NASSARIUS MAXIUTONGI, A NEW SPECIES OF NASSARIIDAE (MOLLUSCA, NEOGASTROPODA) FROM THE SOUTH CHINA SEA

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Abstract *A new nassariid species collected from Lingshui Bay of Hainan Island in the South China Sea is described and assigned to the genus* Nassarius *Duméril, 1805. This new species,* Nassarius maxiutongi *sp. nov., has a medium sized shell with a small, acute spire; spiral sculpture present on earlier teleoconch whorls but becoming reduced and absent on lower part of the penultimate- and upper part of the last whorl. Each rachidian tooth bears 13 or 14 cusps in the male and 16 or 17 in the female specimen. These features can be used to distinguish the new species from its congeners.*

Key words *Nassariidae, new species, China*

INTRODUCTION

Nassariidae are a large and diverse group of scavenging predominantly marine snails with their highest biodiversity in the tropical Indo-West Pacific region, although a large number of species also occur in the tropical East Pacific (Cernohorsky, 1972, 1984; Salisbury, 1977). One single species, *Nassarius incrassatus* (Strøm, 1768), occurs in polar seas (Nekhaev, 2014). Their habitats range from intertidal zone to moderately deep water (more than 1000m), mostly in 0–300m (Cernohorsky, 1984). The genus *Nassarius* Duméril, 1805, is the most species-rich genus in the family Nassariidae, with more than 300 extant and dozens fossil species (MolluscaBase 2018). The genus has been well studied in Japan (Tsuchiya, 2000), Philippines (Martin, 2008), Indonesia (Kool & Strack, 2000) and Vietnam (Hylleberg & Kilburn, 2003; Dekker *et al*., 2016; Thach, 2016; Thach, 2017) but few systematic studies had been undertaken in China until the recent studies by Zhang (2009, 2010, 2013a, b), Yang (2010), Zhang & Yang (2010), Yang & Zhang (2011a, b), and Zhang & Zhang (2014). To date, more than 60 species have been reported from the coast of China, ranging from Bohai in the North to Nansha Islands in the South.

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During several investigations in the Lingshui Bay, Hainan Island, China, four specimens of a possible new nassariid species were sampled. Observations of their shell and radula confirmed that they represent an undescribed *Nassarius* species. In this study, we describe and illustrate this species as new to science, and compare it with its nearest relatives.

MATERIALS AND METHODS

Four specimens were collected from shallow water (24m deep) of Lingshui Bay in the South China Sea, and then preserved in 70% ethanol. Three of which, one male and two female were dissected for examination of radulae and penis. For comparisons, three specimens of *Nassarius multivocus* Kool, 2008a, two from the Yellow Sea and one from the East China Sea, were also observed (including three radulae and two penises). The morphologies are fairly consistent among different specimens.

Shell and soft parts were observed by light microscope and radulae by scanning electron microscope (SEM). For SEM, radulae were placed in 10% NaOH for 10 hours. The radulae were then dehydrated through an ethanol series and laid on a cover slip to air-dry. The samples were then coated with gold and examined under SEM.

Type specimens have been deposited in the Marine Biological Museum, Chinese Academy of Sciences (MBMCAS), Qingdao, China.

SYSTEMATICS

Class Gastropoda Cuvier, 1795
Superfamily Buccinoidea Rafinesque, 1815
Family Nassariidae Iredale, 1916 (1835)

Genus ***Nassarius*** Duméril, 1805

Type species: *Buccinum arcularia* Linnaeus, 1758, by subsequent assignation. Recent, Indo-Pacific Ocean.

Nassarius maxiutongi sp. nov.
(Figs 1–6, 10, 12, 14, 15)

Nassarius sp. Pu *et al*., 2017:8, fig. 2. (Molecular only)

Holotype Collected from 24m deep, mud and sand, in MBMCAS, registration number: MBM285101, 20.2mm.

Paratypes Three specimens, collected together with holotype from the type locality, registration number: MBM285102.

Type locality Lingshui Bay, Hainan Island, China, 18°17'N 109°51'E.

Measurements see Table 1.

