



Taxonomic chaos: A direct result of N. N. Thach's overenthusiastic taxonomy. Fixing the Fascioliidae and Clavilithidae (Gastropoda, Neogastropoda)

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ABSTRACT

In 2025 the Vietnamese malacologist Nguyen Ngoc Thach described in his new, non-peer-reviewed and self-published, book 5 new genera and 208 new species / subspecies of Recent and fossil seashells, freshwater and land snails from Vietnam, Indonesia and some other countries. Several of the newly described taxa are co-authored by the Austrian malacologist Franz Huber and by the Hawaiian malacologist John Abbas. Despite the sincere effort to map the biodiversity of his country and to promote conchology, it cannot be denied that the low quality of the published photographs, imprecise locality data, deficient or absent literature surveys, and the lack of examination of type specimens raise reasonable doubts concerning the scientific value and validity of these taxa. In this paper, the Fascioliidae taxa described by Thach are reviewed, and the necessary corrections are provided based on the available literature and examination of the type specimens. As a result, eight of the nine newly described taxa are placed in the synonymy of previously described species (new synonyms), and two are assigned to their correct genera (new combinations).

Key words – Gastropoda, Fascioliidae, Clavilithidae, new synonyms, new combinations

INTRODUCTION

The Vietnamese malacologist Nguyen Ngoc Thach, sometimes in collaboration with colleagues, published in 2025 once more a book (Thach, 2025) in the same style as his previous works. In recent years, he has already published several non-peer-reviewed, self-



published books (listed in Páll-Gergely *et al.*, 2020: 36). Most taxa in these publications were described solely by Thach, but occasionally in collaboration with others, such as the Austrian malacologist Franz Huber and the Hawaiian malacologist John Abbas. The lack of peer review, the low quality of the published photographs, imprecise locality data, incomplete literature surveys, and the absence of examination, or even mention, of type specimens of relevant previously described species raise reasonable doubts about the validity of these taxa. The questionable reputation of Thach's publications has already been noted by other authors (e.g., Dekkers, 2023; Páll-Gergely *et al.*, 2020, who referred to it as "taxonomic vandalism" in malacology), and I can only agree with this opinion. In his most recent publication, Dr. Thach (2025: 3) appears to have responded by stating that "*The book is dedicated to Genuine Malacologists who did not treat described species of other authors as synonyms by jealousy.*" I would like to emphasize that the present paper is not motivated by jealousy. Rather, the primary concern is the maintenance of taxonomic stability and sound nomenclature, which necessitates the corrections proposed here.

MATERIAL AND METHODS

All scientific names of Thach mentioned in this study were validly introduced according to the ICZN Code, and thus, are available and validly introduced names. The published photographs of the specimens, as well as the actual type specimens described by Thach and his colleagues, were examined and compared with specimens from other sources and figures published in literature.

Abbreviations

MMP	Museo Malacologico Piceno, Cupra Marittima, Italy
MNHN	Muséum National d'Histoire Naturelle, Paris, France
NHMUK	The Natural History Museum, London, UK
NHMW	Natural History Museum Vienna, Austria
NMBE	Natural History Museum Bern, Switzerland
RGM	Naturalis Biodiversity Center, Leiden, the Netherlands
RH	Roland Hadorn collection, Switzerland
SL	shell length

RESULTS - GENERAL REMARKS

In Thach's publications, type material was generally not examined; instead, illustrations were frequently taken from online sources or popular science books. His understanding of basic intraspecific variability differs markedly from that of recently active malacologists. Consequently, minor differences in shell morphology or coloration observed among individuals are often interpreted as diagnostic characters. This practice has led to an unrealistic inflation of species numbers across various genera and families, including the *Fasciolariidae*, a family in which substantial variation in shell shape and color pattern is commonly observed, even within single populations.



Several nominal species have been assigned to incorrect genera, indicating a general lack of knowledge of fasciolariid taxonomy. Moreover, the types or illustrated specimens are often immature, juvenile, or so weathered that subsequent taxonomic evaluation is severely hindered. The inadequacy of these descriptions stems from the absence of comparisons with previously described species, many of which are similar or even identical, as well as the reliance on minor shell characters known to be of limited taxonomic value. As a result, these publications have created a considerable burden for subsequent workers, who must undertake extensive efforts to stabilize nomenclature and evaluate the numerous taxa proposed by Thach and his colleagues.

