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Helicella itala (Linnaeus 1758) - Sarrat de la Sentinelle, Montségur, 10 octobre 2006. © Alain Bertrand

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Sur le plan géographique, il n'est donné aucune limitation, les faunes des contrées les plus lointaines ayant ici autant leur place que les faunes de nos jardins.

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Checklist of mollusk fauna in sand sediment from Xiajinwan, Xiamen, China, with descriptions of new species and new combination

<https://zoobank.org/References/7895eea5-07a4-4403-99d0-f055ffc5246b>

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Abstract - Mollusk fauna in the shell grit sieved from sand sediment around the high-water line in Xiajinwan, Xiamen, China exhibits great species diversity by consisting of three classes, more than 60 families and 170 species. The composition and origin of these species are discussed in this work in view of the climatic and geographical features of Xiamen Island and three new species recognized from this fauna are described with comparisons of conchological differences between the new species and other relevant species being made. A checklist with figures of the species of this fauna is provided.

Key words - China, Xiamen, mollusk fauna, new species.

Résumé - La faune de mollusques tamisés à partir de sédiments de sable autour de la ligne des hautes eaux à Xiajinwan, Xiamen, en Chine, présente une grande diversité en se composant de trois classes, plus de 60 familles et 170 espèces. La composition et l'origine de ces espèces sont discutées dans ce travail au vu des caractéristiques climatiques et géographiques de l'île de Xiamen et trois nouvelles espèces reconnues parmi cette faune sont décrites avec des comparaisons des différences conchologiques entre celles-ci et d'autres espèces pertinentes. Une liste de contrôle de cette faune est fournie avec des illustrations.

Mots Clés - Chine, Xiamen, mollusque, nouvelles espèces.

Introduction

Sand sediment on the coast or from different depth usually contains calcareous or chitinous skeletons of deceased invertebrates, and a large amount of these skeletons are empty shells of various mollusks, among which some are intact while the others are fragments. Studies on the mollusk fauna in sand sediment may contribute to the knowledge of molluscan species composition as well as the ocean current structure and other geological information of a certain sea area. On the one hand, the collecting and researching progress are facilitated when empty shells of different species in different habitats converge in sediment, and the species composition including abundance of each species emerges clearly by preliminary screening. On the other hand, species which live in various depths but appear in the sediment of the same sample point will reflect the changes in geological environments and the features of local ocean currents (MICHEL *et al.*, 2011; BUHL-MORTENSEN *et al.*, 1993).

Xiamen, a city of Fujian Province in Southeastern China, consists of a main island named Xiamen Island and other islands and peninsulas, which face the Taiwan Strait on the east. As a well developed city, the coastline of Xiamen, especially Xiamen Island and Gulangyu Island has changed greatly since the 1970s under various engineering constructions for scenic spots, harbours or airports, with significantly decline of natural coastline (LIN S. *et al.* 2020). In recent years, measures were taken to improve the eco-environment of the intertidal zones around Xiamen by transplanting mangroves, establishing wetland parks and conservation areas. In these areas the mollusk fauna showing considerable diversity, among which quite a number of newly recorded species have been found. Field surveys conducted by researching teams or individual naturalists for mollusks along the coastline of Xiamen have yielded preliminary achievements so far (e.g. CHEN S.-Y. *et al.* 2021; WU Q. *et al.* 2009).

The mollusk fauna in shell grit from sand sediment in Guanyinshan, Xiamen is firstly discovered in 2021 with about 60 species been recorded (Zhong D.-D. pers. comm.). From april to november 2022, several surveys were conducted on a gravelous beach approximately 3 kilometers in length of Xiajinwan to Guanyinshan which is located in the east of Xiamen Island (24°31'N, 118°12'E). The sediment was collected around the high-water line along the seashore which is submerged at full tide. Samplings of specimens from this sediment revealed great species diversity in mollusk fauna.

Material and methods

Shell materials used in this study were collected in shell grit sieved from sediment of Xiajinwan, Xiamen, China. Degreasing cotton with alcohol was used to remove the dirt on the surface of the shells.

Conventional photos of the shells were taken using Nikon D80 camera with Laowa 60mm F2.8 Macro 2:1 lens and were modified in Adobe Photoshop CS6 2012. Scanning electron microscope (SEM) pictures were taken in the University of Vigo, in the Centro de Apoyo Científico y Tecnológico a la Investigación (CACTI) using a Xl30 microscope and a Quanta200.

Number of whorls is calculated in Verduin Method (VERDUIN A. 1982).

Abbreviations:

BMNH: British Museum (Natural History), London.

MBM: Marine Biological Museum, Chinese Academy of Sciences, Qingdao, China.

MHNG: Muséum d'Histoire Naturelle de Genève, Switzerland.

KBIN: Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels, Belgium.

LLW: Collection by Li-Wen Lin (Xiamen, China).

MNCN: Museo Nacional de Ciencias Naturales, Madrid, Spain.

MNHN: Muséum national d'Histoire Naturelle, Paris.

NSMT: Natural Science Museum Tokyo.

Results

Shells of three classes, Gastropoda, Bivalvia and Scaphopoda are recorded and more than 60 families and 168 species are recognized. The sampling mainly focuses on intact specimens under 20 mm while fragments of larger species are not reckoned in the statistics. The most among these species are typical subtidal zone species or species from deeper water, including families Epitoniidae, Zebinidae, Amathinidae, Triphoridae, Vanikoridae, Vitrinellidae, Eratoidae, Mangeliidae, Raphitomidae, Clathurellidae, Pyramidellidae, etc. *Stosicia annulata* (Dunker, 1860) and *Minolia strigata* G. B. Sowerby III, 1894 are dominant species with considerable individuals being found. Species living in intertidal zones of Xiamen can be scatteredly seen in the sampling sediment, such as *Mainwaringia leithii* (E. A. Smith, 1876) inhabiting in mangroves, *Ruditapes philippinarum* (Adams & Reeve, 1850) inhabiting in mudbank and *Peasiella habeii* D. Reid & Mak, 1998 inhabiting on reefs with algae. In addition, planktonic snails *Diacavolinia longirostris* (Blainville, 1821) and terrestrial species (*Kalliella* sp., *Tortaxis* sp., *Bradybaena similis* Ferussac, 1821, etc.) are also collected.

Discussion

The great diversity of species from subtidal zone and deeper area is worth discussing, considering the meteorological characteristics and the anthropogenic geographic activities of Xiamen. Affected by the Pacific thermal current, Xiamen undergoes 4-5 typhoons per year in average, causing storm surges which brought sediment from deep water up to the shore till the extreme high-water line. For example during the super typhoon Dan (No. 9914) in 1999, it reached an extreme water stage of 732 cm (XU & CAI, 2021). Xiajinwan and Guanyinshan are in the east of Xiamen Island, an area lower in altitude, which in addition is directly exposed to typhoons. Sand sediment washed ashore by surges explain the diversity of mollusk fauna to a certain extent, while the sea reclamation projects of Xiamen City should also be taken into account. Reclaiming land from marshes near the coastline of Xiamen Island could date back to the 1920s, and the largest bay of the island, Yundang Harbor, was separated by a coastal levee as a municipal lake in the early 1970s. In recent years to meet the needs of the development of city construction, sand and gravels were dredged at depth of 20-50 m from sea area around, especially on the southeast Xiamen Island. Xiajinwan-Guanyinshan area is covered in the reclamation plan of year 2007 to 2015, parts of bathyal shells in the sand sediment are likely to be brought up by dredging works (XU & CAI, 2021; ZHAO, 2015; LIN, *et al*, 2020).

A preliminary analysis of the composition of species of above mentioned fauna has been made by comparison of species from other sea areas of China, as well as of Japan, Korea and Southeast Asia, particularly Philippines. The studies result in three new species of Gastropoda which are intensively described in this work, together with some comments on extant taxa and the proposal of a new combination. A checklist of species found in sediment from Xiajinwan and abundance of each species is provided with photographs, which makes preciser identification or other researches of this fauna available.



Figure 1. Shell grit in sediment in the sampling point and concisely assorted specimens.

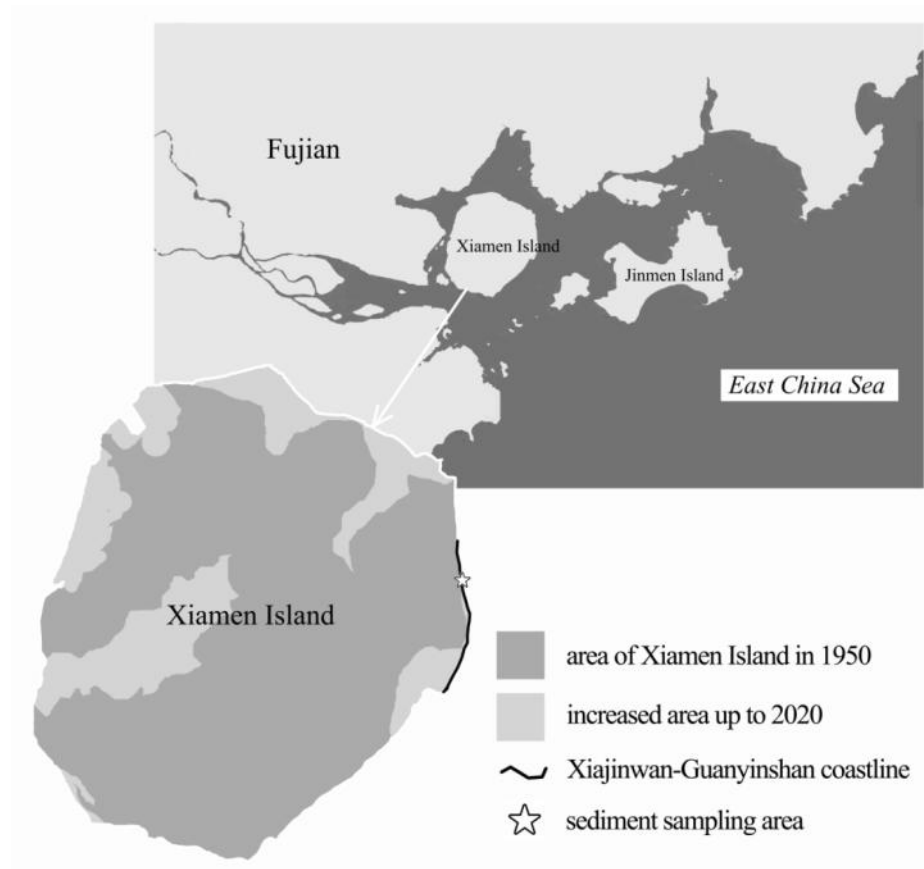


Figure 2. An overview of the reclaiming construction in Xiamen Island and the sampling area of this study.

Systematics

Class Gastropoda Cuvier 1798

Family Conradiidae Golikov & Starobogatov, 1987

Genus *Conradia* A. Adams, 1860

Type species: *Conradia cingulifera* A. Adams, 1860

Conradia muatsi n. sp. (Fig. 3. A-F)

Zoobank : <https://zoobank.org/NomenclaturalActs/501FFE3-6BB7-4039-9259-F1D01282FEA3>

Type locality. China, Fujian Province, Xiamen City [厦门市], Siming District [思明区], Xiajinwan [厦金湾]; 24°31'N, 118°12'E; in sand sediment near the high-water line.

