

A New Species of *Angaria* Röding, 1798 (Gastropoda: Angariidae) from North-Western Sumbawa, Indonesia

Jeff Parsons¹ and John Abbas²

¹ 47 Elizabeth Street, Aitkenvale, Queensland, Australia 4814

jeffonese@yahoo.com.au

² Lihue, Kauai, Hawaii — Jalan Demaga Baru, Muara Angke, Jakarta Utara Pos 14450, Jakarta, Indonesia john123abba@yahoo.com

ABSTRACT This paper describes a new species of *Angaria* Röding, 1798 from north-western Sumbawa, Indonesia. In general appearance it resembles some forms of the species *Angaria delphinus* (Linnaeus, 1758) found in the same area and on neighbouring islands. The new species differs from it in sculptural features and interstitial markings, which it shares with two Vietnamese species, *Angaria fratrummonsecourorum* Günther, 2013 and *Angaria guntheri* Thach, 2018.

KEY WORDS Angariidae, *Angaria*, *A. stevenliei*, new species, Sumbawa, Indonesia

INTRODUCTION

Late in August of 2020, Steven Lie found a single curious specimen of *Angaria* Röding, 1798 among seashells he acquired from divers collecting off islands in the north-western part of Sumbawa, Indonesia. At first glance it appears to represent a new population of the nominate species *Angaria delphinus* (Linnaeus, 1758), found living in the same area and on neighbouring islands. However, a closer inspection shows it is a different species that displays a mix of features seen on *A. delphinus*, *A. guntheri* Thach, 2018 and *A. fratrummonsecourorum* Günther, 2013. It is easily separable from *A. javanica* D. & K. Monsecour, 1999 of south-western Java. Because of the differences with the known species, it is described as a new species.

MATERIALS AND METHODS

Shell dimensions were made in apertural view using digital Vernier callipers (rounded to 1 mm). Measurements excluding spines: shell height refers to the distance from top of spire to basal margin; and shell width (diameter) is the maximum distance between the median keel and posterior (or shoulder) keel at the aperture, measured along and perpendicular to the shell axis respectively. Measurements made in the same fashion except including spines are called “apparent shell height” and “apparent shell width” respectively. Shell sculpture was examined under low magnification (10x) using a jeweller's loupe and via digital images. Whorl count includes the apex (when visible) and counted to the nearest 0.125 ($\frac{1}{8}$) of a whorl; count is only approximate due to the apex and/or protoconch often being covered by encrustations or damaged.

ABBREVIATIONS

LSL	The Linnaean Shell Collection held at the Linnean Society of London, at Burlington House, Piccadilly, Mayfair, London, UK
MNHN	Muséum national d'Histoire naturelle, Paris, France
NBC	Naturalis Biodiversity Center, Leiden, Netherlands
SMNS	Staatliches Museum für Naturkunde Stuttgart
ZMA.MOL	NBC specimen label code, ex-Zoölogisch Museum Amsterdam (ZMA)
JP	Jeff Parsons collection

This new species is described from a single empty shell, the holotype, obtained from local divers in north-western Sumbawa. Comparative material comprised of shells from the primary author's private collection, plus images of types and museum specimens. Photographic credits appear below the plates.

Taxonomic remarks

Dekker (2020) places the following species into synonymy with *Angaria nhatrangensis* Dekker, 2006:

Angaria monsecourorum Thach, 2016
Angaria nasui Thach, 2016
Angaria monsecourorum Thach, 2018
Angaria kronenbergi Thach, 2018
Angaria petuchi Thach, 2018
Angaria walleri Thach, 2018

Only *A. nasui* comes from a different locality: (Lý Sơn Island, Quảng Ngãi Province, Vietnam. All the others, including *A. nhatrangensis*, come from the Nha Trang area, Vietnam. Having not located any specimens collected in Indonesian waters that resemble *A. nhatrangensis*, it is not discussed in this paper.

SYSTEMATICS

Subclass: Vetigastropoda Salvini-Plawen, 1980
Order: Trochida Rafinesque, 1815
Superfamily: Trochoidea Rafinesque, 1815
Family: Angariidae Gray, 1857
Genus: *Angaria* Röding, 1798 (f.)

