

Leptochiton antarcticus (Mollusca, Polyplacophora) – a new species from the Southern Ocean

B.I. SIRENKO

Zoological Institute, Russian Academy of Sciences, Universitetskaya nab. 1, 199034, St. Petersburg, RUSSIA; marine@zin.ru

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ABSTRACT. A new species of chiton, *Leptochiton antarcticus* n. sp., is described from the Southern Ocean from depths of 87–1,524 m. The new species is distinguishable from other congeneric species by the shape of head, of major lateral teeth of radula, dorsal scales and anterior position of mucro.

Introduction

The fauna of the chitons of the Southern Ocean is very poor, and this is true also for species of the globally distributed genus *Leptochiton*. There are 2 species of *Leptochiton* in the ocean: *L. kerguelensis* (Haddon, 1886) and *L. laurae* Schwabe et Sellanes, 2010. Both species inhabit the shelf of Antarctica and the Magellan region [Powell, 1951, 1960; Dell, 1964; Götting, 1989; Sirenko, in press]. The latter species also occurs in southern Chile [Schwabe, Sellanes, 2010]. Examinations of the Antarctic collections of the Smithsonian Institution and the collections of the Zoological Institute of the Russian Academy of Sciences allowed me to find a new species of *Leptochiton* that is widely distributed around Antarctica and in the Scotia Sea.

Materials and Methods

Specimens were collected by cruises of American and Russian research vessels: *Deep-freeze IV* (1959), *Ob* (1963), *Eltanin* (1963, 1972), *Akademik Kurchatov* (1971), *Evrika* (1981), and *Akademik Fedorov* (1989, 1991, 2014). Specimens from the american cruises were kept in the Smithsonian Institution and examined by the author in 1999. A total of 14 specimens of new species were collected around Antarctica and in the Scotia Sea.

For scanning electron microscopy (SEM), the valves, armature of the girdle and radula of the holotype and two paratypes were boiled in 7% KOH solution to remove all organic material and then were boiled twice in fresh water. After these procedures, head valves, valve V and IV, a part of the armature of the girdle and a part of the radula were examined under SEM and the remaining part of the

girdle and radula were examined under a light microscope.

All materials collected by Russian research vessels including the type specimens are stored in ZISP.

Abbreviations: BL – body length. Leg. – specimen original collector. RAE – Russian Antarctic Expedition. RV – research vessel. SAE – Soviet Antarctic Expedition. Spm(s) – specimen(s). St. – station. ZISP – Zoological Institute of Russian Academy of Sciences, St. Petersburg, Russia.

Systematics

Class Polyplacophora Gray, 1821

Order Lepidopleurida Thiele, 1909

Family Leptochitonidae Dall, 1889

Genus *Leptochiton* Gray, 1847

Type species: *Chiton cinereus* Montagu, 1803 (non Linnaeus, 1767) = *Leptochiton asellus* (Gmelin, 1791) *fide* Lovén, 1846, subsequent designation by Gray, 1847.

Genus distribution: Worldwide, Carboniferous-Recent.

Leptochiton antarcticus n. sp.

(Figs. 1–7)

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Type material. Holotype (ZISP 2250); 2 paratypes (ZISP 2251, 2252).

Type locality. Southern Ocean, Scotia Sea, off South Sandwich Islands, 59°42.0'S, 28°12.9'W, 142–160 m, gravel, mud.

Etymology. Named after Antarctica.

Material examined. – Antarctic Continent: RV *Deep-freeze IV*, st. Ed 31, trawl 6, 66°20'S, 67°47'W, 320 m, 3 spms, BL – 5–6 mm, 25.03.1959; RV *Ob*, 8 SAE, st. 668, Sigsby-Gorbunov trawl, 69°54.8'S, 12°50.6'E, 260–230 m, 1 spm, paratype (ZISP 2252), BL – 8.0 mm, 08.03.1963; st. L, Sigsby trawl, 69°57'S, 12°42'E, 400 m, stones, 2 spms, BL – 6.0 mm, 16.03.1963; RV *Eltanin*, cruise 51, st. 5765, Menzies trawl, 76°07.0'S, 170°12.1'W, 71–87 m, 1 spm, BL – 7.0 mm, 10.02.1972; RV *Akademik Fedorov*, 24 cruise, 34 SAE, st. 18/65, Sigsby trawl, 69°06'S, 160°34.81'E, 580 m, 2 spms,

