

The genus *Gemixystus* Iredale, 1929 (Gastropoda: Muricidae: Trophoninae) in New Caledonia with the description of two new species and some notes on the genus in the Indo-West Pacific

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ABSTRACT. The genus *Gemixystus* Iredale, 1929 in New Caledonia is reviewed. Five species are recorded of which two are new, *G. impolitus* n. sp. and *G. lenis* n. sp. *Gemixystus stimuleus* (Hedley, 1912) is recorded for the first time in New Caledonia. *Gemixystus transkeiensis* (Houart, 1987) is re-transferred from *Vaughtia* to *Gemixystus*. The 12 extant species of *Gemixystus* are illustrated.

INTRODUCTION

The genus *Gemixystus* in Australia and New Zealand was reviewed by Houart (2004) who included eight extant and six fossil species in this genus, of which *G. polyphyllius* (Tenison-Woods, 1879) is known from both extant and fossil specimens. A ninth extant species was described by Houart & Héros (2012) from the Chesterfield Reefs.

To date, molecular data of *Gemixystus* has not been analysed. In Barco et al. (2012) it was considered *incertae sedis*. We here provisionally retain *Gemixystus* in Trophoninae, pending future genetic analyses.

With the present revised classification, the new species described in 2012, and the two new ones described here, twelve extant species are currently assigned to *Gemixystus*: *G. calcareus* Houart & Héros, 2012, Coral Sea, Chesterfield Reefs; *G. fimbriatus* Houart, 2004, New South Wales, South Australia and Tasmania (Fig. 6A-B); *G. impolitus* n. sp., Chesterfield Reefs; *G. laminatus* (Petterd, 1884), South Queensland, Australia to Tasmania; *G. lenis* n. sp., Chesterfield Reefs; *G. leptos* (Houart, 1995), South Queensland, Australia and Chesterfield Reefs; *G. polyphyllius* (Tenison-Woods, 1879), extant: New South Wales, Australia and S Tasmania; fossil: Miocene, Victoria (Fig. 6G-H); *G. recurvatus* (Verco, 1909), New South Wales, Australia and South Australia (Fig. 6I-J); *G. rhodanos* Houart, 2004, South Queensland, Australia to Tasmania (Fig. 6K-L); *G. rippingalei* (Houart, 1998), Queensland, Australia; *G. stimuleus* (Hedley, 1908), South Queensland and New South Wales, Australia; *G. trankeiensis* (Houart, 1987), Transkei, South Africa (Fig. 6N-P).

Adult shells of *Gemixystus* are small, rarely exceeding 7 mm in length. The largest being *G. laminatus* and *G. recurvatus* and the smallest *G. stimuleus*, the latter not exceeding 3.5 mm in length.

Material and methods

Material

The material studied here primarily includes specimens collected on various cruises conducted by the MNHN/IRD in New Caledonia. Other illustrated

specimens are from the collections of the Australian Museum, Sydney, the KwaZulu-Natal Museum, South Africa, the South Australian Museum, Adelaide, the Tasmanian Museum, Hobart, and the personal collection of the first author.

Specimens from the following expeditions of the MNHN/IRD were examined: SMIB 8 (1993) DOI 10.17600/93000640 ; BATHUS 2 (1993) DOI 10.17600/93000360; BATHUS 3 (1993) DOI 10.17600/93000370; BATHUS 4 (1994) DOI 10.17600/94100030; NORFOLK 1 (2001) DOI 10.17600/1100050; EBISCO (2005) DOI 10.17600/5100080; KANACONO (2016) DOI 10.17600/16003900 ; KANADEEP (2017) DOI 10.17600/17003800.

These missions were aimed at exploring the seabed around New Caledonia and continuing the exploration in the Coral Sea with the Chesterfield Plateau and Bellona Reefs, as well as the Lansdowne-Fairway Reefs.

Morphological analyses

The characters used to describe shell morphology address the general aspect of the shell, 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 method used to determine diameter and height, and to count the number of protoconch whorls, follows Bouchet & Kantor (2004) as shown in Fig. 1. The bathymetric ranges given herein are the inner values of the recorded depths: the deepest minimum and the shallowest maximum of each recorded depth range.

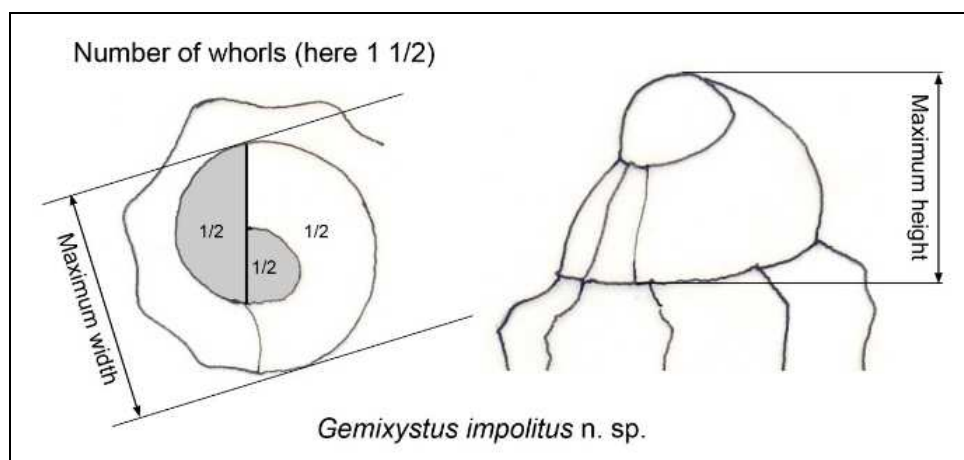


Figure 1. Method for determining diameter, height and counting the number of protoconch whorls.

ABBREVIATIONS

Repository

AMS: The Australian Museum, Sydney, Australia.
 MNHN: Muséum national d'Histoire naturelle, Paris, France.
 NM: KwaZulu-Natal Museum, Pietermaritzburg, South Africa.
 RH: collection of Roland Houart.
 SAMA: South Australian Museum, Adelaide, South Australia.
 TAM: Tasmanian Museum.

Other

IRD: Institut de Recherche pour le Développement.

Station number prefixes

CP: Chalut à perche (beam trawl).
 DW: Drague Warén (Warén dredge).

