

Stenosemus formosaensis sp. nov. (Mollusca: Polyplacophora) from deep waters southwest of Taiwan

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ABSTRACT. A new deep-water species *Stenosemus formosaensis* sp. nov. collected in the northeast of the South China Sea southwest of Taiwan is described. From other species of the genus *Stenosemus* the new species is distinguished by dark olive stripes radially arranged on head valve and lateral areas and longitudinally on pleural areas, and also by the arrangement of grooves of different tegmentum zones.

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Stenosemus formosaensis sp. nov. (Mollusca: Polyplacophora) из глубоких вод юго-западнее Тайваня

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РЕЗЮМЕ. Описан новый глубоководный вид *Stenosemus formosaensis* sp. nov., собранный на северо-востоке Южно-Китайского моря к юго-западу от Тайваня. От других видов рода *Stenosemus* новый вид отличается темнооливковыми полосами радиальными на головном щитке и латеральных полях и продольными на плеуральных полях, а также наличием или отсутствием борозд на полях тегмента.

occurred as a result of deep-sea expeditions organized by the French malacologist Philippe Bouchet (MNHN) [Kaas, 1985, 1990, 1991; Kaas, Van Belle, 1990; Sirenko, 2008, 2016, 2020] To date, 27 species of the genus *Stenosemus* are known [WoRMS; Vončina *et al.*, in press]. Species of this genus inhabit cold seas of Arctic and Antarctic, as well as temperate boreal and natal waters of Atlantic, Pacific and Indian oceans. They also occur in cold deep waters at low tropical latitudes, where water temperature does not rise above 14–15°C [Sirenko, 2023]. The aim of this paper is to describe the 28th species of the genus *Stenosemus*, a new deep-sea species from the South China Sea.

Material and methods

The material (two samples) was collected by the expeditions DongSha 2014 and ZongSha 2015 organized by MNHN.

Holotype of *Stenosemus formosaensis* sp. nov. was boiled for 4–5 min in a 7% KOH solution to remove all soft tissues. Afterwards the valves I, II, IV, and VIII and half of the girdle cuticle and half of the radula were examined with a FEI SEM Quanta 250, while the remaining half of the girdle and radula were embedded in Canada Balsam for examination under a light microscope. The holotype is deposited in MNHN.

Bathymetric ranges are reported as inner values of the shallowest and deepest stations as explained by Bouchet *et al.* [2008].

Abbreviations: BL, body length. MNHN, Muséum national d'Histoire naturelle, Paris. ZIN,

Introduction

A group of species that had been assigned to five different genera and subgenera was finally placed in the genus *Stenosemus* Middendorff, 1847 by Ferreira [1981]. For a long time, the genus comprised only a handful of species, namely *S. albus* (Linnaeus, 1767) and *S. sharpii* (Pilsbry, 1896) from the continental shelf, and *S. exaratus* (G.O. Sars, 1878), *S. simplicissimus* (Thiele, 1906) and *S. stearnsii* (Dall, 1902) from the bathyal zone. The vast majority of species of the genus *Stenosemus* are deep-sea dwellers, which greatly complicates their collection. In this regard, it should be noted that a significant increase in the number of known species within this genus

Zoological Institute of Russian Academy of Sciences,
St. Petersburg, Russia. WoRMS, World Register of
Marine Species.

Taxonomy

Class Polyplacophora Gray, 1821
Subclass Neoloricata Bergenhayn, 1955
Order Chitonida Thiele, 1909
Family Ischnochitonidae Dall, 1889

Genus *Stenosemus* Middendorff, 1847

Lophyrus G.O. Sars, 1878 (non *Lophyrus* Poli, 1791, nom.
null.); *Chondroleura* Thiele, 1906; *Lepidopleuroides*
Thiele, 1928; *Lophyochiton* Jakovleva, 1952.

Type species: *Chiton albus* Linnaeus, 1767, sub-
sequently designated by Winckworth [1926].

Genus distribution and range: All oceans in
cold and temperate waters, intertidal to 4000–5000
m. Miocene–Recent.

Stenosemus formosaensis sp. nov.
(Figs 1–4)

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Type material. Holotype (MNHN-
IM-2013-50131), damaged, now disarticulated
consisting of SEM stub of I, II, IV and VIII valves,
mounted part of perinotum and radula, another part
of perinotum and radula are stored in a vial with
other valves.

Type locality. The northeast of the South China
Sea southwest of Taiwan Island, or southeast of Hong
Kong, 21°02'N, 116°29'E, depth 307–309 m (Dong-
Sha 2014, N.O. “*Ocean Researcher I*” stn CP4124).