Description Shell (Figs 1–6) thick, solid; spire acute, spire angle ~50°; last whorl large, occupying ~2/3 of shell length. Protoconch of 3.25 smooth, glassy whorls, with no distinct carina or keel on surface, transition to teleoconch indistinct; teleoconch of 6 evenly convex whorls. Suture ledged, but not channeled. First 4 teleoconch whorls sculptured with wide, flat spiral cords numbering 6 on the antepenultimate whorl; spiral cords overriding strong axial ribs. Spiral sculpture gradually becoming reduced and absent on the lower part of penultimate whorl and upper part of last whorl. Axial ribs thin and narrowly spaced on upper whorls, becoming very broad and widely spaced on penultimate- and last whorls (15–16 on penultimate whorl, 17 on last whorl), finally becoming thin and narrowly spaced near the aperture. Aperture longer than the spire, outer lip weakly variced, interior of outer lip with 14 moderately long lirae, base of outer lip with 5 small, pointed denticles at the margin. Columella arched, lower part with 5–6 pleats, upper region with a prominent parietal tooth. Columellar callus well developed, somewhat reflected over the last whorl and raised anteriorly. Siphonal canal short with a prominent, U-shaped notch. Anal canal distinct. Color yellowish, each spire whorl ornamented with 2 diffuse, vague, light-brown bands adjacent to suture, last whorl with 3 such bands.

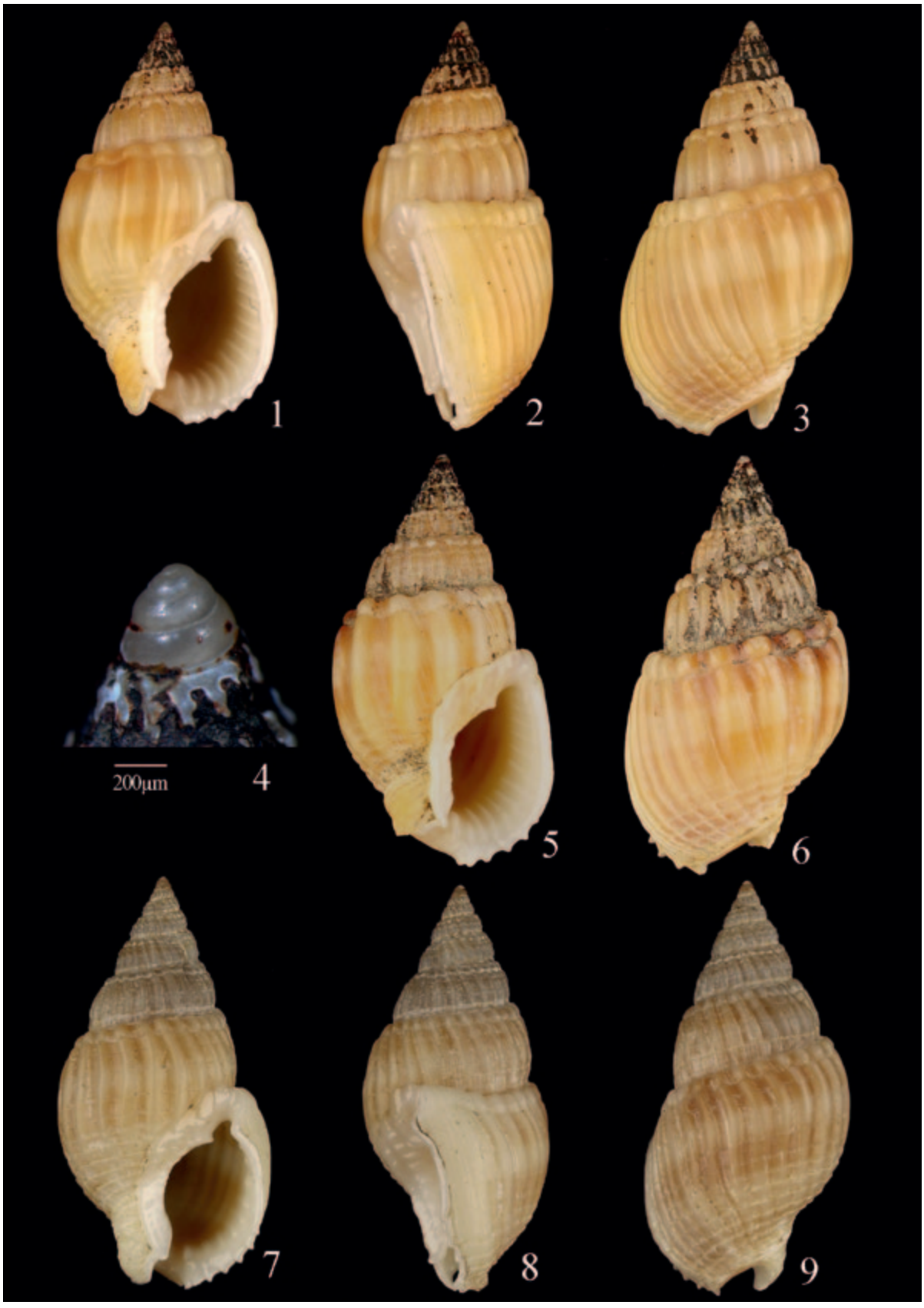
Operculum (Fig 10) roughly triangular, with a basal nucleus, inner margin smooth, outer and basal margin serrated, respectively with 14 and 5 prominent serrations.