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) (Fig. 3A-F). Variable features are given in parentheses.

Convex part of teleoconch whorl and siphonal canal

ab: abapical (or abapertural);
 ABP: abapertural primary cord on the siphonal canal;
 ad: adapical (or adapertural);
 ADP: adapertural primary cord on the siphonal canal;
 MP: median primary cord on the siphonal canal;
 P: primary cord;
 P1: shoulder cord;
 P2-P5: primary cords of the convex part of the teleoconch whorl;
 s: secondary cord;
 s1-s2: secondary cords of the convex part of the teleoconch whorl (s1 = secondary cord between P1 and P2; s2 = secondary cord between P2 and P3).

Aperture

D1 to D5: abapical denticles.

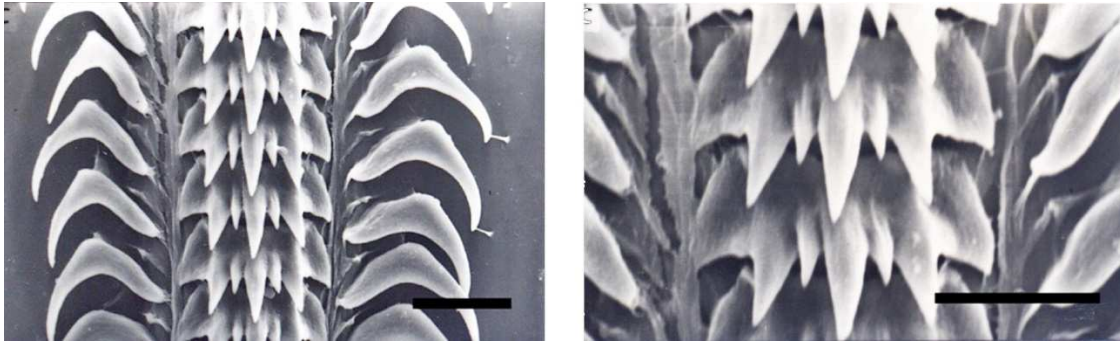


Figure 2. Radula of *Gemixystus leptos*. Holotype MNHN-IM-2000-970 (scale bar 10 μ m).

SYSTEMATICS

Family **MURICIDAE** Rafinesque, 1815
 Subfamily **TROPHONINAE** Cossmann, 1903
 Genus *Gemixystus* Iredale, 1929

Type species by original designation: *Trophon laminatus* Petterd, 1884, Recent, southeastern Australia (Fig. 6C-F).

Apixystus Iredale, 1929. Type species by original designation: *Trophon stimuleus* Hedley, 1907, Recent, eastern Australia (Fig. 5K-T).

Remarks. Iredale (1929: 185) separated *Gemixystus* from *Apixystus* because of their different protoconch morphology, *Gemixystus* having an “angulate apex” (Fig. 6F) compared to the “smooth rounded apex” of *Apixystus* (Fig. 5S-T). 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).

He also transferred two South African species formerly described in *Apixystus* Iredale, 1929, a synonym of *Gemixystus*, to other genera and subfamilies. *Apixystus kilburni* Houart, 1987 was transferred to *Pazinotus* Vokes, 1970 (Muricopsinae) and *A. transkeiensis* Houart, 1987 to *Vaughtia* Houart, 1995 (Ocenebrinae). This new classification was taken over by Houart et al. (2010).

The classification of *A. kilburni* in *Pazinotus* is not questioned, but *A. transkeiensis* is here reintroduced to *Gemixystus* after a re-examination of the material. The small, light shell of *G. transkeiensis* with a broad last teleoconch whorl strongly constricted at base, a broad aperture and an expanded apertural varix; a long, open, siphonal canal and a spiral sculpture consisting of 9-11 axial lamellae on the last teleoconch whorl, together with the broad, broadly open spinelets at intersection of the axial lamellae and the five rounded, spiral cords have prompted us to review its classification.

Gemixystus calcareus Houart & Héros, 2012
 Figs 3A; 4A-B

Gemixystus calcareus Houart & Héros, 2012: 30, fig. 2C, D, N

Type locality. Coral Sea, Chesterfield Reefs, 19°36'S, 158°43'E, 568-570 m [EBISCO: stn DW2603].

Type material. Holotype (dd) MNHN-IM-2000-24180.

Other material examined. New Caledonia, Coral Sea, Chesterfield Reefs, EBISCO, stn DW2603, 19°36'S, 158°43'E, 568-570 m, 4 dd, MNHN-IM-2012-41629, 1 dd, RH.

Distribution. Only known from empty shells from the type locality.

Original 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 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 μ m. 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. *Gemixystus calcareus* differs from *G. stimuleus* in having a comparatively larger shell with twice as large 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* having P1-P5, ADP and MP on the last teleoconch whorl vs P1-P3 in *G. stimuleus*, without any spiral sculpture on the siphonal canal.

Gemixystus calcareus also differs from *G. rippingalei* (Figs 3E, 6M) from Queensland, Australia, in having a comparatively larger shell, *G. rippingalei* reaching only 4.4 mm in length and having a longer siphonal canal; also in having a less spiny shell and different spiral sculpture morphology. *G. rippingalei* having a last whorl with closely spaced P1-P4.

Gemixystus impolitus n. sp.
Figs 3B; 4C-H

Material examined. New Caledonia, Coral Sea, Lord Howe Rise, Banc Capel, KANADEEP, stn CP4934, 25°04'S, 159°55'E, 290-300 m, 1 dd, holotype MNHN-IM-2000-34501; Banc Kelso, stn DW4949, 24°07'S, 159°41'E, 280-300 m, 1 dd, paratype MNHN-IM-2000-34502; Banc Nova, stn DW5011, 22°07'S, 159°19'E, 340-550 m, 1 dd, paratype MNHN-IM-2000-34503

Other material examined. Coral Sea, South Landsdowne, EBISCO stn DW2629, 21°06'S, 160°46'E, 569-583 m, 1 dd.

Type locality. Coral Sea, Lord Howe Rise, Banc Capel, 25°04'S, 159°55'E, 290-300 m.

Distribution. Lord Howe Rise: Bancs Capel, Kelso and Nova and South Landsdowne, empty shells at 300-569 m.