TAXONOMY

Order Neogastropoda

Superfamily Buccinoidea Rafinesque, 1815

Family Fasciolariidae J. E. Gray, 1853

Subfamily Fusininae Wrigley, 1927

Genus *Chryseofusus* Hadorn & Fraussen, 2003

Type species *Fusus chrysodomoides* Schepman, 1911, by original designation

Chryseofusus fraussenii (Thach, 2018) **new combination**
(Pl. 1 Fig. 1A-B)

Fusinus fraussenii Thach, 2018: 29, figs 300-304, 306.

Chrysoefusus vietnamensis [sic] Thach, 2025: 61-62, pl. 48 fig. 316. **new synonym**

Remarks. – Thach (2018) erroneously assigned *Fusinus fraussenii* to the genus *Fusinus* and overlooked the publication on the subgenus *Chryseofusus* by Hadorn & Fraussen (2003), in which the two species *C. valdiviae* and *C. dapsilis*, to which Thach compared his new species, were treated. *Chryseofusus* was originally described as a subgenus of *Fusinus* but raised to generic rank by Callomon & Snyder (2009: 167).

In 2025, Thach described *C. vietnamensis* but forgot that he had already described this species seven years earlier as *Fusinus fraussenii*. Examination of the two holotypes has shown that *C. vietnamensis* is conspecific and therefore a junior synonym.

Additionally, the type locality of *F. fraussenii* is the same as that of *C. vietnamensis* “off Nha Trang area, Khánh Hòa, Vietnam, at deep water”, even though the depth differs slightly (150-250 m vs. 250-300 m).

Moreover, Thach consistently writes *Chrysoefusus* instead of *Chryseofusus*. Peer review could have avoided all these errors.

Genus *Granulifusus* Kuroda & T. Habe, 1954

Type species *Fusus niponicus* E. A. Smith, 1879, by original designation



***Granulifusus humitakesekii* (Thach, 2025) new combination**
(Pl. 1 Fig. 2A)

Fusinus humitakesekii Thach, 2025: 62, pl. 48 figs 317-318.

Remarks. – This is a valid species but assigned to a wrong genus. It is a typical *Granulifusus*, yet Thach compared this species with *Fusinus pauciliratus complex* Snyder, 2000 from Japan and *Fusinus colombiensis* M. A. Snyder & N. C. Snyder, 1999 from the Caribbean region of Colombia! Neither of these species is similar to *Granulifusus*, making the comparisons meaningless. There are numerous *Granulifusus* species with which this new valid species could have been compared (e.g., *G. niponicus* (E. A. Smith, 1879), *G. hayashii* T. Habe, 1961, *G. kiranus* Shuto, 1958). Hadorn & Fraussen (2005) revised the genus *Granulifusus* - this would have provided a good basis for comparing the new species.

***Granulifusus jeanpierrevezaroi* (T. Cossignani, 2017)**
(Pl. 1 Fig. 3A-B)

Pseudolathyrus cf. kurodai – Springsteen & Leobrera, 1986: 177, pl. 48 fig. 1.

Fusolaturus kuroseanus – Thach, 2007: 118, pl. 29, no. 518 (not of Okutani 1975).

Pseudolaturus jeanpierrevezaroi Cossignani, 2017: 14-15, text figs.

Pseudolaturus jeanpierrevezaroi – Mallard & Robin, 2017: 152, figs 1-5.

Granulifusus jeanpierrevezaroi (Cossignani, 2017) – Kantor *et al.*, 2018: 24-27, figs 4C-D, 5.

Pseudofusus truongkhoai Thach, 2025: 63, pl. 48 figs 319-320. **new synonym**

Remarks. – The genus *Pseudofusus* Monterosato, 1884 is distributed in the Mediterranean Sea and adjacent northeastern Atlantic. Therefore, the placement of a species collected in Vietnam in this genus is not justified without additional evidence and a well-reasoned explanation. There is ample recent literature on the subject, if only it were consulted. All evidence suggests a confusion between *Pseudolaturus* and *Pseudofusus*, again reflecting insufficient familiarity with fascioliid taxonomy.

