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Description of a new species of *Tenguella* (Gastropoda: Muricidae: Ergalataxinae) from Oman

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Abstract: A new species of the recently re-established genus *Tenguella* is described from the Sultanate of Oman. It is compared with three of the four species included in this genus: *Tenguella granulata* (Duclos, 1832), the type species and a common species occurring in the Indo-Pacific, *Tenguella ceylonica* (Dall, 1923) known from south-eastern India to the Philippines and *Tenguella marginalba* (Blainville, 1832) from eastern Australia.

Introduction: The genus *Tenguella* Arakawa, 1965 was synonymised with *Morula* Schumacher, 1817 by Houart (2004). However, in Claremont et al. (2008) that genus, as used by Houart (2004), was proved to be polyphyletic. The available name *Tenguella* was then resurrected to include its type species *Purpura granulata* Duclos, 1832. Afterwards, Claremont et al. (2013) assigned four additional species to this genus: *T. ceylonica* (Dall, 1923), *T. marginalba* (Blainville, 1832), *Tenguella musiva* (Kiener, 1835) and an additional apparently undescribed new species from Guam.

Only *T. granulata* is reported from Oman and was commented and illustrated by Bosch & Bosch (1982: 95) and Bosch et al. (1995: 122, fig. 486). However, Bosch et al. (1995: 122) also mentioned an "elongate form with more numerous nodules", but without the illustration of a specimen. This elongate form is here described and carefully compared with *T. granulata* and two other *Tenguella* species.

Material and methods: Most of the material used in this study is based on shells owned by Naturalis Biodiversity Center, Leiden, the Netherlands. Other material

examined belongs to the collection of Bart Van Heugten (Oosterhout, the Netherlands) and to the collection of the author.

Methods for morphological taxonomy: The characteristics used here to describe the shell morphology are the general aspect of the shell, shape and size (Fig. 2), colour, shape of the spire and number of protoconch and teleoconch whorls (Fig. 1), features of the protoconch, shape of the teleoconch whorls and features of the suture and of the subsutural band, axial and spiral sculpture, aperture and siphonal canal.

The description of the new species is based on the holotype and on a representative selection of the paratypes.

Abbreviations:

Repositories:

ZMA: Zoological Museum, Amsterdam (now NCB Naturalis, Leiden), the Netherlands

RH: Collection of Roland Houart

Other abbreviations:

ad: adult shell

dd: empty shell

juv: juvenile shell

lv: live collected specimen

sub: subadult shell

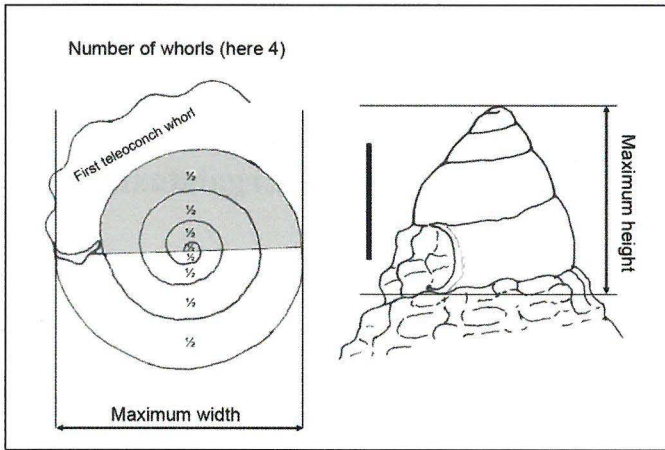


Fig. 1: Measurements of the protoconch (scale bar: 500 μ m)

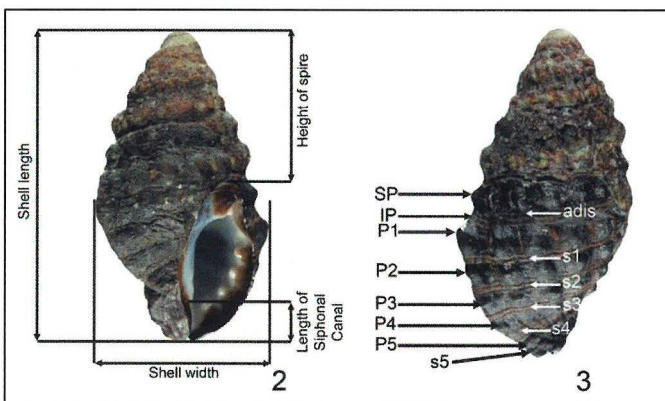
Terminology used to describe the spiral cords and the apertural denticles (after Merle 2001 and 2005) (Fig. 3). Terminology in parentheses: variable features.

