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A Review of *Neodilatilabrum* Dekkers, 2008 (Mollusca: Neostromboidae: Strombidae) Resulting in a New Species from Japan

Stephen J. Maxwell [1]
[1] College of Business, Law, and Governance, James Cook University, Cairns, 4878
stephen.maxwell@my.jcu.edu.au

ABSTRACT The genus *Neodilatilabrum* contains taxa that are both morphologically stable across their ranges, while others are highly plastic, making the choice of discerning characteristics critical to achieving taxonomic stability. A new species of *Neodilatilabrum* from Japan is presented here. *Neodilatilabrum tasminae* n. sp. lacks the axial shoulder rib on the body whorl found in *N. robustum* and *N. sowerbyorum*. The angulate shoulders of *N. succinctum* differentiate that taxon from *N. tasminae*. *Neodilatilabrum simanoki* is placed within the synonymy of *N. sowerbyorum*, and *N. boucheti* is placed under the synonymy of *N. robustum.* This revision provides the basis from which more detailed studies into the complex variability of species, both locally and across their ranges, to be undertaken.

KEYWORDS Distribution, Gastropoda, morphology, taxonomy, *Strombus*, *Neodilatilabrum, Neodilatilabrum tasminae, N. succinctum, N. simanoki, N. sowerbyorum, N. boucheti, N. robustum*

INTRODUCTION

The taxonomic tree of the stromboideans has bloomed over the last decade with a wave of renewal that has revived taxonomic and collecting interest in the complex. Molecular conformation of historical taxonomy has given renewed confidence in the viability of classical taxonomic practice to explain effectively and robustly the diversity of the stromboideans (Latiolais *et al.* 2006; Machkour-M'Rabet *et al*. 2021; Irwin *et al*. 2021). More recently, classical taxonomic studies into stromboidean generic relationships (Dekkers & Maxwell 2020; Maxwell *et al.* 2020). This has been concurrent with revisions of many stromboidean genera such as *Canarium* (Liverani *et al.* 2021); *Doxander* (Maxwell 2022b); *Gibberulus* (Maxwell *et al.* 2021); *Ministrombus* (Maxwell 2022a), studies which have resulted the description of new taxa. The focus of this study, *Neodilatilabrum*, is a similar review of a genus in the family Strombidae.

The taxonomy of *Neodilatilabrum* has been well studied this century with an attainment of a greater understanding of higher taxonomic relationships (Dekkers & Maxwell 2020; Maxwell 2021), better understanding of type material (Kronenberg 2008; Kronenberg *et al.* 2019; Vertriest 2022), the recognition of new taxa (Visser & Man in 't Veld 2005; Liverani 2013; Thach 2016; Vertriest 2022), and increased knowledge of the distribution of species within the complex (Maxwell 2022c). However, confusion remains over the taxonomic composition of the central Indo-Pacific with the number of recognised taxonomic hypotheses varying between authors (Kronenberg *et al.* 2008; Vertriest 2022). This study seeks to provide an evidence-based set of hypotheses to explain the observable variability within extant *Neodilatilabrum*.

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METHODS

The type of each *Neodilatilabrum* was examined (Figure 1), and the synonymy for each of these re-examined for morphological differences (Box 1) and biogeographical significance (Petuch & Berschauer 2020). Type locations, where possible, should reflect the location of the holotype. Range data presented in the literature for each taxon was used to assess appropriateness of its type location, and were appropriate amended. Selected literature is provided for each taxon presented to illustrate synonymies and changes in generic affiliations.
This paper utilises two codes of nomenclature. The PhyloCode (2019) for clades that are at the primary rank (genus) and above. Subgenera are not defined under the PhyloCode herein, and like species, are constructed to be compliant with the ICZN (1999). New species are described based on morphological differences and biogeography.

Distribution records for material examined that have been published in prior works have been treated as a location citation, and not classified as material seen. This avoids confusion and duplication of existing distributional records. New locality records are listed where appropriate under the respective taxon and/or listed in the caption of a figure. Hypothesized normal ranges for each species were mapped based on specimen data and biogeography (Petuch & Berschauer 2020; Figure 1). Images of specimens are shown to the same scale throughout to provide an indication of relative sizes of the taxa.

***Neodilatilabrum* Taxonomic Key**

1.	Body whorl with sharp ridged shoulder	*N. marginatum*
	Shoulder not sharply ridged	go to 2
2.	Shell fusiform and elongated	*N. eliosae*
	Shell bi-pyramidal or bulbiform	go to 3
3.	Left dorsal body whorl without axial rib	go to 4
	Left dorsal body whorl with axial rib	go to 5
4.	Spire shoulders strongly angulate	*N. succinctum*
	Spire shoulders rounded	*N. tasminae*
5.	Body whorl bulbiformis, sutural ramp - straight to convex	*N. sowerbyorum*
	Body whorl triangulate, stutural ramp - convex to straight	*N. robustum*

Box 1. *Neodilatilabrum* taxonomic key.

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SYSTEMATICS

Superfamily	Stromboidea Rafinesque, 1815
Epifamily	Neostromboidae Maxwell, Dekkers, Rymer, & Congdon, 2019 [Maxwell 2021]
Family	Strombidae Rafinesque,1815 [Maxwell 2021]
Subfamily	Neostrombinae Maxwell & Rymer, 2021 [Maxwell 2021]
Tribe	*Dolomenini* Dekkers & Maxwell, 2020 [Maxwell 2021]

Neodilatilabrum
Dekkers, 2008 [Maxwell 2021]

Description. "Stromboidal notch sinuous. The flange is not stepped. Spire with distinct shoulder with knobs. Body whorl shiny and almost without any sculpture; expanded outer lip thickened at the inner edge and smooth. Aperture smooth within. Columellar smooth, with callous, well-marked. The anterior canal is short. The stromboid notch is moderately developed. The posterior canal is present" (Dekkers & Maxwell 2020).
Type Species. *Neodilatilabrum marginatum* (Linné, 1758).
Definition. The maximum clade consisting of *Neodilatilabrum marginatum* (Linné, 1758) and all species that share a more recent common ancestor with them than with *Doxander vittatus* (Linné, 1758), *Dolomena pulchella* (Reeve,1851), *Labiostrombus epidromis* (Linné, 1758), *Ministrombus minimus* (Linné, 1771), *Mirabilistrombus listeri* (Gray, 1852), *Neostrombus fusiformis* (Sowerby II, 1842) or *Laevistrombus vanikorensis* (Quoy & Gaimard, 1834).
RegNum Registration Number. 583.
Reference Phylogeny. Figure 2 in Dekkers & Maxwell (2020).
Comparative Diagnosis. The *Neodilatilabrum* lacks the subsutural cord found in *Doxander* Wenz,1940 and the flange fold found in all *Dolomenina* Dekkers and Maxwell, 2020.
Synonymy.
2007 *Margistrombus* Bandel, p.153 (not available article 13.1.1).
2008 *Neodilatilabrum* Dekkers, p 58 - RegNum registration see Maxwell 2021.
2021 *Neodilatilabrum* Dekkers, 2008 - Maxwell 2021, converted clade name.

Neodilatilabrum marginatum
(Linné, 1758)
(Figure 1A, Figure 2)

Original Description. "*S. testæ labro prominula, dorso marginato lævi, cuda intega*" **(**Linné 1758, p. 744, no. 431).
Type Material. Museum of Evolution, Uppsala University Sweden, 1229a **(**Visser & Man in 'T Veld 2005; Neotype).
Type Locality. Sri Lanka (Abbott 1960).
Synonymy.
1758 *Strombus marginatus* Linné, p. 744, no. 431. Linné 1767, p. 1209, no. 499. Schröter, 1783, p. 431, Gmelin 1791, p. 3513, no. 15. = *Strombus marginatus* - Röding 1798, p. 62, nos. 779-780. = *Strombus marginatus* - Dillwyn 1817, p. 665. Kiener 1843, p. 44, pl. 16, fig. 2. Hanley 1856, p. 123. Reeve 1860, p. 93. Dodge 1956, p. 262. Dance 1974, p. 84. Abbott & Dance 1982, p. 79. = *Strombus marginatus* - Dillwyn 1817, p. 672. = *Strombus* (*Gallinula*) *marginatus* - Tryon 1885, pp. 116 & 141, pl. 5, fig. 53. = *Strombus* (*Dolomena*) *marginatus marginatus* - Abbott 1960, p. 98, pl. 18, figs. 6 & 7, pl. 74, fig. 1, pl. 75. Walls 1980, pp. 115, 116, & 189. Kreipl *et al*. 1999, pp. 12 & 42, pls. 83 & 84. Visser & Man in 'T Veld 2005, p. 56, pl. 1, figs. 1 & 2, pl. 2, fig. 1, pl. 3, figs. 1 & 2. = *Strombus marginata* - Walls 1980, p. 188.
1798 *Lambis carinata* Röding, p. 62, nos. 779 &

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780. Abbott 1960, p. 99. = *Lambis carinatus* - Hanley 1856, p. 123. = *Strombus carinata* - Dance 1974, p. 84. Walls 1980, p. 188.