Type species: *Turbo delphinus* (m.) Linnaeus, 1758 (subsequent designation by P. Fischer, 1878)

Angaria stevenliei Parsons & Abbas,
new species

(Plate 1, Figures 1-3 & Plate 3, Figures 19-21)

Description. Shell medium-sized, depressed turbinate, thick, solid and translucent, except for subopaque interstitial markings and blackened spines. Spire very low, early whorls flattened and depressed, apex sunken. Suture impressed, undulated and margin distinctly lamellate (infrasutural cordlet). Whorls 5¼, descending in front; ultimate not inflated, upper part reclivous and steep at suture, flattened medially and subconvex below; tri-carinate, shoulder and basal (anterior) keels both strong, and a weaker medial keel. Sutural ramp of last whorl strongly corrugated by 9 wide, radial rugae; evenly positioned, each one thickened toward the base of a shoulder spine; furrows between them deep and darker. Rugae develop from nodules on the penultimate whorl, unevenly positioned until the last quarter whorl. Aperture of nearly equal height and width, sub-oblique laterally, opening circular and nacreous silver within; pentagonal in outline, base sub-effuse due to an open spine. Apertural border not stained by colour, and shows external markings on the crenulate palatal margin, matching the sculpture; its upper termination forms a shallow anal notch. Parietal area thick, columella narrow and oblique; and umbilicus wide, narrowly and deeply perforate at its centre. Umbilical tract spirally ridged

within, inner side finely lamellate and outer side partly spinose.

Coloration and Pattern.

Early whorls pale primrose-yellow with a white spinose rim, apex rose; and antepenultimate whorl with a partial ruby red subsutural band. Penultimate whorl is ruby red with primrose-yellow nodules and rugae; and last whorl off-white from sutural ramp to outer edge of umbilical tract. Pattern consists of deep maroon markings (flecks, blotches or squiggles/zigzags) in the interspaces of the cordlets (fine spiral cords) and white growth threadlets, faded to carmine on the umbilical tract and basal keel. Markings extend as fused streaks onto the base of spines on shoulder and median keels. Differentiated circumumbilical zone absent; inner side of umbilical tract light buff with a ruby red border.

Sculpture. Spines on shoulder: moderately long, distorted and variably directed. Complete spines sub-ramose with wedge-shaped ends and curved trifurcate tips. Eight on last whorl, early ones ruby red and remainder blackish-purple; all flecked with off-white, sparse or obsolete on red ones; and final three project 10 to 12 mm outward. Seven on penultimate whorl, ruby red; and seven on antepenultimate whorl, the last two ruby red and the rest off-white. Spines on median keel: twelve on last whorl, base deltoid; ruby red becoming blackish-purple toward lip, all flecked with off-white; directed forward and downward or horizontal; last one c. 4 mm long. Twelve on penultimate whorl, those visible are ruby red. Spines on basal keel: pale orange-yellow, last one c. 2 mm long; bordered by two cordlets, appearing as lateral barbs in profile on final spine. Shoulder spines are hollow, (ignoring damage) most incompletely sealed at their leading edge, vs. lower spines not sealed and open (grooved).

Cordlets on last whorl: pale orange-yellow and positioned as follows. **A)** Eleven on sutural ramp, slightly paler on rugae, weaker in furrows and all squamulose, some obsolete or coarser. **B)** Five between shoulder and median keels, all squamulose. **C)** Nine between median and basal keels, three with very short spines (spinulose) [lowest one near basal keel] and others squamulose. Cordlets of **A)** to **C)** are inequidistant and sub-equal, some thinner or thicker than others and intersected by white growth threadlets, forming a reticulate pattern and same alignment weaker on sutural ramp. **D)** Six on the umbilical tract are unequal, where two pairs of fine, squamulose ones separate two wider spinulose ones and the basal keel.

Type Material. 1 adult shell, Holotype (MNHN-IM-2000-35827, Plate 1, Figures 1-3 and Plate 2, Figures 19-21) shell height 24 mm without spines vs. apparent shell height 27 mm with spines, shell width 28 mm without spines vs. apparent shell width 42 mm with spines, shell weight 8.25 g and 5.25 (5¼) whorls.

Type Locality. North-western Sumbawa, West Nusa Tenggara, Indonesia.

Distribution. Currently known only from the type locality.