Head-foot of animal yellowish with numerous black speckles on front edge of foot. Cephalic tentacles long, tapering, with blackish eyes located at the middle part. Penis (Fig 12) relatively large, elongate, dorso-ventrally flattened, inner side smooth along the length, outer side with 10 papilla-like projections located near the middle part, distal end crooked, truncate, with a large seminal papilla surrounded by a thin, transparent membrane.

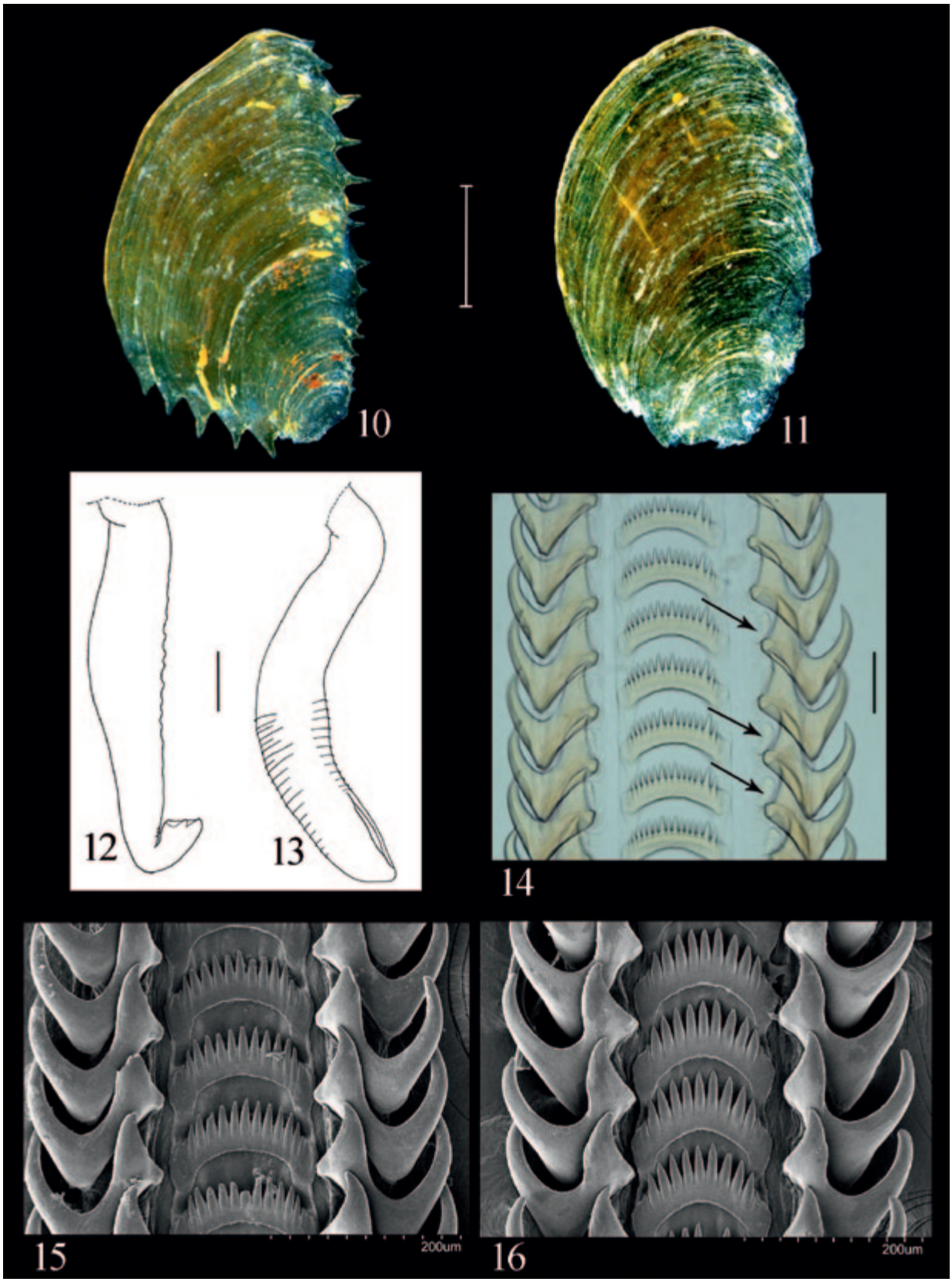
Radula (Figs 14, 15). Central tooth evenly arched, posterior margin with long, sharp-pointed denticles, numbering 13–14 in male, 16–17 in female. Lateral teeth with 2 large, sharp-pointed cusps, outer one longer and narrower than inner one. Accessory plate (see Fig 14, black arrows) present, partially overlapped by base of lateral teeth, auricular in shape.