Etymology. Named after Formosa, former name
of Taiwan Island.

Material examined. Dong Sha 2014, N.O.
“*Ocean Researcher I*” stn. CP4124, 21°02'N,
116°29'E, depth 307–309 m, *Stenosemus formosa-*
ensis sp. n. holotype (MNHN-IM-2013-50131), BL
5.5 mm, 29.09.2014;

Other material examined. South China Sea,
21°05'N, 116°44'E, depth 325–310 m ZhongSha
2015, st. DW4158, 30.07.2015, 2 spms, (MNHN-
IM-2013-59464), BL 2.5 mm.

Distribution. Known only from the type locality,
northeast of the South China Sea southwest of Taiwan
Island, 310–325 m.

Description. Chiton small, BL 5.5 mm. Shell
thin, moderate elevated (dorsal elevation 0.45),
carinate, not beaked, side slopes straight. Color of
valves light olive with dark olive stripes, radial on
head valve and lateral areas, and longitudinal on
pleural areas.

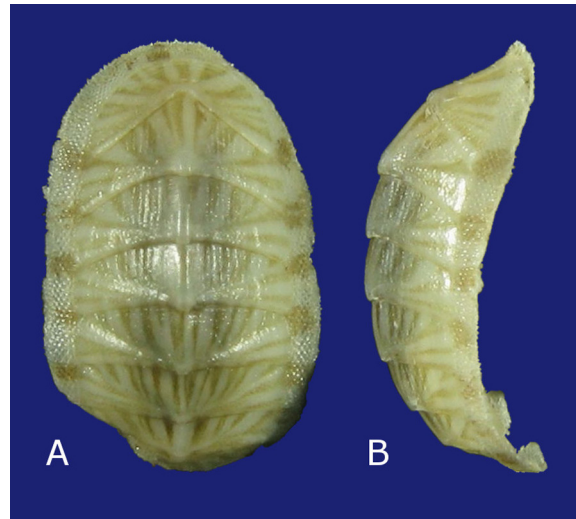


FIG. 1. *Stenosemus formosaensis* sp. nov., northeast of the
South China Sea, 307–309 m, holotype (MNHN IM-2013-
50131), BL 5.5 mm: **A.** Dorsal view; **B.** Lateral view.

РИС. 1. *Stenosemus formosaensis* sp. nov., северо-восток
Южно Китайского моря, 307–309 м, голотип (MNHN
IM-2013-50131), BL 5.5 мм: **A.** Вид со спины; **B.** Вид
сбоку.

Head valve semicircular, tegmentum almost
smooth with very weak granulation, posterior margin
widely V-shaped, apical area with rounded notch.
Intermediate valves broadly rectangular, front mar-
gin convex, posterior margin concave at both sides
of beaked apex, side margins straight, jugal area
smooth, pleural areas with about 10 longitudinal
grooves, lateral areas slightly raised and sculptured
like head valve. Tail valve broken, semicircular,
width less than head valve, front margin slightly
convex, mucro anterior, antemucronal slope convex,
postmucronal slope concave, antemucronal area with
four short grooves in anterior part, postmucronal area
sculptured like head valve.

Articulamentum white, thin, translucent, apophy-
ses, rather short and wide, connected across the shal-
low sinus by a short jugal plate, slit formula 9/1/8?,
teeth short, sharp, slit rays distinct, eaves narrow.

Girdle relatively narrow, with alternating bands of
light olive and dark olive, dorsally beset with curved,
flattened in distal part, smooth spicules with 8–12
distal granules on top, sizes vary 50–125 x 20–80 µm
largest on midgirdle, smallest near margin. Marginal
spicules of several kinds: small pointed spicules 17
x 7 µm, on long bristles 120 µm; relatively long,
pointed spicules 62 x 18 µm, triangular in cross-
section with 8–9 fine ribs on one side; short, pointed
spicules 42 x 17 µm with one rib; very short scales
24 x 20 µm with notch on base. Ventral side of girdle
covered with elongate, rectangular scales 50 x 20
µm, distally convex.

