

A chiton with shining shell (Mollusca: Polyplacophora) from deep waters near Papua New Guinea

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ABSTRACT. A new deep-water polyplacophoran, *Stenosemus nitens* sp. nov., from Papua New Guinea waters is described. It differs from other species of the genus *Stenosemus* by having a sculptureless, smooth and shiny surface of the tegmentum, smooth dorsal spicules with only a few small transverse wrinkles on top, and unusual bends of the front margin of the intermediate valves. Within the genus the new species belongs to a limited group of coloured chitons.

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Хитон с блестящей раковиной (Mollusca: Polyplacophora) из глубоких вод у Папуа Новой Гвинеи

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РЕЗЮМЕ. *Stenosemus nitens* sp. nov. описывается из глубоких вод у Папуа Новая Гвинея. Новый вид отличается от других видов рода *Stenosemus* наличием бескульптурной, гладкой и блестящей поверхности тегмента раковины, гладкими дорсальными спикулами с несколькими мелкими поперечными складками на вершине и необычными изгибами переднего края промежуточных щитков. Новый вид принадлежит к небольшой группе окрашенных хитонов этого рода

ribs or granules. This differentiates this species from all other congeners.

Material and methods

The material under study was kindly placed at my disposal by Dr. Philippe Bouchet (MNHN). It was collected by the French expedition MADEEP 2014. The MADEEP deep sea cruise (PIs: Sarah Samadi, Laure Corbari, Karine Olu-Le Roy) took place in April and May 2014 on board R.V. Alis deployed by Institut de Recherche pour le Développement (IRD). It operated under a Memorandum of Understanding with University of Papua New Guinea (UPNG), with a permit delivered by the Papua New Guinea Department of Environment and Conservation (DEC). The PIs acknowledge funding from Agence Nationale de la Recherche (ANR) and the National Science Council of Taiwan (ANR TF-DeepEvo 12 ISV7 005 01) and the CNRS Institut Ecologie et Environnement (INEE). See details at: <http://expeditions.mnhn.fr/campaign/madeep>.

Specimen selected for a scanning electron microscopy (SEM) study was treated by the method according to Sirenko [2015].

Abbreviations: BL – body length. MNHN – Muséum National d'Histoire Naturelle, Paris, France. Stn. – station. ZISP – Zoological Institute of Russian Academy of Sciences, St. Petersburg, Russia.

Taxonomy

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

Introduction

The vast majority of species of the genus *Stenosemus* inhabit deep waters. In recent years, more research is being directed towards the deep-water ecosystems, and chitons of this genus are increasingly being studied [Kaas, 1993; Sirenko, 1994, 2008, 2016, 2017; Van Belle, Dell'Angelo, 1998; Carmona-Zalvide et al., 2001; Clark, 2002; Schwabe, 2008;]. Despite basic similarity in features, such as finger-shaped spicules of perinotum, sutural plates of the shell and characteristics of the radula, this genus shows some considerable variability in the surface shell sculpture like fasciculated ribs, grooves and granules of different sizes. The present description of a new species from the waters of Papua New Guinea points out the sculpture of its tegmentum. It is smooth, shiny and without any

Genus *Stenosemus* Middendorff, 1847

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

Genus distribution and range: All oceans in cold and temperate waters, usually not more than 14°C, intertidal to 4572 m. Miocene-Recent.

Stenosemus nitens sp. nov.
(Figs 1-4)

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Type material. Holotype (MNHN IM-2013-45830), now disarticulated consisting of SEM stub of 3 valves, part of perinotum and radula, mount of part of perinotum and radula and vial with other valves.

Type locality. Papua New Guinea, near the North-East coast of New Guinea Island, 08°44'S, 151°48'E, depth 500 m, holotype BL 23.0 mm. (Campagne MADEEP 2014, stn DW4317, 04.05.2014).

Etymology. Named from the Latin *nitens*, shining, referring to the surface of tegmentum in this species.

