

Descriptions of four new species of the genus *Reticunassa* Iredale, 1936 (Gastropoda: Nassariidae) from the northeastern coast of Taiwan Island and the South China Sea

Shuqian Zhang^{1,2}, Suping Zhang^{1,2*}, Chih-Yeh Lee³

¹Institute of Oceanology, Chinese Academy of Sciences, Qingdao 266071, China

²Center for Ocean Mega-Science, Chinese Academy of Sciences, Qingdao 266071, China

³233 Wusheng Street, Keelung 204010, Taiwan, China

Received 1 July 2021; accepted 30 August 2021

© Chinese Society for Oceanography and Springer-Verlag GmbH Germany, part of Springer Nature 2022

Abstract

In the present study, four new species of the genus *Reticunassa* Iredale, 1936 collected from Chinese waters are described and illustrated. *Reticunassa hugokooli* sp. nov., *Reticunassa jungi* sp. nov. and *Reticunassa aureolineata* sp. nov. were collected from the northeastern coast of Taiwan Island, whereas *Reticunassa fuscofasciata* sp. nov. was collected from the northeastern coast of Taiwan Island and the South China Sea. The four new species can be distinguished conchologically from other congeners mainly in protoconch, shell shape, sculpture, and coloration. These findings demonstrate that the biodiversity of this group in China might be largely underestimated.

Key words: Gastropoda, Buccinoidea, Nassariidae, new species, South China Sea

Citation: Zhang Shuqian, Zhang Suping, Lee Chih-Yeh. 2022. Descriptions of four new species of the genus *Reticunassa* Iredale, 1936 (Gastropoda: Nassariidae) from the northeastern coast of Taiwan Island and the South China Sea. *Acta Oceanologica Sinica*, 41(8): 74–77, doi: 10.1007/s13131-021-1910-3

1 Introduction

The family Nassariidae represents a diverse group of predominantly marine scavenging snails that currently includes more than 600 species in at least 23 genera (MolluscaBase, 2021). The members of this group are distributed worldwide, ranging from temperate, subtropical, to tropical waters, from the intertidal zone to deeper waters (1 000 m depth, mostly in 0–300 m depth), with their highest biodiversity in the tropical Indo-West Pacific (Cernohorsky, 1972, 1984). Among them, the genus *Reticunassa* Iredale, 1936 is a relatively diverse group that is present in the Indo-Pacific region. The genus was originally proposed by Iredale (1936) to accommodate “species around the *pauperus*-complex Gould”. Cernohorsky (1984) regarded *Reticunassa* as a synonym of the subgenus *Hima* Leach in Gray, 1852 within the genus *Nassarius* Duméril, 1805 (for more discussion on *Hima*, see Galindo et al., 2017). Cernohorsky (1984) also considered the species in this group as the morphological variants of a single species. Kool and Dekker (2006, 2007) recognized the existence of different species based on the differences in their protoconchs, sculpture, microscopic spiral threads between the primary spiral cords and the shape and sculpture of the columellar callus. Recently, a molecular phylogenetic analysis by Galindo et al. (2016) supported the splitting approach of Kool and Dekker (2006, 2007), at least 10 lineages were found in this clade, indicating that the diversity of the genus was highly underestimated. On the basis of these results, Galindo et al. (2017) reinstated *Reticunassa* to full generic status and added six new species to the genus

Intensive taxonomic efforts in recent years have revealed that the biodiversity of the family Nassariidae in China remains un-

derestimated. Many new species and new records are waiting for their discovery. In this study, as part of an ongoing investigation of the biodiversity of Nassariidae in China, four hitherto undescribed species were recognized and assigned to the genus *Reticunassa*. Herein, we describe and illustrate these four species and expand the taxonomic knowledge of the genus *Reticunassa* in Chinese waters.

2 Materials and methods

All specimens were collected from the shallow water of the northeastern coast of Taiwan Island and the South China Sea. They were all dry, and the soft parts and operculum were unavailable. The shell morphology was observed under a stereomicroscope, and photos were taken using a digital camera. Protoconchs and the microscopic spiral sculpture were photographed using an AxioCam MRc5 digital camera mounted on the stereomicroscope; images were then patched through an extended depth of field with images of different focal planes. Measurements were taken using a vernier caliper to an accuracy of 0.1 mm. Type specimens have been deposited at the Marine Biology Museum of Chinese Academy of Sciences (MBMCAS), Qingdao, China.