1860 *Strombus emarginatus* Hanley, p. 74.

Records. ***India*** - Cuddalore (Dekkers & Maxwell 2020); Kilakari (Dekkers & Maxwell 2020; Visser & Man in't Veld 2005); Kilarkarai (Dekkers & Maxwell 2020); Kottai Pattanam (Dekkers & Maxwell 2020); Madras (Visser & Man in'T Veld 2005); Pamban, Gulf of Manaar ('Thurston' in Abbott 1960; Visser & Man in't Veld 2005); Ramanathapuram, Devipattanam (Dekkers & Maxwell 2020; Visser & Man in't Veld 2005); Rameswaram (Visser & Man in't Veld 2005). ***Sri Lanka*** - Pearl bank, Gulf of Manaar (Abbott 1960); Eluvativu Island (Abbott 1960); Galle (Dekkers & Maxwell 2020); Trincomalee (Dekkers & Maxwell 2020). ***Myanmar*** - North of Tavoy, Maungmagon (Abbott 1960). ***Thailand*** - Phuket (Visser & Man in't Veld 2005). ***Indonesia*** - Oebjoeng Batee Kapal ('Oostingh' in Abbott 1960); Lam Baro, Atjeh Head ('Oostingh' in Abbott 1960); Tapatoean, Sumatra (Visser & Man in't Veld 2005).

Neodilatilabrum eloiseae
(Vertriest, 2022)
(Figure 1B, Figure 3)

Original Description. "Shell very slender and elongated, shell width usually less than ½ of shell height. Shell size usual for the genus, between 33 mm and 62 mm. Coloration between pale orange brown and brown with 3 – 4 white lines on the last whorl, interrupted by a zig-zag pattern. Columella white and smooth in the centre. Faint striae present on the upper and lower columella near the siphon and posterior siphon. Aperture white with clear striae not running until the edge of the lip. Stromboid notch very shallow. 7-9 whorls with multiple varices on the spire. Top heavily structured up until around the 5th whorl. Last 2-3 whorls with faint structure. Last whorl smooth or with very faint structure up until the lip, which is faintly structured on the outside. Faint rounded dorsal keel with a knob located approximately in the centre of the dorsum. Posterior canal variable in length: from short and reaching the body whorl only to long and running up the spire for 2-3 whorls" (Vertriest 2022, pp. 93-94).

Type Material. Museum National d'Histoire Naturelle, Paris, MNHN-IM-2000-37645 (Vertriest 2022; Holotype; Figure 1B).

Type Locality. Madras, Tamil Nadu, South-East India (Vertriest 2022, p. 93).

Synonymy.

Strombus succinctus - Sowerby 1842, pl. 6, figs. 20 & 21. Kiener 1843, p. 45, pl. 10, fig. 2. Duclos 1844, pl. 12, figs. 5 & 6, pl. 21, figs. 6 & 7. Hanley 1860, p. 74. Hanley 1856, p. 124, pl. 25, fig. 30. Reeve 1860, p. 94. Dodge 1956, pp. 262 & 278. Dance 1974, p. 84. = *Strombus* (*Gallinula*) *succinctus* - Tryon 1883, p. 190, pl. 49, fig. 59. Tryon 1885, pp. 116 & 145, pl. 6, fig. 56. = *Strombus* (*Labiostrombus*) *succinctus* - Cox 1948, p. 24. = *Labiostrombus succinctus* - Iredale 1929, p. 344. Abbott & Dance 1982, p. 79. = *Strombus* (*Dolomena*) *marginatus succinctus* - Abbott 1960, p. 99, pl. 18, figs. 13 & 14. Walls 1980, pp. 117, 118 & 190. Kreipl *et al*. 1999, pp. 12 & 43, pl. 86, figs. 1-3. Visser & Man in 't Veld 2005, p. 64, pl. 1, figs. 5 & 6, pl. 2, fig. 3, pl. 3, fig. 7. = *Strombus* (*Margistrombus*) *succinctus* - Bandel 2007, p. 154, fig. 20a. = *Margistrombus succinctus* - Liverani 2013, pl. 153, fig. 1. = *Neodilatilabrum succinctum* - Dekkers & Maxwell 2020, p. 57, fig. 3k. [not *Strombus succinctus* Linné, 1767 which is valid]

2022 *Margistrombus eloiseae* Vertriest, p. 90, pl. 3.

Records. ***India*** - Auroville (Vertriest 2022); Colachel (Vertriest 2022); Cuddalore (Dekkers & Maxwell 2020; Vertriest 2022); Kottai Pattinam (Dekkers & Maxwell 2020; Vertriest 2022); Madras (Abbott 1960; Dekkers & Maxwell 2020; Vertriest 2022); Rameswaram (Vertriest 2022); Tamil Nadu (Vertriest 2022); Thondi (Vertriest 2022); Tuticorin (Dekkers & Maxwell 2020; Vertriest 2022). ***Sri Lanka*** - Ara point, Nilaveli (Abbott 1960); Colombo (Vertriest 2022); Galle (Dekkers & Maxwell 2020; Vertriest 2022); Jaffnah (Vertriest 2022); Kalkudah (Vertriest 2022); Kuchchaveli (Vertriest 2022); Lavinia (Dekkers & Maxwell 2020; Vertriest 2022); Pearl Banks, Gulf of Manaar (Abbott 1960); Matara (Vertriest 2022); Trincomalee (Abbott 1960; Vertriest 2022). ***Thailand*** - Andaman Sea, Ko Chan Island (Vertriest 2022).

Neodilatilabrum robustum
(Sowerby, 1875)
(Figure 1C, Figure 4, Figures 9B-H)

Original Description. "*S. testa conica, solida, ventricosa, cæruleo-alba, castaneo zonata et maculata ; spira parviuscula acuta; anfractibus nodulosoangulatis, superne spiraliter striatis; anfractu ultimo in medio fere lævi, deinde versus marginem conspicue striato, ad basinsulcato; apertura elongata, canali superne spiram ascendente; columella callosa, alba, obsolete lirata; labio externo emarginato, intus lirato*… Shell conoid, solid, ventricose, bluish white, banded and blotched with dark brown; spire rather short, acute; whorls angulated and noduled at the angle, spirally striated above; last whorl almost smooth in the middle, then towards the margin conspicuously striated, grooved at the base; aperture elongated, with a canal at the upper part, running up the spire; columella furnished with a thickened white enamel, which is faintly ridged; outer lip emarginated; interior ridged" (Sowerby 1875, p. 599).

Type Material. Natural History Museum (UK) no. 20100312 (Kronenberg *et al*. 2019; Lectotype; Figure 1C).

Type Locality. Hong Kong, China (Sowerby 1875).

Synonymy.

1875 *Strombus robustus* Sowerby, pl. 22, figs. 3 & 3a. Tryon 1885, pp. 116 & 144, pl. 5, fig. 54. Dodge 1956, pp. 264 & 280. = *Strombus* (*Dolomena*) *marginatus marginatus var. robustus* - Walls 1980, pp. 115, 116 & 190. = *Margistrombus robustus* - Kronenberg *et al*. 2019, figs. 2a & b, 4-6. = *Neodilatilabrum robustum* - Maxwell 2022, fig. 1.

2016 *Margistrombus boucheti* Thach, p. 39, figs. 77-82 (Figure 1H). Kronenberg *et al*. 2019, figs. 8a, b, & c,

Strombus marginatus - Cob *et al.* 2008, p. 618, fig. 10b [non *Strombus marginatus* Linné, 1758 which is valid].