Derivation of name The new species is named after the late Chinese malacologist, Xiutong Ma.

Comparisons To date, more than 60 species of genus *Nassarius* have been recorded from China Seas. From the majority of the species, *Nassarius maxiutongi* sp. nov. clearly differs by its medium sized, broad shell with small, acute spire, spiral sculpture present on earlier teleoconch whorls but becoming reduced and absent on lower part of the penultimate- and upper part of the last whorl. *Nassarius maxiutongi* sp. nov. is most similar to *Nassarius multivocus* Kool, 2008a, a common species in China seas, in general shell shape. However, that species can be distinguished by *Nassarius maxiutongi* sp. nov. in having spiral cords throughout the surface of the shell (see Figs 7–8), ovate operculum with indistinct



Figures 1–9 Shells of *Nassarius* species. **1–6** ***Nassarius maxiutongi*** **sp. nov. 1–4** Holotype, 20.2mm, South China Sea, 18°17'N 109°51'E, in MBMCAS, MBM285101; **5–6** Paratype 1, 20.2mm, in MBMCAS, MBM285102; **7–9** ***Nassarius multivocus*** **Kool, 2008**, 21.5mm, East China Sea.



Figures 10–16 Operculum, penis and radula of *Nassarius* species. **10 12, 14, 15** ***Nassarius maxiutongi*** **sp. nov. 10** Operculum, holotype; **12** Penis, holotype; **14** radula of female, black arrows indicate the accessory plate, paratype 2; **15** radula of male, holotype. **11, 13, 16** ***Nassarius multivocus*** **Kool, 2008, 11** Operculum; **13** Penis; **16** Radula. Scale bars: **10, 11, 12, 13** 1mm; **14** 100μm.

Table 1 Shell dimensions (in mm) of holotype and three paratypes of *Nassarius maxiutongi* sp. nov.

	Shell length	Shell width	Last whorl length	Aperture length
Holotype	20.2	10.5	14.3	11.2
Paratype 1	20.2	10.5	13.7	10.8
Paratype 2	20.1	11.0	14.5	11.5
Paratype 3	19.0	10.7	13.4	10.3
Mean	19.9	10.7	14.0	11.0

serrations (see Fig 11), penis with a lateral (*vs*. distal) seminal opening (see Fig 13). In addition, *Nassarius multivocus* Kool, 2008a has less cusps (11 in number in both male and female) on a more arched rachidian base than that in *Nassarius maxiutongi* sp. nov. (13–14 in male and 16–17 in female). *Nassarius maxiutongi* sp. nov. also resembles *Nassarius castus* (Gould, 1850), a species endemic to Fiji, in general shape and color pattern. However, that species has a smaller adult shell (up to 12.3mm *vs.* 20.2mm) with a straight shell profile, with last two protoconch whorls strongly carinated, the spirals present throughout the whole shell or occasionally obsolete at the dorsal side of last whorl (see Kool, 2008a).

Two other nearly related species are the Indo-Pacific species *Nassarius vitiensis* (Hombron & Jacquinot, 1848) and *Nassarius rufus* (Dunker, 1847) from Oman (see Kool, 2008b). The protoconch of both species have less whorls and the teleoconch whorls have spiral grooves between the axial ribs, whereas *Nassarius maxiutongi* sp. nov. has basal grooves merely on the last whorl.

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