Distribution. Only known from the type locality.

Diagnosis. Chiton of medium size, elongate oval, shell moderately elevated and carinated, intermediate valves not beaked, all surface of tegmentum smooth and shining. Girdle dorsally covered with juxtaposed, bent finger-shaped spicules, all surface of dorsal spicules smooth except several small transversal wrinkles on top. Marginal spicules of three forms. Central tooth of radula more or less rectangular, slightly pinched in the middle, with a narrow, somewhat convex blade, major lateral tooth with a sharply pointed, unicuspidate head. Colour of tegmentum brownish-yellow with more loosely painted lateral areas near the apex. Twenty three gills per side arranged from valve IV to valve VIII.

Description. Holotype, BL – 23.0 mm, width 12.0 mm. Valves thin, moderately elevated (dorsal elevation 0.32), carinated, apex damaged, side slopes straight. Colour of valves brownish-yellow with more loosely painted lateral areas near the apex, girdle banded in the same colour, alternately light and dark.

Head valve semicircular, notched in the middle. Intermediate valves broadly rectangular, front margin of valve II concave at both sides of the strongly forwardly produced jugal part, in the other valves the front margin is slightly sinuous, convex in a wide central part, concave near the antero-lateral corners, side margin truncated, hind margin weakly convex, lateral areas slightly raised. Such unusual bends of the front margin of the intermediate valves

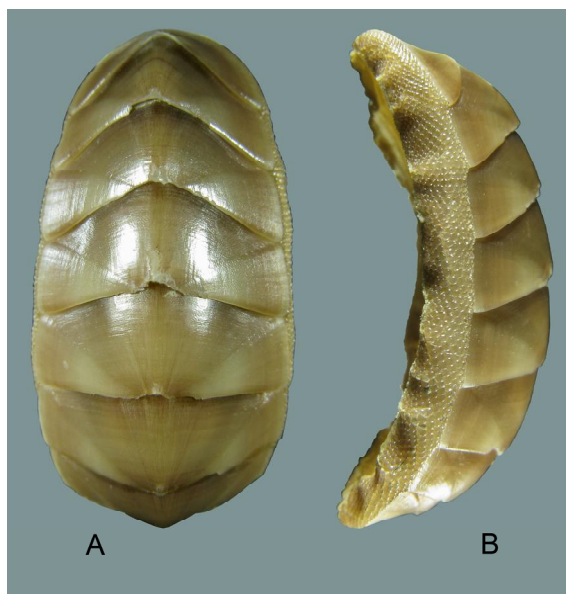


FIG. 1. *Stenosemus nitens* sp. nov., holotype (MNHN IM-2013-45830), Papua New Guinea, BL – 23.0 mm. A. Dorsal view; B. Lateral view.

РИС. 1. *Stenosemus nitens* sp. nov., ГОЛОТИП (MNHN IM-2013-45830), у Папуа Новая Гвинея, BL – 23,0 мм. А. Вид сверху; В. Вид сбоку.

is not known for other species of the genus. Tail valve less than semicircular, the width twice the length, front margin straight, mucro anterior, pointed, postmucronal slope faintly concave.

Tegmentum sculpturless, smooth and shining in all areas, except for some faint comarginal growth lines, especially near the outer margins.

Articulamentum white, thin, apophyses wide, projecting, more or less triangular, connected across the shallow sinus by a very short, slitless jugal plate, ratio of width of apophyses to width of jugal sinus 1.4, insertion plates short, slit formula 13/1(2)/11, insertion plate of valve II with 1 slit on the right side and 2 slits on the left side, teeth short, sharp, with hardly visible pectination, slit rays distinct, eaves narrow and solid.