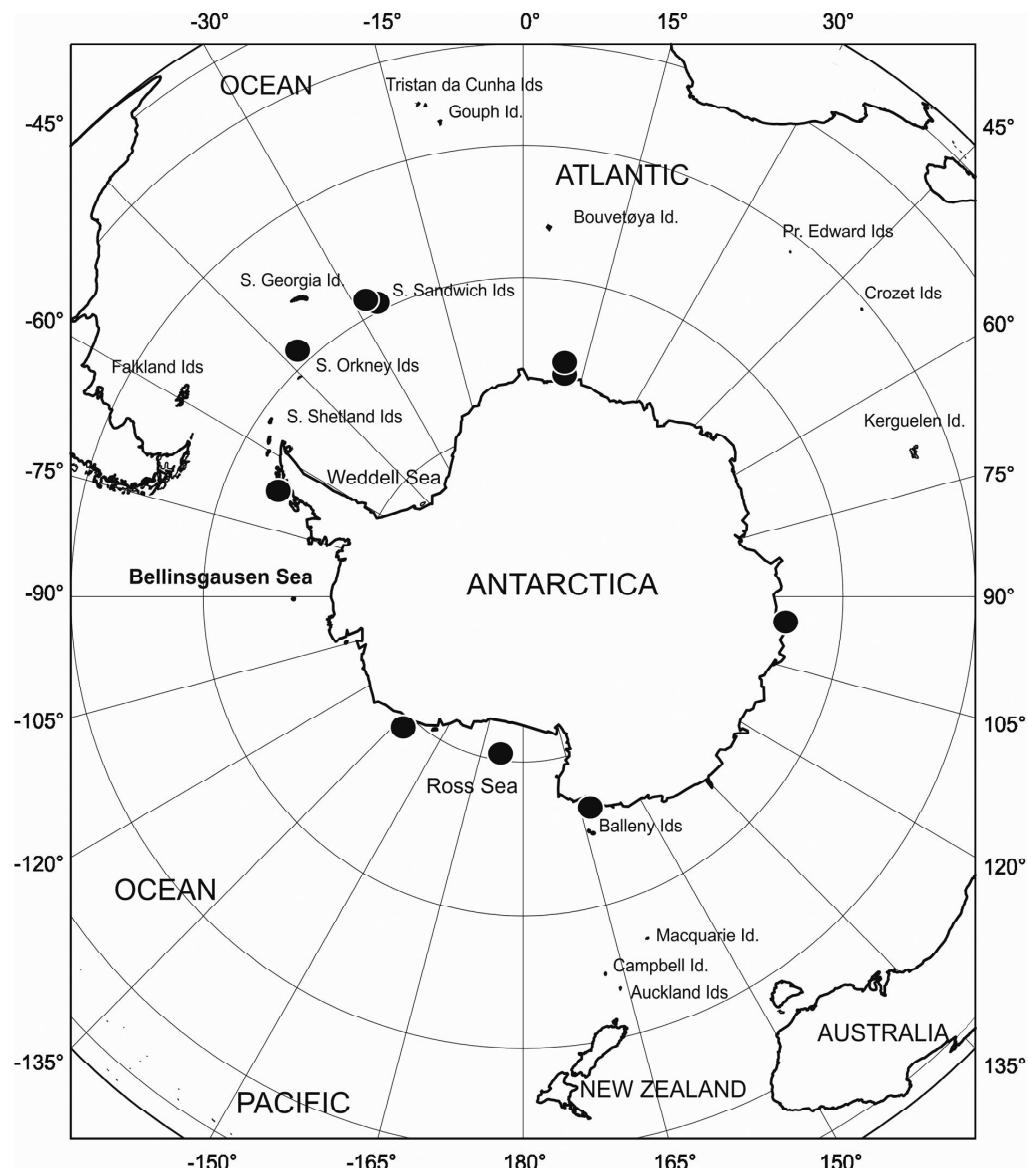


FIG. 1. Distribution of *Leptochiton antarcticus* n. sp. in the Southern Ocean.

РИС. 1. Распространение *Leptochiton antarcticus* n. sp. в Южном океане.

BL – 3-4 mm, 20.03.1989, leg. A. Puskin; RV *Akademik Fedorov*, 36 SAE, st. 20, sample 2, Sigsby trawl, 66°21.51'S, 94°39.41'E, 324-283 m, 1 spm, BL – 7.0 mm, 14.01.1991, leg. A. Puskin and A. Ostrovsky; RV *Akademik Fedorov*, 59 RAE, st. 17, Van Veen grab, 74°09.68'S, 136°14.33'W, 995 m, small stones and silty mud, 1 spm, paratype (ZISP, 2251), BL – 4,5 mm, 16.02.2014, leg O. Bazhenova and B. Anokhin;

Scotia Sea: RV *Eltanin*, cruise 8, st. 628, Menzies trawl, 59°53'S, 27°42'W, 1244 m, 1 spm, BL – 4.2 mm, 18.05.1963; RV *Akademik Kurchatov*, cruise 11, st. 904, 59°24'S, 44°21'W, 1524 m, 1 spm, BL – 6.0 mm, 09.12.1971; RV *Evrika*, dredge 4, 59°42.0', 28°12.9'W, 142-160 m, gravel, mud, 1 spm, holotype (ZISP 2250), BL – 6.5 mm, 12.01.1981, leg. A. Neelov and I. Smirnov.

Diagnosis. Animal small, up to 8.0 mm. Valves subcarinate, not beaked, the sides weakly convex; mucro of tail valve anterior, prominent, postmucronal slope straight. Tegmentum sculptured with

rounded well-raised granules arranged in longitudinal rows, distinct in pleural areas and sometimes indistinct in jugal areas of intermediate valves and antemucronal area of tail valve. Other areas sculptured with weakly raised granules arranged almost quincuncially. Each granule with 1 megalaeasthe and 4 micraesthetes in front. Girdle densely covered with curved scales with 12-16 ribs. Radula with 150-180 transverse rows of very small teeth, first lateral teeth narrow and long, major lateral teeth with unicuspis head with sharp top displaced outside. Seven gills on each side.