Convex part of teleoconch whorl and siphonal canal

- ab: abapical (or abapertural)
 ad: adapical (or adapertural)
 ADP: adapertural primary cord on the siphonal canal;
 adis: adapical infrasutural secondary cord (on subsutural ramp)
 IP: infrasutural primary cord (primary cord on subsutural ramp)
 P: primary cord
 P1: shoulder cord
 P2-P6: primary cords of the convex part of the teleoconch whorl
 s: secondary cord
 s1-s6: secondary cords of the convex part of the teleoconch whorl (example: s1 = secondary cord between P1 and P2; s2 = secondary cord between P2 and P3, etc.)
 SP: subsutural cord
 t: tertiary cord

Aperture

- D-D5: abapical denticles
 ID: infrasutural denticle



Figs 2-3: *Tenguella hoffmani* sp. nov., paratype RH
 2: Definition of the shell measurements
 3: Spiral cords and apertural denticles morphology

Systematics:

Family **MURICIDAE** Rafinesque, 1815

Subfamily **ERGalATAXINAE** Kuroda & Habe, 1971

Genus *Tenguella* Arakawa, 1965

Type species (by original designation): *Purpura granulata* Duclos, 1832, Indo-West Pacific.

Tenguella hoffmani sp. nov.

Figs 2, 3, 5A-J

Type material: Oman, Ash Sharqiyah, Masirah Island, 20°35' N, 58°82' E, lv, ad, holotype ZMA.MOLL. 90010, 1 paratype ZMA.MOLL.362910.

Other paratypes: Oman, Ash Sharqiyah, Masirah Island, NW coast, Ras Faydak, near electric power station by hand dredge, falling tide in surf zone, 04 March 1995, 9 lv & dd, ad & sub, ZMA.MOLL. 420482; Oman, Al Nakdah, near ferry to Masirah Island, in muddy sand with grass patches, 1995, 12 lv & dd, ad, sub & juv, ZMA.MOLL. 72670; Oman, Ash Sharqiyah, Masirah Island, Sur Masirah, beach, 1989, 4 lv, juv, 1989, ZMA.MOLL. 37313; Oman, Al Wusta, Khaluf, on rocks, intertidal, December 2002, lv, 2 ad, 2 sub, 4 paratypes RH.

Other material: Oman, Ash Sharqiyah, Masirah Island, NW coast, Ras Faydak, near electric power station by hand dredge, falling tide in surf zone, 04 March 1995, 25 lv & dd, ad & sub, ZMA.MOLL. 72020; Oman, Ash Sharqiyah, Masirah Island, Sur Masirah, beach, 1989, 23 lv & dd, juv & sub, ZMA.MOLL.362911 (ex ZMA.MOLL. 37313); Oman, Ash Sharqiyah, Masirah Island, off Wadi Diyunayt, Hidden Reef, approximately 8-12 m, under rocks + sediment, by scuba, 3 lv, sub, 21. Feb. 1997, ZMA.MOLL. 369664; Oman, Dhofar, Mirbat, Jazirat Hino, near Hino, under rocks, 08 Feb. 1997, 9 lv & dd, ad, sub & juv, ZMA.MOLL. 60326; Oman, Muscat, Al Bustan, low tide under rocks, January 2003, 2 lv, ad, coll. Bart Van Heugten; Oman, Muscat, Al Bustan, under rocks, intertidal, January 2003, 1 lv, juv, RH.

Type locality: Oman, Ash Sharqiyah, Masirah Island, 20°35' N, 58°82' E.