Description of the holotype. Shell small, 4 mm in length. Length/width ratio 1.7. Biconical, broadly ovate. Heavy, weakly spinose, squamous, angulate.

Subsutural ramp broad, strongly sloping, weakly convex.

Ivory white to light tan with darker coloured subsutural area. Aperture white.

Spire high with 1.5 protoconch whorls. Teleoconch of 3.5 broad, angulate, strongly shouldered, weakly spinose whorls. Suture of whorls impressed. Protoconch large, broad. Whorls rounded, smooth. Maximum width 400 µm, height 500 µm. Terminal lip shallow, thin, weakly opisthocline.

Axial sculpture of teleoconch whorls consisting of moderately high, narrow, nodose, weakly spinose varices; each varix with nodes and small, open spinelets. Other axial sculpture of numerous, low, narrow growth lamellae. Seven varices on first and second whorls, 5 on last. Spiral sculpture of low, rounded, narrow, squamous primary and secondary cords, with weakly broader P1 and P2, followed abapically by lower P3-P5 and ADP. Low s1 secondary cord between P1 and P2, and s2 between P2 and P3. Crossing of P1 and P2 with axial varices giving rise to short, open, acute spinelets, less conspicuous on apertural varix. P3-P5 weakly nodose on varices.

Aperture moderately large, roundly ovate. Columellar lip narrow, with 2 weak, small knobs abapically; rim broken. Anal notch very broad, shallow. Outer lip narrow, weakly erect, with weak, narrow, elongate D3 and D4; D1 and D2 obsolete. Siphonal canal short, narrow, slightly dorsally recurved, open.

Operculum and radula unknown.

Remarks. This new species is somewhat atypical for the genus, in having broader varices instead of axial lamellate varices as in the other species. However it is here included in *Gemixystus* because of its biconical small shell with a broadly ovate aperture with typical, narrow, elongate denticles within the outer lip. These denticles are mostly situated at adapical part of the aperture, with a strong, elongate D4 and absent ID and D1. The shell also has a typical, broad, expanded, apertural varix and a broadly open, short, siphonal canal.

Figure 3. Spiral sculpture and apertural denticles morphology

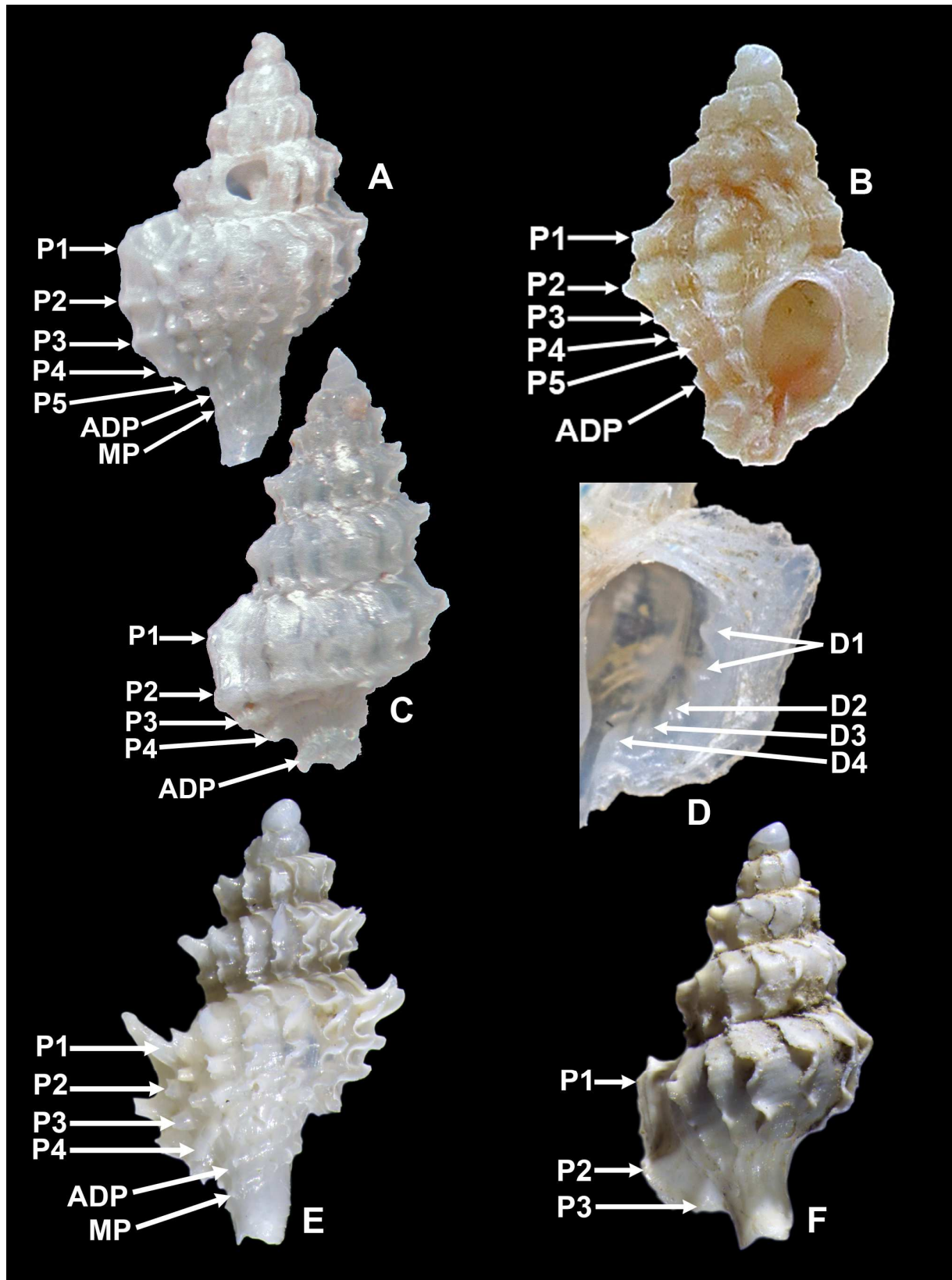
A. *Gemixystus calcareus* Houart & Héros, 2012. Chesterfield Plateau, 19°36' S, 158°43' E, 568-570 m, RH, 4.9 mm.