3 Results

Systematics

Class Gastropoda Cuvier, 1795

Superfamily Buccinoidea Rafinesque, 1815

Family Nassariidae Iredale, 1916 (1835)

Subfamily Nassariinae Iredale, 1916 (1835)

Foundation item: The National Natural Science Foundation of China under contract Nos 31750002 and 42090040.

*Corresponding author, E-mail: museum@qdio.ac.cn

Genus *Reticunassa* Iredale, 1936

Type Species: *Nassa paupera* Gould, 1850. Recent, Pacific Ocean, by original designation.

3.1 *Reticunassa jungi* sp. nov. (Figs 1a–d and 2a–c)

Reticunassa dermestina. Lai, 1996: 43, Fig. 4 (non Gould, 1850)

Reticunassa pauperus. Jung, 2015: 47, Fig. 43b (non Gould, 1850)

Material examined: Holotype, registration number (RN): MBM286702 (length 9.0 mm, width 4.5 mm), off Xinbei City (Taiwan), sandy bottom, 1–2 m, in MBMCAS.

Paratype 1, RN: MBM286703 (length 12.0 mm, width 6.8 mm), collected from an abalone culture pond on the coast of Xinbei City.

Paratype 2, RN: MBM286704 (length 8.8 mm, width 4.6 mm), collected together with the holotype.

Description of the holotype: Shell (Figs 1a–c) thick, solid, of medium size for the genus; spire acute, spire angle $\sim 50^\circ$; last whorl large, $\sim 3/5$ of shell length. Protoconch (Fig. 2a) of ~ 1.25 rounded, smooth whorls, transition to teleoconch distinct by an axial scar. Teleoconch of 6 moderately convex whorls. Suture constricted, ledged. Spiral sculpture consisting of thin primary spiral cords and microscopic spiral threads in between (Fig. 2b). First teleoconch whorl sculptured with 5, penultimate whorl with 8–9, and last whorl with 14–15 primary spiral cords, peripheral ones strongest. Microscopic spiral threads fine, numbering 8–10 on middle part of last whorl. Axial sculpture of rounded ribs, thin and narrowly spaced on upper whorls, becoming broader towards shell base, reduced on ventral side of last whorl. Ribs numbering 15 on first teleoconch whorl, 13 on penultimate whorl, and 11 on last whorl. Aperture equally long as spire, outer lip varied with a thickened edge, interior with 7–8 lirae. Columella arched, lirate throughout with about 12 lirae, upper region with a strong parietal tooth (Fig. 1a). Columellar callus (Fig. 2c) well developed. Siphonal canal short, semi-tubular. Shell color generally yellowish. Protoconch and siphonal area whitish; primary spiral cords on last three whorls often light brown.

Etymology: The new species is named after Bor-Seng Jung in recognition of his important contributions to our knowledge of gastropods in Taiwan Island.

Type locality: An abalone culture pond on the coast of Xinbei City, Taiwan, approximately $24^\circ 35'N$, $121^\circ 53'E$.

Distribution and habitat: Known from northeastern Taiwan Island and southern Hengchun Peninsula, living in shallow water on sandy bottom.

3.2 *Reticunassa hugokooli* sp. nov. (Figs 1e–h and 2d–f)

Material examined: Holotype, RN: MBM286705 (length 10.0 mm, width 5.5 mm), off Xinbei City (Taiwan), sandy bottom, 1–2 m, in MBMCAS.

Paratype, RN: One specimen, RN: MBM286706 (length 9.4 mm, width 5.1 mm), collected together with the holotype.

Description of the holotype: Shell (Figs 1e–g) thick, solid, of medium size for the genus; spire acute, spire angle $\sim 50^\circ$; last whorl large, occupying $\sim 3/5$ of shell length. Protoconch (Fig. 2d) of ~ 1.25 rounded, smooth whorls, transition to teleoconch distinct by several weak axial riblets. Teleoconch of 5.5 moderately convex whorls. Suture constricted, deep. Spiral sculpture comprising thick primary spiral cords with microscopic spiral threads in between (Fig. 2e). First teleoconch whorl sculptured with 5, penultimate whorl with 7, and last whorl with 15–17 primary spiral cords, peripheral ones strongest. Microscopic spiral threads