Records. ***Thailand*** - Koh Chang (Abbott 1960); Koh Samet (Abbott 1960); Khan Nu Paknam (Abbott 1960); Ban Ao Moo, Bang Ko Chai (Abbott 1960); ***Hong Kong*** - south of Lema Island (Abbott 1960). ***Malaysia*** - Merambong Shoal, Johor Straits (Cob *et al*. 2008). Philippines - Corregidor Island (Dekkers & Maxwell 2020). ***Singapore*** - Changi Coast Walk (Dekkers & Maxwell 2020; Chim *et al.* 2009). ***Vietnam*** - Nah Trang (Thach 2016); An Dang Beach (Dekkers & Maxwell 2020); Mui Ne (Dekkers & Maxwell 2020). ***Australia*** - Dingo Beach (Maxwell 2022); Point Cartwright (Maxwell 2022a).

Neodilatilabrum sowerbyorum
(Visser & Man in't Veld, 2005)
(Figure 1E, Figure 5)

Original Description. "This is what Abbott described as the heavier and more rotund

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subspecies. The shell is indeed globose and always without a keel present on the shoulder of *S. m. marginatus*. Very characteristic for this subspecies in the plication ventrally on the left, forming a thin rib. The length of shell varies from 25-65 mm. The anal canal extends up the spire and often bends sharply to the left, well onto the spire whorls" (Visser & Man in't Veld 2005, p. 59).

Type Material. Natuurmuseum Rotterdam 15986 (Visser & Man in't Veld 2005; Holotype; Figure 1D).

Type Locality. Kuala Beliat, Borneo, Brunei (Visser & Man in't Veld 2005).

Synonymy.

1767 *Strombus uccinctus* Linnaeus, p. 1212, no. 509, in part. = *Strombus accinctus* Linnaeus 1767, p. 1212, no. 509, in part. = *Strombus accinctus* Born 1778, pp. 280 & 281 in part. Born 1780, p. 283, pl. 10, figs. 14 &15. [non *Strombus succinctus* Linné, 1767 which is valid],

2005 *Strombus (Dolomena) marginatus sowerbyorum* Visser & Man in 't Veld, pp. 58-60, pl. 1, figs. 3 & 4, pl. 2, fig. 2, pl. 3, figs. 3 & 4. Chim *et al*. 2009, p. 379, figs. 1-5. = *Strombus sowerbyorum* - Kronenberg 2008, p. 62, figs. 9-15.

2013 *Margistrombus simanoki* Liverani, p. 77, pl. 1, figs. 1 & 2 (Figure 1H).

Strombus (Dolomena) marginatus robustus - Abbott, 1960, p. 100, pl. 76, figs. 1 & 2. = *Dolomena marginata marginata robusta* - Raven 2002, pp. 11 & 12, pl. 3, figs. 15-17, pl. 4, figs. 18-22. = *Margistrombus robustus* - Kronenberg *et al*. 2019, figs. 7a-c, [non *Strombus robustus* Sowerby, 1875 which is valid].

Records. ***Brunei*** – Belait (Raven 2002; Visser & Man in't Veld 2006); Tutong (Raven 2002). Sarawak (Abbott 1960); Tapaktuan, Aceh Province (Liverani 2013). ***Malaysia*** - Santubong (Raven 2002); Bekenu (Raven 2002); Miri (Raven 2002); Baram River (Raven 2002); Labuan Island (Raven 2002); Tanjung Aru Beach, Kota Kinabalu (Raven 2002); Kudat Bay (Raven 2002); Cherating (Raven 2002); Kuala Terengganu (Raven 2002).

Neodilatilabrum succinctum
(Linné, 1767)
(Figure 1F, Figure 6)

Original Description. "*S. testa labro rotundato retuso, ventre laevi cingulis quatuor pallidis lineari-punctatis… Testa laevis, testacea, dorso subcarinato cincto lineis bigeminis albo-punctatis. Spirae anfractus striati carinula crenata. Labrum exterius intus striatum; Interius adnatum, laeve, gibbum, antice substriatum"* (Linné 1767, p. 1212).

Type Material. Linnean Society of London Collection no. 437 (Dodge 1956; Lectotype; Figure 1E).

Type Locality. Luzong, Bataan Peninsula, Luzon Island, Philippines (Vertriest 2022).

Synonymy.

1767 *Strombus ccinctus* Linné, p. 1212, no. 509. = *Strombus accinctus* Linné, 1767a, p. 1212, no. 509. Born 1778, p. 280. Dillwyn 1817, p. 672; Hanley 1856, p. 124. Tryon 1885, p. 135. Dodge 1956, p. 279. Abbott 1960, p. 100. = *Strombus succinctus* Gmelin, 1791, p. 3518; no. 26, in part. = *Lambis succinta* Röding 1798, p. 62, no. 781. = *Strombus succinctus* Dillwyn 1817, p. 672. = *Marigistrombus succinctus* - Vertriest 2022, p. 90, pl. 2, figs. A-E.

1844 *Strombus septimus* Duclos, pl. 13, figs. 9 & 10, pl. 15, fig. 11, pl. 26, fig. 2. = *Strombus* (*Gallinula) succinctus septimus* – Tryon 1885, pp. 117 & 144, pl. 6, fig. 57. = *Strombus septimus* - Dodge 1956, p. 279. = *Strombus marginatus septimus* - Hinton 1972, p. 10, pl. 5, figs. 7 & 8. Hinton 1977a, p. 12, no. 7. Hinton 1977b, p. 9, no. 7. Abbott & Dance 1982, p. 79. = *Strombus* (*Dolomena*) *marginatus*

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septimus - Abbott 1960, p. 101, pl. 18, figs. 10 & 11, pl. 74, fig. 2. Walls 1980, pp. 117, 118 & 190. Cernohorsky 1972, p. 78, pl. 19, fig. 2. Springsteen & Leobrera 1986, p. 72, pl. 17, fig. 13. Kreipl *et al.* 1999, pp. 12 & 43, pl. 86, figs. 4-7. Visser & Man in 't Veld 2005, pp. 58-60, pl. 1, figs. 7-8, pl. 2, fig. 2, pl. 3, figs. 8. = *Strombus* (*Labiostrombus*) *marginatus septimus* - Willan 2000, p. 19. = *Dolomena marginata septima* - Raven 2002, pl. 4, fig. 23. = *Margistrombus septimus* - Liverani 2013, pl. 153, fig. 2. = *Neodilatilabrum septimum* - Dekkers & Maxwell 2020, p. 57, fig. 3I.

Records. ***Brunei*** (Vertriest 2022). ***Indonesia*** - Ambon (Raven 2002); Hitu, Ambon Bay, Rumahtiga (Visser & Man in 't Veld 2005). ***Philippines*** - Balicasag Island (Dekkers & Maxwell 2020; Vertriest 2022); Bantanyan Island (Vertriest 2022); Basilan Island (Abbott 1960); Bataan Island (Abbott 1960); Bohol (Dekkers & Maxwell 2020; Vertriest 2022); Garidad, Panay (Dekkers & Maxwell 2020; Vertriest 2022); Cebu, Sogod (Vertriest 2022); Dupolog, Mindanao Island (Abbott 1960); east end of Corregidor Island (Abbott 1960); Leyte Island, Albuera (Vertriest 2022); Lusong Island (Abbott 1960); Manila Bay (Dekkers & Maxwell 2020; Vertriest 2022); Marinduque (Vertriest 2022); Masbate Island (Abbott 1960); Negros (Dekkers & Maxwell 2020; Vertriest 2022); Puerto Princessa, Palawan Island (Abbott 1960); Rasal Island (Vertriest 2022); San Nicolas Shoals Light, Manila Bay (Abbott 1960); Luzon Island (Abbott 1960; Visser & Man in 't Veld 2005). ***Solomon Islands*** - Honiara (Visser & Man in 't Veld 2005; Vertriest 2022); Kakaboma (Vertriest 2022); Lunga River (Vertriest 2022); Marapa Island (Dekkers & Maxwell 2020); Marau Sound (Dekkers & Maxwell 2020); Gaudalcanal (Dekkers & Maxwell 2020). ***Papua New Guinea*** - Kieta, Bougainville (Abbott 1960); New Brittan (Hinton 1972). ***Vanuatu*** - Efate Island (Cernohorsky 1972). ***New Caledonia*** - Bourail (Abbott 1960); Touho (Vertriest 2022).