Type material (6 shells). *Holotype*: CHINA • 1 shell (Fig. 3. A-B); Xiajinwan; 24°31'N, 118°12'E; in sand sediment near the high-water line; Apr.-Nov.-2022; MBM 287608. *Paratype 1*: CHINA • 1 shell (SEM sample, Fig. 3. C-F); same data as for holotype; MNCN 15.05/200300P. *Paratype 2*: CHINA • 1 shell; same data as for holotype; MBM 287609. *Paratypes 3-5*: CHINA • 1 shell; same data as for holotype; LLW.

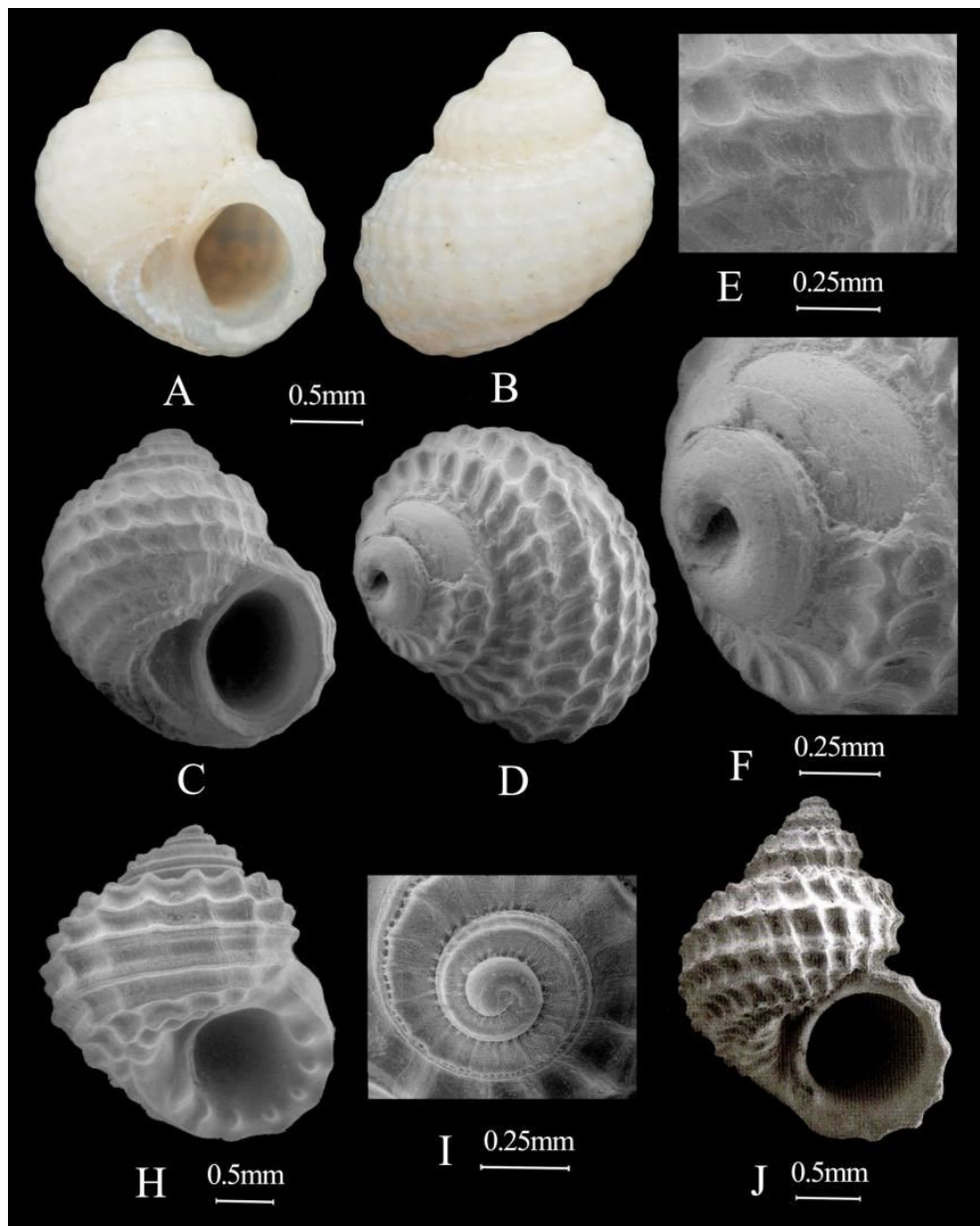


Figure 3. **A-F.** *Conradia muatsi* n. sp. **A-B.** Holotype MBM 287608, 2.79×2.28 mm: ventral (A) and dorsal (B) views, **C-F.** Paratype 1 MNCN 15.05/200300P: apertural (C) and dorsal (D) views, E - detail of shell sculpture, F - detail of protoconch. **H-I.** *Parviturbo fortius* Rubio, Rolán & Fernández-Garcés, 2015. H - apertural view of one paratype MNHN IM-2012-37354, I - protoconch of the holotype MNHN IM-2012-5726. **J.** *Conradia edita* Rubio & Rolán, 2020, apertural view of holotype MNHN IM- 2000-35137.

Etymology. Muatsi, spelled in Southern Fujian Dialect, is a kind of snack with round shape and coarse surface, which suggests the appearance of the shells.

Description: Shell small for this genus, white to cream, solid and robust, turbiniform, formed by $3\frac{3}{4}$ whorls separated by a moderately deep suture, deeply and narrowly umbilicate.

Protoconch smooth, with $1\frac{3}{4}$ whorls. Teleoconch with approximately 2 very convex whorls.

Ornamentation of wide spiral and axial ribs crossing with each other to form a reticulate surface pattern. The ribs strengthen near the suture which granulate the shoulder area. apertural view, 22-25 axial ribs and 9 spiral ribs can be seen on the body whorl.

Umbilicus rounded, narrow and very deep delimited by a spiral rib, inside only with fine axial striae can be observed.

Aperture slightly elliptical, prosocline; parietal callus thick, continued into the columella which is thick and arched; outer lip very thick, with the crenulated margin formed by the termination of the spiral ribs.

Dimensions of the holotype: 2.79 mm in height and 2.28 mm in diameter.

Distribution: Only known from the type locality.

Differential diagnosis. This new species shares a similar appearance with some species in the genus *Parviturbo* Pilsbry & T. L. McGinty, 1945, such as *Parviturbo fortius* Rubio, Rolán & Fernández-Garcés, 2015 and *Parviturbo seamountensis* Rubio, Rolán & Gofas, 2015, especially in shell shape and sculptures. However, the protoconch of *Parviturbo* species is characterised by $\frac{3}{4}$ nuclear whorls with smooth or with spiral cords, while the new species has a $1\frac{3}{4}$ -whorl-protoconch. Furthermore, *Parviturbo* species are mainly distributed in Atlantic coasts and no records from west Pacific can be found (Rubio F., Rolán E. & Fernández-Garcés R. 2015). The number of whorls varies a lot in *Conrardia* species and the punctate sculpture, deep umbilicus, well-developed inner lip and scalloped outer lip of the new species matches the features of *Conrardia* (Hickman, C. S. 2013, Rubio F. & Rolán E. 2020), and can be distinguished from the similar species *Conrardia edita* Rubio & Rolán, 2020 by a round shape, weaker spiral ribs and an oval aperture.

Family Vitrinellidae K. J. Bush, 1897

Genus *Circulus* Jeffreys, 1865

Type species: *Delphinula duminyi* Requier, 1848 = *Circulus striatus* (Philippi, 1836)

***Circulus xuae* n. sp. (Fig. 4. A-F, K-L)**

Zoobank : <https://zoobank.org/NomenclaturalActs/01AB5BC7-25BB-4680-A65B-BC45C9AEBF31>

Type locality. China, Fujian Province, Xiamen City [厦门市], Siming District [思明区], Xiajinwan [厦金湾]; 24°31'N, 118°12'E; in sand sediment near the high-water line.

Type material (6 shells). *Holotype:* CHINA • 1 shell (Fig. 4. A-C); Xiajinwan; 24°31'N, 118°12'E; in sand sediment near the high-water line; Apr.-Nov.-2022; MBM 287610. *Paratype 1:* CHINA • 1 shell (SEM sample, Fig. 4. D-E, K-L); same data as for holotype; MNCN 15.05/200301P. *Paratype 2:* CHINA • 1 shell; same data as for holotype; MBM 287611. *Paratypes 3-5:* CHINA • 1 shell; same data as for holotype; LLW.

Etymology. Named after Ping Xu, for her support in the first author's study in malacology.

Description: Shell small, translucently white, solid and robust, depressed- turbiniform, formed by $3\frac{3}{4}$ whorls separated by a shallow suture, strongly carinate outline and deeply umbilicate.

Protoconch approximately of $1\frac{1}{4}$ whorls, smooth, transition to the teleoconch is obscure by the similar smoothness of early teleoconch. Teleoconch with $2\frac{1}{2}$ very carinate whorls; periphery rounded.

Ornamentation of carinate, wide spiral cords and dense small spots near the basal and periumbilical keel. On the body whorl 5 strong carinae are observed: the subsutural carina angles the shell and form a flattened shoulder area; 2 peripheral carinae are prominent and the lower one is slightly protrudes than the upper one; the basal carina and periumbilical carina are obtuser than three other carinae, and the periumbilical carina delimits the umbilicus. Few spiral cords on the teleoconch and obsolete axial growing lines can be seen.

Umbilicus narrow and deep, delimited by the obtuse and strong periumbilical carina. Umbilical wall is convex with exquisite spiral cords on the surface.

Aperture rounded, outer lip moderately thickened and externally modified by the termination of spiral

carinae. Inner lip callous and slightly reflected towards the umbilicus.
Dimensions of the holotype: 1.14 mm in height and 2.68 mm in diameter.