Girdle relatively narrow, about 1.7 mm in width near valve V, covered dorsally with elongate, bent finger-shaped spicule 280 x 180 µm on mid girdle, surface of dorsal spicules smooth except several small transversal wrinkles on top. Marginal spicules are of several types: narrow spicules 150 x 13 µm on top of long bristles, numerous small spicules 60 x 20 µm on short chitinous bristles, flattened triangular scales 100 x 35 µm with 4-5 thin, obliquely ribs, and flattened sharp pointed spicules 100 x 44 µm with feather-like ribs. Ventrally the girdle is covered with radiating rows of elongate, straight scales 70 x 16 µm.

Radula of the holotype (Fig. 4) is 6.4 mm long and has 56 transverse rows of mature teeth. Central tooth of radula more or less rectangular, slightly

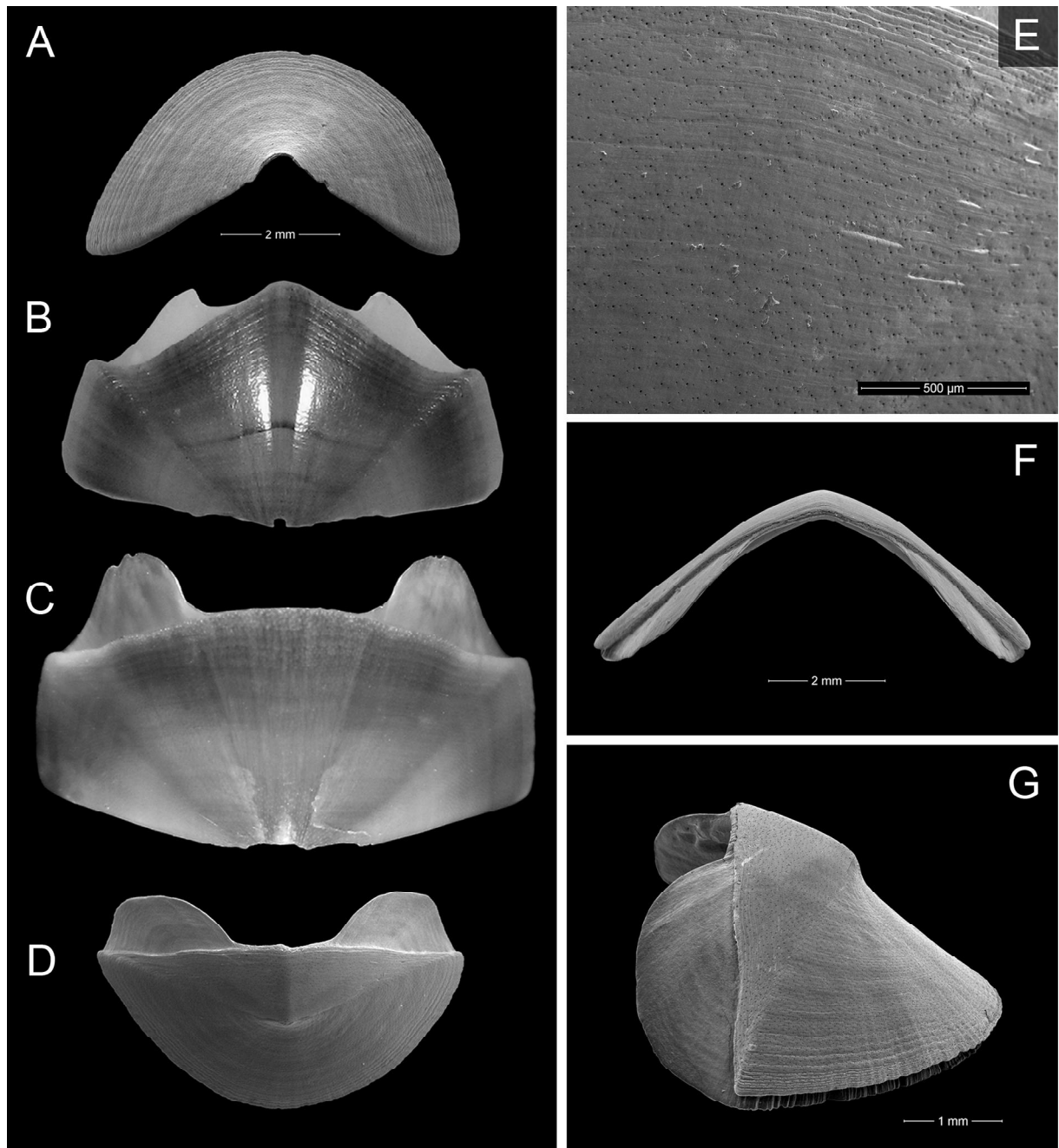


FIG. 2. *Stenosemus nitens* sp. nov., holotype (MNHN IM-2013-45830). **A.** Head valve, dorsal view; **B.** Valve II, dorsal view; **C.** Valve V, dorsal view; **D.** Valve VIII, dorsal view; **E.** Valve VII, central area; **F.** Valve VII, rostral view; **G.** Valve VIII, lateral view.