Radula of holotype 2.1 mm long with 20 trans-

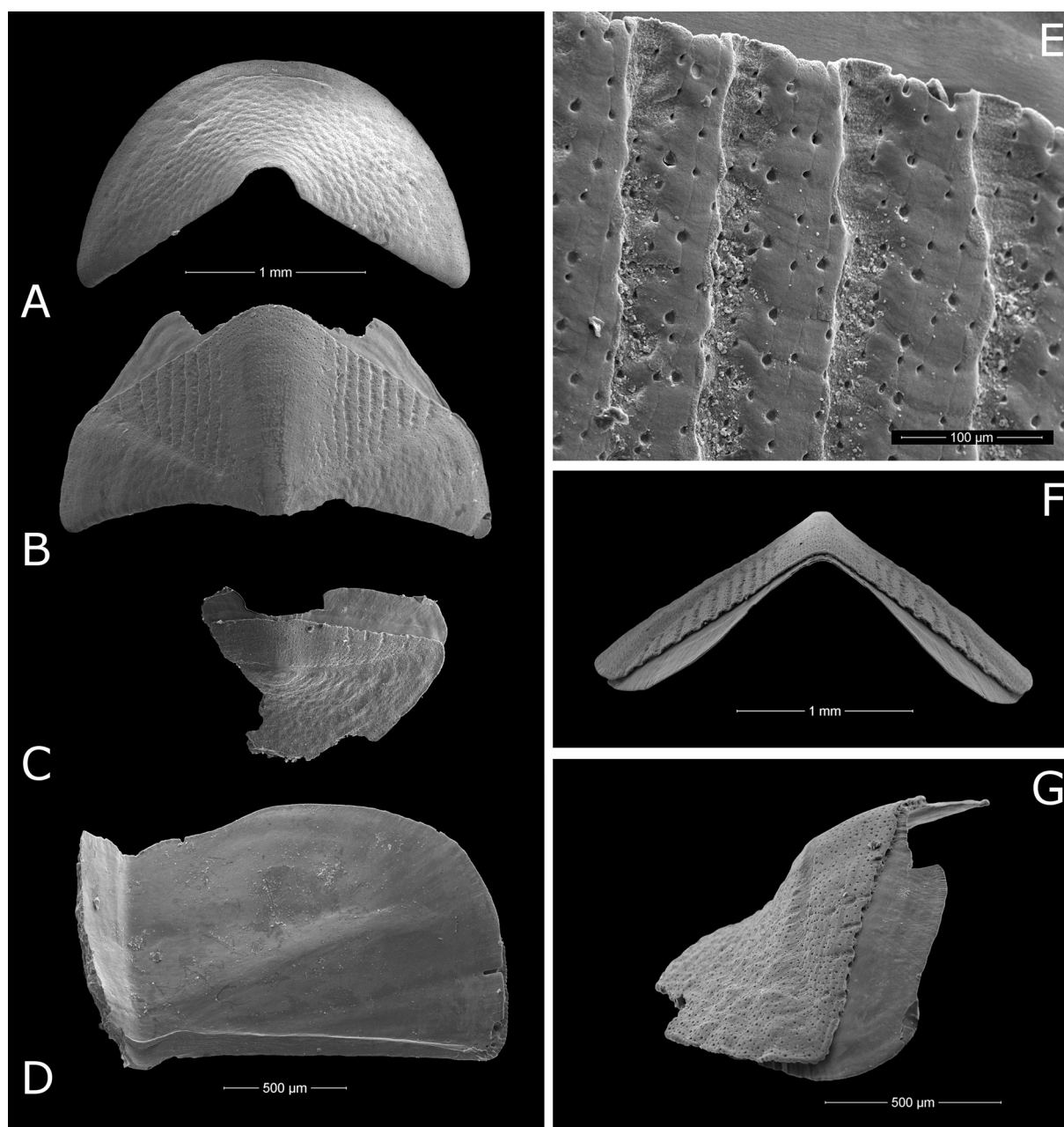


FIG. 2. *Stenosemus formosaensis* sp. nov., northeast of the South China Sea, 307–309 m, holotype (MNHN IM-2013-50131), BL 5.5 mm: **A**. Valve I, dorsal view; **B**. Valve II, dorsal view; **C**. Valve VIII, dorsal view; **D**. Valve IV, ventral view. **E**. Valve II, detail of tegmentum surface of pleural area; **F**. Valve II, rostral view; **G**. Valve VIII, lateral view.

РИС. 2. *Stenosemus formosaensis* sp. nov., северо-восток Южно Китайского моря, 307–309 м, голотип (MNHN IM-2013-50131), BL 5.5 мм: **A**. Щиток первый, вид сверху; **B**. Щиток второй, вид сверху; **C**. Щиток восьмой, вид сверху; **D** Щиток четвертый, вид снизу; **E**. Щиток второй, деталь поверхности тегмента центрального поля; **F**. Щиток второй, вид спереди; **G**. Щиток восьмой, вид сбоку.

verse rows of mature teeth. Central tooth rectangular, somewhat pinched in middle with narrow blade, first lateral teeth wing-shaped, head of major lateral tooth bicuspid, outer denticle small.