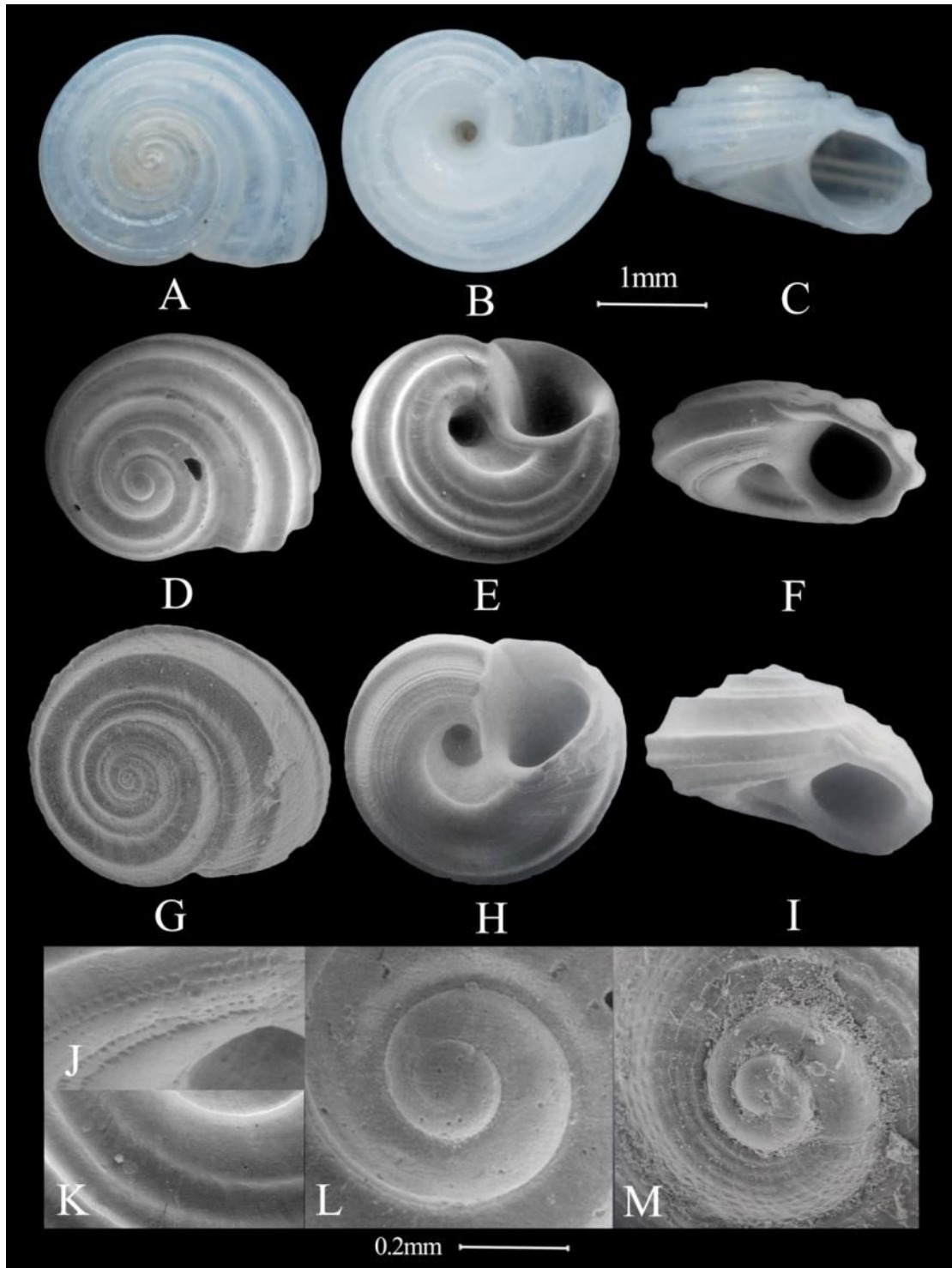


Figure 4. **A-F, K-L.** *Circulus xuae* n. sp. **A-C.** Holotype MBM 287610, 1.14×2.68 mm: apical (A) basal (B) and apertural (C, D) views, **D-F, K-L.** Paratype 1 MNCN 15.05/200301P: apical (D) basal (E) and apertural (F) views, **K** - detail of shell sculpture, **L** - detail of protoconch. **G-J, M.** *Circulus duplicatus* (Lischke, 1872) NMST-Mo123871: apical (G) basal (H) and apertural (I) views, **J** - detail of shell sculpture, **M** - detail of protoconch. 1.14×2.68 mm

Distribution: Only known from the type locality.

Differential diagnosis. *Circulus xuae* n. sp. is closest with *Circulus duplicatus* (Lischke, 1872) by sharing the same carinae features, while the periumbilical carina of *C. xuae* is stronger and sharper than that of *C. duplicatus*. Furthermore, *C. duplicatus* has rather different surface sculpture: rough and granular protoconch,

teleoconch with thin spiral cord marked with growing lines to form a pitted sculpture. *C. xuae* is also distinguished from the “Teramachii group” (Rubio F. & Rolán E. 2022) containing *Circulus teramachii* (Habe, 1958) and congener species by having obtuse basal and periumbilical carinae and narrow umbilicus.

Distribution. Only known from the type locality.

Family Vanikoridae Gray, 1840

Genus *Vanikoro* Quoy & Gaimard, 1832

Type species: *Sigaretus cancellatus* Lamarck, 1822 = *Vanikoro cancellata* (Lamarck, 1822)

***Vanikoro hairoinsularis* n. sp. (Fig. 5. A-F)**

Zoobank : <https://zoobank.org/NomenclaturalActs/FD3446AF-0B80-46BE-9244-99F9CD7DFCB3>

Type locality. China, Fujian Province, Xiamen City [厦门市], Siming District [思明区], Xiajinwan [厦金湾]; 24°31'N, 118°12'E; in sand sediment near the high-water line.

Type material (5 shells). *Holotype*: CHINA • 1 shell (Fig. 5. A-C); Xiajinwan; 24°31'N, 118°12'E; in sand sediment near the high-water line; Apr.-Nov.-2022; MBM 287612. *Paratype 1*: CHINA • 1 shell (SEM sample, Fig. 5. D-F); same data as for holotype; MNCN 15.05/200303P. *Paratype 2*: CHINA • 1 shell; same data as for holotype; MBM 287613. *Paratypes 3-4*: CHINA • 1 shell; same data as for holotype; LLW.

Etymology. This name is a latinization of Egret Island, an alternative name of Xiamen Island.

Description: Shell of micro size for this genus, translucently white, thin and fragile, rounded, spire elevated. Protoconch approximately 2 whorls, globose, with 5 spiral cords on the surface and fine axial grooves near the suture. Teleoconch with 2 ¼ whorls in the holotype, uniformly enlarging. The shell has prominent axial ribs and numerous very thin spiral lines; axial ribs obtuse, loosely and evenly distributed; 27-30 axial ribs can be seen on the body whorl. Suture deep with a shallow and slightly concave shoulder near it.

Aperture ovoid, outer lip thin and sharp. Umbilicus open, wide and deep with a keel. Axial ribs extend over the keel and stretch into the umbilicus, spiral ribs absent in the umbilicus.

Dimensions of the holotype: 2.79 mm in height and 2.28 mm in diameter.

Distribution: Only known from the type locality.

Differential diagnosis : *Vanikoro hairoinsularis* n. sp. has some features of the genus *Megalomphalus* Brusina, 1871 and *Macromphalina* Cossmann, 1888, such as a small shell with a prominent apex, a wide aperture, a large umbilicus and strong axial ribs. However its shell shape is globose rather than depressed as *Macromphalina* species; the strong, obtuse and widely spaced axial ribs make this species less similar to known *Megalomphalus* species but some *Vanikoro* species. In addition no matter *Macromphalina* or *Megalomphalus* an area lower in altitude, which in addition is directly exposed to typhoons. So here this species is placed under *Vanikoro*. Compared with *Vanikoro* species, those having similar sculptures on the surface are usually large and thick species with narrow umbilicus, such as *Vanikoro foveolata* Souverbie & Montrouzier, 1866, *Vanikoro tricarinata* (Récluz, 1843) etc. Species with similar size, shape and umbilicus, like *Vanikoro cuvieriana* (Récluz, 1843), has a larger, deep-colour protoconch and different sculpture.

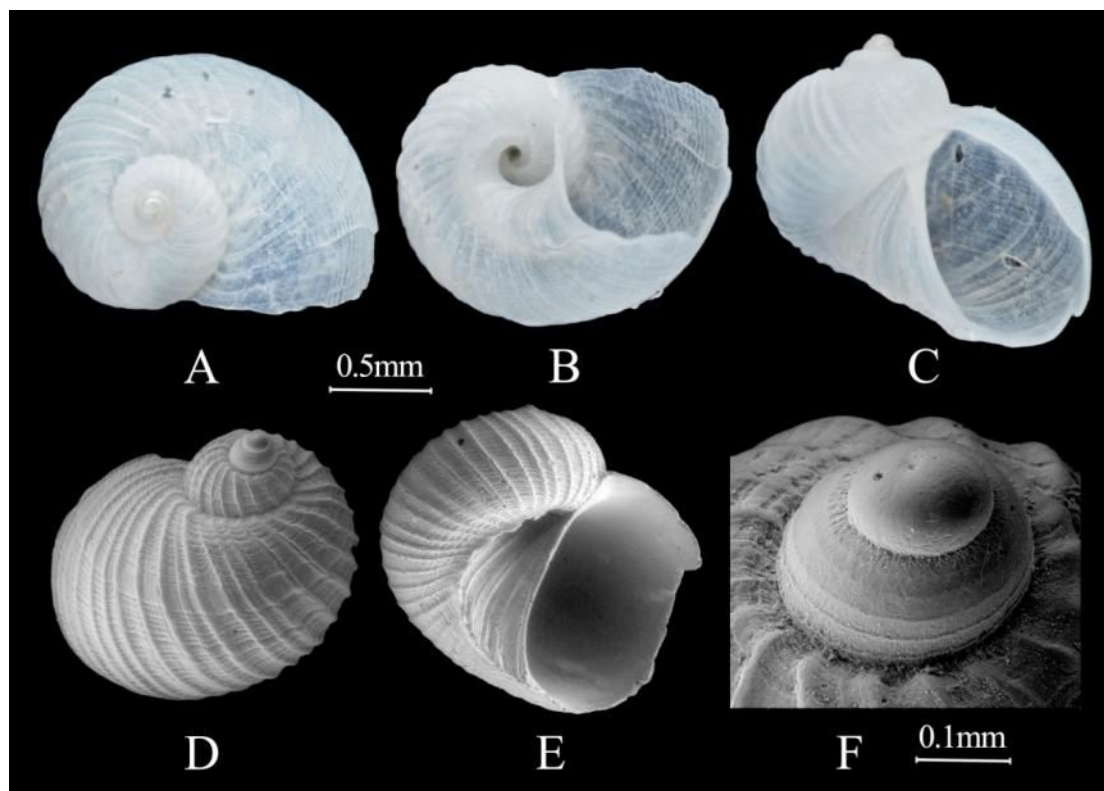


Figure 5. A-F. *Vanikoro hairoinsularis* n. sp. A-C. Holotype MBM 287612, 2.79×2.28 mm: apical (A) basal (B) and apertural (C) views, D-E. Paratype 1 MNCN 15.05/200303P: dorsal (D) and basal (E) views, F - detail of protoconch.

Family Cancellariidae Forbes & Hanley, 1851

Genus *Trigonaphera* Iredale, 1936

Type species: *Trigonostoma vinnulum* Iredale, 1925 = *Trigonaphera vinnulum* (Iredale, 1925)

Trigonaphera fusca (G. B. Sowerby III, 1889) n. comb. (Fig. 9. P)

Cancellaria fusca G. B. Sowerby III, 1889, *Proc. Zool. Soc. London*. 56: 565-570, pl. 28.

Type material: holotype of *C. fusca* BMNH 1989034; syntypes of *C. fusca* var. *minor* BMNH 1989035, KBIN I.G.10591, MHNG 11535. Type Locality: Hong Kong.

Material examined: Xiajinwan, China; 24°31'N, 118°12'E; in sand sediment near the high-water line; Apr.-Nov.-2022; LLW.