Thach compares his *Pseudofusus truongkhoai* with *Pseudolaturus pallidus* (Kuroda & Habe, 1961) [a *Vermeijius*] and writes: “The new species is not similar to any species of *Fusinus* illustrated in Hadorn & Fraussen (2006).” This seems to be the only publication known to him that describes a few new fascioliids, yet it includes no similar species. *Pseudolaturus pallidus* is the type species of the genus *Vermeijius* Kantor, Fedosov, Snyder & Bouchet, 2018, incidentally described in the same publication in which *Granulifusus jeanpierrevezaroi* was redescribed and excellently illustrated.

During my visit in mid-April 2026 to the MNHN for the purpose of photographing Thach’s holotypes, it was found that the holotype MNHN-IM-2000-40157 had not (yet) been deposited at the MNHN. For comparison, a typical specimen from the NMBE collection is therefore illustrated instead of the holotype (Pl. 1 Fig. 3B).

Examination of the figured type material in Thach (2025: pl. 48 figs 319–320) has shown that *Pseudofusus truongkhoai* is a junior synonym of *G. jeanpierrevezaroi*. Coincidentally, both share the same type locality (Nha Trang, Vietnam).



Subfamily **Peristerniinae** Tryon, 1880

Genus **Peristernia** Mörch, 1852

Type species *Turbinella nassatula* Lamarck, 1822, by subsequent designation Martens, 1868

Peristernia nassatula (Lamarck, 1822)

(Pl. 1 Fig. 4A-B)

Turbinella nassatula Lamarck, 1822: 110.

Peristernia nassatula – Mallard & Robin, 2017: 313, figs 1-4, 6-8 [fig. 5= *P. sp.*; figs 9-12= *P. forskalii forskalii*].

Peristernia vietnamense Thach, 2025 – 62-63, pl. 49 figs 321a; 322d [incorrect grammatical agreement of specific epithet – corrected by WoRMS to *vietnamensis*]. **new synonym**

Remarks. – Thach compares his supposedly new species with an image linked (fig. 321c) in WoRMS (<https://www.marinespecies.org/aphia.php?p=image&pic=48015&tid=208048>).

This image shows two heavily encrusted specimens of *P. nassatula* from Taiwan, in which no diagnostic details are visible. Comparisons based on unverified online images cannot be considered a reliable method. Thach appears to assume that all images linked in WoRMS hold the same status as holotypes. However, WoRMS explicitly places a disclaimer on its website: “WoRMS does not exercise any editorial control over the information displayed here.”

P. nassatula is a common and rather variable species widely distributed in the western Pacific. The differences listed by Thach are best explained by intraspecific variation. Since there are no significant differences between the two taxa, they are treated as a single species, *P. nassatula*.

Genus **Benimakia** T. Habe, 1958

Type species *Turbinella rhodostoma* Dunker, 1860, by original designation

Benimakia lanceolata (Reeve, 1847)

(Pl. 1 Fig. 5A-C)

Turbinella lanceolata Reeve, 1847: pl. 3 fig. 12.

Benimakia lanceolata – Bouchet & Snyder, 2013: 334-336, figs 2A-D, 3B.

Benimakia lanceolata – Mallard & Robin, 2017: 215, figs 1-5.

Benimakia vietnamense Thach, 2025 – 63, pl. 47 figs 314-315 [incorrect grammatical agreement of specific epithet – corrected by WoRMS to *vietnamensis*]. **new synonym**

Remarks. – Thach (2025: fig. 314) selected a heavily water-worn, gerontic specimen with a broken and subsequently repaired rostrum as the holotype and compared it with the illustration in Reeve (1847: pl. 3, fig. 12). A gerontic specimen is not representative of the typical characteristics of a species, as very old individuals often differ markedly from juvenile or fully adult forms. Fortunately, paratype 1 (Thach, 2025: fig. 315) is a typical specimen and clearly shows that, once again, an unnecessary synonym was created based on an abnormal individual. The syntype figured by Reeve is housed in the NHMUK (NHMUK)



1874.12.11.161) and is shown here for comparison (Pl. 1 Fig. 5A). A fresh, typical specimen from the MNHN collection is figured on Pl. 1 Fig. 5C.