Distribution: Oman, from Mirbat, Dhofar, Ash Sharqiyah, Masirah Island, Al Wusta, Khaluf and Muscat, Al Bustan, intertidally on rocks to approximately 8-12 m.

Description: Shell medium-sized for the genus, up to 28.5 mm in length at maturity (paratype ZMA.MOLL.362910). Length/width ratio 1.72-2.15.

Slender, lanceolate, narrowly ovate. Heavy, nodose. Subsutural ramp strongly sloping, concave.

Shell entirely black or blackish brown. Aperture bluish white inside, with black band along the columellar and outer apertural edges, black colour occasionally weakly extended on apertural denticles.

Spire high with 4 protoconch whorls and teleoconch up to 6 broad, weakly convex, elongate, slightly shouldered, nodose whorls. Suture impressed, occasionally partially obscured by broad subsutural cord (SP). Protoconch small, conical. Height 900 μm , width 700 μm ; first whorl 300 μm wide. Terminal lip of sinusigera type. Sculpture of teleoconch whorls consisting of low, weak, narrow or moderately broad axial ribs crossed by low, broad, primary spiral cords and narrow secondary cords and threads. Crossing of primary cords and axial ribs forming high, strong nodes at their intersection. First teleoconch whorl with 11 or 12 axial ribs, second and third with 12 or 13, fourth and fifth with 10 or 11, last whorl with 9-11 ribs, occasionally with single axial varix on last teleoconch whorl. First to penultimate whorl with visible SP, P1 and 1 or 2 additional, secondary cords and narrow threads between them on all whorls. Last whorl with SP, (adis), IP, abis, P1, P2, P3, P4, P5, ADP, secondary cords s1-s5 and additional threads between primary and secondary cords and on siphonal canal. P1 broadest, P2 and P3 weakly narrower, P4-P5 decreasing in strength abapically. Aperture small, narrowly ovate. Columellar lip narrow, smooth or with two very weak knobs abapically, rim adherent, with weak, low parietal tooth at adapical extremity. Anal notch deep, broad. Outer lip weakly erect with very weak, broad IP and small, narrow D1-D4, weakly decreasing in strength abapically. Siphonal canal very short, 16-17 % of total shell length, narrow, straight or very weakly dorsally bent, broadly open.

Operculum not examined (animal dried inside). Radula unknown.

Remarks: *T. granulata* also occurs in Oman. It was illustrated by Bosch et al. (1995: 122, fig. 486). It is distributed throughout the Indo-Pacific, from Transkei, South Africa (Houart et al., 2010) (Fig. 5N-O) to the Hawaiian Archipelago (Houart, 2011) (Fig. 5K), up to the Izu Islands, Japan in the north (Higo et al., 1999 and Tsuchiya, 2000) (Fig. 5L-M).

Tenguella hoffmani sp. nov. differs from *T. granulata* in having a longer, more elongate, narrower shell with a higher spire, a broader subsutural ramp, 9 or 11 axial ribs on the last teleoconch whorl in adult specimens as opposed to 7 or 8, occasionally 9 in *T. granulata*, a slightly broader aperture relative to the width of the shell with narrower denticles inside the outer lip, compared to the generally strong, broad denticles in *T. granulata*, a

straighter, smooth or anteriorly less folded columellar lip, with a less excavated parietal wall, narrower primary spiral cords and less obvious, usually smaller nodes at intersection of primary cords and axial ribs. However, the conical protoconch consisting of 3.5 to 4 whorls is identical in both species (Fig. 5J and P). The length/width ratio measured in 10 adult or subadult specimens of each species, with a shell length of 16.7 mm to 26.3 mm for *T. hoffmani* sp. nov. and of 19.5 to 27.1 mm for *T. granulata* from throughout its geographical distribution renders an average length/width ratio of 1.89 for *T. hoffmani* sp. nov. and 1.45 for *T. granulata* (Fig. 4) with a minimum of 1.72 and a maximum of 2.15 in *T. hoffmani* sp. nov. and a minimum of 1.30 (Kenya) and a maximum of 1.64 (South Africa) in *T. granulata*. Omitting the minimum and maximum extremes from both species does not change the final length/width ratio result.