Ecology/Habitat. Collected by local divers on fringing reef.

Etymology. Named in honour of Steven Lie for supplying the holotype.

DIFFERENTIAL DIAGNOSIS

Angaria delphinus (Linnaeus, 1758) India to Philippines and south to Australia (Plate 1, Figures 4-5)

Similar in shape, solidity, apertural outline, lip thickness, some dimensions and in having shoulder spines recurved on spire whorls. Medial keel spines are similar, shorter or longer but never red. Differs from new species in lacking an infrasutural cordlet, instead has a “clear space” circa 3 mm wide; number of spines on shoulder less than on median keel (for example 7 versus 13); scales larger, subarcuate to tall-arched (vaulted) and cordlets coarser. Differently coloured post apical whorls, often greenish-yellow to yellowish-green, or pinkish; last whorl whitish becoming pink tinted to deep pink and a purple stained apertural border.

Pattern different, spirally lineate, white to pink cordlets with greyish or brown to black gemmae/granules, scales or spinules, and narrowing the spacing between them creates dark varieties where these may become solid-coloured lines; and interstitial markings absent. Shoulder spines are thick, rudely branched projections, very short or raised and divided into two or three lobes, or the tips shallowly to deeply lobed (lacinate); generally dark-coloured, sometimes red-lined on the back or rarely red on early whorls; always thicker, even when stunted and moderately- to widely-spaced. Basal keel spines not pale-coloured, equally fine on sympatric forms except forked; but generally larger, straight or forked, or short with tips shallowly lobed.

Angaria javanica K. & D. Monsecour, 1999
SW Java, Indonesia (Plate 1, Figure 6)

Differs from new species in numerous ways, such as spire low to tall; suture deeply impressed and lacks a distinct infrasutural cordlet, occasionally bordered by a row of growth squamae; last whorl deeply descending in front, exposing the base of the penultimate whorl. Subaxial folds on sutural ramp angular in profile, curved or slanted forward and unevenly

positioned; wide and thickened toward suture; furrows shallow and paler than ridges; and often obsolescent toward lip. Aperture wider, width greater than height on specimen studied; and apertural border white edged with external coloration. Early whorls variable in colour, mainly white, red, green or black; surface and spines greyish brown or tinged with purple, which may be faded in places or lost on tips of spines; and shells lack a pattern.

Median and basal keels absent, basal slope rounded with 6 to 9 spinose cords and 3 or 4 spinose cords on outer side of the umbilical tract; spines erect or slightly recurved and scaly when not worn. Most spines are “hollow” and almost sealed, others are “open-sided”; sub-horizontal and laterally compressed on the shoulder with bifurcate tips; short below and of similar size, sub-horizontal above to erect or sub-recurved below. Underside surface is basically smooth between spines. Cordlets on sutural ramp and spines are scaly toward lip, both with arched or flattened scales respectively, which are crowded closer to lip, obsolete or absent (worn off) elsewhere.

Angaria fratrummonsecourorum Günther, 2013
Nha Trang, Khanh Hoa Province, Vietnam
(Plate 2, Figures 10-12 and Plate 3, Figures 22-24)

Overall like an almost spineless version of the new species, being similar in shape, aperture and development of the posterior, median and basal keels. Spines have a similar “reddish” to “dark purplish” colour change, just different tones and hues. Differs in the colour of the infrasutural cordlet and other cordlets; and inner umbilical tract lacks a reddish border. Subaxial folds on sutural ramp similar on early whorls, except vinaceous-pink and become angular in profile, unevenly positioned on last whorl and obsolescent toward lip. Interstitial markings are

different, white and maroon on a claret brown ground and from a distance appear as purplish spiral bands speckled with white. According to Dekker (2020), *Angaria moolenbeeki* Thach, 2018 is a synonym.

Angaria guntheri Thach, 2018 Nha Trang, Khanh Hoa Province, Vietnam (Plate 2, Figures 13-15 and Plate 3, Figures 25-27)

Somewhat resembles the new species, mostly in shape and having similar coloured cordlets and interstitial markings. Differs in all three keels being weaker; columella wider and thicker; aperture wider, width greater than height and outline elliptic-pentagonal; sutural ramp almost flat; and outer lip thinner, less mature than new species. It has a differently coloured penultimate whorl, whitish circumumbilical zone; narrower infrasutural cordlet; and radial rugae are not darkened or paler. Surface rougher, so pattern is more diffuse; markings appear similar, except above the base these are reddish (jasper red or maroon) and white on a paler reddish ground; base is white with reddish markings, which are sparse on the basal keel.