B. lanceolata is a common and slightly variable species, widely distributed across the western Indo-Pacific. The differences cited by Thach are best interpreted as intraspecific variations. As there are no significant distinguishing features between the two taxa, they are treated as conspecific and regarded as a single species, *B. lanceolata*.

Order Neogastropoda

Superfamily Neogastropoda *incertae sedis*

Family **Clavilithidae** Vermeij & M. A. Snyder, 2018

Genus ***Clavilithes*** Swainson, 1840

Type species *Murex noae* Holten, 1802, by subsequent designation Herrmannsen, 1847

Clavilithes fennemai (K. Martin, 1906)

(Pl. 2 Fig. 6A-G)

Fusus (Clavella) fennemai K. Martin, 1906: 307-308, pl. 45 figs 729.

Clavilithes fennemai – K. Martin, 1921: 454, pl. 58 figs 26-27.

Clavilithes fennemai – Leloux & Wesselingh, 2009: 54, pl. 108 figs 6-7.

Clavilithes fennemai – Dharma, 2024: pl. 2 figs 6-8.

Nodolaturus abbasi Thach & F. Huber, 2025: 63-64, pl. 49 figs 323a,d,f; 325c-d. **new synonym**

Nodolaturus sukabumiensis Thach & Abbas, 2025: 64, pl. 49 figs 324; 325a-b. **new synonym**

Nodolaturus purpureus Thach & Abbas, 2025: 64, pl. 50 figs 326a-c. **new synonym**

Nodolaturus stevenliei Thach & Abbas, 2025: 64, pl. 50 figs 327a-c. **new synonym**

Remarks. – Thach & F. Huber as well as Thach & Abbas failed to compare their newly proposed species with *C. fennemai*. The reason for this omission remains unclear. Based on the available illustrations and comparison material, however, it appears to me that all of these purported new species are most likely nothing more than juvenile specimens of *C. fennemai* at different growth stages. *C. fennemai* is a rather variable species, and juvenile specimens differ markedly from adults. The spire may be either slender and elongated or shorter and broader, all of which can be attributed to intraspecific variation. Dharma (2024: pl. 2 figs 6-8) illustrated a growth series of *Clavilithes fennemai* exceptionally well. It would also be helpful if all “*Nodolaturus*” (*Clavilithes*) specimens were illustrated at the same scale, which would greatly facilitate comparison.

They assigned all four fossil species from Java to the fasciolariid genus *Nodolaturus* Bouchet & Snyder, 2013. Bouchet & Snyder (2013: 331-332) clearly defined the genus; among other characters, *Nodolaturus* possesses 2-6 characteristic raised, thickened cords at the adapical end of the rostrum, numerous fine lirae inside the aperture, three to as many as six columellar plicae, and a spiral sculpture of fine cords. None of the four described species exhibits any of these diagnostic features. The failure to consider existing modern literature and the general



lack of knowledge of fascioliid taxonomy are evident here once again. Otherwise, one of the three authors would likely have considered comparing these new species with *Clavilithes*. Furthermore, none of the new species includes information on the stratigraphic units from which they originate, and their geological age is likewise not mentioned. Based on material in my own collection, these species can be assigned to the Middle Miocene.

CONCLUSIONS

In their 2025 book, Thach and his colleagues described nine new species of Fascioliidae: five recent species from Vietnam and four fossil species from Java. Of these, eight are here regarded as new synonyms, while only one species is considered valid, although it was assigned to the wrong genus. The four fossil species were placed in *Nodolaturus* (Fascioliidae), even though they actually belong to *Clavilithes* (Clavilithidae). In other words, the success rate for recognizing genuinely new species in this case is 11%. No further comments seem necessary.