B. *Gemixystus impolitus* n. sp. KANADEEP, stn CP4934, 25°04'S, 159°55'E, 290-300 m, holotype MNHN-IM-2000-34501, 4 mm.

C-D. *Gemixystus leptos* (Houart, 1995). C. Coral Sea, 19°40' S, 158°27' E, 245-252 m, holotype MNHN-IM-2000-970, 4.8 mm; D. KANACONO, stn DW4695, North Iles des Pins, 22°47' S, 167°27' E, 200-290 m, MNHN, 5.1 mm.

E. *Gemixystus rippingalei* Houart, 2004. Australia, Queensland, E of Lady Musgrave Island, 23°62.5'-23°51.9' S, 152°427'-152°41.7' E, 296 m, holotype AMS C.313232, 4 mm (photo Alison Miller, AMS).

F. *Gemixystus stimuleus* (Hedley, 1908). New South Wales, Sydney, 22 miles east of Narraben, 146 m, holotype AMS C.25787, 3.0 mm (photo Alison Miller, AMS).



A paratype of 4.8 mm, also with 3.5 teleoconch whorls (Fig. 4E-F) is entirely light brown coloured. It has three denticles within the outer apertural lip (D2-D4) with obsolete D1, a broader protoconch of 600 µm high and wide. The spiral and axial sculpture as well as the apertural denticles are more conspicuous but otherwise are similar to the holotype.

Gemixystus stimuleus (Fig. 5K-T) differs by its lighter shell with narrow, more numerous lamellae, by the absence of any other axial sculpture, by the three spiral cords on the last teleoconch whorl instead of five in *G. impolitus* n. sp. and in having a narrower and smooth siphonal canal.

Etymology. *Impolitus* (L), unpolished, rough, named for the rough appearance of the shell.

***Gemixystus lenis* n. sp.**
Fig. 4I-N

Material examined. New Caledonia, Coral Sea, Lord Howe Rise, Banc Argo, KANADEEP, stn DW4956, 23°13'S, 159°35'E, 295 m, 1 dd, holotype MNHN-IM-2000-34504; Banc Kelso, stn DW4951, 24°12'S, 159°41'E, 270-385 m, 1 lv, 1 dd, paratypes MNHN-IM-2000-34505 (syntopic with *G. leptos*).

Type locality. Coral Sea, Lord Howe Rise: Banc Argo, 23°13'S, 159°35'E, empty shells at 295 m.

Distribution. Coral Sea: Bancs Argo and Kelso, living at 270 m.

Description of the holotype. Shell very small, 2.9 mm in length. Length/width ratio 1.6. Biconical, broad, smooth, lightly built. Subsutural band narrow, weakly sloping, weakly convex.

Shell entirely white.

Spire high with 1.75 protoconch whorls and teleoconch consisting of 3 broad, weakly convex, weakly shouldered whorls. Suture of whorls impressed. Protoconch large, weakly elongate, whorls longitudinally keeled, otherwise smooth. Maximum width 450 µm, height 500 µm. Terminal lip low, delicate, thin, weakly prosocline.

Axial sculpture of teleoconch whorls consisting of low, weak, narrow lamellae. Apertural lamellae broad, flaring. First and second whorls with 7 lamellae, last whorl has 6 with a broad space between penultimate and last lamellae. No trace of spiral sculpture except low P1 giving rise to small, broad, low, open spines at intersection with axial lamellae.

Aperture large, broad, roundly ovate. Columellar lip broad, smooth, rim weakly erect, a small portion adherent at adapical extremity. Anal notch shallow, very broad. Outer lip narrow, weakly erect, with 4 strong, elongate denticles within, consisting of D1-D4 with D1 highest and broadest. Siphonal canal short, narrow, weakly dorsally recurved, broadly open. Operculum and radula unknown.

Remarks. The holotype is subadult and both paratypes are also juveniles of 2.1 and 2.3 mm in length, consisting of two teleoconch whorls and featuring all the characteristics of the holotype.

Gemixystus lenis n. sp. differs from all the other *Gemixystus* species in lacking any spiral sculpture except a low P1 cord and in having a wide distance between the penultimate and the last varix.

Etymology. *Lenis* (L), smooth, soft, named for the smooth shell.

***Gemixystus leptos* Houart, 1995**
Figs 3C-D; 5A-J

Apixystus leptos Houart, 1995: 490, figs 28-29, 86-89, 134-136.

Apixystus leptos — Houart, 1998: 100, figs 18-19.

Gemixystus leptos — Houart, 2004: 6, figs 5-7, 9-11, 22, 30-32, 37.

Gemixystus leptos — Houart & Héros, 2012: 31, fig. 2G.