Spines slightly more numerous on shoulder and median keels and differently coloured; pinkish or reddish ones marked with white wiggly lines and macules. Spines on basal keel slightly darker, spines on the umbilical tract are larger; and scales present are thicker and/or larger. Sutural ramp corrugation is less pronounced and develops from twin-peaked nodes connected by cordlets on the penultimate whorl and furrows deep; nodes expand into angular radial ridges on the last whorl with outer peak larger, thickened medially and weakened (reduced) toward lip, and furrows shallow.

Angaria cf. guntheri Thach, 2018 Moluccas (Maluku), Indonesia (Plate 2, Figures 7-9 and Plate 3, Figures 28-30)

Shell displays a mix of features seen on *Angaria guntheri* and the next species. It differs from the new species in having longer pale-coloured spines without forked tips, compressed towards the lip. Cordlets on upper surface off-white becoming cream-coloured adaperturally; those below the shoulder buff-pink and coarser, sub-medial ones have much longer spines. Sutural ramp somewhat flat with weaker radial rugae that are angular in profile, thickened medially, curved forward or perpendicular to suture and unevenly spaced, obsolescent toward lip; furrows shallow and darker than the rugae.

Spines from suture to anterior/basal keel are buff-pink to testaceous with off-white markings. Interstitial markings ox blood red to maroon and set between off-white growth threads, equally distinct above and below the shoulder; on upper surface coalescent toward the lip and at the base of shoulder spines, and absent below the basal keel. Inner umbilical tract dull rose pink and surrounded by fewer spinose cordlets. Medial and basal keels weakly developed, and shoulder keel moderately strong; outer umbilical tract with only two pale buff-pink, spinose cordlets. Aperture is wider, more rounded and sub-pentagonal in outline with a thinner outer lip.

Angaria scalospinosa Günther, 2016 Masbate, Philippines (Plate 2, Figures 16-18 and Plate 3, Figures 31-33)

Species similar in appearance to the specimen considered here as *Angaria cf. guntheri*. It differs from the new species by having a white infrasutural cordlet, other cordlets creamy and straight or irregular; bright rose-red inner umbilical tract and off-white to creamy upper surface with a rosy subsutural band. Early whorls Eugenia red changing to creamy-white lower whorls with a wide zone of pomegranate purple interstitial markings, set between off-white growth threads and lamellae on the last

whorl. Sculpture coarser, especially on the sutural ramp; and scales more acute, larger. Shoulder and median keels moderately strong, except spines are somewhat flattened, longer and honey yellow with white markings, slightly darker than finer spirals. Sutural ramp almost flat with creamy radial folds that are angular in profile, curved or slanted forward and unevenly positioned, wide and thickened toward suture and obsolescent toward lip; furrows shallow and paler than ridges. Basal keel only weakly developed with small spines, base rounded and aperture wider, outline sub-pentagonal.

ACKNOWLEDGMENTS

We thank the locals for sending the holotype of this new species to Steven Lie. We also give thanks to Virginie Héros, Chargée de conservation collection Mollusques at MNHN for assistance in depositing the holotype and permission to use their images. Thanks also given to editors of Vita Malacologica and Gloria Maris, and to Dr. I. Richling, Curator for Malacology collection at SMNS for permission to use their images.

LITERATURE CITED

- Dekker, H. 2020.** An overview of the living species of *Angaria* (Vetigastropoda, Trochoidea, Angariidae), with description of two new species. *Vita Malacologica* 19:30-66.
- Monsecour, D. & K. Monsecour, 2011.** On the status of *Angaria aculeata* (Reeve, 1842) (Gastropoda: Turbinidae). *Gloria Maris* 50(3-4): 93-100.