РИС. 2. *Stenosemus nitens* sp. nov., голотип (MNHN IM-2013-45830). **A.** Головной щиток, вид сверху; **B.** Щиток II, вид сверху; **C.** Щиток V, вид сверху; **D.** Щиток VIII, вид сверху; **E.** Щиток VII, центральное поле; **F.** Щиток VII, вид спереди; **G.** Щиток VIII, вид сбоку.

pinched in the middle, with a narrow, somewhat convex blade, first lateral tooth irregularly shaped, pinched in the middle, distally abruptly widening to an oblique, narrow, truncated blade, major lateral tooth with a sharply pointed, unicuspidate head.

The holotype has 23 gills per side ranging from valve IV to valve VIII.

The holotype is a male with full developed gonads.

Gut contains mainly detritus, a few small foraminiferans, one small gastropod and sand.

Remarks. Certain species of the genus *Stenosemus*, such as *S. albus* (Linnaeus, 1767), *S. sharpii* (Pilsbry, 1896), *S. simplicissimus* (Thiele, 1906), *S. vitreolus* (Kaas, 1985), *S. golikovi* Sirenko, 1994, and *S. kolesnikovi* Sirenko, 1994, have a tegmen- tum that appears to the naked eye to be sculpture- less. However, viewed under strong magnification,