Remarks: *Cancellaria fusca* was described by G. B. Sowerby III based on four specimens: one as holotype for *C. fusca* and three as syntypes for *C. fusca* var. *minor* which are considered as *C. fusca* in Verhecken A. 1990. Also in this article Verhecken viewed and figured all type specimens, as well as discussed the affinities of this species. The conjecture that *C. fusca* is a small local form of *Cancellaria scalariformis* Lamarck, 1822 (= *Scalptia scalariformis* (Lamarck, 1822)) was suggested, but remained uncertain then due to the lack of specimens. Several pieces collected from Xiajinwan matched the descriptions and pictures in the original description of *C. fusca* and in Verhecken A. 1990. Considering the taxonomic progress in recent years, its generic status in *Cancellaria* Lamarck, 1799 becomes obsolete. Molecular analysis showed that the clade of *Cancellaria* consisted of a series of ovate and reticulate species, while *C. fusca* belongs to the *Scalptia-Trigonaphera* group through comparisons of shell morphology. Moreover, the differences between *Scalptia* Jousseaume, 1887 and *Trigonaphera* Iredale, 1936 and the validity of *Trigonaphera* need further studies. Morphologically, *Trigonaphera* appears to be slenderer in outline and higher in shell spire. (Modica M. V. et al. 2011; Verhecken A. 2018a; Verhecken A. 2018b). Based on the discussion above, *Trigonaphera fusca* (G. B. Sowerby III, 1889) n. comb. is proposed here.

Checklist of species recorded in sand sediments from Xiajinwan

*The criteria of the abundance of individuals of each species in sediments: + for less than 5, ++ for 5~10, +++ for 10~25, ++++ for 25~50 and +++++ for more than 50 per 3000 pieces.

Family	Species	Abundance*	Figure
Lottiidae	<i>Patelloida pygmaea</i> (Dunker, 1860)	++	Fig. 11. A
Fissurellidae	<i>Diodora mus</i> (Reeve, 1850)	+++	Fig. 8. A
Fissurellidae	<i>Diodora octagona</i> (Reeve, 1850)	+++	Fig. 8. B
Fissurellidae	<i>Scutus sinensis</i> (Blainville, 1825)	+	Fig. 8. C
Fissurellidae	<i>Emarginula concinna</i> A. Adams, 1852	++	Fig. 8. D-E
Solariellidae	<i>Minolia strigata</i> G. B. Sowerby III, 1894	+++++	Fig. 10. C-E
Chilodontaidae	<i>Vaceuchelus clathratus</i> (A. Adams, 1853)	++++	Fig. 9. A
Chilodontaidae	<i>Euchelus scaber</i> (Linnaeus, 1758)	+++++	Fig. 7. O
Trochidae	<i>Monodonta labio</i> (Linnaeus, 1758)	+	Fig. 7. N
Trochidae	<i>Sericominolia stearnsii</i> (Pilsbry, 1895)	+	Fig. 10. F-H
Trochidae	<i>Umbonium vestiarium</i> (Linnaeus, 1758)	++++	Fig. 9. C-D
Turbinidae	<i>Turbo cornutus</i> [Lightfoot], 1786	+	Fig. 9. B
Calliostomatidae	<i>Calliostoma filiareginae</i> (Sakurai, 1994)	++	Fig. 7. P
Calliostomatidae	<i>Tristichotrochus consors</i> (Lischke, 1872)	++	Fig. 7. Q
Conradiidae	<i>Conradia muatsi</i> sp. nov.	++	Fig. 14. E
Neritidae	<i>Nerita yoldii</i> Récluz, 1841	+++	Fig. 8. F
Neritidae	<i>Clithon oualaniense</i> (Lesson, 1831)	+	Fig. 12. H
Dialidae	<i>Diala semistriata</i> (Philippi, 1849)	++	Fig. 14. I
Scaliolidae	<i>Finella purpureoapicata</i> Preston, 1905	++++	Fig. 14. M
Scaliolidae	<i>Finella</i> cf. <i>vulnerata</i> (Hedley, 1909)	+++	Fig. 14. N
Cerithiidae	<i>Bittium glareosum</i> Gould, 1861	+	Fig. 14. J
Cerithiidae	<i>Cerithium</i> sp.	+	Fig. 10. K
Potamididae	<i>Pirenella</i> sp.	++	Fig. 10. J
Capulidae	<i>Capulus violaceus</i> Angas, 1867	+	Fig. 12. P-Q
Epitoniidae	<i>Epitonium replicatum</i> (G. B. Sowerby II, 1844)	+++	Fig. 11. B
Epitoniidae	<i>Epitonium coretum</i> (Iredale, 1936)	++++	Fig. 11. C
Epitoniidae	<i>Epitonium yokoyamai</i> K. Suzuki & Ichikawa, 1936	+	Fig. 11. D
Epitoniidae	<i>Epitonium</i> cf. <i>yangi</i> L. G. Brown, 2010	+	Fig. 11. E
Epitoniidae	<i>Epitonium</i> cf. <i>eclecticum</i> (Melvill & Standen, 1903)	+	Fig. 13. N
Epitoniidae	<i>Opalia mormulaeformis</i> (Masahito, Kuroda & Habe, 1971)	+	Fig. 13. M
Epitoniidae	<i>Narvaliscala percancellata</i> (T. Nakayama, 2000)	+	Fig. 13. O
Epitoniidae	<i>Amaea</i> cf. <i>tosaensis</i> (M. Azuma, 1962)	+	Fig. 14. A
Littorinidae	<i>Littoraria sinensis</i> (Philippi, 1847)	++	Fig. 10. I
Littorinidae	<i>Mainwaringia leithii</i> (E. A. Smith, 1876)	+	Fig. 12. I
Littorinidae	<i>Peasiella habei</i> D. Reid & Mak, 1998	+	Fig. 14. F
Naticidae	<i>Notocochlis gualteriana</i> (Récluz, 1844)	++	Fig. 8. G
Naticidae	<i>Eunaticina papilla</i> (Gmelin, 1791)	+++	Fig. 8. H
Naticidae	<i>Mammilla kurodai</i> (Iw. Taki, 1944)	++	Fig. 8. I
Naticidae	<i>Natica</i> sp.	+	Fig. 8. J
Triphoridae	<i>Viriola tricineta</i> (Dunker, 1882)	++++	Fig. 12. A
Triphoridae	<i>Coriophora granosa</i> (Pease, 1871)	+++	Fig. 12. C
Triphoridae	<i>Coriophora fusca</i> (Dunker, 1860)	+	Fig. 12. B, Fig. 8. D-E
Cerithiopsidae	<i>Seila morishimai</i> (Habe, 1970)	+++	Fig. 11. F
Cerithiopsidae	<i>Joculator marileutes</i> (Melvill & Standen, 1896)	+	Fig. 14. G
Zebinidae	<i>Stosicia annulata</i> (Dunker, 1860)	+++++	Fig. 13. H
Rissoidae	<i>Alvania ogasawarana</i> (Pilsbry, 1904)	+	Fig. 13. P
Litiopidae	<i>Alaba hungerfordi</i> G. B. Sowerby III, 1894	+	Fig. 13. Q
Rissoinidae	<i>Phosinella media</i> (Schwartz von Mohrenstern, 1860)	+++	Fig. 13. F

Family	Species	Abundance*	Figure
Rissoinidae	<i>Rissoina costulata</i> Dunker, 1860	++++	Fig. 13. G
Iravadiidae	<i>Iravadia ornata</i> W. T. Blanford, 1867	+	Fig. 13. I
Iravadiidae	<i>Chevallieria</i> cf. <i>australis</i> Ponder, 1984	+	Fig. 13. J
Iravadiidae	<i>Pseudonoba yendoi</i> (Yokoyama, 1927)	+	Fig. 13. K
Assimineidae	<i>Paludinellassiminea tanegashimae</i> (Pilsbry, 1924)	+	Fig. 12. O
Caecidae	<i>Caecum glabellum</i> (Carpenter, 1868)	+	Fig. 14. Q
Tornidae	<i>Anticlimax obesa</i> Rubio & Rolán, 2014	+	Fig. 12. U-V
Vitrinellidae	<i>Circulus cinguliferus</i> (A. Adams, 1850)	+	Fig. 12. W-X
Vitrinellidae	<i>Pseudoliotia pulchella</i> (Dunker, 1860)	+++++	Fig. 6. A-C, Fig. 14. L
Vitrinellidae	<i>Circulus xuae</i> n. sp.	++	Fig. 14. K
Eulimidae	<i>Pyramidelloides mirandus</i> (A. Adams, 1861)	+	Fig. 13. D
Eulimidae	<i>Hemiliostraca metcalfei</i> (A. Adams, 1853)	+	Fig. 13. C
Eulimidae	<i>Melanella persimilis</i> (Kuroda & Habe, 1971)	+	Fig. 12. E
Eulimidae	<i>Melanella</i> cf. <i>lunata</i> Pilsbry, 1918	++	Fig. 13. A
Eulimidae	<i>Melanella solidula</i> (A. Adams & Reeve, 1850)	++	Fig. 13. B
Eulimidae	<i>Mucronalia</i> cf. <i>ryukyuensis</i> Takano, Kubo & Oguchi, 2022	+	Fig. 13. E
Eulimidae	<i>Eulima bifascialis</i> (A. Adams, 1864)	+	Fig. 9. Q
Vanikoridae	<i>Macromphalus tornatilis</i> (Gould, 1859)	++	Fig. 12. R
Vanikoridae	<i>Macromphalus jinyuae</i> L.-W. Lin, 2023	++++	Fig. 12. S
Vanikoridae	<i>Macromphalus</i> cf. <i>styliferinus</i> (G.Nevill, 1885)	+	Fig. 12. T
Vanikoridae	<i>Constantia elegans</i> A. Adams, 1860	+	Fig. 14. B
Vanikoridae	<i>Vanikoro hairoinsularis</i> n. sp.	++	Fig. 14. C
Vanikoridae	<i>Vanikoro distans</i> (Récluz, 1844)	+	Fig. 14. D
Calyptraeidae	<i>Calyptraea pellucida</i> (Reeve, 1859)	++++	Fig. 10. A-B
Ovulidae	<i>Sandalia triticea</i> (Lamarck, 1810)	++	Fig. 9. R
Ovulidae	<i>Cuspidolva bellica</i> (C. N. Cate, 1973)	++	Fig. 12. G
Eratoidea	<i>Alaerato angistoma</i> (G. B. Sowerby I, 1832)	++++	Fig. 12. K-L
Eratoidea	<i>Sulcerato pellucida</i> (Reeve, 1865)	+++	Fig. 12. M-N
Eratoidea	<i>Sulcerato tomlini</i> (Schilder, 1933)	+++	Fig. 12. J
Velutinidae	<i>Velutina pusio</i> A. Adams, 1860	+	Fig. 13. L
Cancellariidae	<i>Scalptia obliquata</i> (Lamarck, 1822)	++	Fig. 9. N
Cancellariidae	<i>Trigonaphera fusca</i> G. B. Sowerby III, 1889	++	Fig. 9. P
Cancellariidae	<i>Trigonostoma thysthlon</i> Petit & Harasewych, 1987	+	Fig. 9. O
Columbellidae	<i>Zafra pumila</i> (Dunker, 1858)	++++	Fig. 6. F-G, Fig. 14. H
Columbellidae	<i>Metanachis jaspidea</i> (G.B.Sowerby I, 1844)	+++	Fig. 9. J
Columbellidae	<i>Mitrella pudica</i> (Brazier, 1877)	++	Fig. 12. F
Columbellidae	<i>Mitrella bella</i> (Reeve, 1859)	++	Fig. 9. I
Fasciolaridae	<i>Fusinus perplexus</i> (A. Adams, 1864)	+	Fig. 9. K
Nassariidae	<i>Reticunassa paupera</i> (A. Gould, 1850)	+++	Fig. 9. F
Nassariidae	<i>Reticunassa festiva</i> (Powys, 1835)	+++	Fig. 11. T
Nassariidae	<i>Nassarius fidus</i> (Reeve, 1853)	+	Fig. 8. O
Nassariidae	<i>Nassarius smithii</i> (Marrat, 1877)	+	Fig. 9. G
Nassariidae	<i>Nassarius nanhaiensis</i> S.-P. Zhang, 2013	++	Fig. 9. H
Nassariidae	<i>Nassarius</i> cf. <i>reeveanus</i> (Dunker, 1847)	+	Fig. 9. E
Pisaniidae	<i>Engina concinna</i> (Reeve, 1846)	++	Fig. 8. N
Muricidae	<i>Bedequina birileffi</i> (Lischke, 1871)	+++	Fig. 8. K
Muricidae	<i>Rapana bezoar</i> (Linnaeus, 1767)	++	Fig. 8. M
Muricidae	<i>Ergalatax</i> sp.	++	Fig. 8. L
Mitridae	<i>Swainsonia</i> cf. <i>fusca</i> (Swainson, 1824)	+	Fig. 11. R
Olividae	<i>Olivella aureobalteata</i> Kuroda & Habe, 1971	+++	Fig. 9. L
Olividae	<i>Olivella</i> cf. <i>zonalis</i> (Lamarck, 1811)	++	Fig. 9. M
Terebridae	<i>Myurella</i> sp.	+++	Fig. 9. S
Turridae	<i>Gemmula monilifera</i> (Pease, 1860)	+	Fig. 8. Q