The holotype has 18 gills per side ranging from valve IV to valve VIII.

Remarks. This species superficially resembles *S. delicatus* (Kaas, 1991), *S. exaratus*, *S. mexicanus* (Kaas, 1993), *S. philippe* Sirenko, 2017, *S. stearnsii* and *S. solomonensis* Sirenko, 2017. *S. formosaensis*

sp. nov. differs from these species by the absence of radial ribs or radiating grooves on the head valve, on the lateral areas of the intermediate valves and on the postmucronal area of the tail valve, and by having a unique coloration of the tegmentum.

The new species further differs from *S. exaratus*, *S. mexicanus* and *S. delicatus* by having a bicuspid head of major lateral tooth of radula (vs. unicuspid head in all last species).

Stenosemus formosaensis sp. nov. differs from *S.*

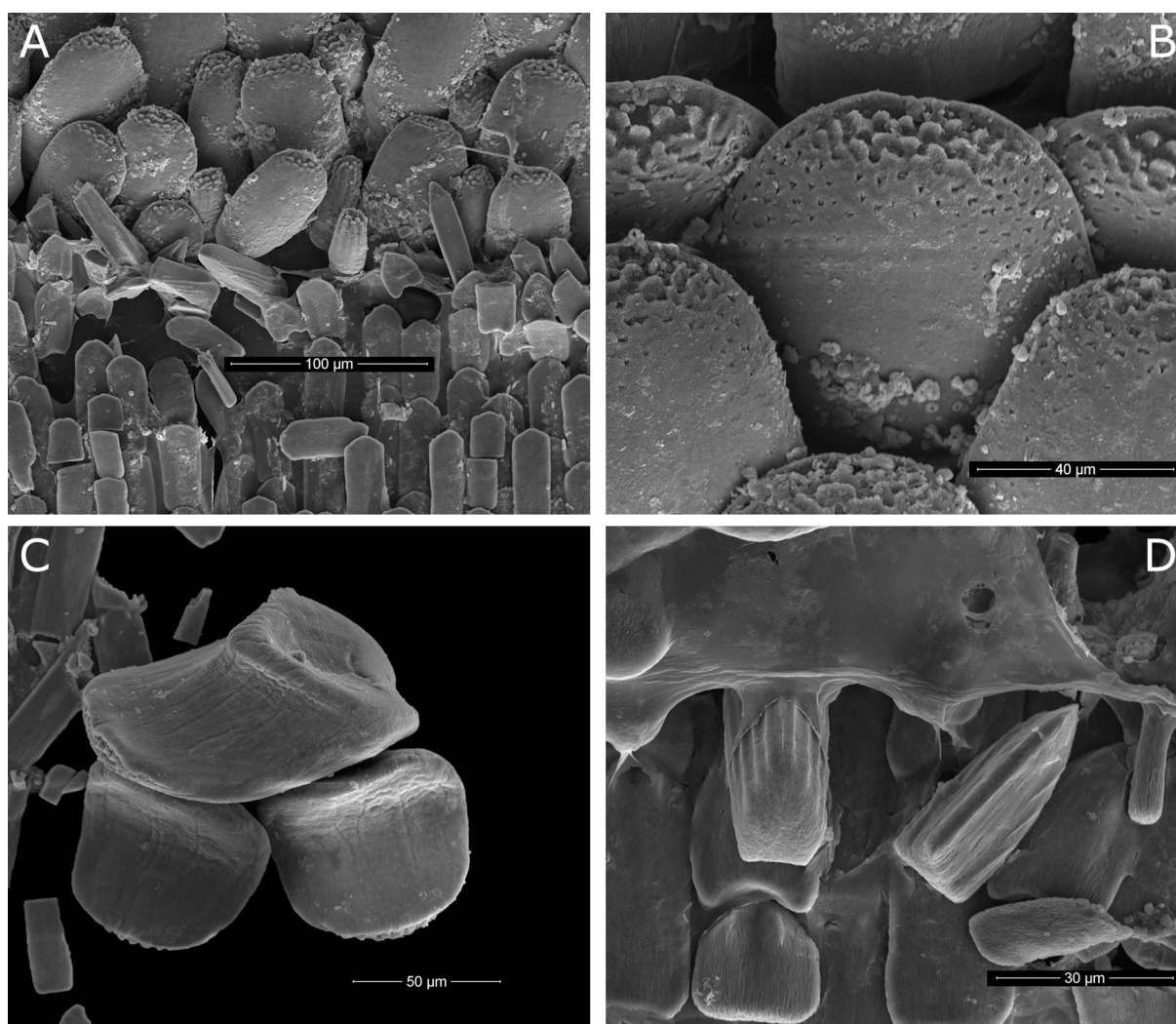


FIG. 3. *Stenosemus formosaensis* sp. nov., northeast of the South China Sea, 307–309 m, holotype (MNHN IM-2013-50131), BL 5.5 mm: **A.** Dorsal spicules, marginal spicules and scales, ventral scales; **B.** Dorsal spicules; **C.** Dorsal spicules and ventral scales; **D.** Marginal spicules and scales.