Диагноз. Животное маленькое, длина тела до 8,0 мм. Щитки раковины немного угловатые, апекс не выражен, боковые склоны слабо выпуклые; мукро хвостового щитка выступает и сдвинуто вперед, постмукрональный склон прямой. Тегментум скульптурирован округлыми замет-

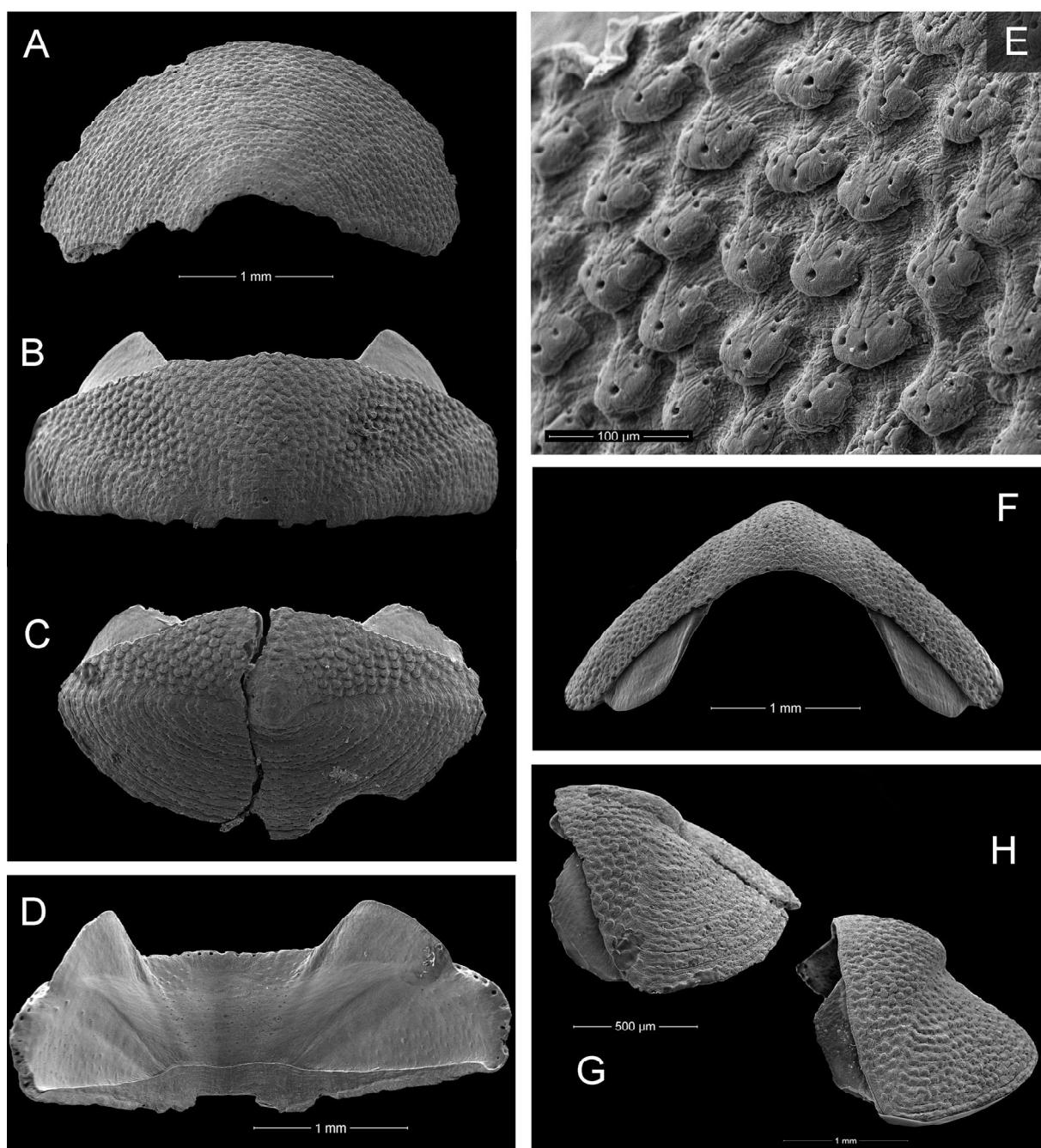


FIG. 2. *Leptochiton antarcticus* n. sp., holotype (ZISP 2250), BL – 6.5 mm (A-G) and paratype (ZISP 2252), BL – 8.0 mm (H): A, valve I, dorsal view; B, valve V, dorsal view; C, valve VIII, dorsal view; D, valve IV, ventral view; E, valve V, tegmentum sculpture in central area; F, valve V, rostral view; G, H, valve VIII, left lateral view.

РИС. 2. *Leptochiton antarcticus* n. sp., голотип (ZISP 2250), BL – 6.5 мм (А-Г) и параптип (ZISP 2252), BL – 8.0 мм (Н): А, щиток I, с дорсальной стороны; Б, щиток V, с дорсальной стороны; С, щиток VIII, с дорсальной стороны; Д, щиток IV, с вентральной стороны; Е, щиток V, скульптура тегментума на центральном поле; Ф, щиток V, вид с рострума; Г, Н, щиток VIII, вид слева.

но приподнятыми гранулами, расположенные продольными рядами, отчетливыми на плевральных полях и иногда неотчетливыми на югальном поле промежуточных щитков и антемукрональном поле хвостового щитка. Другие поля скульптурированы слабо приподнятыми гранулами, расположенными почти в шахматном порядке. Каждая гранула с 1 мегалоэстетом и расположенными впереди 4 микроэстетами. Перинотум плотно покрыт изогнутыми чешуйками с 12-16 ребрышками. Радула с 150-180 попечными рядами очень мелких зубов, первый латеральный зуб узкий и длинный, крючковой зуб с однозубцовым наконечником с заостренной вершиной смещенной наружу. С каждой стороны 7 жабр.]

речными рядами очень мелких зубов, первый латеральный зуб узкий и длинный, крючковой зуб с однозубцовым наконечником с заостренной вершиной смещенной наружу. С каждой стороны 7 жабр.]