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REFERENCES

- Bouchet, P. & Snyder, M. A. (2013).** New and old species of *Benimakia* (Neogastropoda: Fascioliidae) and a description of *Nodolaturus*, new genus. *Journal of Conchology* 41(3): 331-341. [May 2013; journal running head erroneously dated "2012"]
- Callomon, P. & Snyder, M. A. (2009).** On the Genus *Fusinus* in Japan V: Further species, an unnamed form and discussion. *Venus* 67(3-4): 159-172.
- Dekkers, A. M. (2023).** Boek review [translated from the original Dutch publication] – Thach, N. N. 2023. *New Shells of South Asia and Japan, Taiwan, China*. *Spirula* 436: 47.
- Dharma, B. (2024).** A new fossil species of *Indolithes* new genus from Java, Indonesia (Gastropoda: Fascioliidae). *The Festivus* 56(3): 154-164. <http://doi:10.54173/F563154>
- Hadorn, R. & Fraussen, K. (2003).** The deep-water Indo-Pacific radiation of *Fusinus* (*Chryseofusus* subgen. nov.) (Gastropoda: Fascioliidae). *Iberus* 21(1): 207-240.
- Hadorn, R. & Fraussen, K. (2005).** Revision of the genus *Granulifusus* Kuroda & Habe 1954, with description of some new species. *Archiv für Molluskenkunde* 134(2): 129-171, pls 1-10.



- Hadorn, R. & Fraussen, K. (2006).** Five new species of *Fusinus* (Gastropoda: Fascioliariidae) from western Pacific and Arafura Sea. *Novapex* 7(4): 91-102, figs 1-36.
- Kantor, Y. I., Fedosov, A. E., Snyder, M. A. & Bouchet, P. (2018).** *Pseudolatirus* Bellardi, 1884 revisited, with the description of two new genera and five new species (Neogastropoda: Fascioliariidae). *European Journal of Taxonomy* 433: 1-57.
<https://doi.org/10.5852/ejt.2018.433>
- Lamarck, [J. B. P. A. de M.] de (1822).** Histoire naturelle des animaux sans vertèbres ... Vol. 7. Paris: Published by the author. 711 pp.
- Leloux, J. & Wesselingh, F. P. (2009).** Types of Cenozoic Mollusca from Java in the Martin collection of Naturalis. *NNM Technical Bulletin* 11: 1-765, pls 1-289.
- Mallard, D. & Robin, A. (2017).** Recent Fascioliariidae. Association Francaise de Conchiologie, Paris and Conchbooks, Harxheim. 349 pp.
- Martin K. (1895-1906).** Die Fossilien von Java auf grund einer Sammlung von Dr. R. D. M. Verbeek. I. Band. Gasteropoda. Sammlungen des Geologischen Reichs-Museums in Leiden. Neue Folge 1(2-5): 1-132, pls 1-20 [1895]; 1(6-8): 133-220, pls 21-33 [1899]; 1(9): 221-281, pls 34-41 [1905]; 1(10): 282-332, pls 42-45 [1906].
- Martin, K. (1921-1922).** Die Mollusken der Njalindungschichten. Sammlungen des Geologischen Reichs-Museums in Leiden. Neue Folge 1(2-4): 446-496, pls 58-61. [446-470, pls 58-59 (1921); 471-496, pls 60-61 (1922)].
- Páll-Gergely, B., Hunyadi, A. & Auffenberg, K. (2020).** Taxonomic vandalism in malacology: comments on molluscan taxa recently described by N. N. Thach and colleagues (2014–2019). *Folia Malacologia* 28(1): 35–76.
- Reeve, L. A. (1847).** Monograph of the genus *Turbinella*. In: *Conchologia Iconica* or illustrations of the shells of molluscos animals, Vol. 4. London: Reeve, Benham and Reeve. [unpaginated text], pls 1-13.
- Springsteen, F. J. & Leobrera, F. M. (1986).** Shells of the Philippines. Manila: Carfel Seashell Museum. 377 pp.
- Thach, N. N. (2007).** Recently collected shells of Vietnam. Ancona: L'Informatore Piceno. 384 pp.
- Thach, N. N. (2018).** New shells of South Asia. Seashells-landsnails-freshwater shells, 3 new genera, 132 new species & subspecies. Akron, Ohio: 48Hr Books Company. 173 pp.
- Thach, N. N. (2025).** New shells of Vietnam, Indonesia and some other countries. Recent & fossil, seashells - freshwater - landshells, with 5 new genera & 208 new species, subspecies. Akron, Ohio: 48Hr Books Company. 188 pp.
- Vermeij, G. J. & Snyder, M. A. (2018).** Proposed genus-level classification of large species of Fusininae (Gastropoda, Fascioliariidae). *Basteria* 82(4-6): 57-82.