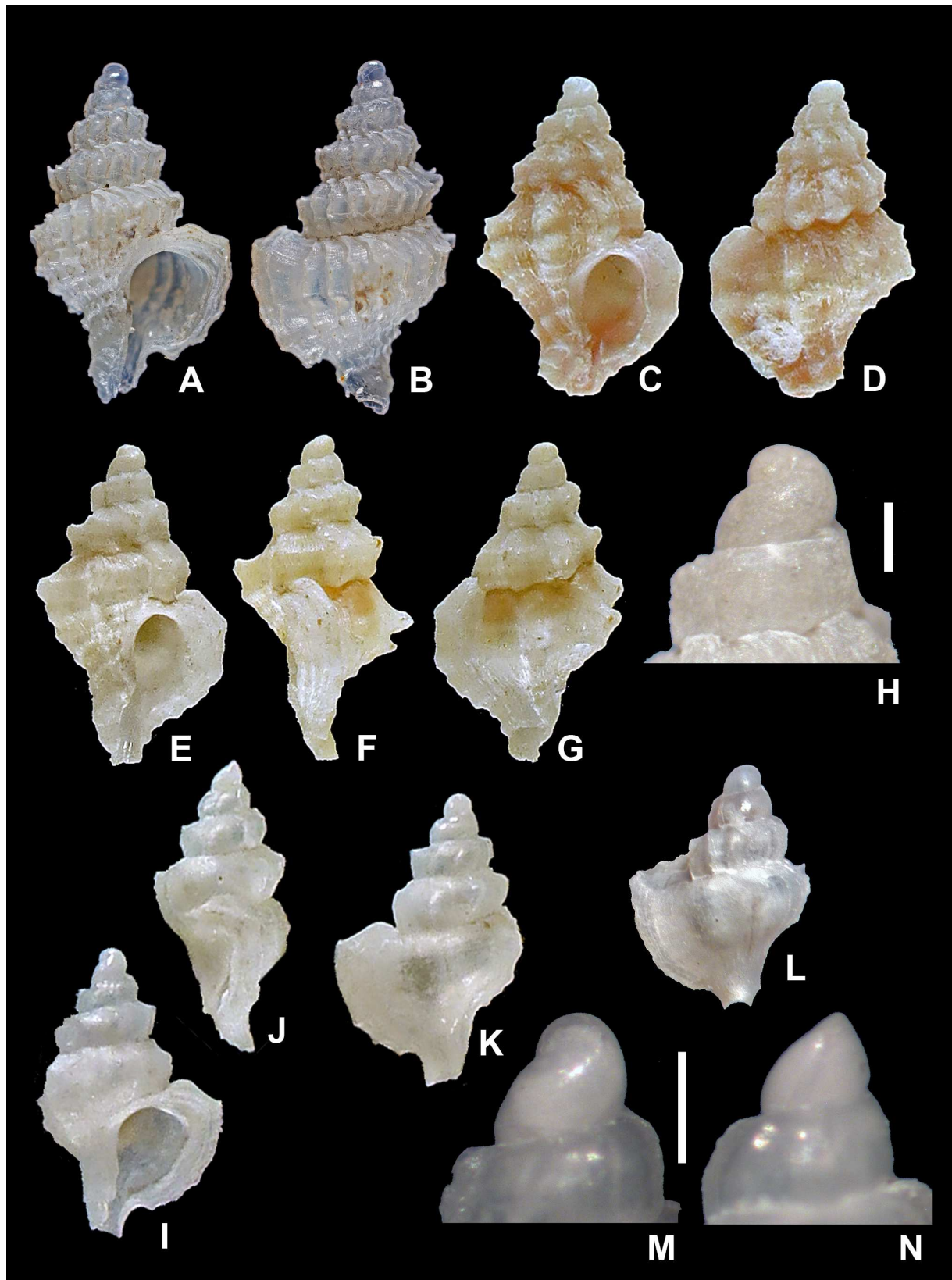
Type locality. Coral Sea, Chesterfield Plateau, 19°40'S, 158°27'E, 245-252 m, lv [MUSORSTOM 5: stn DW346]

Figure 4. Scale bars 250 µm.

A-B. *Gemixystus calcareus* Houart & Héros, 2012. Coral Sea, Chesterfield Reefs, 19°36'S, 158°43'E, 568-570 m, holotype MNHN-IM-2000-24180, 5.4 mm.

C-H. *Gemixystus impolitus* n. sp. C-D, H. KANADEEP, stn CP4934, 25°04'S, 159°55'E, 290-300 m, holotype MNHN-IM-2000-34501, 4 mm; H. Protoconch; E-F. KANADEEP, stn DW5011, Banc Nova, 22°07' S, 159°19' E, 340-550 m, paratype MNHN-IM-2000-34503, 4.8 mm.

I-N. *Gemixystus lenis* n. sp. I-K, M-N. KANADEEP, stn CP4956, 23°13' S, 159°35' E, Banc Argo, 295 m, holotype MNHN-IM-2000-34504, 2.9 mm; M-N. Protoconch; L. KANADEEP, stn DW4951, Banc Kelso, 24°12' S, 159°41' E, 270-385 m, paratype MNHN-IM-2000-34505, 2.2 mm.



Type material. Holotype MNHN-IM-2000-970.

Other material examined. New Caledonia. Coral Sea, between Chesterfield and Bellona Reefs, EBISCO, stn DW2574, 20°20'S, 158°45'E, 358-374 m, 2 dd; Lansdowne-Fairway Reefs: stn DW2617, 20°06'S, 160°22'E, 427-505 m, MNHN-IM-2017-256, 1 lv; stn DW2632, 21°05' S, 160°45' E, 297-378 m, 13 dd.

Banc Kelso, KANADEEP, stn DW4951, 24°12'S, 159°41'E, 270-385 m, 1 dd (syntopic with *G. lenis* n. sp.); stn DW4954, 24°12'S, 159°41'E, 300 m, 1 dd.

North of New Caledonia, Grand Passage, BATHUS 4, stn DW918, 18°49'S, 163°16'E, 613-647 m, MNHN-IM-2012-33083, 1 dd.

Norfolk Ridge, South of New Caledonia, SMIB 8, stn DW166, 23°38'S, 167°43'E, 433-450 m, MNHN-IM-2012-33088, 1 dd; stn DW167, 23°38'S, 167°43'E, 430-452 m, MNHN-IM-2012-33007, 1 lv; stn DW169, 23°37'S, 167°42'E, 447-450 m, MNHN-IM-2012-33086, 2 lv; stn DW 170-172, 23°41'S, 168°00'-168°01'E, 230-290 m, 1 dd; stn DW182-184, 23°18'-23°19'S, 168°05'E, 305-367 m, MNHN-IM-2012-32982, 2 lv, 4 dd; stn DW190, 23°18'S, 168°05'E, 305-310 m, MNHN-IM-2012-32983, 4 dd.

BATHUS 2, stn DW714, 22°38'S, 167°10'E, 124 m, MNHN-IM-2017-362, 3 dd; MNHN-IM-2014-2453, 1 dd; stn DW715, 22°39'S, 167°11'E, 202-227 m, MNHN-IM-2012-33085, 1 dd; stn DW724, 22°48'S, 167°26'E, 344-358 m, MNHN-IM-2010-4899, 1 dd;

BATHUS 3, stn CP805, Banc Jumeau Ouest, 23°41'S, 168°01'E, 278-310 m, MNHN-IM-2012-32986, 1 lv; stn DW809, Banc Jumeau Ouest, 23°39'S, 167°59'E, 650-730 m, MNHN-IM-2012-32984, 2 dd; stn DW824, Nord Banc Antigonina 23°19'S, 168°00'E, 601-608 m, MNHN-IM-2012-32985, 2 dd; stn DW829, Nord Banc Antigonina, 23°21'S, 168°02'E, 386-390 m, MNHN-IM-2012-33084, 1 dd.