ADDITIONAL REFERENCES

- Günther, R., 2013.** *Angaria fratrummonsecourorum* n. sp. – a new species of Angariidae from Vietnam (Mollusca: Gastropoda). — *Conchylia* 44(1-2): 45-52.
- Günther, R., 2016.** *Angaria rubrovaria* n. sp. and *Angaria scalospinosa* n. sp. - Two new species of

Angariidae from the Philippines (Mollusca: Gastropoda). — *Conchylia* 46(1-4): 79-87.

- Linnaeus, C. 1758.** *Systema naturae per regna tria naturæ, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Tomus I, Editio decima, reformata.* Laurentius Salvius: Holmiae: [1-4], 1-824.
- Monsecour, K. & D. Monsecour, 1999.** Two new species of *Angaria* (Mollusca: Gastropoda). *Gloria Maris* 37(5-6): 63-70.
- Thach, N.N. 2016.** Vietnamese new mollusks. *Seashells - Land snails – Cephalopods*, with 59 new species. 48HRBooks Company, Akron, Ohio, USA: 205 pages.
- Thach, N.N. 2018.** New shells of South Asia. *Seashells-Landsnails-Freshwater Shells, 3 New Genera, 132 New Species and Subspecies.* 48HRBooks Company, Akron, Ohio, USA: 173 pages.

IMAGES CITED

- Caballer, M. 2016.** Project: RECOLNAT (ANR-11-INBS-0004). '*Angaria scalospinosa*,' Image: holotype MNHN-IM-2000-30064. Muséum national d'Histoire naturelle (scientific databases), Paris (France) Collection: Molluscs (IM) (science.mnhn.fr). [Accessed: 8 July 2021] <http://coldb.mnhn.fr/catalognumber/mnhn/im/2000-30064>
- Caballer, M. 2019.** Project: RECOLNAT (ANR-11-INBS-0004). '*Angaria guntheri*,' Image: holotype MNHN-IM-2000-34018. Muséum national d'Histoire naturelle (scientific databases), Paris (France) Collection: Molluscs (IM) (science.mnhn.fr). [Accessed: 6 July 2021] <http://coldb.mnhn.fr/catalognumber/mnhn/im/2000-34018>
- SMNS, 2018.** '*Angaria fratrummonsecourorum*,' Image: paratype SMNS ZI0076692. Staatliches Museum für Naturkunde Stuttgart - Biology types and published specimens (typus.smns-bw.org). [Accessed: 8 July 2021] <https://typus.smns-bw.org/dev5/index.php?hemisphere=Biology&hid=0>

Cite as: Parsons, J. and J. Abbas. 2021. A New Species of *Angaria* Röding, 1798 (Gastropoda: Angariidae) from North-Western Sumbawa, Indonesia. *The Festivus* 53(4):261-269. <https://doi.org/10.54173/F534261>