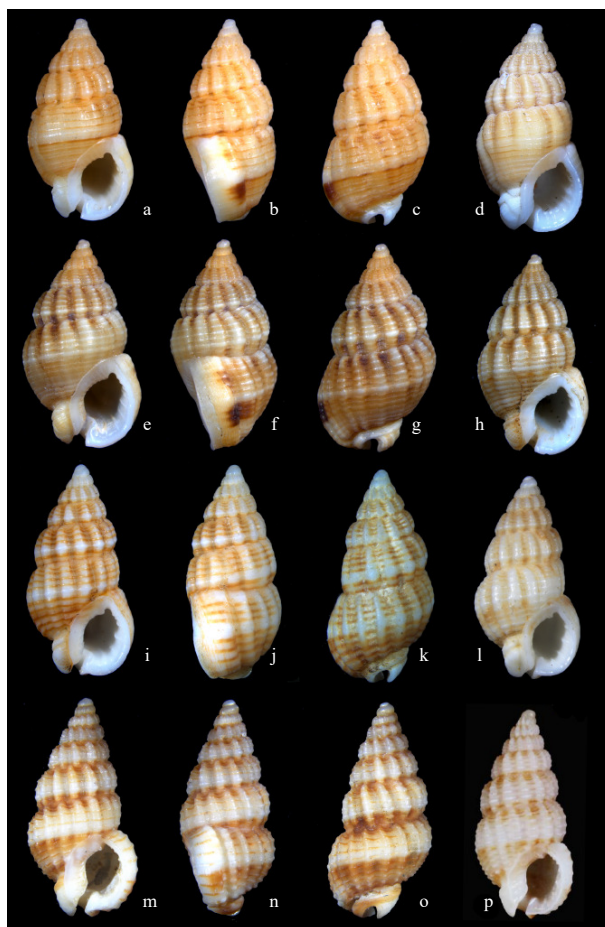


Fig. 1. Shells of *Reticunassa* spp. a–d. *Reticunassa jungi* sp. nov.; a–c. Holotype, MBM286702, 9.0 mm; d. Paratype 1, MBM286703, 12.0 mm. e–h. *Reticunassa hugokooli* sp. nov.; e–g. Holotype, MBM286705, 10.0 mm; h. Paratype, MBM286706, 9.4 mm. i–l. *Reticunassa aureolineata* sp. nov.; i–k. Holotype, MBM286707, 9.3 mm. l. Paratype, MBM286708, 9.2 mm. m–p. *Reticunassa fuscofasciata* sp. nov.; m–o. Holotype, MBM286710, 11.2 mm; p. Paratype, MBM207913, 10.5 mm.

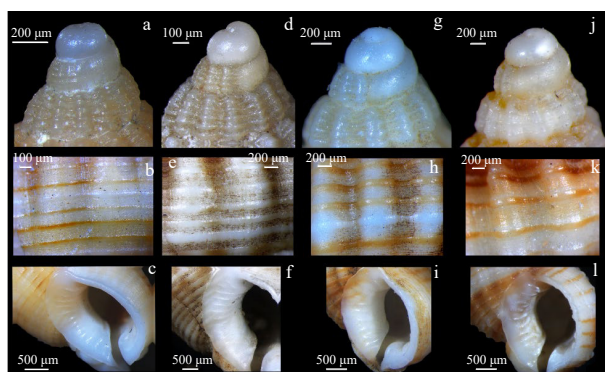


Fig. 2. Protoconch, microsculpture, and inner lip of *Reticunassa* spp. a–c. *Reticunassa jungi* sp. nov.; d–f. *Reticunassa hugokooli* sp. nov.; g–i. *Reticunassa aureolineata* sp. nov.; j–l. *Reticunassa fuscofasciata* sp. nov.

fine, numbering 8–11 on the middle part of the last whorl. Axial sculpture of rounded, raised ribs, extending from suture to suture on spire, reduced on lower part of last whorl, numbering 14 on first teleoconch whorl, 13 on penultimate whorl, and 13 on

last whorl, excluding varix. Aperture equally long as spire, outer lip varied with a thickened edge, interior with 7–8 lirae. Columella arched, lirate throughout, about 12 lirae in number, upper region with a strong parietal tooth (Fig. 2f). Columellar callus well developed. Siphonal canal short, semi-tubular. Shell color pale yellowish to brown.

Etymology: The new species is named after Hugo H. Kool, a specialist in nassariid taxonomy, who initiated the study of this group of Nassariidae.

Type locality: An abalone culture pond on the coast of Xinbei City (Taiwan), approximately 24°35'N, 121°53'E.

Distribution and habitat: Only known from the type locality, living in shallow water on sandy bottom.

3.3 *Reticunassa aureolineata* sp. nov. (Figs 1i–l and 2g–i)

Material examined: Holotype, RN: MBM286707 (length 9.3 mm, width 4.7 mm), off Xinbei City (Taiwan), sandy bottom, 1–2 m, in MBMCAS.