T. ceylonica (Fig. 6C-F) was described from Ceylon (Sri Lanka) (holotype USNM 336197) (Fig. 6C-D.). Dall (1923: 305) also mentioned other records from the Marquesas Islands, Mauritius and Chain Islands, South Pacific. However, to my knowledge, those localities have never been confirmed by later observations. That species is now confined to a broad area in the eastern Indian and the western Pacific Oceans, particularly in southeastern India, Sri Lanka, Thailand, Indonesia (Sumatra, Java, Bali, Lombok, Java Sea) and the Philippines, probably also Malaysia. *T. hoffmani* sp. nov. differs from *T. ceylonica* in having a narrower shell with a much higher spire and a broader, more strongly sloping subsutural ramp, but also in having a narrower outer apertural lip and a narrower columellar lip without an anterior strong, single denticle as observed in *T. ceylonica*.

T. marginalba (Fig. 6A-B) lives on the east coast of Australia, from southern Queensland to Sydney, New South Wales. *T. hoffmani* sp. nov. is usually smaller with a much higher spire, narrower teleoconch whorls, more numerous, narrower axial ribs with smaller knobs at intersection with the axial ribs and narrower primary spiral cords, a comparatively broader aperture with a straighter columellar lip and smaller apertural denticles.

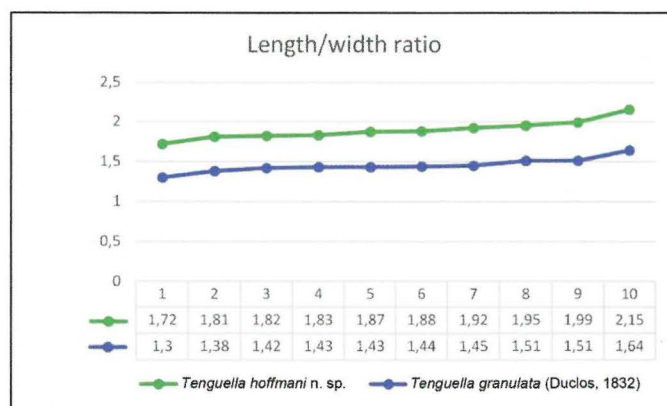


Figure 4: Length/width ratio of *T. hoffmani* sp. nov. and *T. granulata* (Duclos, 1832)

Etymology: Named for Leon Hoffman (Wilhelmshaven, Germany) in recognition for the gift of species from Oman and surrounding areas, including this new species.

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Figure 5

A-J: *Tenguella hoffmani* sp. nov.

A-C: Oman, Ash Sharqiyah, Masirah Island, 20°35' N, 58°82 E'

A-B: 20.9 x 11.2 mm, holotype
ZMA.MOLL.90010

C: 28.4 x 14.4 mm, paratype
ZMA.MOLL.362910

D: Oman, Ash Sharqiyah, Masirah Island, NW coast, Ras Faydak, near electric power station by hand dredge, falling tide in surf zone, 21 x 10.7mm, paratype
ZMA.MOLL.72020

E-F: Oman, Al Nakdah, near ferry to Masirah Island, in muddy sand with grass patches, 18.3 x 10.4 mm, paratype
ZMA.MOLL.72670

G-I: Oman, Khaluf, intertidal, on rocks
G: 26.3 x 12.9 mm, paratype RH

H-I: 24.4 x 12.9 mm, paratype RH

J: Oman, Ash Sharqiyah, Masirah Island, Sur Masirah, beach, paratype ZMA.MOLL.37313
Protoconch (scale bar 500 µm)