Neodilatilabrum tasminae
Maxwell, new species
(Figures 1D, 7, 8 & 9A)

Description. The ovate shell is large, heavy and solid. The early spire whorls are convex with fine even axial ribs. The rounded shoulder becomes more angular mid-development, gradually losing the axial sculpture and replacing it with incised spiral lines. The shell develops an obtusely angled shoulder by the penultimate whorl. Sutures are shallow and are positioned just below the shoulder of the proceeding whorl. While typically smooth, the body whorl is covered in finely spiral incised lines that may be diminished centrally. Shoulder knobs when present are few and obsolete. The columella is well formed and white, the posterior portion forming the side of the canal before becoming diminished. The outerlip is thickened centrally the aperture is white, and rarely violet. The posterior canal is highly variable crossing at or just above the shoulder to running the length of the spire and reflexing over the apex.

Type Material. Holotype: Okinawa, Japan, 1965, ex SMC67a.008a (Blue Sky Research Foundation Collection TC008), 61 mm (Figure 1F); Paratype 1: Koninato, Japan, 2004, SMC67a.001, 49 mm; Paratype 2: Taiwan, 2000, SMC67a.002, 52 mm; Paratype 3: Okinawa, Japan, 1965, SMC67a.003a, 64 mm; Paratype 4: Okinawa, Japan, 1965, SMC67a.003b, 60 mm; Paratype 5; Okinawa, Japan, 2005, SMC 67a.004, 59 mm.

Type Locality. Okinawa, Japan as the type locality designated herein.

Etymology. Named in honour of Dr. Tasmin Rymer for her contribution to education and advancement of excellence in research. Dr.

Rymer has been awarded teaching citations for excellence in evolutionary sciences, and has also worked on stromboideans authoring new taxa and advancing the understanding of the internal cladistic relationships within the complex, as well as working on the complex's population dynamics and anatomy.

Synonymy.

Labiostrombus succinctus - Kira 1959, p. 31, pl. 15, fig. 14. Vertriest 2022, pl. 2, figs. F & G. [non *Strombus succinctus* Linné, 1767 which is valid].

Dolomena marginata robusta - Kira 1962, p. 36, pl. 16, fig. 14. = *Strombus (Dolomena) marginatus robustus* - Abbott, 1960, p. 100, pl. 18, figs. 8 & 9. [non *Strombus robustus* Sowerby 1875 which is valid].

Records. Literary records that were originally placed under *N. robustum or N. succinctus* and are placed here after biogeographical considerations. These records all fall within the hypothesised range of the new species; however, given the ability for migration of this species it is not unexpected to see individual arsing outside known ranges. ***Japan*** – Sagami Bay, Honshu Island (Abbott 1960); Kii, Honshu Island (Abbott 1960); Kominato Chib (Dekkers & Maxwell 2020); Tosa Bay, Shikoku Island (Abbott 1960); Moeshima, Kagoshima Bay, Kyushu Island (Abbott 1960); Miyazaki Prefecture ('Kuroda' in Abbott 1960). Buckner Bay, Okinawa Island (Abbott 1960); Okinawa (Dekkers & Maxwell 2020; Vertriest 2022); ***Taiwan*** – Anping (Vertriest 2022); Lavinia (Vertriest 2022). ***Philippines*** - Negros Island, 54.47 mm (Vertriest 2022); Masbate, 43.97 mm (Vertriest 2022).

Biogeographical And Comparative Remarks

The *Neodilatilabrum* can be biogeographically divided into three groups: the first cross into both the Lemurian Molluscan Province (Petuch & Berschauer 2020); a second is encapsulated within the Indo-Malaysian Province (Petuch & Berschauer 2020); and a third, with one species, *N. tasminae*, found in the Japonic Molluscan Province (Petuch & Berschauer 2020).

Within the Lemurian Molluscan Province, the Andamanian and Bengalian Subprovinces contain two species. The first, *Neodilatilabrum marginatum* is morphologically stable across its range only showing a limited variability in colour. The strongly acute shoulder of the body whorls of *N. marginatum* enables the differentiation from *N. tasminae*, which has rounded shoulders. The second, *N. eloiseae,* is found within the distribution of *N. marginatum*; however, it is more localised and restricted in range *Neodilatilabrum eloiseae* is also stable in morphology across its range and differs from *N. tasminae* in being more elongated and having a finer surface sculpture. Reports of *Neodilatilabrum marginatum* and *Neodilatilabrum eloiseae* from Singapore should be treated as sporadic or invasive occurrences and not reflective of long-term stability in presence (Visser & Man in't Veld 2005; Vertriest 2022). The Indo-Malaysian Province contains three species.

The first, *N. robustum*, which ranges within the Vietnamese Infraprovince and has occasional occurrences within the Philippinian Subprovince. *Neodilatilabrum robustum* is highly variable in its shell plasticity within and between populations. The profound differences at the ends of the morphological spectrum within this species can lead to taxonomic misadventure (= *N. boucheti*), and in error seeking to recircumscribe a species and instead describing a novel one (= *N. sowerbyorum*). *Neodilatilabrum robustum* can be differentiated from the *N. tasminae* by the presence of an axial shoulder ridge, which may be broad and thick, or rarely diminutive, a characteristic missing in the new species. Although geographically

isolated, a population of *N. robustum* is also known to exist along the coasts of Queensland, with at least one verifiable live example from Dingo Beach having been found (Maxwell 2022). *Neodilatilabrum simanoki* is herein considered a provisional synonym of *N. sowerbyorum,* based on the variability of that species; however, reservations remain on this taxonomic arrangement given the stepped and uniform nodulation of the spire and shape of outerlip. It is this complexity in form between differing populations that complicates achieving complete taxonomic certainty using morphology.

The second, *N. sowerbyorum* is found in the Nusa Tenggaran Infraprovince on north to north eastern coasts of Borneo and is highly variable, and this can lead to taxonomic confusion. Notwithstanding, *N. sowerbyorum* differs from other members of the complex in having a convex ramp below the suture on the left when viewed dorsally; in contrast, *N. robustum* is concave. The strong spiral incised uniform lines on the dorsum of *N. tasminae* are greatly reduced in *N. sowerbyorum*. Furthermore, *N. sowerbyorum* possesses an axial ridge on the shoulder not dissimilar, but less pronounced, to that on *N. robustum*. *Neodilatilabrum simanoki* is found in southern central Indonesia, and this includes the Kangean Islands (Liverani 2013). The author has examined a large sample (n = 146) of *N. sowerbyorum* from the Kangean Islands, and while no examples exactly match all the characteristics of the *N. simanoki* holotype, collectively they account for the variance, and therefore, *N. simanoki* is provisionally best placed within the synonymy of *N. sowerbyorum.* Morphological characteristics like the shape of the upper shoulder remain problematic.

The third, *N. succinctum* is found throughout the western and central Indo-Malaysian Province. In *N. succinctum* the height of the spire, which is often up to a third of the height of the shell and has later whorls that are sharply shouldered, and with well-defined sutures. This contrasts with *N. tasminae.* The new species, has later spire whorls that are finely and uniformly incised, being convex with a small raised spiral ridge at the point of maximum shoulder height.

The new taxa within the complex, *N. tasminae,* is known to range within Japonic Molluscan Province and into the neighbouring Philippinian Subprovince. Within the Japonic Molluscan Province, *N. tasminae* is recorded from the Ryukyuan and South China Subprovince. This species is stable in form, most variability is restricted to the shape, length and position of the posterior canal.

CONCLUSION

This paper introduces *N. tasminae* from Japan and brings the total of recognised species to six. *Neodilatilabrum simanoki* is provisionally placed within the synonymy of *N. soweryborum* based on shared characteristics. The *Neodilatalibrum* complex is one of dichotomies. Some taxa have a high degree of morphological stability such as *N. marginatum*, in contrast to other taxa, which are highly plastic in form such as *N. sowerbyorum*. This high degree of variability had historically led to taxonomic confusion. The development of a taxonomic key provides a means to differentiate specimens that have typical characteristics. The hypotheses presented in this paper seeks to explain the diversity within the Stromboideans and provides a definitive starting point from which to further explore the *Neodilatilabrum* for new taxonomic hypotheses.