Paratype 1, RN: MBM286708 (length 9.2 mm, width 4.7 mm), collected together with the holotype.

Paratype 2, RN: MBM286709 (length 10.2 mm, width 5.0 mm), collected together with the holotype.

Description of the holotype: Shell (Figs 1i–k) thick, solid, slender, of medium size for the genus; spire acute, spire angle ~50°; last whorl large, occupying ~1/2 of shell length. Protoconch of 2 rounded, smooth whorls, transition to teleoconch distinct (Fig. 2g). Teleoconch of 5.25 moderately convex whorls. Suture deeply constricted. Spiral sculpture comprising thick primary spiral cords with microscopic spiral threads in between (Fig. 2h). First teleoconch whorl sculptured with 5, penultimate whorl with 6, and last whorl with 10 primary spiral cords, peripheral ones strongest. Fine microscopic spiral threads numbering 10–12 on the middle part of the last whorl. Axial sculpture of rounded ribs, extending from suture to suture; numbering 12 on first teleoconch whorl, 14 on penultimate whorl, and 12 on last whorl excluding varix. Aperture slightly shorter than spire, outer lip varied with a thickened edge, interior with 7 lirae, middle one strongest. Columella with about 11 lirae, upper region with a strong parietal tooth (Figs 1i and 2i). Columellar callus well developed. Siphonal canal short, semitubular. Color yellowish, peripheral primary spiral cords white, remaining cords brownish.

Etymology: The combination of *aureus* (golden) and *lineata* (line), referring to the golden spiral cords on the shell surface.

Type locality: An abalone culture pond on the coast of Xinbei City (Taiwan), approximately 24°35'N, 121°53'E.

Distribution and habitat: Only known from the type locality, living in shallow water on sandy bottom.

3.4 *Reticunassa fuscofasciata* sp. nov. (Figs 1m–p and 2j–l)

Material examined: Holotype, RN: MBM286710 (length 11.2 mm, width 5.5 mm), off Xinbei City (Taiwan), sandy bottom, 1–2 m, in MBMCAS, Qingdao.

Paratype, RN: one specimen, MBM207913 (length 10.5 mm, width 5.0 mm), trawled from the Beibu Bay (Guangxi), live on coarse sand bottom, 45 m, in MBMCAS.

Description of the holotype: Shell (Figs 1m–o) thick, solid, of medium size for the genus. Protoconch (Fig. 2j) of 1.75 smooth, rounded whorls. Spire high, about 1/2 of shell length. Teleoconch of 5.5 convex whorls. Axial sculpture of rounded ribs, 11 on first teleoconch whorl, 13 on penultimate whorl, 14 on last whorl, varix excluded. Spiral sculpture of prominent, widely spaced cords, overriding the axial ribs, giving shell surface a somewhat spiny appearance. There are 4 spiral cords on first teleoconch

whorl, 6 on penultimate whorl, 10 on last whorl. About 20 fine secondary spiral threads between primary spiral cords (Fig. 2k). Aperture rounded, outer lip variced, edge sharp, interior with 7 denticles, middle one strongest; arched columella, with about 10–12 denticles (Fig. 2l). Siphonal canal short and wide. Shell color yellowish, with 2 prominent brownish bands on each teleoconch whorl. Primary spiral cord brownish.

Etymology: From the Latin *fusco*, brown, and *fasciata*, banded, referring to the brown bands on teleoconch whorls.

Type locality: An abalone culture pond on the coast of Xinbei City (Taiwan), approximately 24°35'N, 121°53'E.

Distribution and habitat: Known from northeastern Taiwan Island and the Beibu Bay (Guangxi), living in shallow water (1–50 m) on the sandy bottom.

4 Comparisons and discussion

Galindo et al. (2017) defined the diagnosis for the *Reticunassa*. On the basis of the characteristic features of the genus, such as a small shell size, unkeeled protoconch, and the presence of a secondary spiral sculpture between primary spiral cords, the four new species described herein can be clearly assigned to this genus.

Reticunassa jungi sp. nov. was previously misidentified by various authors; for example, Lai (1996) identified this species as *Reticunassa dermestina* Gould, 1850 and Jung (2015) identified it as *Reticunassa pauper* Gould, 1850. However, *R. jungi* sp. nov. has broad axial ribs on the spire that are diminishing on the last whorl; this feature is absent on both *R. dermestina* and *R. paupera*. In addition, *R. paupera* has a multispiral protoconch and *R. dermestina* differs from *R. jungi* in the shape of the protoconch.