NORFOLK 1, stn DW1722, Banc Antigonina, 23°16'S, 168°01'E, 540-540 m, MNHN-IM-2012-9285, 1 dd; stn DW1723, Banc Cryptelia, 23°18'S, 168°15'E, 267-266 m, MNHN-IM-2012-9246, 2 dd.

NORFOLK 2, stn DW2040, Banc Jumeau Ouest, 23°41'S, 168°01'E, 285 m, MNHN-IM-2012-9298, 2 dd.

KANACONO, stn DW4677, 22°53'S, 167°35'E, 376-390 m, 1 dd; stn DW4685, 22°28'S, 167°29'E, 404-405 m, 1 dd; stn DW4686, 22°29'S, 167°31'E, 249-255 m, 1 dd; stn DW4695, 22°47'S, 167°27'E, 200-290 m, 1 dd.

Distribution. South Queensland, Australia to the Coral Sea and the Norfolk Ridge. Only recorded dead in Australia, from 31-73 m; New Caledonia, recorded alive in 124-447 m.

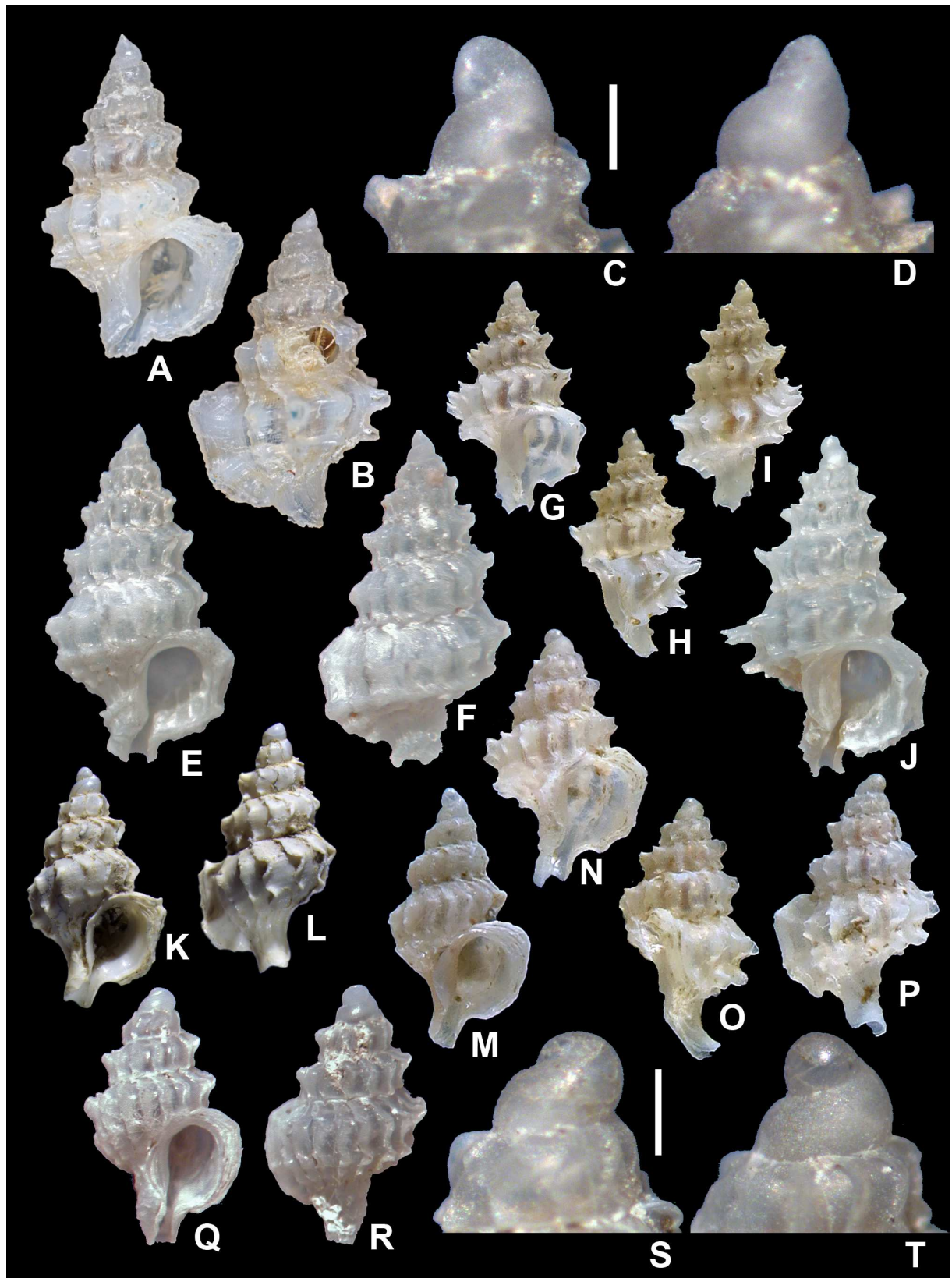
Original description. Shell up to 4.9 mm in length (AMS C150077), spinose, delicate. Spire high with 1.75 protoconch whorls and up to 5 angulate, shouldered, spinose teleoconch whorls. Protoconch acuminate, rounded or keeled, whorls smooth, glossy; terminal varix erect, delicate, thin. Suture impressed. Axial sculpture consisting of sharp, erect lamellae. First whorl with 10 or 11 lamellae, second and third whorls with 11 lamellae, last whorl with 10 or 11 lamellae. Spiral sculpture consisting of weak, rounded cords. First to fourth teleoconch whorls with visible, broadly spaced P1 and P2; last whorl with broadly spaced P1 and P2, followed abapically by narrow, closely spaced, low P3 and P4. Last whorl of a few specimens with s1 between P1 and P2 (AMS C.321889). Short to moderately long, narrow, open spinelets occurring at crossing of axial and spiral sculpture. Spine on P1 longest.

Anal notch obsolete. Outer apertural lip smooth, with 5 strong, narrow, strongly elongate denticles within: D1 (split), D2, D3 (split). Siphonal canal short, 9-11% of total shell length, narrow, weakly abaxially bent, open, smooth. Translucent milky white with traces of pale brown on last teleoconch whorl. Rachidian radular tooth with long central and marginal cusps and short lateral denticles. Lateral teeth sickle-shaped. Aperture rounded. Columellar lip flaring, smooth, partially erect, weakly adherent at adapical extremity.