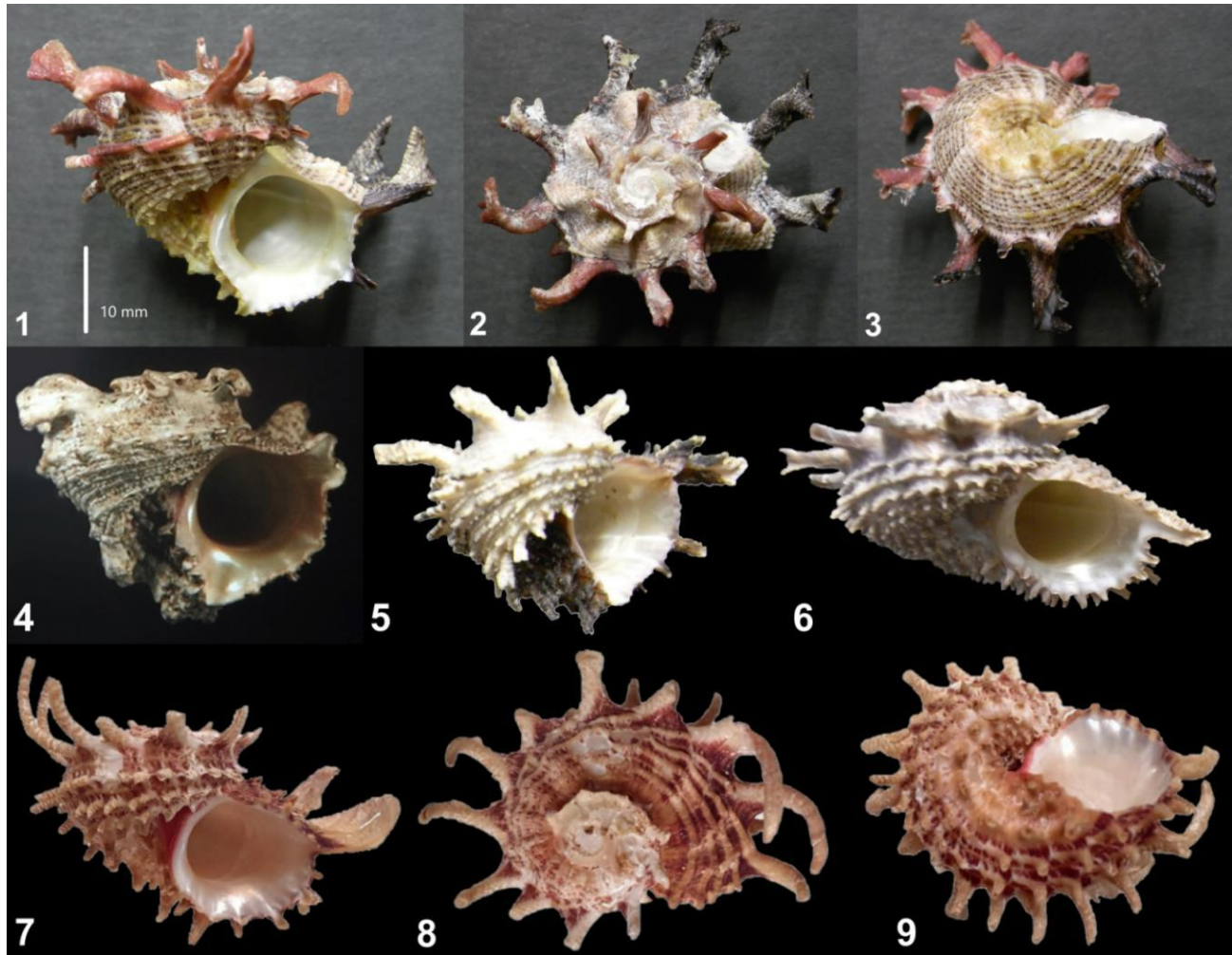


Plate 1. Comparison and contrast of *Angaria* species living closest to *Angaria stevenliei* n. sp. in Indonesia. **First row, Figures 1-3** = *A. stevenliei* n. sp. Holotype MNHN-IM-2000-35827; **Second row, Figure 4** = *A. delphinus* LSL.527, specimen or probable syntype; **Figure 5** = *A. delphinus* Zamboanga, Philippines (JP); and **Figure 6** = *A. javanica* Pangandaran Bay, SW Java, Indonesia (JP); **Third row, Figures 7-9** = *A. cf. guntheri* Moluccas (Maluku), Indonesia ZMA.MOLL.310442; [Image credits: 1-3 and 5-6 JP; 4 modified from D. & K. Monsecour, 2011 plate 3, figure 21; 7-9 modified from Dekker, 2020 plate 6, figure 3].



Plate 2. Non-Indonesian relatives of *Angaria stevenliei* n. sp. **First row, Figures 10-12** = *A. fratrummonsecourorum* Paratype SMNS ZI0076692; **Second row, Figures 13-15** = *A. guntheri* Holotype MNHN-IM-2000-34018; **Third row, Figures 16-18** = *A. scalospinosa* Holotype MNHN-IM-2000-30064; [Image credits: **10-12** copyright SMNS, 2018, photo: Mike Severns; **13-15** M. Caballer - 2019 Project: RECOLNAT (ANR-11-INBS-0004); and **16-18** M. Caballer - 2016 Project: RECOLNAT (ANR-11-INBS-0004)].