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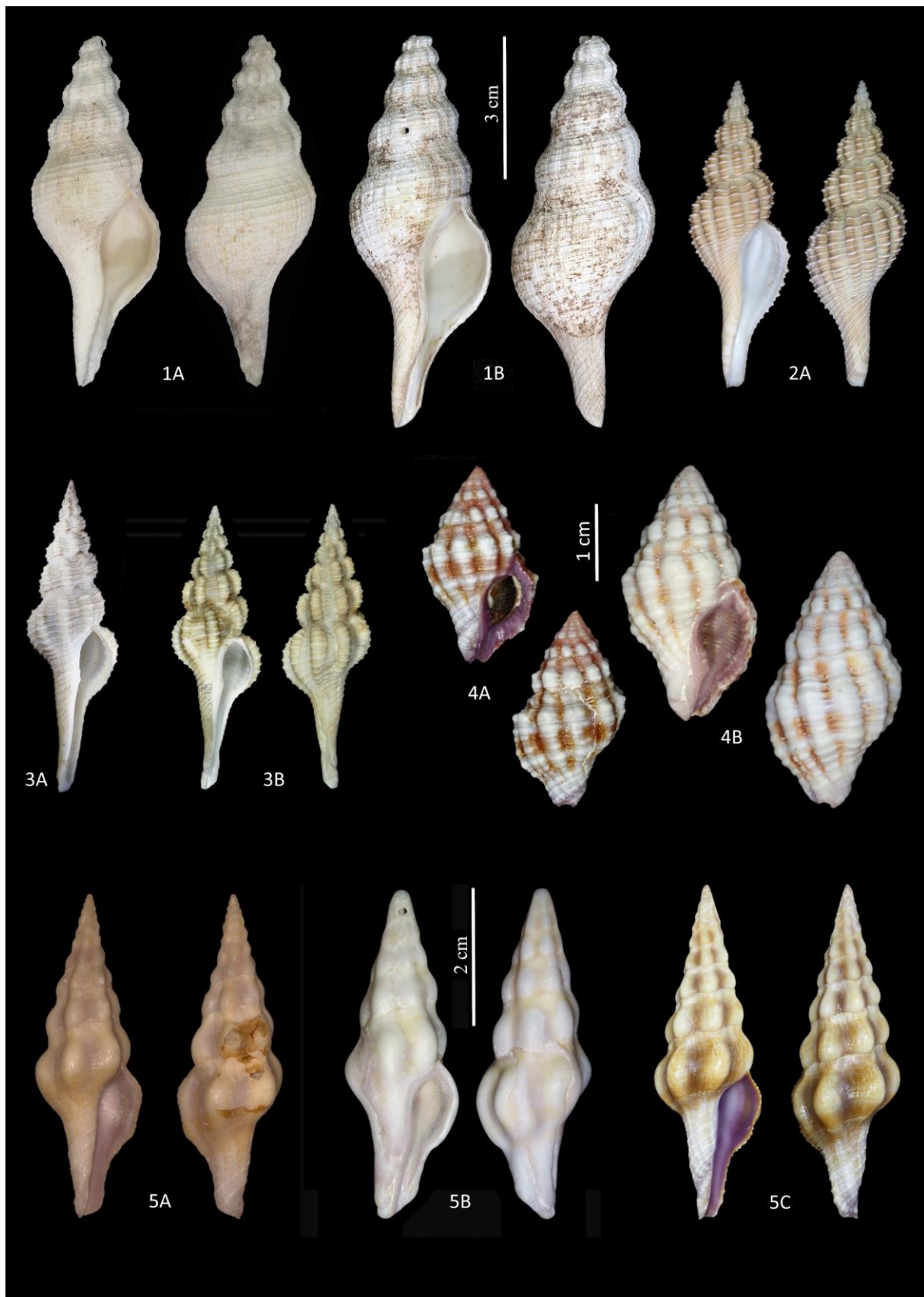


Plate 1. See next page for legend.