Description. Holotype 6.5 x 4.0 mm. Shell elongate oval, rather elevated (elevation ratio 0.39 in valve V), valves subcarinated. Tegmentum white.

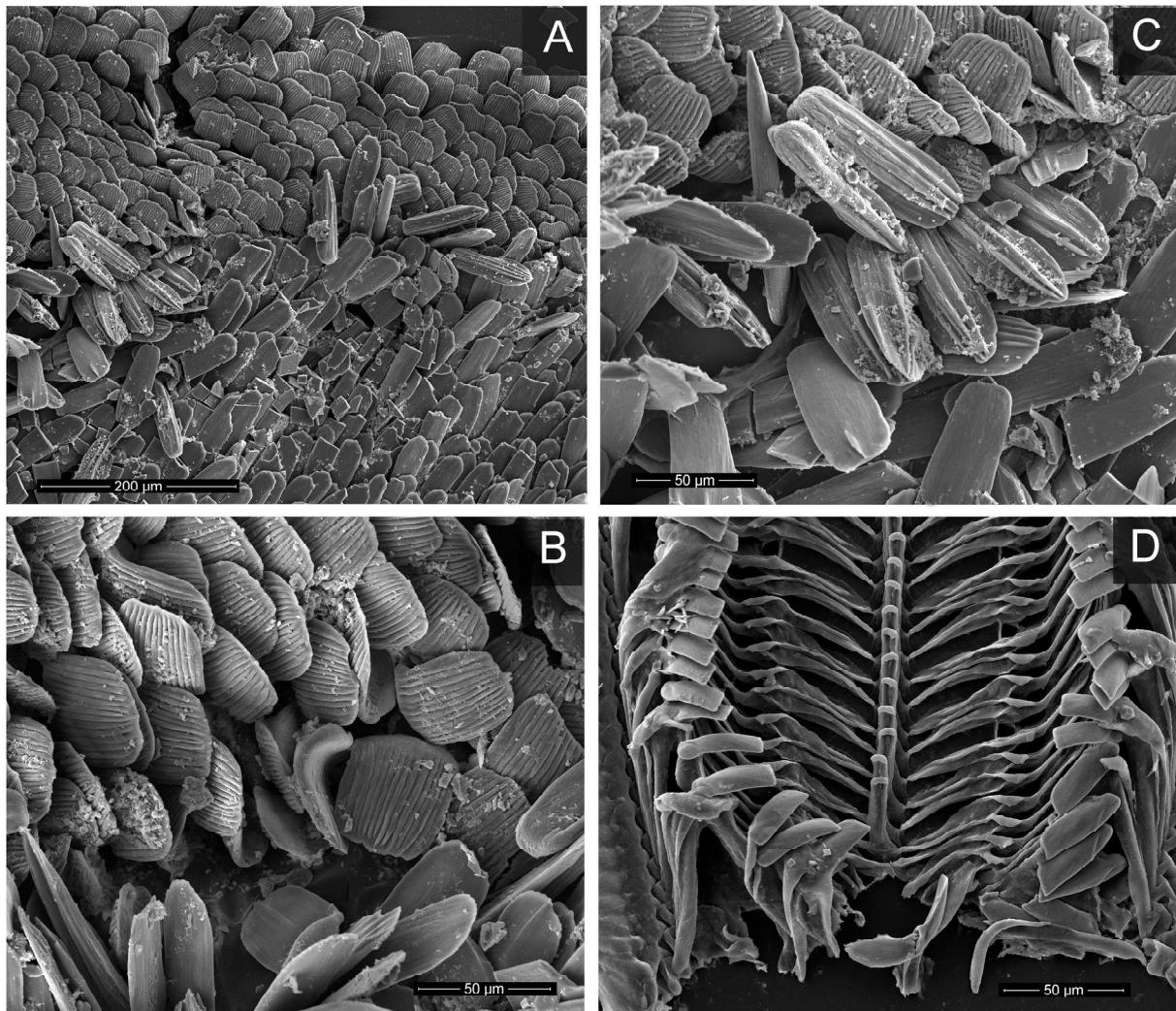


FIG. 3. *Leptochiton antarcticus* n. sp., holotype (ZISP 2250), BL – 6.5 mm: A, B, C, dorsal scales, marginal scales and needle and ventral scales; D, radula.

РИС. 3. *Leptochiton antarcticus* n. sp. голотип (ZISP 2250), BL – 6.5 мм: А, В, С, дорсальные чешуйки, маргинальные чешуйки и игла и вентральные чешуйки; Д, радула.

Head valve semicircular, posterior margin widely V-shaped. Intermediate valves rectangular, side margins rounded, anterior margin convex in the jugal part, posterior margin more or less straight, apex not projecting. Lateral areas little raised. Tail valve as wide as the head valve, mucro anteriorly, ratio of length of antemucronal area to length of postmucronal area 0.8, antemucronal area convex, postmucronal area almost straight.

Tegmentum sculptured with raised oval granules (50 µm) arranged in longitudinal rows distinct in pleural areas and sometimes indistinct in jugal areas of intermediate valves (about 48 rows), and antemucronal area of tail valve (about 30 rows). In head valve, lateral areas of intermediate valves and postmucronal area of tail valve granules weakly raised and arranged almost quincuncially. Each gra-

nule with 1 megalaesthete and 4 micraesthetes in front.

Articulamentum white, apophyses short, width of apophyses less than width of jugal sinus.