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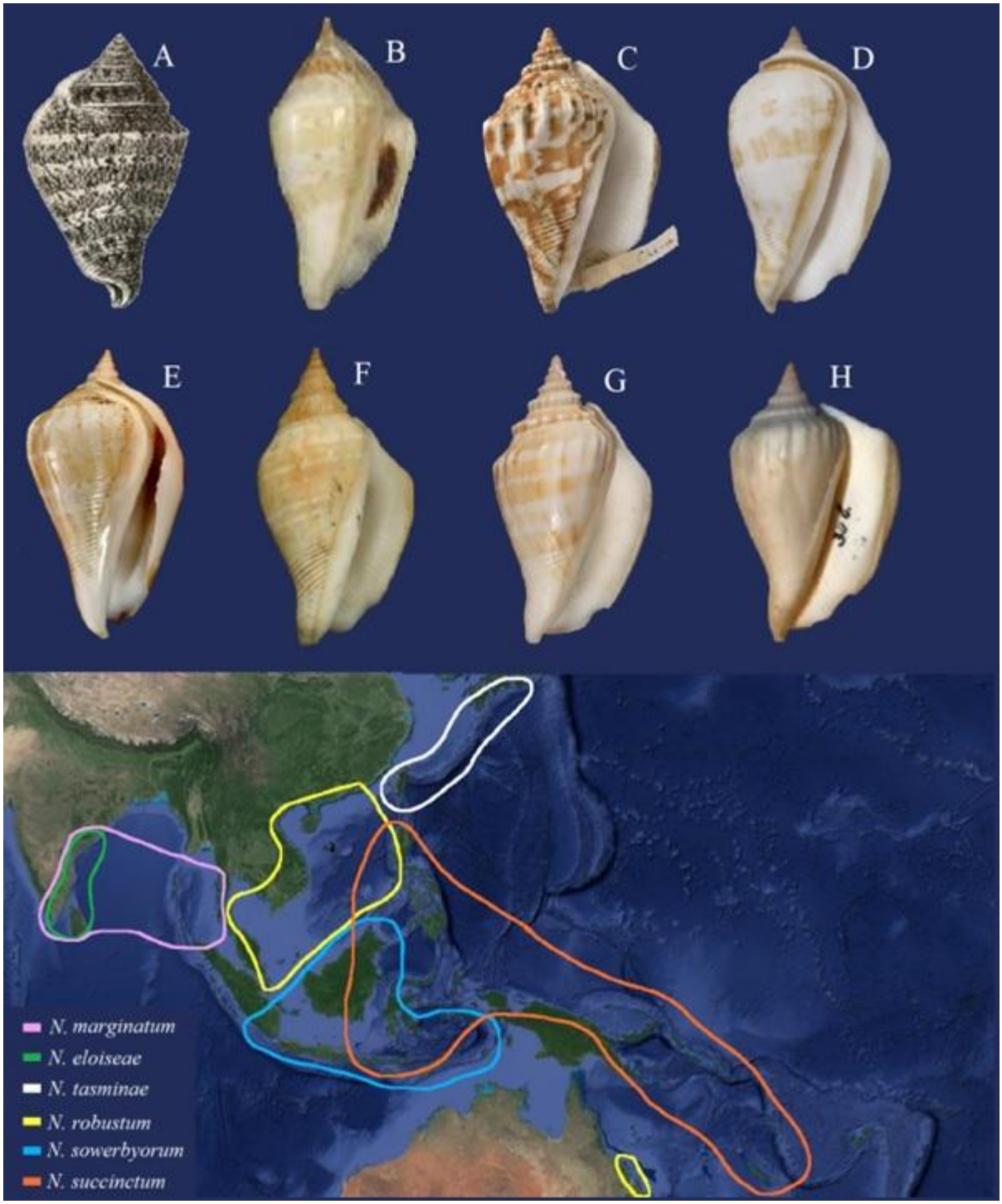

Figure 1. Types and distribution of taxa within the *Neodilatilabrum*: A= *Strombus marginatus* Linné, 1758, Neotype (Visser & Man in't Veld, 2005); **B=** *Margistrombus eloiseae* (Vertriest, 2022), Holotype (Vertriest, 2022); **C=** *Strombus robustus* Sowerby, 1875, Lectotype (Kronenberg *et al.* 2019); **D=** *Neodilatilabrum tasminae n. sp.,* Holotype 15986; **E=** *Strombus sowerbyorum* Visser & Man in 't Veld, 2005, Holotype (Kronenberg *et al.* 2019); **F=** *Strombus succinctus* Linné, 1767, Lectotype (Vertriest, 2022). **G=** *Margistrombus boucheti* Thach, 2016, Holotype (Kronenberg *et al.* 2019) [= *N. robustus* (Sowerby, 1875)]; **H=** *Margistrombus simanoki* Liverani, 2013, Holotype (Liverani 2013) [= *N. sowerbyorum* (Visser & Man in 't Veld, 2005)].

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Figure 2. ***Neodilatilabrum marginatum*** **(Linné, 1758) variations in colour and form: A=** Kilarkaria, India, SMC 66.008f, 56 mm; **B=** Kilarkaria, India, SMC 66.008c, 56 mm; **C=** Kilarkaria, India, SMC66.008f, 41 mm; **D=** Kilakari, India, SMC 66.007c, 37 mm; **E=** Kilarkaria, India, SMC 66.003, 56 mm; **F=** Rameswaran, India, SMC 66.012, 50 mm; and **G=** Sri Lanka, SMC 66.010a, 41 mm.

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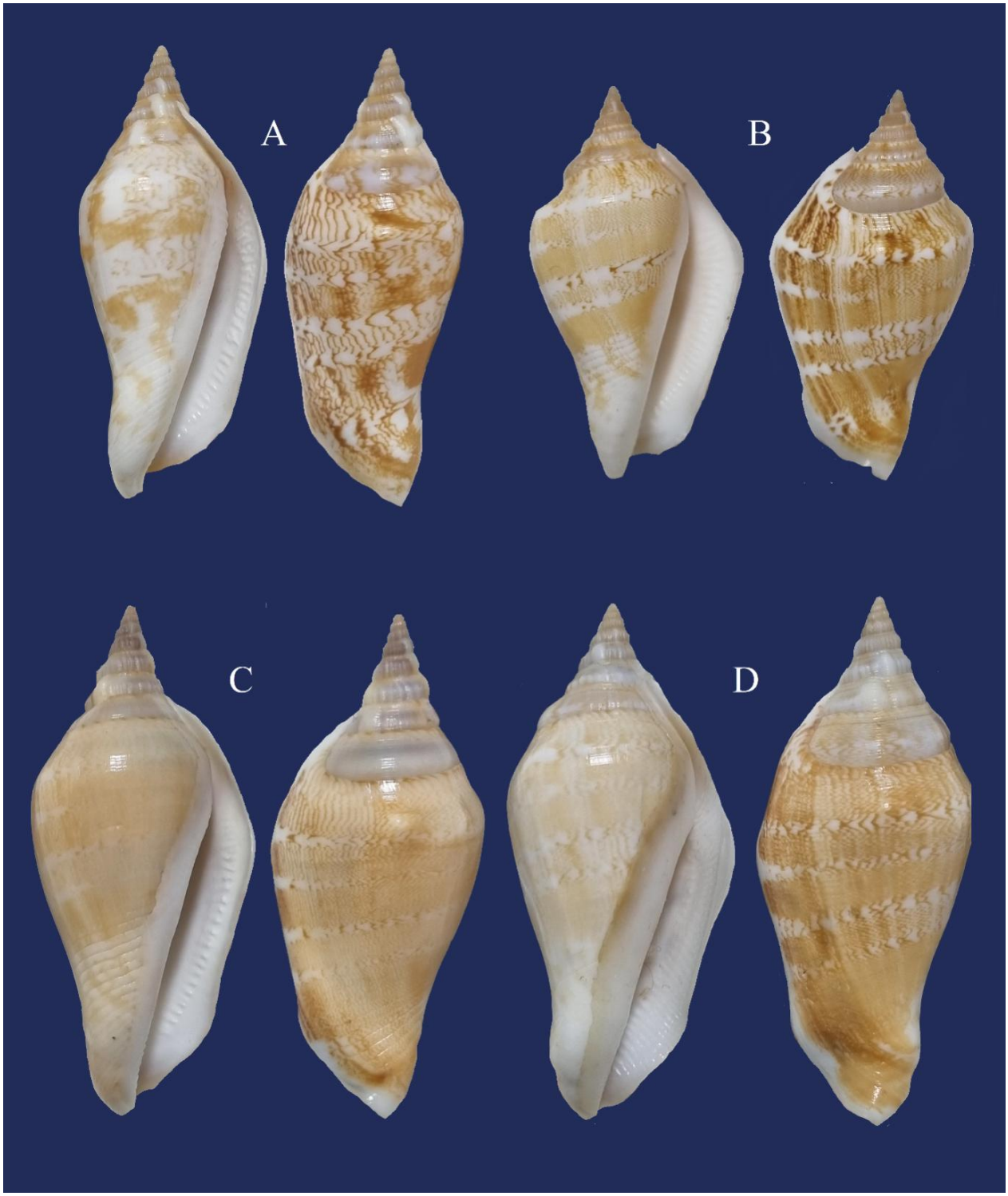