← **Plate 1.** Fig. 1A-B. *Chryseofusus fraussenii* (Thach, 2018). A. Holotype MNHN-IM-2000-34024, *Fusinus fraussenii* Thach, 2018, Vietnam, Khánh Hòa Province, Nha Trang, depth 150-250 m, SL 74.0 mm. B. Holotype MNHN-IM-2000-40152, *Chryseofusus vietnamensis* Thach, 2025, Vietnam, Khánh Hòa Province, off Nha Trang, depth 250-300 m, SL 82 mm (**new synonym**). Fig. 2A. *Granulifusus humitakesekii* (Thach, 2025). Holotype MNHN-IM-2000-40154, *Fusinus humitakesekii* Thach, 2025, Vietnam, Khánh Hòa Province, off Nha Trang, depth 100-120 m, SL 64.4 mm. Fig. 3A-B. *Granulifusus jeanpierrevezaroi* (Cossignani, 2017). A. Holotype MMP, *Pseudolatirus jeanpierrevezaroi* Cossignani, 2017, Vietnam, Khánh Hòa Province, Nha Trang, SL 66.3 mm. B. NMBE MOLL-0576456, Taiwan, South China Sea, SL 59.5 mm. Fig. 4A-B. *Peristernia nassatula* (Lamarck, 1822). A. NMBE MOLL-0576766, Philippines, Bantayan, SL 26.2 mm. B. Holotype MNHN-IM-2000-40156, *Peristernia vietnamensis* Thach, 2025, Vietnam, Quảng Ngãi, Lý Sơn Island, among rocks at 2-5 m, SL 34.0 mm (**new synonym**). Fig. 5A-C. *Benimakia lanceolata* (Reeve, 1847). A. Figured syntype NHMUK 1874.12.11.161, *Turbinella lanceolata* Reeve, 1847, Philippines, SL 45.9 mm. B. Holotype MNHN-IM-2000-40155, *Benimakia vietnamensis* Thach, 2025, Vietnam, Khánh-Hòa Ninh-Thuân area, near rocks on coral reefs, water-worn gerontic specimen, SL 48.3 mm (**new synonym**). C. MNHN, Bismarck Sea, Papua New Guinea, Madang, Pana Tibun islet, PAPUA NIUGINI stn PR33, SL 49.0 mm. Different scales for Figs 1 to 3; Fig. 4; Fig. 5.

→ **Plate 2.** Fig. 6A-G. *Clavilithes fennemai* (K. Martin, 1906). A. Holotype RGM.9016, Nyalindung Formation (Middle Miocene), Indonesia, West Java, near Citalahab, SL ~80 mm (spire fragment). B. RH 34429, Nyalindung Formation (Middle Miocene), Indonesia, West Java, Sukabumi Regency, Jampang Tengah, SL 143.8 mm. C. RH 34370, Nyalindung Formation (Middle Miocene), Indonesia, West Java, Sukabumi Regency, Jampang Tengah, juvenile, SL 66.5 mm. D. Holotype MNHN-IM-2000-40158, *Nodolaturus abbasi* Thach & F. Huber, 2025, Indonesia, West Java, Sukabumi Regency, SL 65.1 mm (**new synonym**). E. Holotype MNHN-IM-2000-40159, *Nodolaturus sukabumiensis* Thach & Abbas, 2025, Indonesia, West Java, Sukabumi Regency, SL 57.6 mm (**new synonym**). F. Holotype MNHN-IM-2000-40195, *Nodolaturus purpureus* Thach & Abbas, 2025, Indonesia, West Java, Nyalindung, SL 45.6 mm (**new synonym**). G. Holotype MNHN-IM-2000-40196, *Nodolaturus stevenliei* Thach & Abbas, 2025, Indonesia, West Java, Nyalindung, SL 48.0 mm (**new synonym**).