Figure 5. Scale bars 250 µm

A-J. *Gemixystus leptos* (Houart, 1995). A-B. Coral Sea, 19°40' S, 158°27' E, 245-252 m, holotype MNHN-IM-2000-970, 4.8 mm; C-D. Protoconch, BATHUS 2, stn DW714, 22°38' S, 167°10' E, 124 m, MNHN-IM-2014-2453; E-F. KANACONO, stn DW4695, North Iles des Pins, 22°47' S, 167°27' E, 200-290 m, MNHN, 5.1 mm; G-I. SMIB 8, stns DW182-184, 23°18' - 23°19' S, 168°05' E, 305-367 m, MNHN-IM-2012-32982, 3.7 mm; J. SMIB 8, stns DW170-172, 23°41' S, 168°00' - 168°01' E, 230-290 m, MNHN, 5.1 mm.

K-T. *Gemixystus stimuleus* (Hedley, 1908). K-L. New South Wales, Sydney, 22 miles east of Narraben, 146 m, holotype AMS C.25787, 3.0 mm (photo Alison Miller, AMS); M. Australia, QLD, NE of Cape Moreton, 26°54'-26°57' S, 153°32' - 153°35' E, 115-124 m, RH, 3.4 mm; N-P, S-T. SMIB 8, stns 146-147, 22°55' S, 168°22' E, 508-532 m, MNHN-IM-2012-33087, 3.5 mm; S-T. Protoconch; Q-R. KANADEEP, Banc Argo, 23°02' S, 159°28' E, 315-1260 m, MNHN, 3.4 mm.



Remarks

Gemixystus leptos differs from *G. stimuleus* in having a smaller, sharper, acute, shouldered, or more or less keeled protoconch (Figs 5C-D; 5S-T); the spire is higher with comparatively narrower spire whorls. *G. leptos* also has a broader subsutural ramp, narrower spines and more widely spaced P1-P2, the shell is more strongly angulate and the outer apertural lip is more strongly denticulate within with P1, P2, P3, P4 of which some are split as opposed to P1, P2, P3 in *G. stimuleus*.

Only empty shells were recorded from South Queensland and in shallower depths than the New Caledonian shells (Houart, 2004). However no significant differences were detected between the two populations. The maximum length of 4.9 mm observed in 2004 is now increased to 5.3 mm in a specimen collected in New Caledonia.

Gemixystus stimuleus (Hedley, 1907)
Figs 3F; 5K-T

Trophon stimuleus Hedley, 1907: 293, pl. 55, fig. 19.

Type locality. New South Wales, Sydney, 22 miles east of Narrabeen, 146 m.

Type material. Holotype AMS C.25787.

Other material examined. Australia, Queensland, off Cape Moreton, 128-183 m, 5 dd (AMS C.150076), NE of Cape Moreton, 26°54' - 26°57'S, 153°32' - 153°35'E, 115-124 m, 16 dd (AMS C.321981), 1 dd (RH) (in Houart, 2004).

South of New Caledonia, Norfolk Ridge, SMIB 8, stns DW146-147, 24°55'S, 168°22'E, 508-532 m, MNHN-IM-2012-33087, 6 lv, 11 dd.

BATHUS 3, stn DW818, 23°44'S, 168°16'E, 394-401 m, MNHN-IM-2012-32987, 2 lv, 1 dd.

NORFOLK 1, stn DW1692, Banc Eponge, 24°55'S, 168°20'E, 507-967 m, MNHN-IM-2012-33082, 1 lv, 1 dd.

Coral Sea, Lord Howe Rise, KANADEEP, stn DW4951, 24°12'S, 159°41'E, 270-385 m, 1 dd; stn DW4962, Banc Argo, 23°02'S, 159°28'E, 315-1260 m, 4 dd.

Distribution. Australia: South Queensland and Sydney, New South Wales, 115-183 m (dd); New Caledonia (new distribution record): Coral Sea and Norfolk Ridge, collected alive in 401-508 m.

Description (from Houart, 2004). Shell up to 3.5 mm in length at maturity, biconical. Spire high with 1.5 protoconch whorls, and up to 4 broad, weakly shouldered teleoconch whorls. Suture impressed, partially obscured by small axial lamellae of following whorl. Protoconch large, broadly elongate. Whorls rounded, smooth; terminal varix unknown (eroded in examined specimens).

Axial sculpture of teleoconch whorls consisting of high, strong, webbed lamellae: 9 on first whorl, 12 on second, 15 on third, 11 or 12 on last whorl. Spiral sculpture of rounded cords: visible spiral sculpture of first, second and third whorls of P1-P2; last whorl with P1-P3, decreasing in strength abapically.

Aperture large, broad, rounded. Columellar lip broad, flaring, smooth, lip partially erect, adherent at adapical extremity. Anal notch obsolete. Outer lip broad, with 2 weak, broad, low denticles within. Siphonal canal short, 18-20% of total shell length, narrow, smooth. Creamy white.

Figure 6. Scale bar 250 µm.

A-B. *Gemixystus fimbriatus* Houart, 2004. Tasmania, E of D'Entrecasteaux Channel, 44°2.2'S, 146°50.5'E, 176 m, holotype AMS C.322414, 4.1 mm (photo Alison Miller, AMS).

C-F. *Gemixystus laminatus* (Petterd, 1884). C-D. Tamar Heads, Tasmania, holotype TM E824/8165, 4.9 mm (photo Simon Grove, TAM); E-F. Australia, Victoria, 30 km SW of Cape Everard, 38°4'S, 149°9'E, 119 m, RH, 4.6 mm; F. Protoconch.