Family	Species	Abundance*	Figure
Borsoniidae	<i>Tomopleura</i> cf. <i>pouloensis</i> (Jousseume, 1883)	+	Fig. 11. G
Clathurellidae	<i>Paraclathurella contracta</i> (Reeve, 1843)	++++	Fig. 6. L-M, Fig. 11.
Clathurellidae	<i>Etrema alphonsianum</i> (Hervier, 1896)	++++	Fig. 13. R
Mangeliidae	<i>Eucithara coronata</i> (Hinds, 1843)	++++	Fig. 6. H-I, Fig. 11. H
Mangeliidae	<i>Pseudorhaphitoma bipyramidata</i> Hedley, 1922	++	Fig. 13. S
Mangeliidae	<i>Pseudorhaphitoma fuscescens</i> (Thiele, 1925)	+++	Fig. 6. N-O, Fig. 13. T
Mangeliidae	<i>Pseudorhaphitoma hervieri</i> (Hedley, 1922)	+++	Fig. 13. Y
Mangeliidae	<i>Guraleus semicarinatus</i> (Pilsbry, 1904)	+++	Fig. 13. W
Mangeliidae	<i>Guraleus</i> sp.	+	Fig. 11. J
Raphitomidae	<i>Asperdaphne subzonata</i> (E. A. Smith, 1879)	+	Fig. 8. R
Raphitomidae	<i>Vepracula pungens</i> (Gould, 1860)	+	Fig. 11. K
Raphitomidae	<i>Kuroshiodaphne saturata</i> (Reeve, 1845)	+++	Fig. 6. J-K, Fig. 11. L
Raphitomidae	<i>Kermia pumila</i> (Mighels, 1845)	+	Fig. 13. U
Raphitomidae	<i>Pseudodaphnella barnardi</i> (Brazier, 1876)		Fig. 13. V
Drilliidae	<i>Clavus unizonalis</i> (Lamarck, 1822)	++	Fig. 8. P
Pseudomelatomidae	<i>Inquisitor pseudoprincipalis</i> (Yokoyama, 1920)	+	Fig. 9. T
Horaiclavidae	<i>Anacithara</i> cf. <i>ione</i> (Melvill & Standen, 1896)	+	Fig. 13. X
Architectonicidae	<i>Heliacus cerdaleus</i> (Melvill & Standen, 1903)	++	Fig. 10. O-Q
Architectonicidae	<i>Heliacus enoshimensis</i> (Melvill, 1891)	+	Fig. 10. R-T
Architectonicidae	<i>Heliacus</i> cf. <i>nereidis</i> Bieler, 1993	+++	Fig. 10. L-N
Mathildidae	<i>Mathilda amanda</i> Thiele, 1925	+	Fig. 9. W
Acteonidae	<i>Punctacteon fabreanus</i> (Crosse, 1874)	+	Fig. 8. S
Ringiculidae	<i>Ringicula doliaris</i> Gould, 1860	++	Fig. 14. O
Ringiculidae	<i>Ringicula propinquans</i> Hinds, 1844	+	Fig. 14. P
Retusidae	<i>Pyrunculus phialus</i> (A. Adams, 1862)	+++	Fig. 14. V
Tornatinidae	<i>Acteocina simplex</i> (A. Adams, 1850)	++++	Fig. 14. T
Tornatinidae	<i>Truncacteocina arata</i> (R. B. Watson, 1883)	+	Fig. 12. Y
Cylichnidae	<i>Cylichna sibogae</i> Schepman, 1913	+	Fig. 8. T
Cylichnidae	<i>Cylichna consobrinoides</i> Kuroda & Habe, 1952	+	Fig. 8. U
Haminoeidae	<i>Vellicolla constricta</i> (Habe, 1952)	+	Fig. 11. U
Haminoeidae	<i>Lamprohaminoea</i> sp.	+	Fig. 12. Z
Haminoeidae	<i>Vellicolla okamotoi</i> (Habe, 1952)	++	Fig. 14. U
Cavoliniidae	<i>Diacavolinia longirostris</i> (Blainville, 1821)	+	Fig. 11. M
Murchisonellidae	<i>Murchisonella</i> cf. <i>densistriata</i> (Nomura, 1936)	+++	Fig. 12. D
Pyramidellidae	<i>Colsyrnola brunnea</i> (A. Adams, 1854)	+	Fig. 9. U
Pyramidellidae	<i>Polyspirella trachealis</i> (Gould, 1861)	+++	Fig. 11. S
Pyramidellidae	<i>Microthyca crenellifera</i> (A. Adams, 1862)	+	Fig. 14. R-S
Pyramidellidae	<i>Tiberia pulchella</i> (A. Adams, 1854)	++	Fig. 9. V
Pyramidellidae	<i>Miralda diadema</i> (A. Adams, 1860)	++	Fig. 14. W
Pyramidellidae	<i>Pyrgulina pseudalveata</i> (Nomura, 1936)	++	Fig. 14. X
Pyramidellidae	<i>Megastomia interolineata</i> (Nomura, 1936)	++	Fig. 14. Y
Pyramidellidae	<i>Turbonilla</i> cf. <i>loiclegoffi</i> Peñas & Rolán, 2010	+++	Fig. 14. Z-a
Pyramidellidae	<i>Linopyrga punctigera</i> (A. Adams, 1860)	++	Fig. 14. b
Pyramidellidae	<i>Megastomia tenera</i> (A. Adams, 1860)	++	Fig. 14. c
Pyramidellidae	<i>Turbonilla kurodai</i> Nomura, 1936	++	Fig. 14. d
Pyramidellidae	<i>Pyrgiscus yoritomoi</i> (Nomura, 1938)	++	Fig. 14. e
Pyramidellidae	<i>Boonea</i> cf. <i>okamurai</i> Hori & Okutani, 1996	+	Fig. 14. f
Amathinidae	<i>Monotygmia digitalis</i> (Dall & Bartsch, 1906)	++++	Fig. 11. V
Amathinidae	<i>Monotygmia pareximia</i> (Nomura, 1936)	++	Fig. 11. W
Amathinidae	<i>Amathina tricarinata</i> (Linnaeus, 1767)	+	Fig. 11. X

Family	Species	Abundance*	Figure
Ellobiidae	<i>Laemodonta cf. exaratooides</i> Kawabe, 1992	+	Fig. 12. a
Achatinidae	<i>Tortaxis</i> sp.	+	Fig. 11. N
Chronidae	<i>Kaliella</i> sp.	+	Fig. 11. O
Camaenidae	<i>Bradybaena similis</i> Ferussac, 1821	+	Fig. 11. P-Q
Mytilidae	<i>Arcuatula senhousia</i> (Benson, 1842)	+	Fig. 7. G
Mytilidae	<i>Vignadula atrata</i> (Lischke, 1871)	+++	Fig. 7. H
Arcidae	<i>Barbatia grayana</i> Dunker, 1867	+	Fig. 7. F
Plicatulidae	<i>Plicatula regularis</i> Philippi, 1849	++++	Fig. 7. J
Veneridae	<i>Dosina</i> sp.	+	Fig. 7. E
Veneridae	<i>Ruditapes philippinarum</i> (Adams & Reeve, 1850)	+++	Fig. 7. D
Mactridae	<i>Mactra iridescens</i> Kuroda & Habe, 1958	++	Fig. 7. B
Mactridae	<i>Mactra quadrangularis</i> Reeve, 1854	+	Fig. 7. C
Cardiidae	<i>Laevicardium</i> sp.	+++	Fig. 7. I
Corbulidae	<i>Corbula taitensis</i> Lamarck, 1818	+++	Fig. 7. A
Dentaliidae	<i>Antalis weinkauffi</i> (Dunker, 1877)	++	Fig. 7. K
Dentaliidae	<i>Striodentalium chinensis</i> Z. Qi & X.-T. Ma, 1989	++++	Fig. 7. M
Gadilidae	<i>Gadila virginalis</i> (Boissevain, 1906)	+	Fig. 7. L

CONCLUSIONS

The sediment in Xiajinwan is dominated by quartz grains originating from desert dust and coastal sand dunes and is mixed with carbonate shells which show great species diversity. This fauna reflects the mollusk species living in the intertidal zones of Xiamen and species from subtidal zones or deeper areas, especially the dominant species. The taxonomic studies of mollusks from sea areas around Xiamen is inadequate compared with those in Japan and Philippines. Moreover, the researches of soft parts of these species by anatomical and molecular methods could be expected.