РИС. 3. *Stenosemus formosaensis* sp. nov., северо-восток Южно Китайского моря, 307–309 м, голотип (MNHN IM-2013-50131), BL 5.5 мм: **A.** Дорсальные спикулы, маргинальные спикулы и чешуйки, вентральные чешуйки; **B.** Дорсальные спикулы; **C.** Дорсальные спикулы и вентральные чешуйки; **D.** Маргинальные спикулы и чешуйки.

delicatus, *S. mexicanus* and *S. philippei* by having granules on top of dorsal spicules (vs. no granules other mentioned species).

The new species differs from *S. solomonensis* by having convex antemucronal area and concave postmucronal area of the tail valve (vs. antemucronal and postmucronal areas straight in *S. solomonensis*)

Stenosemus formosaensis sp. nov. increases the number of deep-sea chiton species of Taiwan from 16 (Sirenko, 2018) to 17.

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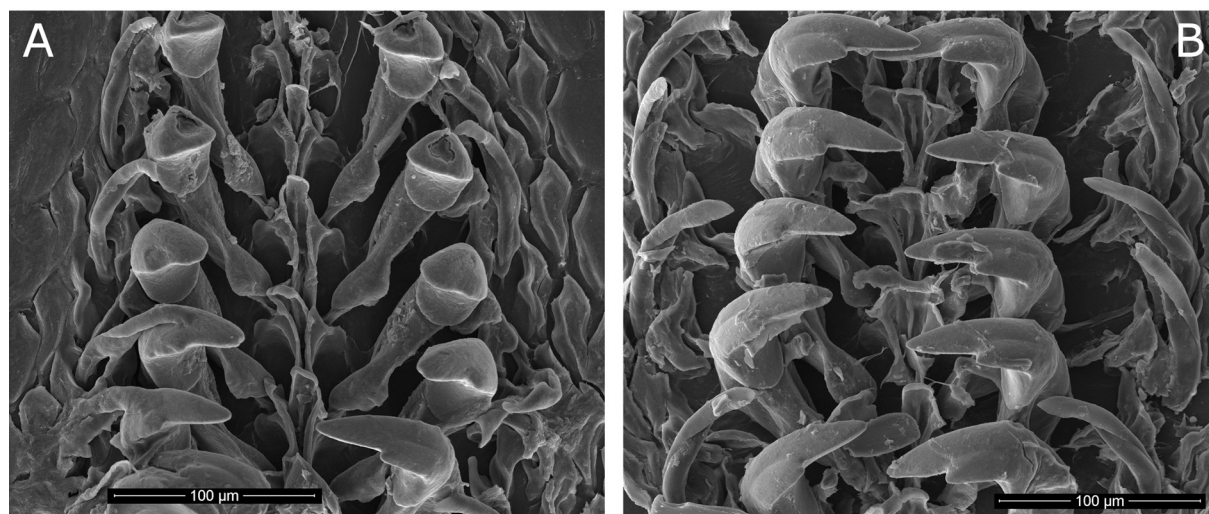


FIG. 4. *Stenosemus formosaensis* sp. nov., northeast of the South China Sea, 307–309 m, holotype (MNHN IM-2013-50131), BL 5.5 mm: **A**. Radula, working part; **B**. Radula, non-working part.

РИС. 4. *Stenosemus formosaensis* sp. nov., северо-восток Южно Китайского моря, 307–309 м, голотип (MNHN IM-2013-50131), BL 5.5 мм: **A**. Радула, рабочая часть; **B**. Радула, нерабочая часть.

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