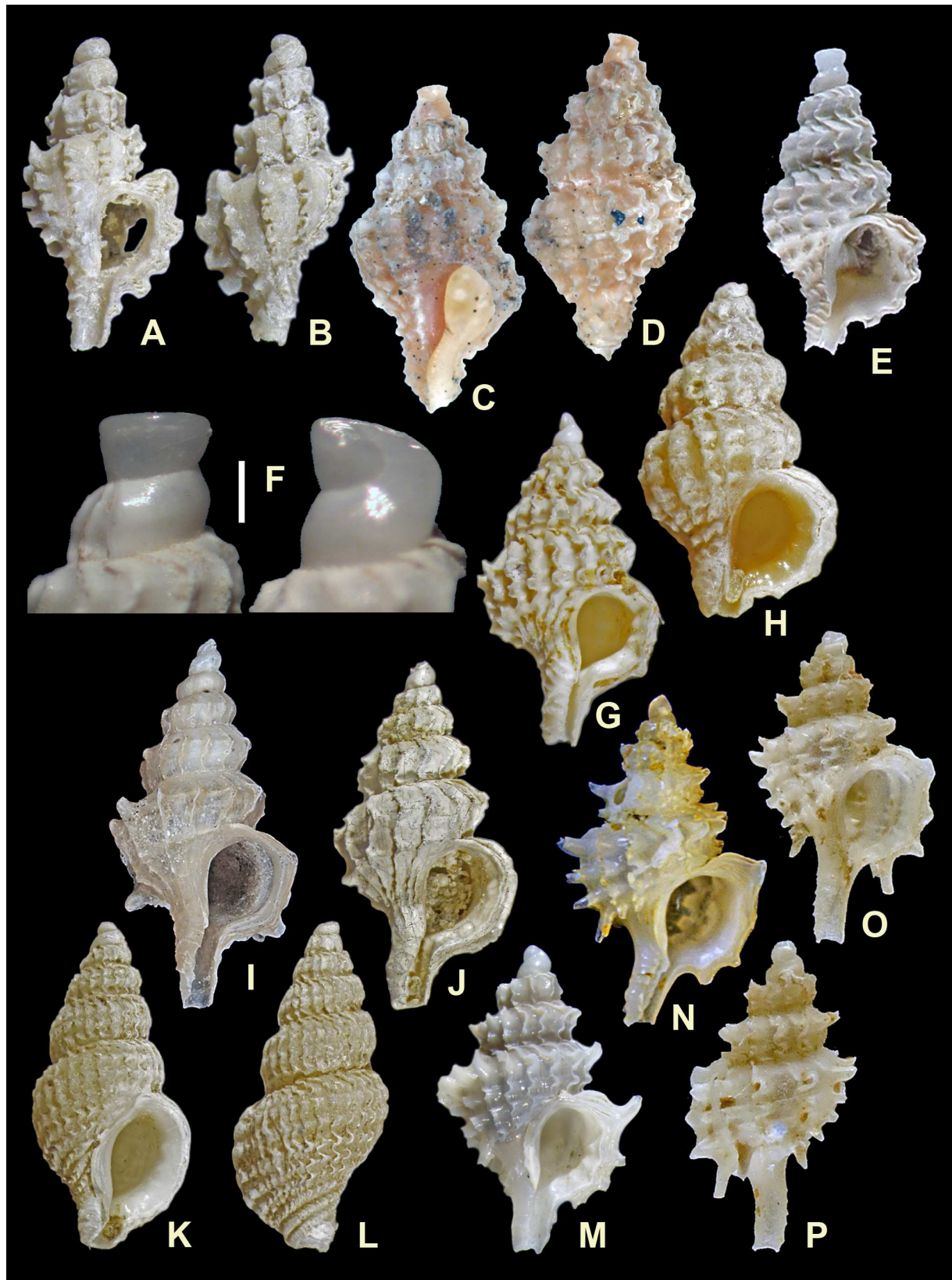
G-H. *Gemixystus polyphyllius* (Tenison-Woods, 1879). G. Victoria, Muddy Creek, near Hamilton, 37°44'S, 141°56'E, Miocene, holotype AMS C.170873, 5.1 mm; H. Australia, Victoria, Gabo Is. 37°34'S, 149°55'E, 21 m, AMS C322366, 5.4 mm (photo Alison Miller, AMS).

I-J. *Gemixystus recurvatus* (Verco, 1909). I. South Australia, 200 fathoms of Beachport, holotype SAMA D13484, 6.7 mm (photo Shirley Sorokin, SAMA); J. New South Wales, off Sydney, 384 m, AMS C150080, 7 mm (photo Alison Miller, AMS).

K-L. *Gemixystus rhodanos* Houart, 2004. Australia, NSW, 2.3 km E of Malabar, Sydney. 33°59.45'S, 151°16.8'E, 66 m, holotype AMS C.322835, 5.9 mm (photo Alison Miller, AMS).

M. *Gemixystus rippingalei* (Houart, 1998). Australia, Queensland, E. of Lady Musgrave Is, 23°62.5' - 23°51.9'S, 152°42.7' - 152°41.7'E, 296 m, holotype AMS C313232, 4 mm (photo Alison Miller, AMS).

N-P. *Gemixystus transkeiensis* (Houart, 1987). N. South Africa, N Transkei, off Nthlonyane R., 32°17.5'S, 29°03.9' E, 130 m, coarse brown sand, old calcareous fragments, holotype NM C5902, 5.1 mm (photo NM); O-P. South Africa, Transkei, off Mtamvuna River, 31°10'S, 30°15'E, 120-140 m, paratype RH, 4.5 mm.



Remarks. *Gemixystus stimuleus* is now also recorded from New Caledonia, in greater depths than in Australia, but except for a slightly lower spire and occasionally more numerous axial varices, no other significant differences were identified.

The New Caledonian form also resembles *G. rippingalei* (Houart, 1998) (Fig. 3E; 6M), but *G. rippingalei* has a more evenly biconical shell with obvious, narrower P1-P4 spiral cords on the last teleoconch whorl and ADP, MP on the siphonal canal. P1-P4 ending as narrow, open spinelets on the axial varices, more obvious on the apertural varix with a longer, narrow P1 spine and shorter P2-P4 spines of same length. The aperture is also different, being more ovate in *G. rippingalei* with 4 narrow D1-D4 denticles within the outer lip, as opposed to a rounded aperture with lower denticles in *G. stimuleus*.

Gemixystus stimuleus from New Caledonia has the typical sculpture of the species, with relatively broad, more spaced P1-P2 cords and a narrow and shallow P3 cord, ending as broad, short open spinelets on the varices, shorter or obsolete on the apertural varix. The siphonal canal is smooth.

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