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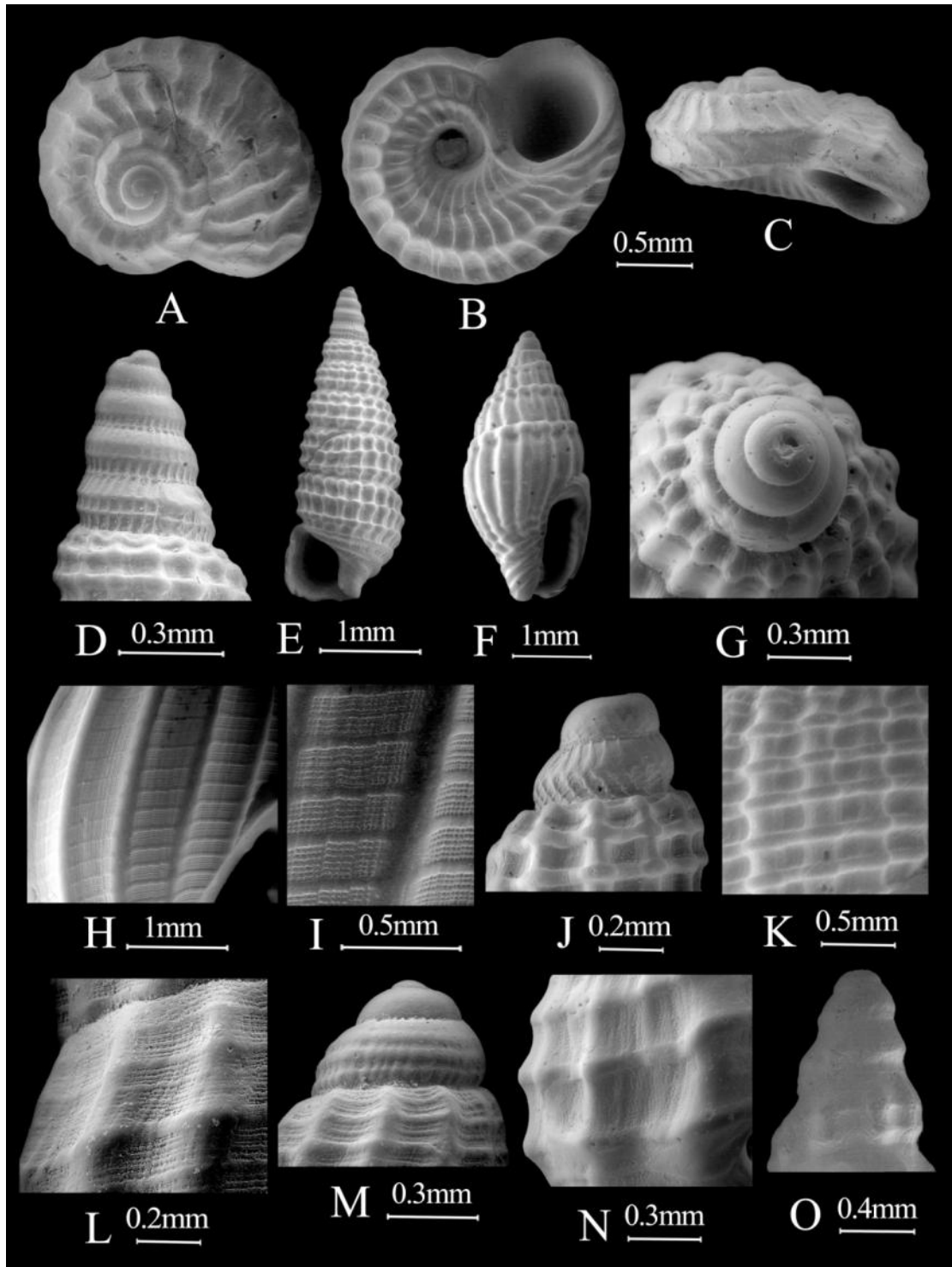


Figure 6. Specimens from Xiajinwan, SEM pictures for details. A-C: *Pseudoliotia pulchella* (Dunker, 1860); D-E: *Coriophora fusca* (Dunker, 1860); F-G: *Zafra pumila* (Dunker, 1858); H-I: *Eucithara coronata* (Hinds, 1843); J-K: *Kuroshiodaphne saturata* (Reeve, 1845); L-M: *Paraclathurella contracta* (Reeve, 1843); N-O: *Pseudorhaphitoma fuscescens* (Thiele, 1925);

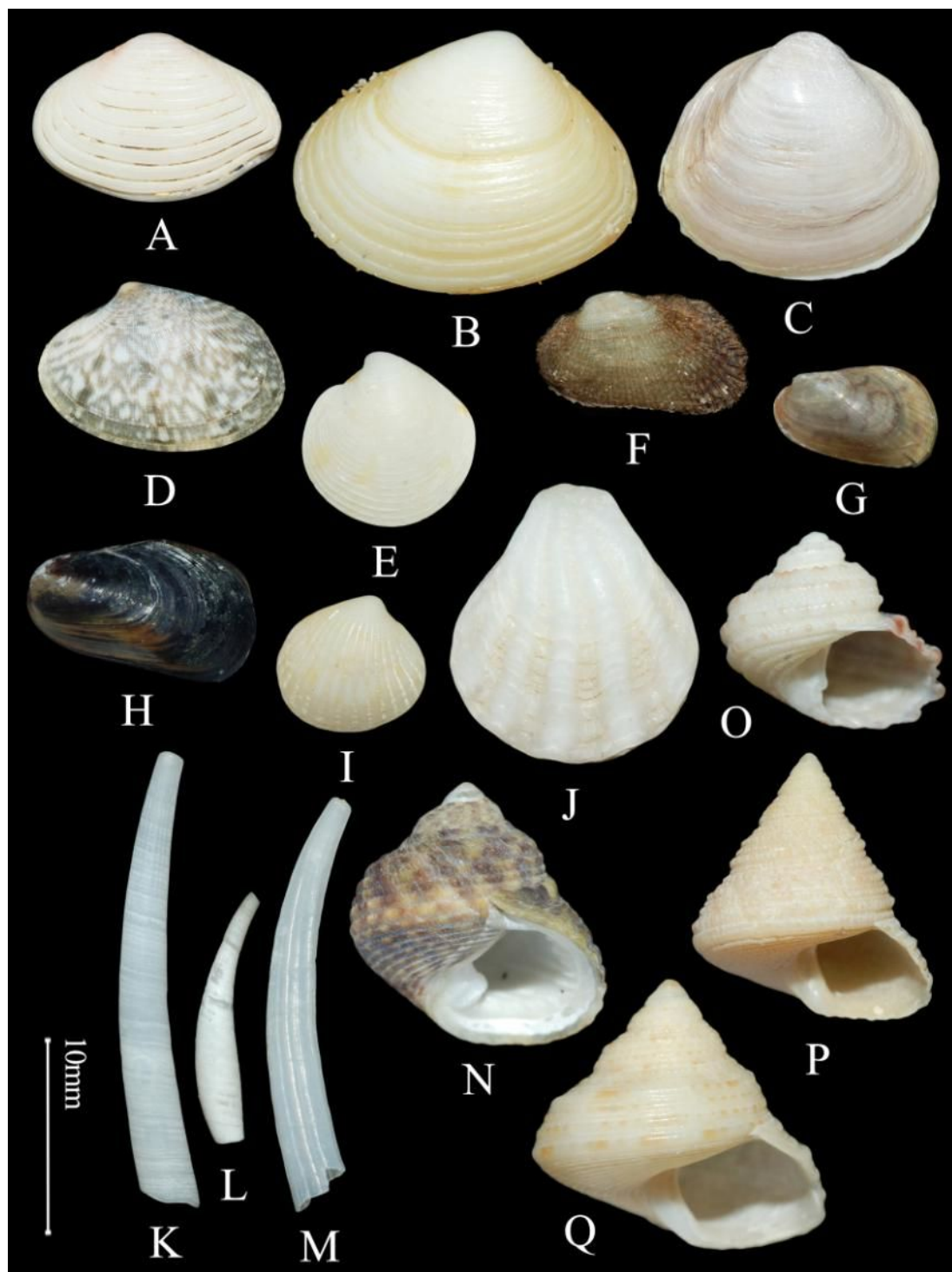


Figure 7. Specimens from Xiajinwan. A: *Corbula taitensis* Lamarck, 1818; B: *Macra iridescens* Kuroda & Habe, 1958; C: *Macra quadrangularis* Reeve, 1854; D: *Ruditapes philippinarum* (Adams & Reeve, 1850); E: *Dosina* sp. F: *Barbatia grayana* Dunker, 1867; G: *Arcuatula senhousia* (Benson, 1842), juvenile; H: *Vignadula atrata* (Lischke, 1871); I: *Laevicardium* sp. juvenile; J: *Plicatula regularis* Philippi, 1849; K: *Antalis weinkauffi* (Dunker, 1877); L: *Gadila virginalis* (Boissevain, 1906); M: *Striodentalium chinensis* Z. Qi & X.-T. Ma, 1989; N: *Monodonta labio* (Linnaeus, 1758); O: *Euchelus scaber* (Linnaeus, 1758); P: *Calliostoma filiareginae* (Sakurai, 1994); Q: *Tristichotrochus consors* (Lischke, 1872)