Different scales for Fig. 6A-B and Fig. 6C-G.

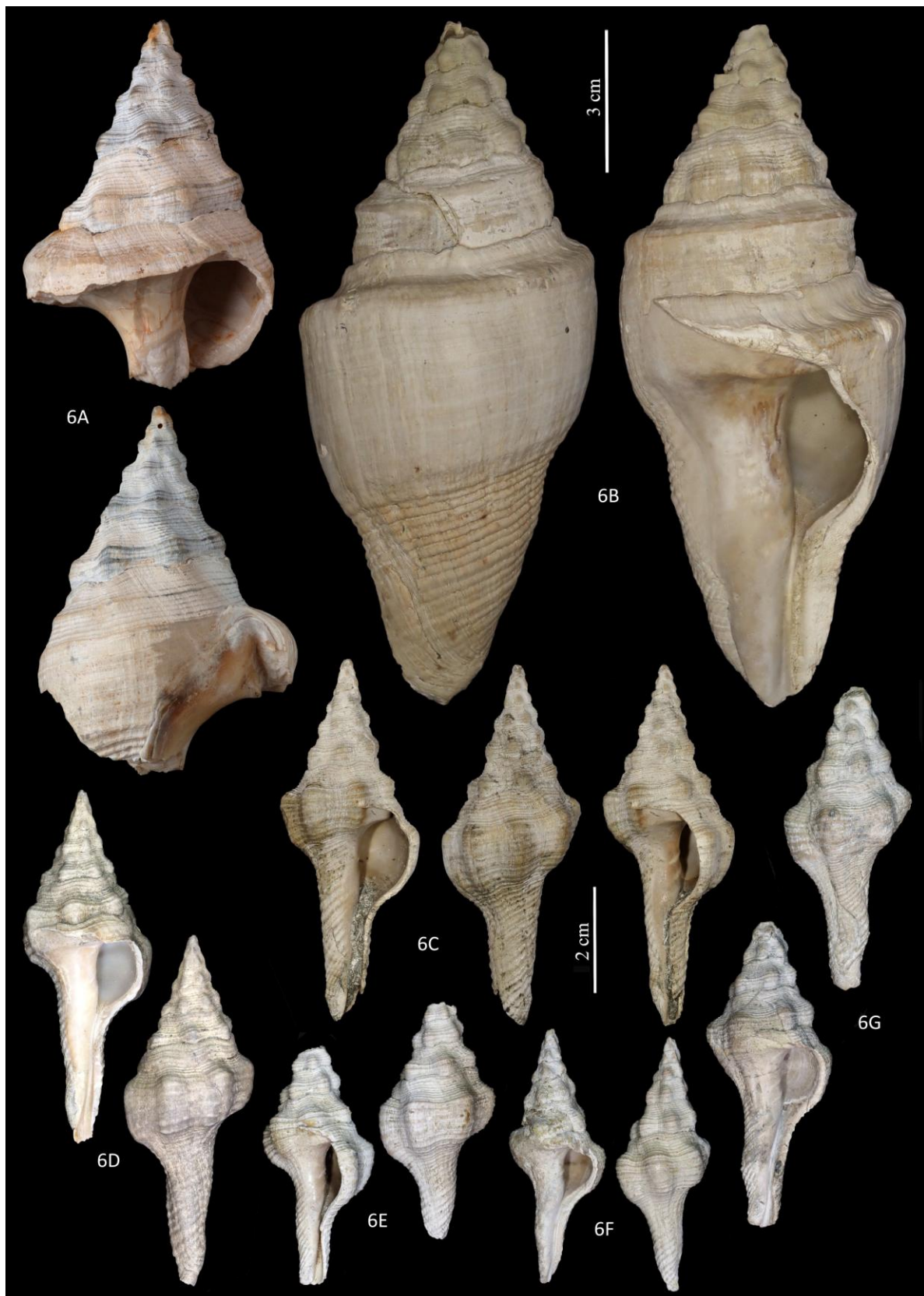


Plate 2. See previous page for legend.