM-2013-66428, 1 lv, MNHN, 1 dd; stn CP4906, 33°26'S, 44°00'E, 799–837 m, 3 dd; stn CP4907, 33°27'S, 44°00'E, 880 m, 2 dd; stn CP4908, 33°29'S, 44°00'E, 900–950 m, 2 dd; stn CP4909, 32°45'S, 44°03'E, 987–989 m, 2 dd; stn CP4910, 32°45'S, 44°06'E, 986–988 m, 1 dd; stn CP4911, 32°46'S, 44°18'E, 964–965 m, MNHN-IM-2013-66426, 1 lv, MNHN-IM-2013-66430, 1 lv, MNHN, 5 dd.

Distribution: Circum-subantarctic, Australia, Tasmania, off St. Patricks Head, living at 940–990 m and Bollons Plateau, southern New Zealand, living at 1,210–1,261 m (Marshall & Houart, 2011); off southern Chile (type locality), Strait of Magellan, off South Georgia, living at 742 m; and Walters Shoal, living at 965–1,000 m.

Remarks: As already noted by Marshall & Houart (2011: 110), the morphology of the protoconch of *Enixotrophon veronicae* suggests planktotrophic larval development (Fig. 5V), explaining the circum-Antarctic geographical distribution. The presence of this species at Walters Shoal is a notable extension of its range and appropriately completes its distribution, while the depth for live specimens is within the same range as other records (from Houart, in press).

Discussion

Of the 41 species assigned to *Enixotrophon* by Barco *et al.* (2015) 23 occur entirely or partially in the Tropical Indo-Pacific region. *Trophon johannthielei* and *Trophonopsis ziczac* then included as valid species are here considered junior synonym of *E. pulchellus* while four species are added, *E. petalospeira*, *E. pistillum*, *E. karubar* n. sp. and an undetermined species from Mozambique, increasing the number of *Enixotrophon* species from the Tropical Indo-Pacific to 25.

Of these, 15 species were collected during expeditions of the Tropical Deep-Sea Benthos programme and are commented here (●), one is a new combination (◇) and six extend their geographical distribution (◆) (see Table 1).

Table 1. List of Tropical Indo-West Pacific *Enixotrophon* species.

Species	Species treated here	Geographic extension	New combination
<i>Enixotrophon araios</i> (Houart & Engl, 2007)			
<i>E. atanua</i> (Houart & Tröndlé, 2008)	●		
<i>E. carduelis</i> (Watson, 1882)			
<i>E. karubar</i> n. sp.	●		
<i>E. kosunorum</i> (Houart & Lan, 2003)			
<i>E. latus</i> (Marshall & Houart, 2011)			
<i>E. lochi</i> (Marshall & Houart, 2011)	●	◆	
<i>E. multigradus</i> (Houart, 1990)	●		
<i>E. obtuseliratus</i> (Schepman, 1911)	●		
<i>E. obtusus</i> (Marshall & Houart, 2011)	●		
<i>E. occiduus</i> (Marshall & Houart, 2011)			
<i>E. petalospeira</i> Houart & Buge, 2022	●		
<i>E. pistillum</i> (Barnard, 1959)	●	◆	◇
<i>E. planispinus</i> (E.A. Smith, 1906)	●	◆	
<i>E. plicilaminatus</i> (Verco, 1909)	●	◆	
<i>E. procerus</i> (Houart, 2001)	●		
<i>E. pulchellus</i> (Schepman, 1911)	●	◆	
<i>E. pygmaeus</i> (Marshall & Houart, 2011)			
<i>E. sansibaricus</i> (Thiele, 1925)	●	◆	
<i>E. sp. cf. E. sansibaricus</i>	●		
<i>E. siberutensis</i> (Thiele, 1925)			
<i>E. simildroueti</i> (Houart, 1989)			
<i>E. tenuirostratus</i> (E.A. Smith, 1899)			
<i>E. venustus</i> (Marshall & Houart, 2011)			
<i>E. veronicae</i> (Pastorino, 1999)	●		

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Enixotrophon 属 (腹足綱: アッキガイ科: ツノオリイレ亜科):
熱帯インド・西太平洋の種に関する新情報

Roland Houart

要 約

パリ自然史博物館とIRD (フランス国立開発研究所) が30年以上にわたって実施した「Tropical Deep-Sea Benthos Programme (以前はMUSORSTOM)」の様々な調査によって、インド・西太平洋から得られた試料の中から、*Enixotrophon* 属の14種が認められた。これらすべての種について、ホロタイプと一連の調査によって得られた標本を図示した。これらの種は漸深海帯から得られ、生きた個体は250~800 mの深さを中心とする198~1,280 mの深度範囲から出現した。*Enixotrophon pistillum* (Barnard, 1959) では新組み合わせを提唱し、*Trophon johannthielei* Barnard, 1959 と *Trophonopsis ziczac* Tiba, 1981 イナヅマツノオリイレは *E. pulchellus* (Schepman, 1911) の新異名と見なした。また *E. lochi* (B. A. Marshall & Houart, 2011), *E. pistillum*, *E. planispinus* (E. A. Smith, 1906), *E. plicilaminatus* (Verco, 1909), *E. pulchellus* (Schepman, 1911), *E. sansibaricus* (Thiele, 1925) の6種について、新しい地理的分布を示した。ニューカレドニアからは *E. lochi*, *E. multigradus* (Houart, 1990), *E. obtuseliratus* (Schepman, 1911), *E. plicilaminatus* (Verco, 1909), *E. procerus* (Houart, 2001), *E. pulchellus* (Schepman, 1911) の6種を記録した。インドネシアからは1新種 *E. karubar* n. sp. を記載し、MAINBAZA 調査によってモザンビーク海峡から得られた1個体の未成熟標本は *Enixotrophon* sp. cf. *E. sansibaricus* として同定を保留した。

Enixotrophon karubar n. sp.

貝殻はこの属としては中庸のサイズで、殻長は最大16.45 mm (ホロタイプ)、殻長/殻幅比は1.7-2.1。殻の造りは軽く、細長く、殻頂部は尖り、体層部は膨らみ縦肋の肩が棘立つ。縫合下は緩やかに傾き、初期成殻では弱く凹むが、体層では緩く凸状となる。殻色は均一な白色。

タイプ産地: インドネシア・タンニバル諸島沖, 08°42'S, 131°53'E, 356~368 m。

分布: タイプ産地の他にフィリピン・ボホール海, 198~624 m (死殻のみ)。

付記: 本新種は Houart (1997: 291, figs 9-10) によって *Trophonopsis plicilaminatus* に同定され、また Marshall & Houart (2011: 106) によって *E. sansibaricus* の老成個体と見なされていた。その後、フィリピンから追加個体が得られ、独立した種であることが確認された。

本新種は、*E. plicilaminatus* とは、主螺肋 P1 と P2 の間が広く開くこと、体層が短めで周縁がより角張り、3本 (*E. plicilaminatus* では5~6本) の主螺肋を持つことで区別できる。また、本新種はすべての検討個体の成殻が4~6層で、初期成殻で2本だった螺肋が体層で3本 (稀に4本) となることで、*E. sansibaricus* と異なる (後者では5~6本)。さらに、原殻は本種のホロタイプでは保存状態が良くないが、フィリピン産の個体についてみると *E. sansibaricus* より幅が狭く、細長い。