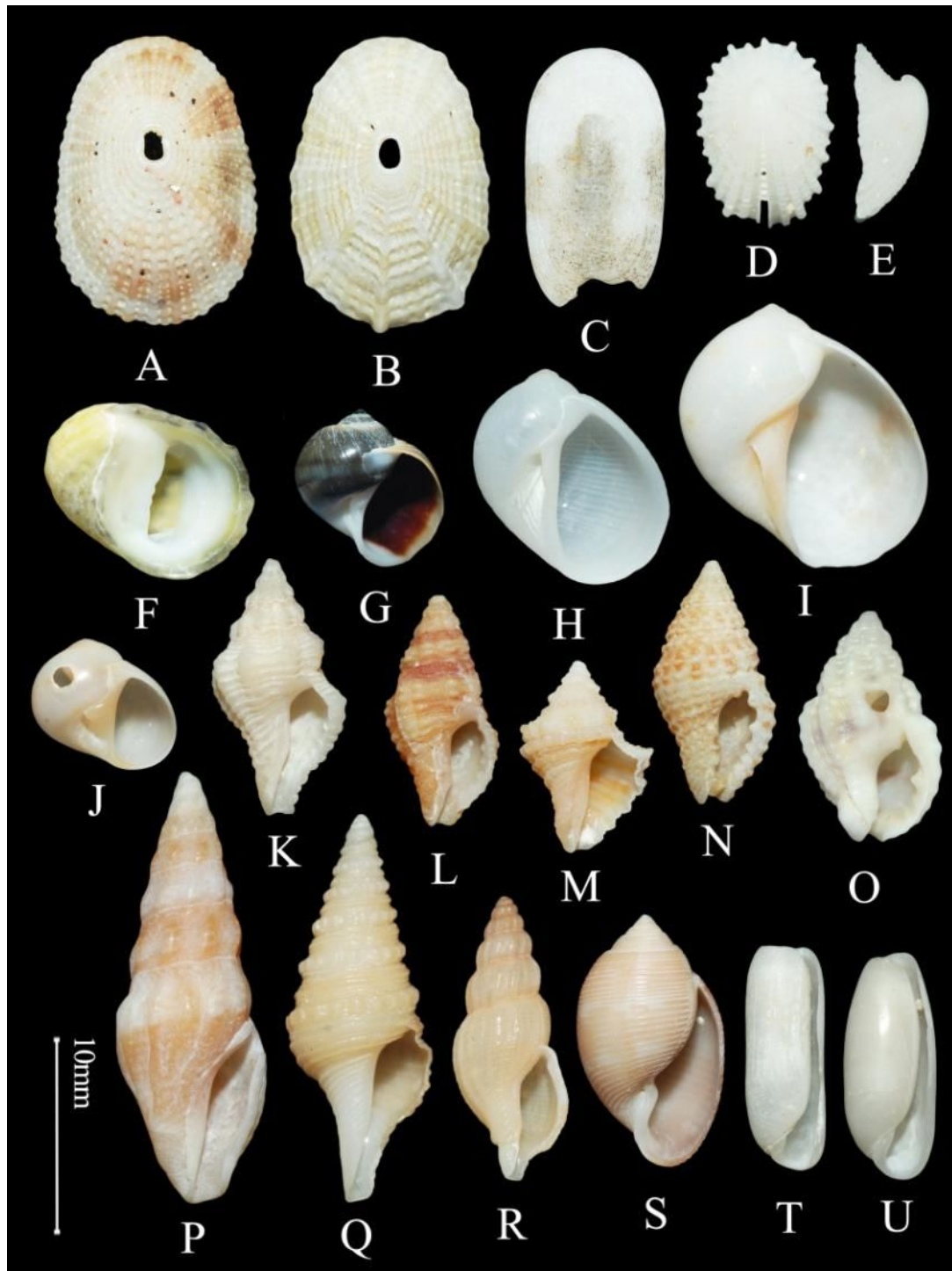


Figure 8. Specimens from Xiajinwan. A: *Diodora mus* (Reeve, 1850); B: *Diodora octagona* (Reeve, 1850); C: *Scutus sinensis* (Blainville, 1825); D-E: *Emarginula concinna* A. Adams, 1852; F: *Nerita yoldii* Récluz, 1841; G: *Notocochlis gualteriana* (Récluz, 1844); H: *Eunaticina papilla* (Gmelin, 1791); I: *Mammilla kurodai* (Iw. Taki, 1944); J: *Natica* sp. K: *Bedevina birileffi* (Lischke, 1871); L: *Orania serotina* (A. Adams, 1853); M: *Rapana bezoar* (Linnaeus, 1767), juvenile; N: *Engina concinna* (Reeve, 1846); O: *Nassarius fidus* (Reeve, 1853); P: *Clavus unizonalis* (Lamarck, 1822); Q: *Gemmula monilifera* (Pease, 1860); R: *Asperdaphne subzonata* (E. A. Smith, 1879); S: *Punctateon fabreanus* (Crosse, 1874); T: *Cylichna sibogae* Schepman, 1913; U: *Cylichna consobrinoides* Kuroda & Habe, 1952.

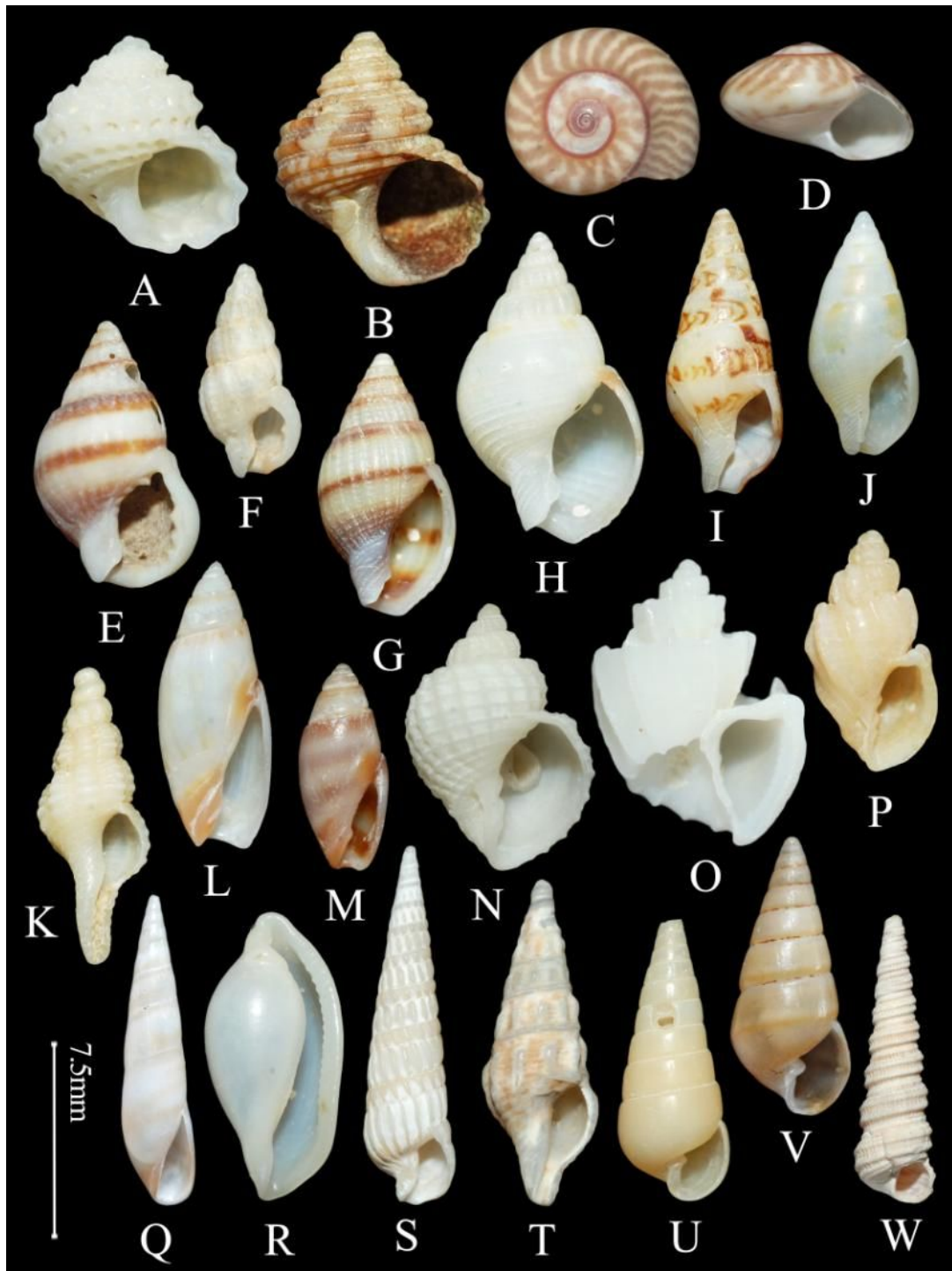


Figure 9. Specimens from Xiajinwan. A: *Vaceuchelus clathratus* (A.Adams, 1853); B: *Turbo cornutus* [Lightfoot], 1786; C-D: *Umbonium vestiarium* (Linnaeus, 1758); E: *Nassarius cf. reeveanus* (Dunker, 1847); F: *Reticunassa paupera* (A. Gould, 1850); G: *Nassarius smithii* (Marrat, 1877); H: *Nassarius nanhaiensis* S.-P. Zhang, 2013; I: *Mitrella bella* (Reeve, 1859); J: *Metanachis jaspidea* (G.B.Sowerby I, 1844); K: *Fusinus perplexus* (A. Adams, 1864); L: *Olivella aureobalteata* Kuroda & Habe, 1971; M: *Olivella cf. zonalis* (Lamarck, 1811); N: *Scalptia obliquata* (Lamarck, 1822); O: *Trigonostoma thysthlon* Petit & Harasewych, 1987; P: *Trigonaphera fusca* G. B. Sowerby III, 1889; Q: *Eulima bifascialis* (A. Adams, 1864); R: *Sandalia triticea* (Lamarck, 1810); S: *Myurella* sp.; T: *Inquisitor pseudoprincipalis* (Yokoyama, 1920); U: *Colsyrnola brunnea* (A. Adams, 1854); V: *Tiberia pulchella* (A. Adams, 1854); W: *Mathilda amanda* Thiele, 1925.



Figure 10. Specimens from Xiajinwan. A-B: *Calyptrea pellucida* (Reeve, 1859); C-E: *Minolia strigata* G. B. Sowerby III, 1894; F-H: *Sericominolia stearnsii* (Pilsbry, 1895); I: *Littoraria sinensis* (Philippi, 1847); J: *Pirenella* sp.; K: *Cerithium* sp.; L-N: *Heliacus* cf. *nereidis* Bieler, 1993; O-Q: *Heliacus cerdaleus* (Melvill & Standen, 1903); R-T: *Heliacus enoshimensis* (Melvill, 1891).



Figure 11. Specimens from Xiajinwan. A: *Patelloida pygmaea* (Dunker, 1860); B: *Epitonium replicatum* (G. B. Sowerby II, 1844); C: *Epitonium coretum* (Iredale, 1936); D: *Epitonium yokoyamai* K. Suzuki & Ichikawa, 1936; E: *Epitonium* cf. *yangi* L. G. Brown, 2010; F: *Seila morishimai* (Habe, 1970); G: *Tomopleura* cf. *pouloensis* (Jousseaume, 1883); H: *Eucithara coronata* (Hinds, 1843); I: *Paraclathurella contracta* (Reeve, 1843); J: *Guraleus* sp.; K: *Vepracula pungens* (Gould, 1860); L: *Kuroshiodaphne saturata* (Reeve, 1845); M: *Diacavolinia longirostris* (Blainville, 1821); N: *Tortaxis* sp.; O: *Kaliella* sp.; P-Q: *Bradybaena similis* Ferussac, 1821, juvenile; R: *Swainsonia* cf. *fusca* (Swainson, 1824); S: *Polyspirella trachealis* (Gould, 1861); T: *Reticunassa festiva* (Powys, 1835); U: *Vellicolla constricta* (Habe, 1952); V: *Monotygmata digitalis* (Dall & Bartsch, 1906); W: *Monotygmata pareximia* (Nomura, 1936); X: *Amathina tricarinata* (Linnaeus, 1767), juvenile, damaged.



Figure 12. Specimens from Xiajinwan. A: *Viriola tricineta* (Dunker, 1882); B: *Coriophora fusca* (Dunker, 1860); C: *Coriophora granosa* (Pease, 1871); D: *Murchisonella* cf. *densistriata* (Nomura, 1936); E: *Melanella persimilis* (Kuroda & Habe, 1971); F: *Mitrella pudica* (Brazier, 1877); G: *Cuspidovolvella bellica* (C. N. Cate, 1973); H: *Clithon oualaniense* (Lesson, 1831); I: *Mainwaringia leithii* (E. A. Smith, 1876); J: *Sulcerato tomlini* (Schilder, 1933); K-L: *Alaerato angustoma* (G. B. Sowerby I, 1832); M-N: *Sulcerato pellucida* (Reeve, 1865); O: *Paludinellassiminea tanegashimae* (Pilsbry, 1924); P-Q: *Capulus violaceus* Angas, 1867; R: *Macromphalus tornatilis* (Gould, 1859); S: *Macromphalus jinyuae* L.-W. Lin, 2023; T: *Macromphalus* cf. *styliferinus* (G. Nevill, 1885); U-V: *Anticlimax obesa* Rubio & Rolán, 2014; W-X: *Circulus cinguliferus* (A. Adams, 1850); Y: *Truncatococina arata* (Watson, 1883); Z: *Lamprohaminoea* sp.; a: *Laemodonta* cf. *exaratoidea* Kawabe, 1992.