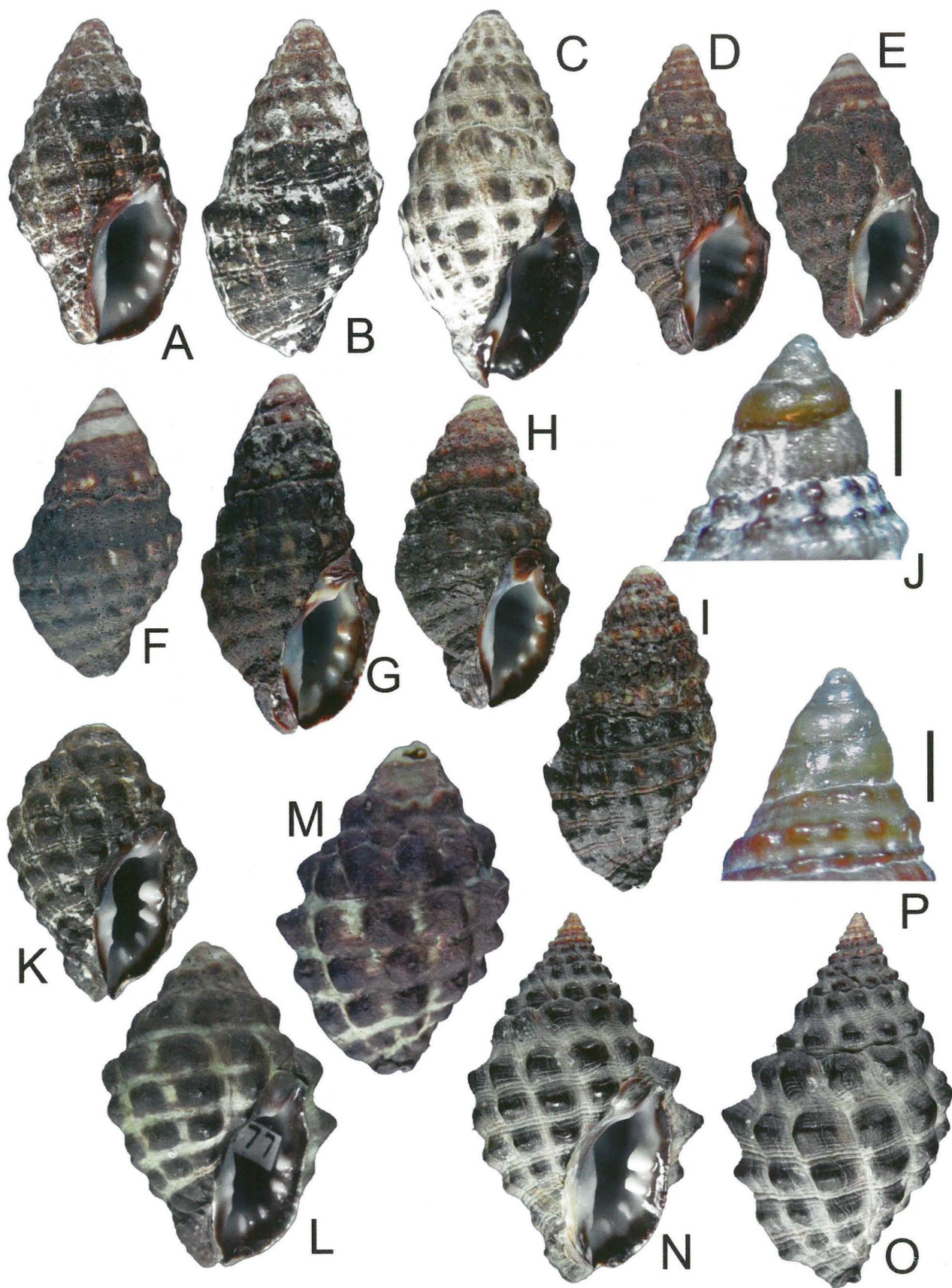
K-P: *Tenguella granulata* (Duclos, 1832)

K: Hawaii, Oahu, 08 May 1969, 15.8 x 10.5 mm, RH

L-M: Japan, Kagoshima Prefecture, 1983, 20.7 x 14.5 mm, RH

N-O: South Africa, Natal, 2007, 27.1 x 16.8 mm, RH

P: New Caledonia, RH (scale bar 500 µm)