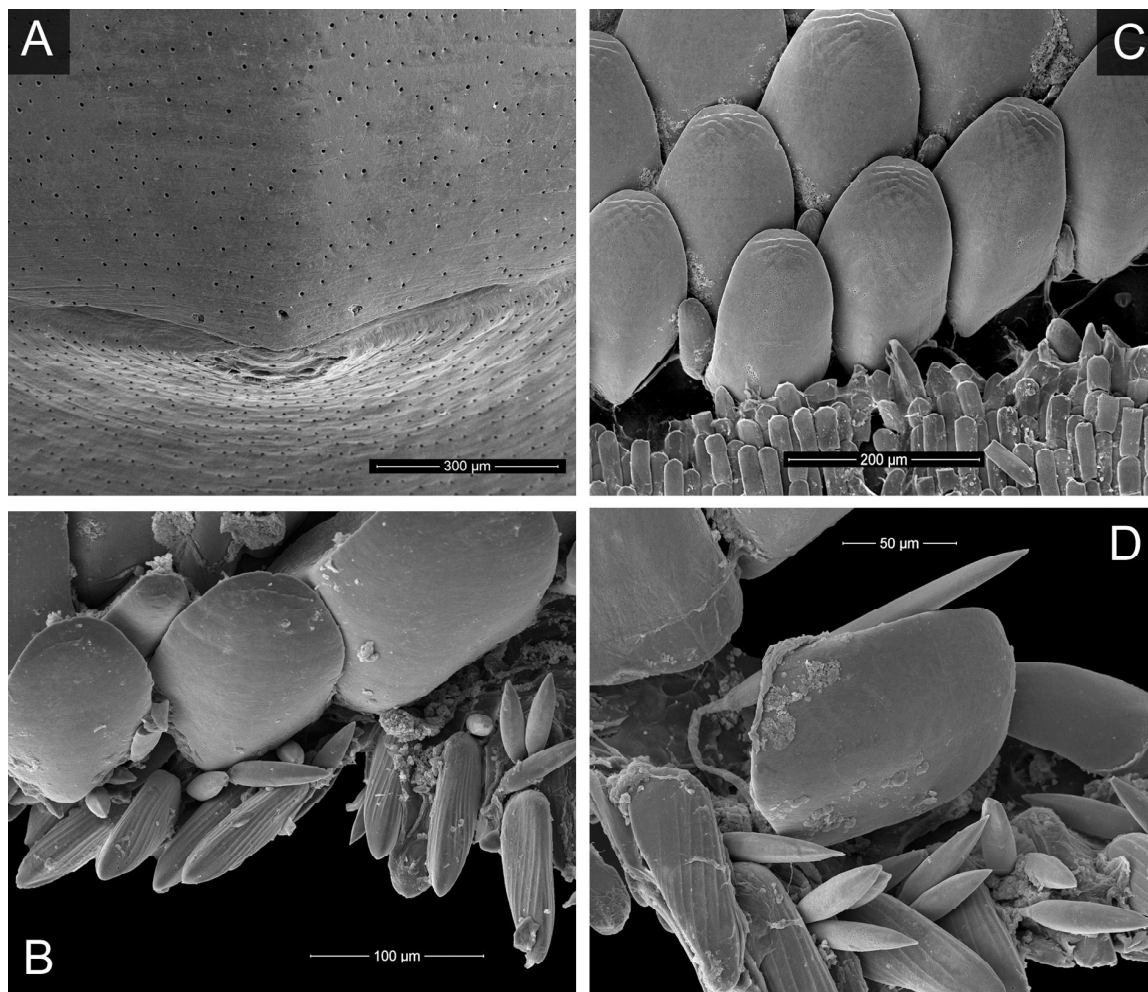


FIG. 3. *Stenosemus nitens* sp. nov., holotype (MNHN IM-2013-45830). **A.** Valve VIII, mucro; **B, D.** Dorsal and marginal scales; **C.** Dorsal and marginal spicules and ventral scales.

РИС. 3. *Stenosemus nitens* sp. nov., голотип (MNHN IM-2013-45830). **A.** Щиток VIII, мукро; **B, D.** Дорсальные и маргинальные спикеры; **C.** Дорсальные и маргинальные спикеры.

the tegmentum is microgranulose or even finely grooved.

The new species described here does indeed have a sculptureless surface of the tegmentum lacking not only ribs or grooves, but also granules. It is perfectly smooth and shiny. This is one of the main features distinguishing the new species from the other mentioned species of the genus *Stenosemus*. In addition, *S. nitens* sp. nov. differs from the other related species having unusual bends of the front margin of the intermediate valves and smooth dorsal spicules with several small transversal wrinkles on top.

Most species of the genus *Stenosemus* have white shells and a white girdle, which is typical for deep-water species. The new species belongs to a limited group of colored chitons of the genus, containing: *S. merweae* Sirenko, 2016 (South Africa), *S. vanbellei* (Kaas, 1985) (Mediterranean Sea and off Mauritania), *S. dolii* (Van Belle & Dell'Angelo,

1998) (Mediterranean Sea), *S. beui* (O'Neill, 1987) (New Zealand), *S. fijiensis* Sirenko, 2016 (Fiji), and *S. herosae* Sirenko, 2008 (Vanuatu). These taxa live, as a rule, at deep-sea in low latitudes.