Girdle narrow, about 0.5 mm wide near valve V (width of valve V 3.1 mm), dorsally densely covered with curved scales (58 x 44 µm) with 12-16 ribs. Intersegmental area with longer scales (82 x 39) and with long needles (142 x 15 µm) embedded in chitinous cups in the form of ring-shaft needles of Thiele (1908). Margin armed with two different kinds of elements: numerous long pointed scales (84 x 24 µm) with 2-5 ribs on one side, and few long needle (140 x 13) looks like intersegmental needles. Ventrally girdle covered with elongate, obtusely pointed, smooth scales (90 x 28 µm).

Radula of holotype 2.8 mm long with about 150

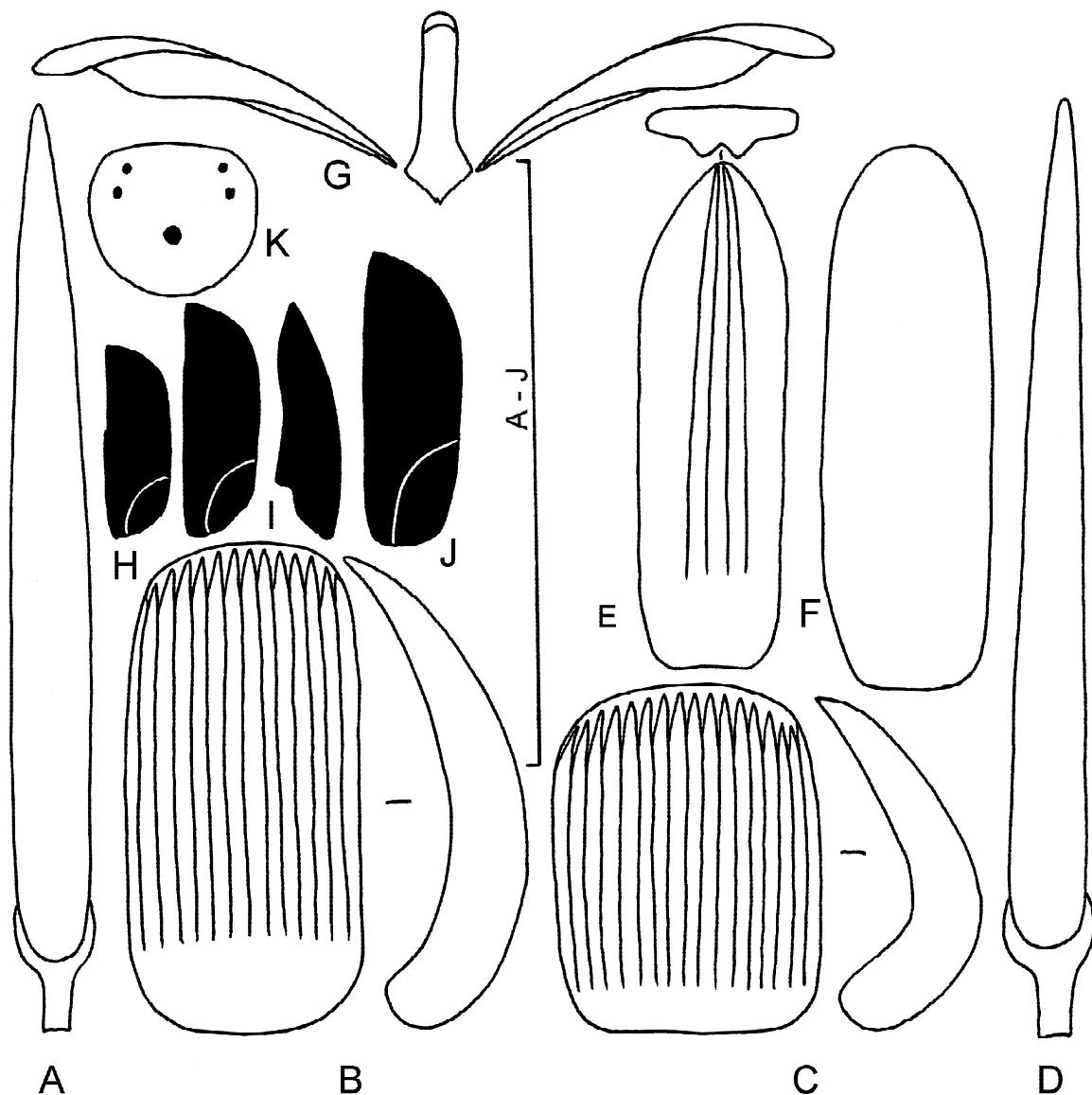


FIG. 4. *Leptochiton antarcticus* n. sp., holotype (ZISP 2250), BL – 6.5 mm, (A-G, I, K); paratype (ZISP 2251), BL – 4.5 mm, (H); paratype (ZISP 2252), BL – 8.0 mm (J): A, intersegmental needle; B, intersegmental scales; C, dorsal scales; D, marginal needle; E, marginal scale; F, ventral scale; G, central and first lateral teeth of radula; H, I, J, head of major lateral teeth of radula; K, aethete group. Scale bar: A-J 100 μ m.

РИС. 4. *Leptochiton antarcticus* n. sp. голотип (ZISP 2250), BL – 6.5 мм, (A-G, I, K), параптип (ZISP 2251), BL – 4.5 мм, (H), параптип (ZISP 2252), BL – 8.0 мм (J): А, интерсегментальная игла; В, интерсегментальная чешуйка; С, дорсальные чешуйки; Д, маргинальная игла; Е, маргинальная чешуйка; F, вентральная чешуйка; G, центральный и промежуточные зубы радулы; H, I, J, коронка крючкового зуба радулы; K, эстетическая группа. Масштаб: А-Д 100 μ м.

transverse rows of very small mature teeth. Central teeth very narrow, first lateral teeth elongate, major lateral teeth with unidentate cusp with sharp top displaced outside.