Figure 3. ***Neodilatilabrum eloiseae*** **(Vertriest, 2022) from Madras, India showing localised variability**: **A=** Paratype 21: Madras, 1982, SMC 70.001a, 47 mm; **B=** SMC 70.001i, 40 mm; **C=** Paratype 22: Madras, 1982, SMC 70.001b, 52 mm; and **D=** Paratype 23: Madras, 1982, SMC 70.001c, 54 mm.

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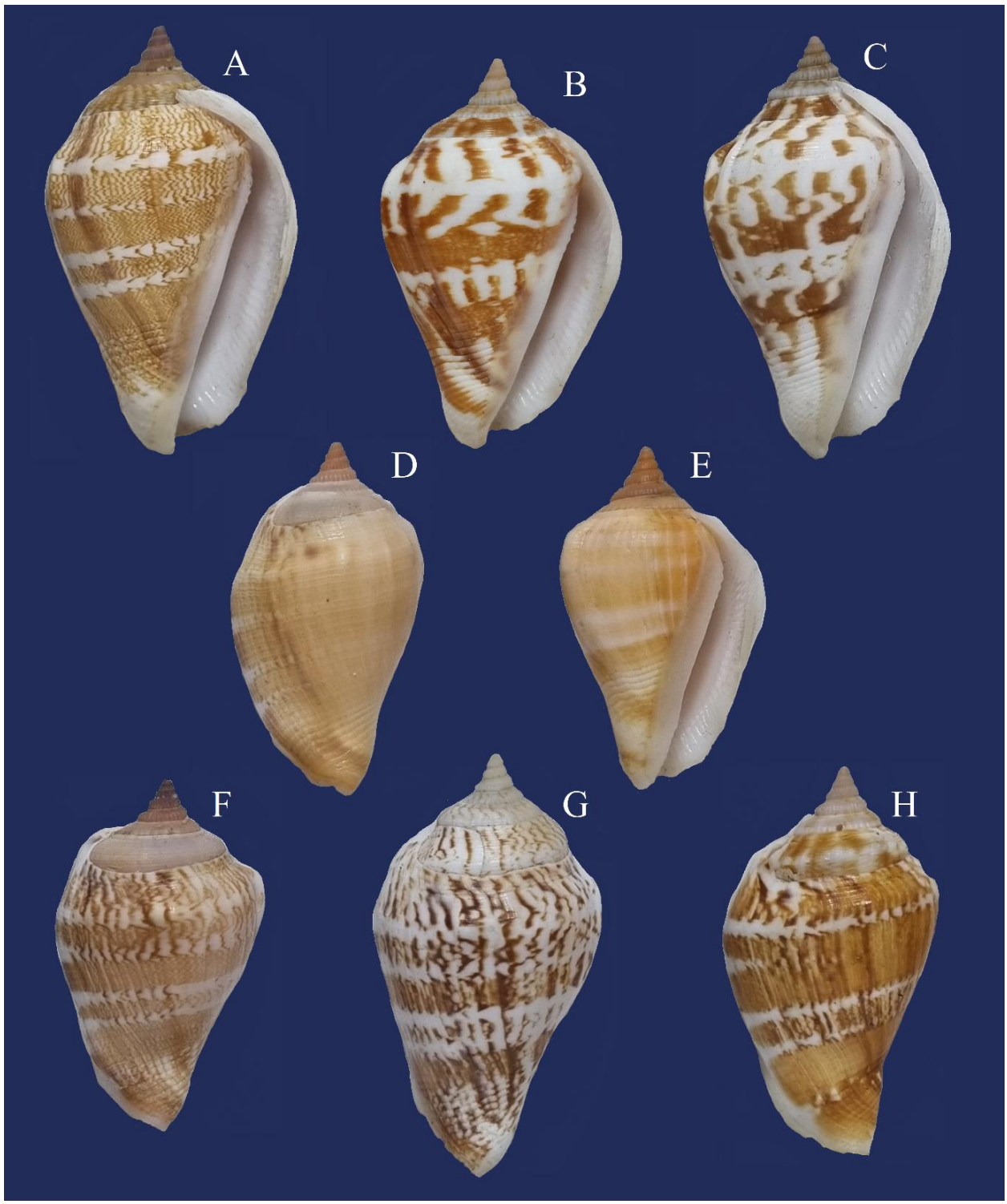

Figure 4. ***Neodilatilabrum robustum*** **(Sowerby, 1875) from Phan Theit, Vietnam illustrating the species localised variability: A=** SMC 68.008h, 44 mm; **B=** SMC 68.008i, 40 mm; **C=** SMC 68.008g, 43 mm; **D=** SMC 68.008d, 36 mm; **E=** SMC 68.008b, 35 mm; **F=** SMC 68.008a, 38 mm; **G=** SMC 68.008f, 43 mm; and **H=** SMC 68.008c, 40 mm.

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Figure 5. ***Neodilatilabrum sowerbyorum*** **(Visser & Man in't Veld, 2006) from the Kangean Islands of Indonesia illustrating the species high levels of localised intraspecific variability: A=** SMC 68a.002k, 40 mm; **B=** SMC 68a.002i, 51 mm; **C=** SMC 68a.002l, 30 mm; **D=** SMC 68a.002a, 39 mm; **E=** SMC 68a.002m, 37 mm; **F=** SMC 68a.002d, 40 mm; **G=** SMC 68a.002f, 31 mm; **H=** SMC 68a.010d, 41 mm; **I=** SMC 68a.010j, 36 mm; **J=** SMC 68a.010f, 35 mm; **K=** SMC 6a8.010i, 44 mm; and **L=** SMC 68a.002n, 30 mm.