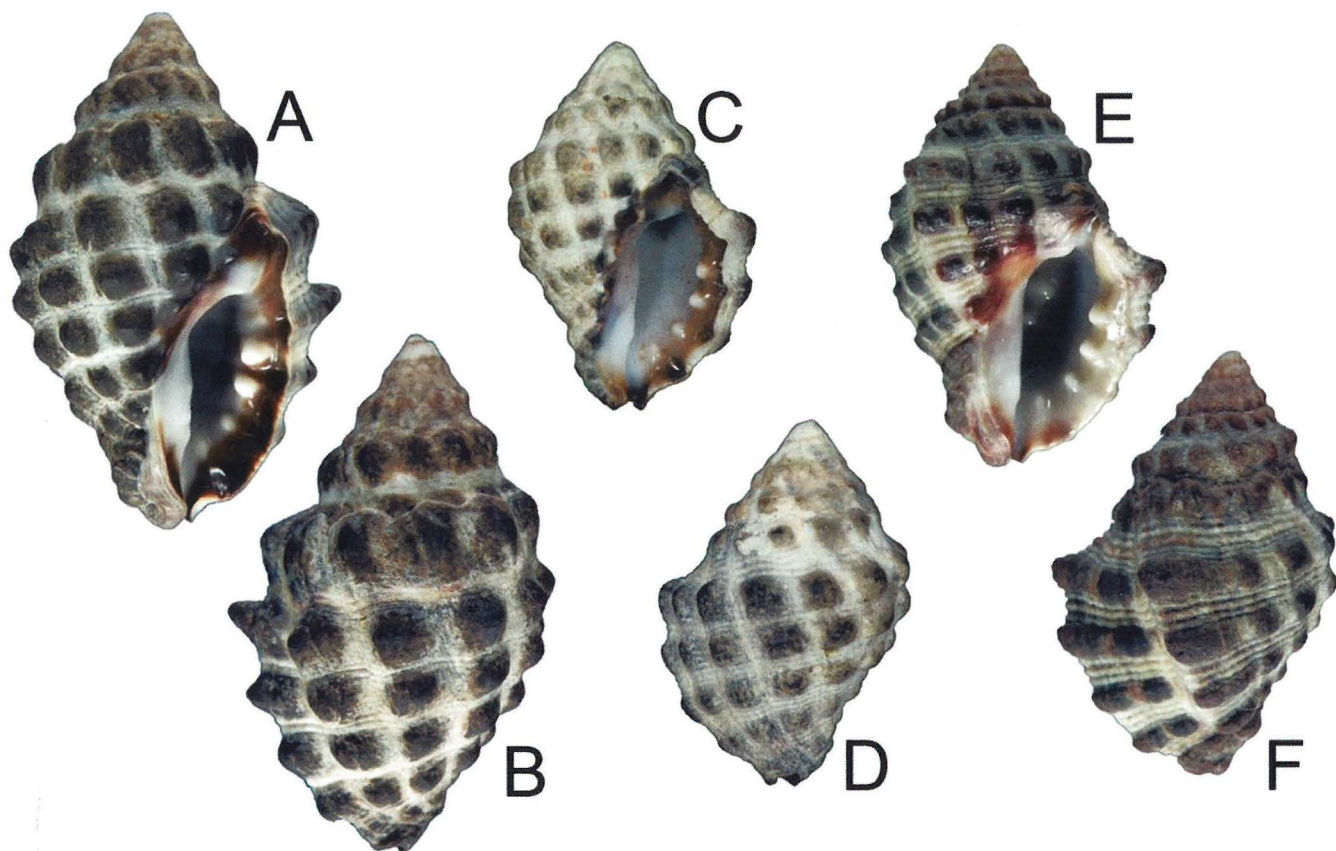


Figure 6

A-B: *Tenguella marginalba* (Blainville, 1832)
Australia, Queensland, 1989, 28.4 x 18.1 mm, RH

C-F: *Tenguella ceylonica* (Dall, 1923)
C-D: Ceylon (Sri Lanka) 15.9 x 10.8 mm, Holotype USNM 336197 (photo courtesy Ellen Strong)
E-F: India, Tamil Nadu, Chennai, 19.5 x 12.9 mm, RH