There are 7 gills per side arranged from valve VI to anus.

Remarks. The fourteen specimens collected around Antarctica and in the Scotia Sea showed variability of the tegumentum structure in the head valve, lateral areas of intermediate valves and the postmucronal area of the tail valve. Most studied specimens had tegmental structure similar to the

structure of the holotype (weakly raised granules arranged almost quincuncially). A small specimen (paratype ZISP 2251) had weakly-raised granules in the head valve and postmucronal area of the tail valve (Fig. 5 A, C, G) and absence of granules in the lateral areas of the intermediate valves (Fig. 5B, 6A). On the other hand the largest specimen (paratype ZISP 2252) had a well-raised granules in all areas including lateral and postmucronal ones (Fig. 2H). There is variability in the number of gills apparently attributable to age or growth. While the holotype (BL 6.5 mm) has 7 gills, the paratype

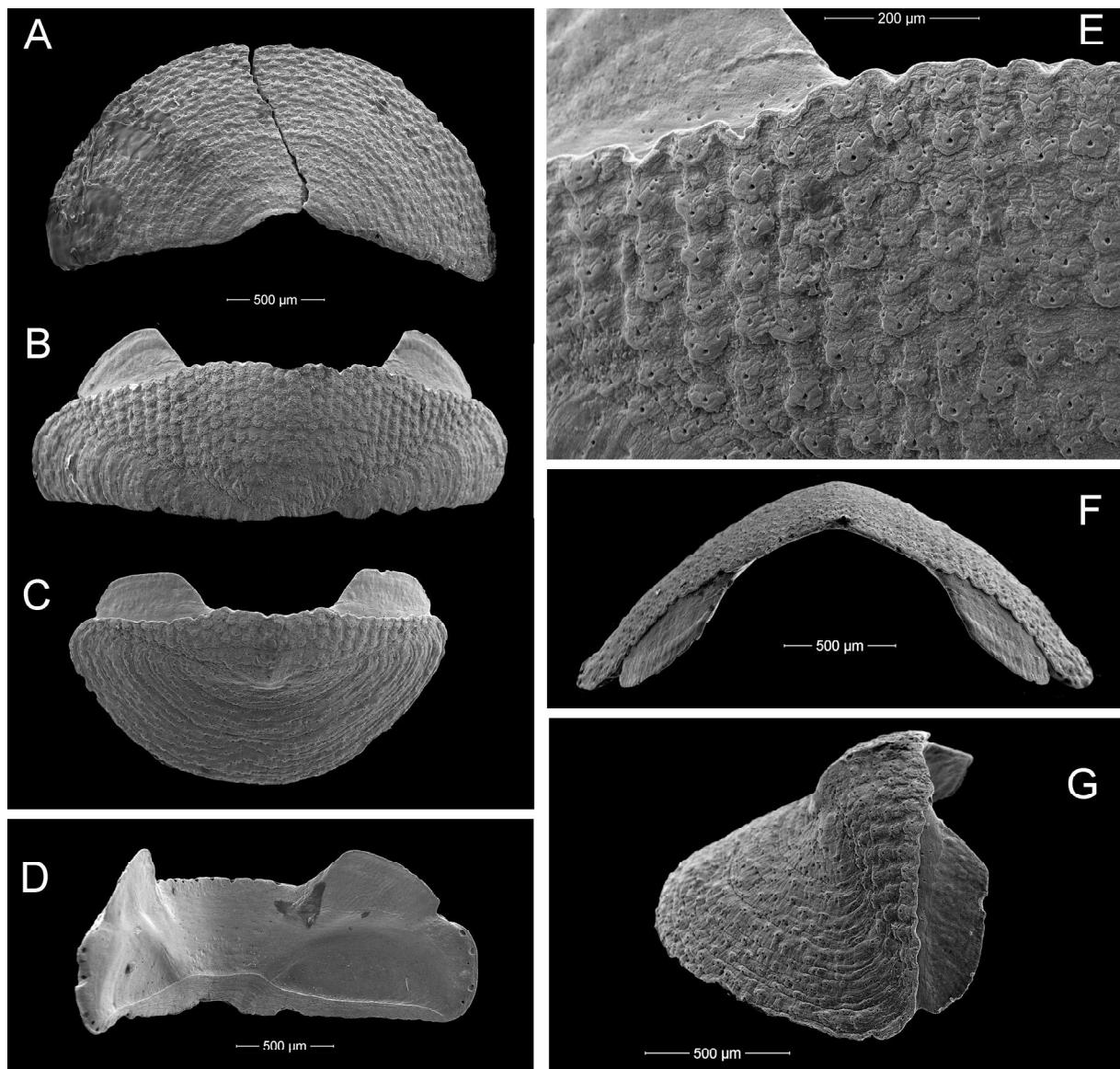


FIG. 5. *Leptochiton antarcticus* n. sp., paratype (ZISP 2251), BL – 4.5 mm: A, valve I, dorsal view; B, valve V, dorsal view; C, valve VIII, dorsal view; D, valve IV, ventral view; E, valve V, tegmentum sculpture in central area; F, valve V, rostral view; G, valve VIII, right lateral view.