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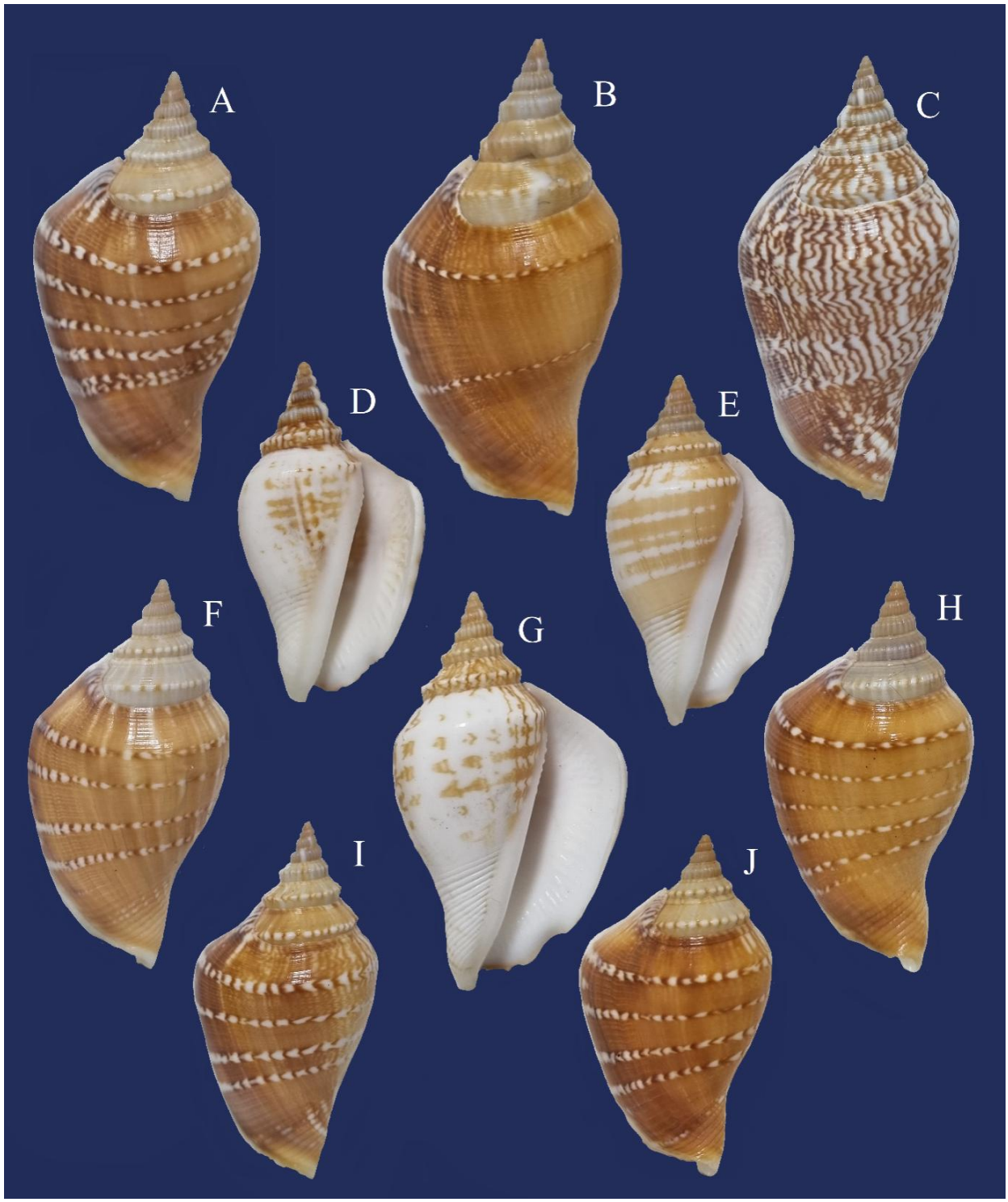

Figure 6. ***Neodilatilabrum succinctum*** **(Linné, 1767) variations from across the range showing variability: A=** Papua New Guinea, SMC 67.001a, 44 mm; **B=** Bilicasag Island, Philippines, SMC 67.002b, 49 mm; **C=** Solomon Islands, SMC 67.006b, 46 mm; **D=** Solomon Islands, SMC 67.003, 36 mm; **E=** Lunga River, Solomon Islands, SMC 67.004b, 39 mm; **F=** Papua New Guinea, SMC 67.001e, 40 mm; **G=** Papua New Guinea, SMC 67.001c, 41 mm; **H=** Papua New Guinea, SMC 67.001g, 40 mm; **I=** Papua New Guinea, SMC 67.001d, 39 mm; and **J=** Papua New Guinea, SMC 67.001b, 37 mm.

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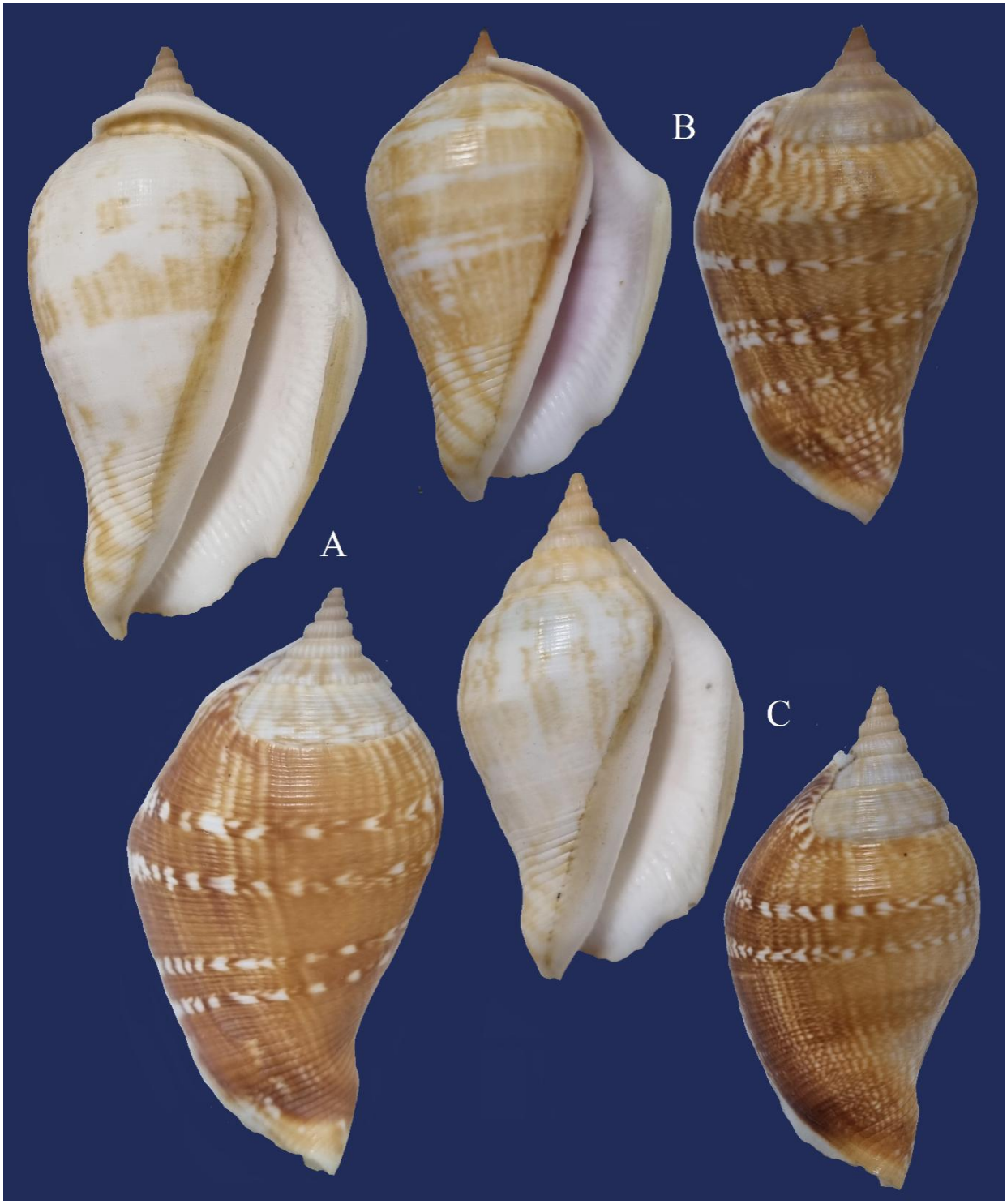

Figure 7. ***Neodilatilabrum tasminae n. sp.*** **type material: A=** Holotype: Okinawa, Japan, 1965, (TC008, exSMC 67a.008a), 61 mm; **B=** Paratype 1: Koninato, Japan, 2004, SMC 67a.001, 49 mm; and **C=** Paratype 2: Taiwan, 2000, SMC 67a.002, 52 mm.