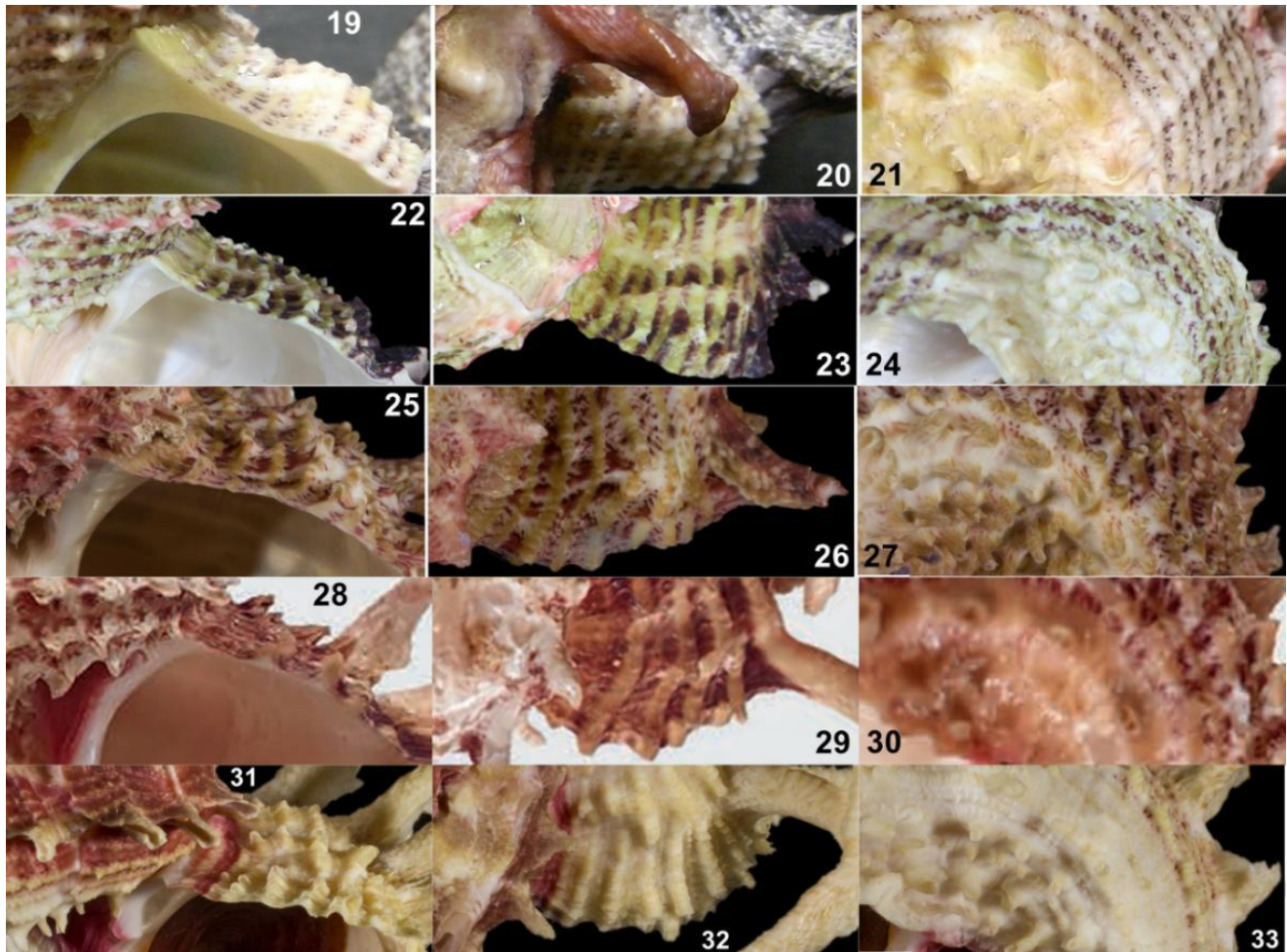


Plate 3. Comparison and contrast of sculpture and interstitial markings or coloration on *Angaria stevenliei* n. sp. with those on closest relatives shown in plate 1. **First row, Figures 19-21** = *A. stevenliei* n. sp. Holotype MNHN-IM-2000-35827; **Second row, Figures 22-24** = *A. fratrummonsecourorum* Paratype SMNS ZI0076692; **Third row, Figures 25-27** = *A. guntheri* Holotype MNHN-IM-2000-34018; **Fourth row, Figures 28-30** = *A. cf. guntheri* Maluku ZMA.MOLL.310442; **Fifth row, Figures 31-33** = *A. scalospinosa* Holotype MNHN-IM-2000-30064; [Image credits: JP, modified from figures in first plate]