РИС. 5. *Leptochiton antarcticus* n. sp. паратип ZISP 2251), BL – 4.5 мм: А, щиток I, с дорсальной стороны; В, щиток V, с дорсальной стороны; С, щиток VIII, с дорсальной стороны; Д, щиток IV, с вентральной стороны; Е, щиток V, скульптура тегментума в центральном поле; Ф, щиток V, вид сrostрума; Г, щиток VIII, вид справа.

(ZISP 2251) BL – 4.5 mm had 6 gills per side, specimen with BL – 7.0 mm had 8 gills and the paratype (ZISP 2252) BL – 8.0 mm had 9 gills. No noticeable variability in the armature of girdle and the teeth of radula were found in studied specimens.

This new species is most similar to *Leptochiton chariessa* Barnard, 1963 from South Africa. It differs from the latter in having narrower interstices between longitudinal rows on the central area of the intermediate valves (vs. interstices almost as wide as rows of granules in *L. chariessa*), a shorter antemucronal area of the tail valve (vs. length of antemucronal and postmucronal areas equal in *L.*

chariessa), granules arranged almost quincuncially in the head valve, lateral areas of the intermediate valves and the postmucronal area of the tail valve (vs. radial rows of granules in *L. chariessa*).

Like *Leptochiton kerguelensis*, the new species has a wide distribution around the Antarctica and differs from the former in having a unicuspид head of major lateral teeth of radula (vs. a bidentate cusp in *L. kerguelensis*), five aesthetes pores in each granule on tegmentum (one pore in *L. kerguelensis*) and distinct longitudinal rows of granules on pleural areas of intermediate valves (vs. indistinct rows in *L. kerguelensis*).

The above-described new species is the third

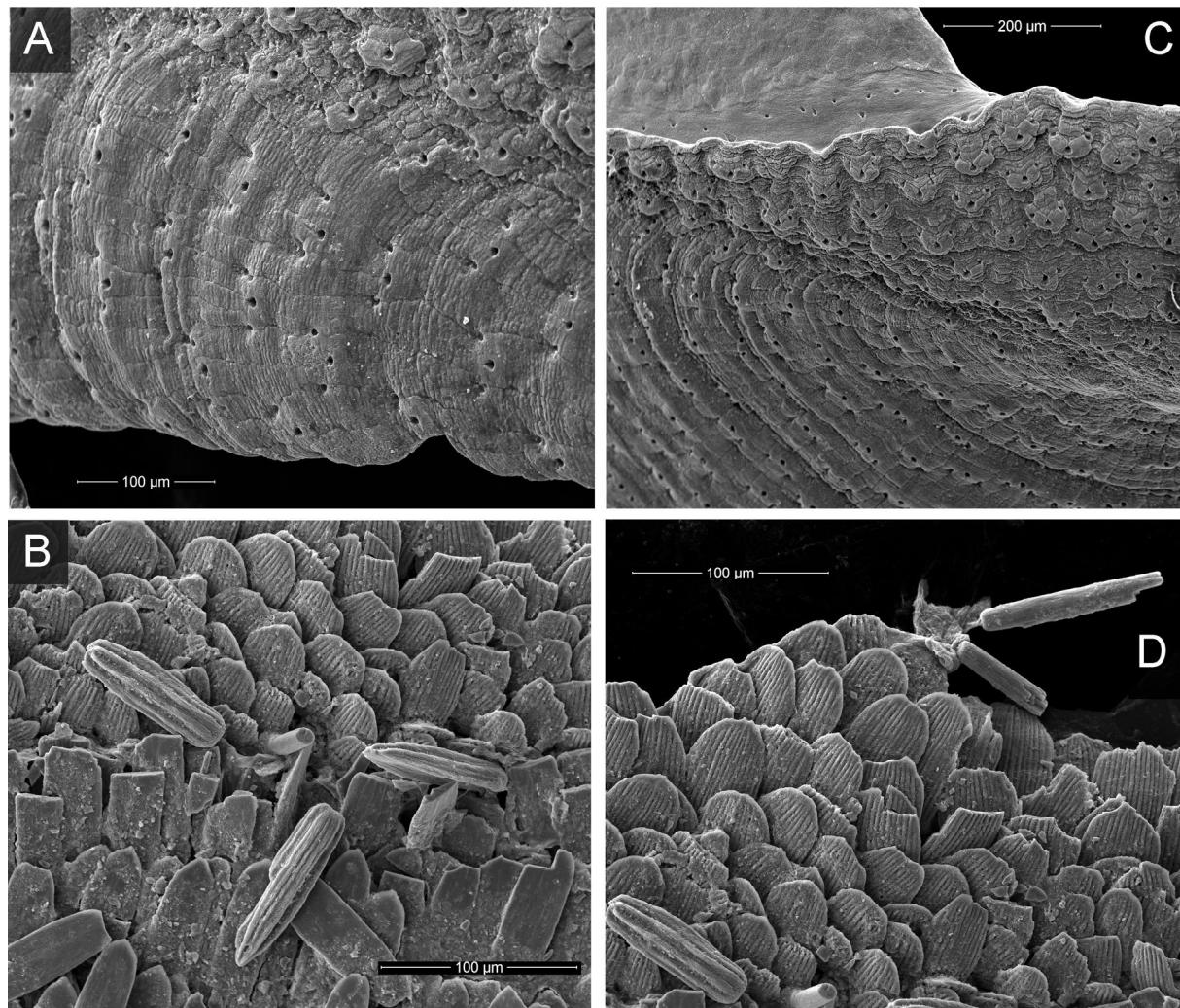


FIG. 6. *Leptochiton antarcticus* n. sp., paratype (ZISP 2251), BL – 4.5 mm: A, valve V, tegmentum sculpture on lateral area; B, dorsal, marginal and ventral scales; C, valve VIII, tegmentum sculpture in antemucronal and postmucronal areas; D, intersegmental needles dorsal and marginal scales.