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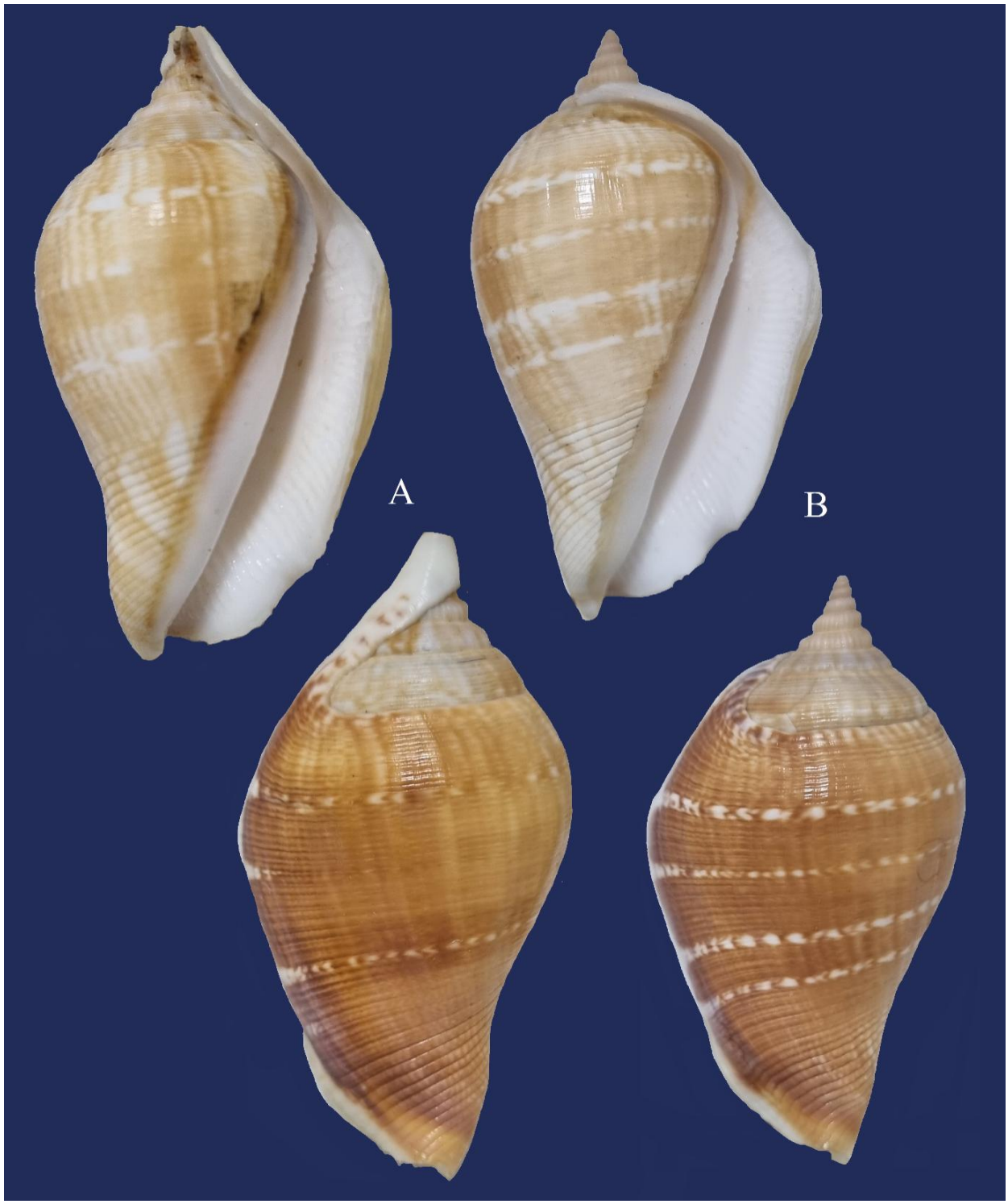

Figure 8. ***Neodilatilabrum tasminae n. sp.*** **type material: A=** Paratype 3: Okinawa, Japan, 1965, SMC 67a.003a, 64 mm; and **B=** Paratype 4: Okinawa, Japan, 1965, SMC 67a.003b, 60 mm.

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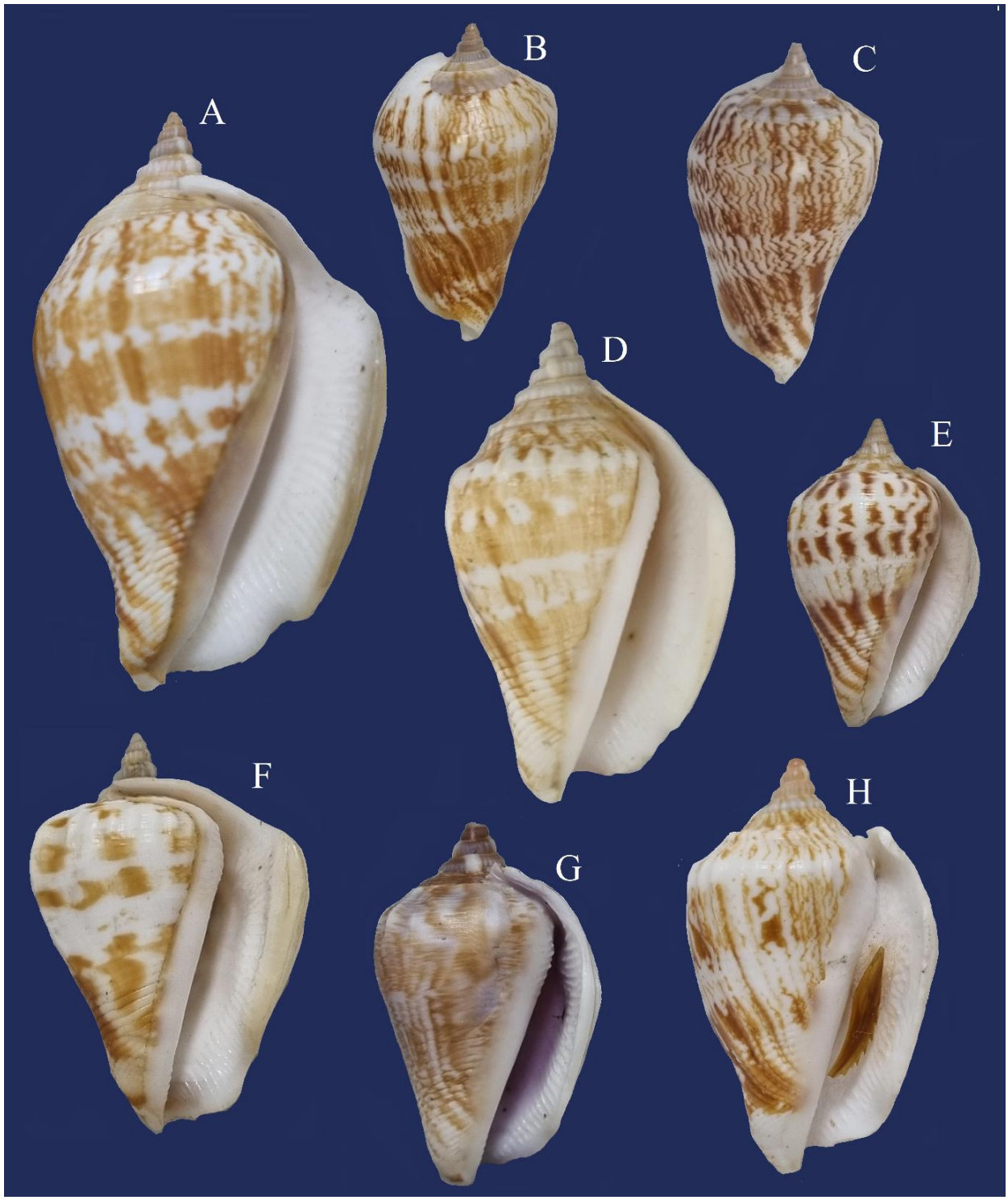

Figure 9. Comparative plate showing *Neodilatilabrum tasminae n. sp* and the variability of *N. robustum* (Linné, 1767) across its range. Note all *N. robustum* have a left axial ridge. *N. tasminae* type material herein: **A=** Paratype 5; Okinawa, Japan, 2005, SMC 67a.004, 59 mm. *N. robustum* material herein: **B=** East Coast of Thailand, SMC 68.006b, 33 mm; **C=** Endai, Johor, Malaysia, SMC 68.009b, 35 mm; **D=** Corregideo, Philippines, SMC 68.005c, 50 mm; **E=** East Coast of Thailand, SMC 68.006a, 32 mm; **F=** Indonesia, SMC 68.001, 41 mm; **G=** With purple aperture, SMC 68.0011, 38 mm; **H=** Dingo Beach Australia, SMC 68.004, 43 mm.