Figure 13. Specimens from Xiajinwan. A: *Melanella* cf. *lunata* Pilsbry, 1918; B: *Melanella solidula* (A. Adams & Reeve, 1850); C: *Hemiliostraca metcalfei* (A. Adams, 1853); D: *Pyramidelloides mirandus* (A. Adams, 1861); E: *Mucronalia* cf. *ryukyuensis* Takano, Kubo & Oguchi, 2022; F: *Phosinella media* (Mohrenstern, 1860); G: *Rissoina costulata* Dunker, 1860; H: *Stosicia annulata* (Dunker, 1860); I: *Iravadia ornata* W. T. Blanford, 1867; J: *Chevallieria* cf. *australis* Ponder, 1984; K: *Pseudonoba yendoi* (Yokoyama, 1927); L: *Velutina pusio* A. Adams, 1860; M: *Opalia mormulaeformis* (Masahito, Kuroda & Habe, 1971); N: *Epitonium* cf. *eclecticum* (Melvill & Standen, 1903); O: *Narvaliscula percancellata* (Nakayama, 2000); P: *Alvania ogasawarana* (Pilsbry, 1904); Q: *Alaba hungerfordi* G. B. Sowerby III, 1894; R: *Etrema alphonsum* (Hervier, 1896); S: *Pseudorhaphitoma bipyrarnidata* Hedley, 1922; T: *Pseudorhaphitoma fuscescens* (Thiele, 1925); U: *Kermia pumila* (Mighels, 1845); V: *Pseudodaphnella barnardi* (Brazier, 1876); W: *Guraleus semicarinatus* (Pilsbry, 1904); X: *Anacithara* cf. *ione* (Melvill & Standen, 1896); Y: *Pseudorhaphitoma hervieri* (Hedley, 1922).

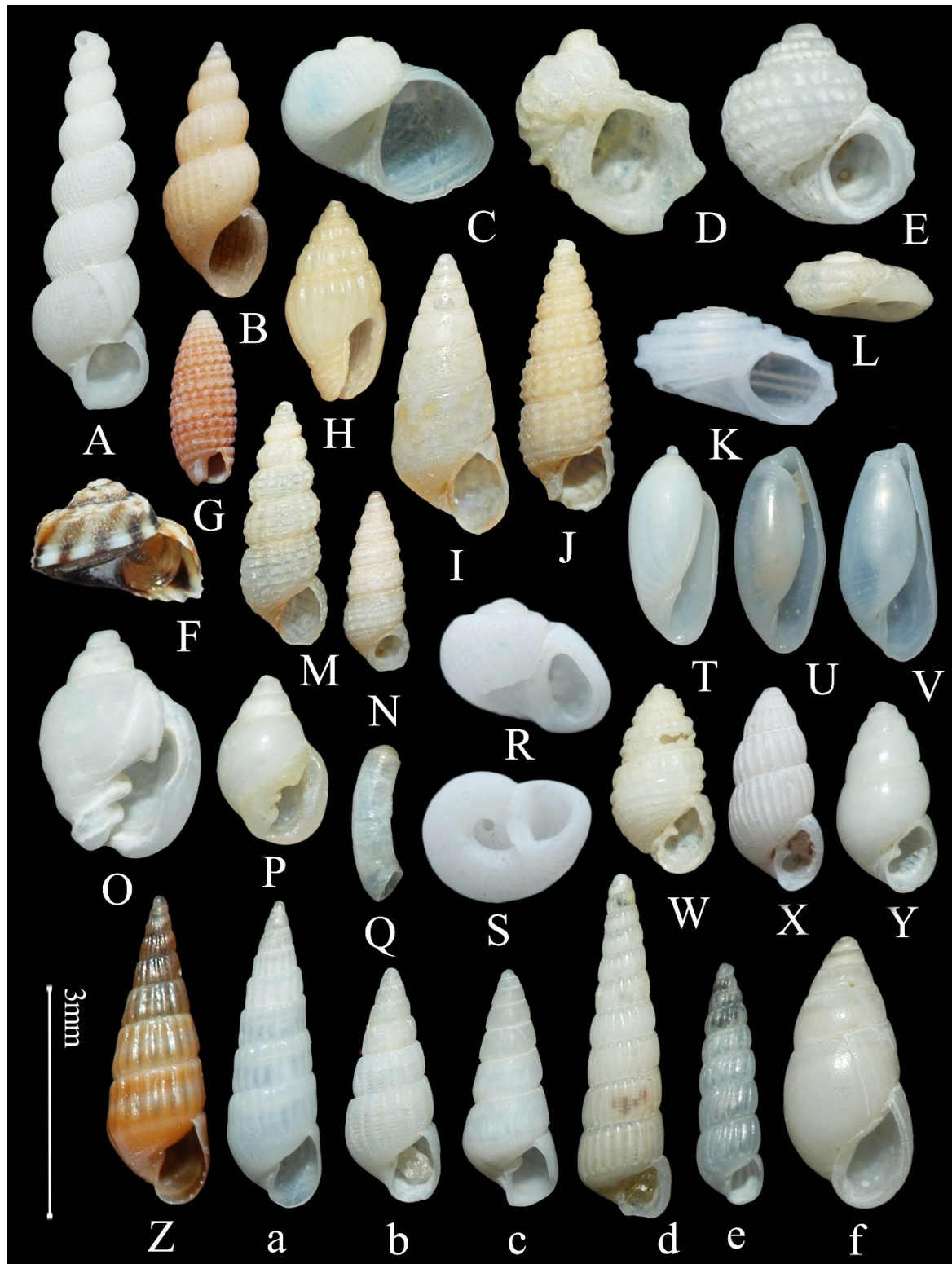
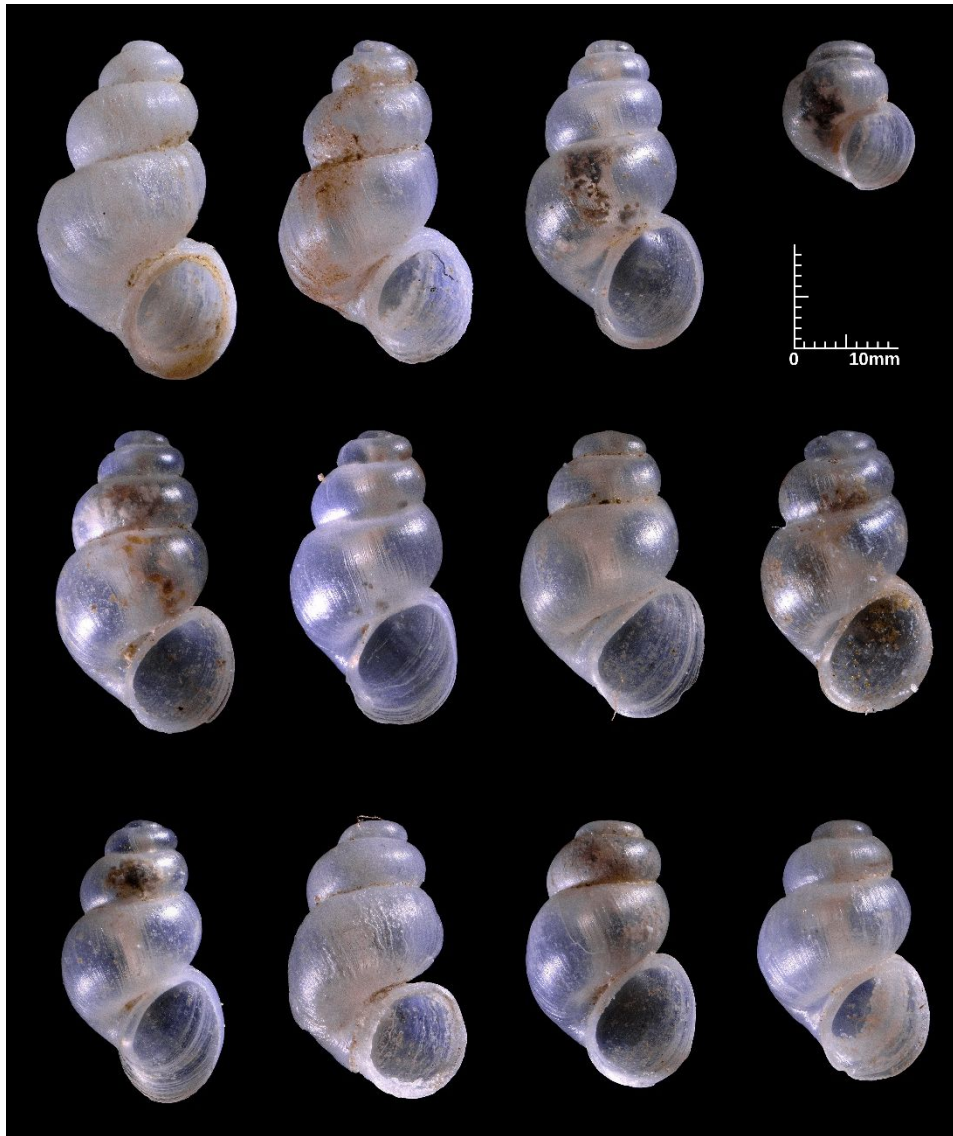


Figure 14. Specimens from Xiajinwan. A: *Amaea* cf. *tosaensis* (M. Azuma, 1962); B: *Constantia elegans* A. Adams, 1860; C: *Vanikoro hairoinsularis* n. sp.; D: *Vanikoro distans* (Récluz, 1844); E: *Conradia muatsi* n. sp.; F: *Peasiella habei* D. Reid & Mak, 1998; G: *Joculator marileutes* (Melvill & Standen, 1896); H: *Zafra pumila* (Dunker, 1858); I: *Diala semistriata* (Philippi, 1849); J: *Bittium glareosum* Gould, 1861; K: *Circulus xuae* n. sp.; L: *Pseudoliotia pulchella* (Dunker, 1860); M: *Finella purpureoapicata* Preston, 1905; N: *Finella* cf. *vulnerata* (Hedley, 1909); O: *Ringicula doliaris* Gould, 1860; P: *Ringicula propinquans* Hinds, 1844; Q: *Caecum glabellum* (Carpenter, 1868); R-S: *Microthyca crenellifera* (A. Adams, 1862); T: *Acteocina simplex* (A. Adams, 1850); U: *Vellicolla okamotoi* (Habe, 1952); V: *Pygmaulus phialus* (A. Adams, 1862); W: *Miralda diadema* (A. Adams, 1860); X: *Pyrgulina pseudalveata* (Nomura, 1936); Y: *Megastomia interlineata* (Nomura, 1936); Z-a: *Turbonilla* cf. *loiclegoffi* Peñas & Rolán, 2010; b: *Linopyrga punctigera* (A. Adams, 1860); c: *Megastomia tenera* (A. Adams, 1860); d: *Turbonilla kurodai* Nomura, 1936; e: *Pyrgiscus yoritomoi* (Nomura, 1938); f: *Boonea* cf. *okamurai* Hori & Okutani, 1996.



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