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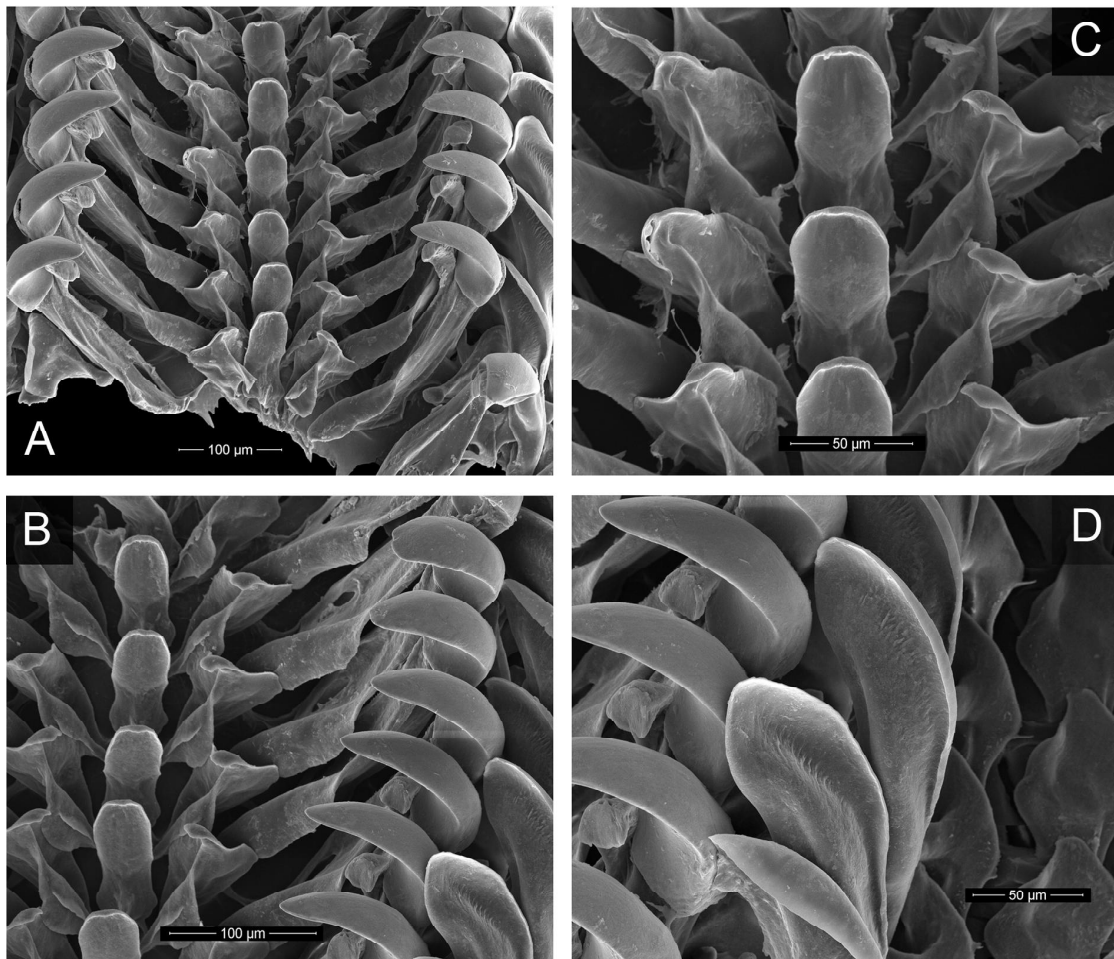


FIG. 4. *Stenosemus nitens* sp. nov., holotype (MNHN IM-2013-45830). **A.** Portion of radula; **B.** Central, first lateral, major lateral and major uncinal teeth; **C.** Central and first lateral teeth of radula; **D.** Major lateral and major uncinal teeth of radula.

РИС. 4. *Stenosemus nitens* sp. nov., голотип (MNHN IM-2013-45830). **A.** Часть радулы; **B.** Центральный, первый латеральный, большой латеральный и большой унциальный зубы радулы; **C.** Центральный и первый латеральный зубы радулы; **D.** Большой латеральный и большой унциальный зубы радулы.

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