Reticunassa hugokooli sp. nov. and *Reticunassa jungi* sp. nov. closely resemble each other in terms of the shell shape. However, *R. hugokooli* sp. nov. differs in having a dumpy shell sculptured with strong spiral cords and axial ribs, a different protoconch (Fig. 2d) and different coloration. A thorough statistical comparison between these two species was not possible in the present study because of the low sample size. Therefore, larger sample sizes of both species are needed for further morphological analysis and comparisons.

Reticunassa aureolineata sp. nov. is most similar to *Reticunassa annabolteae* Galindo, Kool & Dekker, 2017 and *Reticunassa goliath* Galindo, Kool & Dekker, 2017 in terms of the general shape. *Reticunassa annabolteae* from Madagascar differs from the new species in having weak axial ribs and a prominent brown spiral band. *Reticunassa goliath* can be differentiated from the new species in a much smaller size, and in having more rounded whorls and a deeper suture.

Reticunassa fuscofasciata sp. nov. is somewhat similar to *Reticunassa intrudens* Galindo, Kool & Dekker, 2017 in shell shape. However, the latter species differs from the new species in having a more bulbous and flattened protoconch.

To date, 26 species have been recognized from the genus *Reticunassa* (MolluscaBase, 2021), all of which are found in the western Indo-Pacific region. Several species of *Reticunassa* have a multispiral protoconch, indicating a planktotrophic/planktonic larval development that results in a larger distribution range; others have a paucispiral protoconch, indicating a short, nonplanktotrophic/direct larval development that results in a sporadic distribution (Galindo et al., 2017). In the present study, the four new species have a paucispiral protoconch of 1.25–2 whorls, indicating that they have a nonplanktotrophic development and limited distribution. This is indeed reflected in their narrow geographic range. The finding of the four new species from only two sites

demonstrates that the biodiversity of this group in China might still be largely underestimated. In fact, there may be many more new species or new records awaiting discovery in Chinese waters.

Acknowledgements

Thanks to Xuwen Wu for his enthusiastic help with image processing. Special gratitude to Hugo H. Kool (the Netherlands), who kindly compared the pictures of our specimens with specimens in his extensive collection of Nassariidae.

References

- Cernohorsky W O. 1972. Indo-Pacific Nassariidae (Mollusca: Gastropoda). Records of the Auckland Institute and Museum, 9: 125–194
- Cernohorsky W O. 1984. Systematics of the family Nassariidae (Mollusca: Gastropoda). Bulletin of the Auckland Institute and Museum, 14: 1–356
- Galindo L A, Kool H H, Dekker H. 2017. Review of the *Nassarius pauper* (Gould, 1850) complex (Nassariidae): Part 3, reinstatement of the genus *Reticunassa*, with the description of six new species. *European Journal of Taxonomy*, (275): 1–43, doi: [10.5852/ejt.2017.275](https://doi.org/10.5852/ejt.2017.275)
- Galindo L A, Puillandre N, Utge J, et al. 2016. The phylogeny and systematics of the Nassariidae revisited (Gastropoda, Buccinoidea). *Molecular Phylogenetics and Evolution*, 99: 337–353, doi: [10.1016/j.ympev.2016.03.019](https://doi.org/10.1016/j.ympev.2016.03.019)
- Iredale T. 1936. Australian molluscan notes. No. 2. Records of the Australian Museum, 19(5): 267–340, doi: [10.3853/j.0067-1975.19.1936.704](https://doi.org/10.3853/j.0067-1975.19.1936.704)
- Jung Bor-Seng. 2015. Nassariidae from the coast of Taiwan. *The Pei-Yo*, 40: 42–59
- Kool H H, Dekker H. 2006. Review of the *Nassarius pauper* (Gould, 1850) complex (Gastropoda: Nassariidae). Part 1, with the description of four new species from the Indo-West Pacific. *Visaya*, 1(6): 54–75
- Kool H H, Dekker H. 2007. Review of the *Nassarius pauper* (Gould, 1850) complex (Gastropoda, Nassariidae). Part 2, the western Indian Ocean species, with the description of two new species and introducing a nomen novum. *Visaya*, 2(2): 62–77
- Lai Haoran. 1996. Nassariidae from Taiwan. *The Pei-Yo*, 22: 42–47
- MolluscaBase. 2021. MolluscaBase. Nassariidae Iredale, 1916 (1835). World Register of Marine Species. <http://www.marinespecies.org/aphia.php?p=taxdetails&id=151>[2021-04-01]