РИС. 6. *Leptochiton antarcticus* n. sp. параптип (ZISP 2251), BL – 4.5 мм: А, щиток V, скульптура тегментума на латеральном поле; В, дорсальные, маргинальные и вентральные чешуйки; С, щиток VIII, скульптура тегментума на антемукрональном и постмукрональном полях; Д, интерсегментальные иглы, дорсальные и маргинальные чешуйки.

species of the genus *Leptochiton* in the Southern Ocean. The two others *L. kerguelensis* and *L. laurae* Schwabe et Sellanes, 2010 inhabit both the Southern Ocean and the Sub-Antarctic and Magellan regions.

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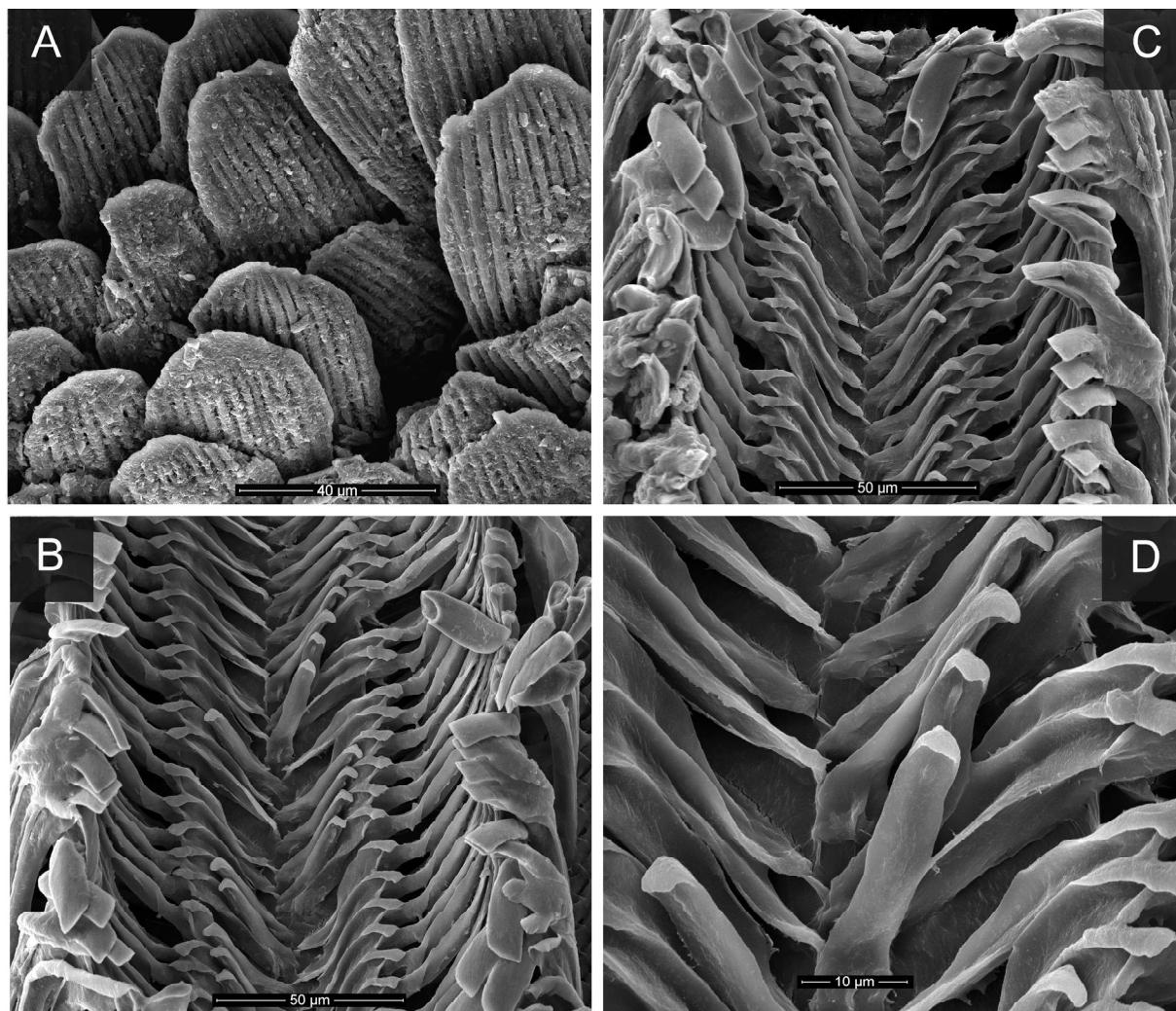


FIG. 7. *Leptochiton antarcticus* n. sp., paratype (ZISP 2251), BL – 4.5 mm: A, dorsal scales; B, C, radula; D, central and first lateral teeth of radula.

РИС. 7. *Leptochiton antarcticus* n. sp. паратип (ZISP 2251), BL – 4.5 мм: А, дорсальные чешуйки; В, С, радула; Д, центральные и промежуточные зубы радулы.

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Leptochiton antarcticus (Mollusca, Polyplacophora) – новый вид из Южного океана

Б.И. СИРЕНКО

Зоологический институт РАН, Университетская наб., 1, 199034, Санкт Петербург; marine@zin.ru

Описывается новый вид хитонов *Leptochiton antarcticus* n. sp. из Южного океана с глубины 87-1524 м. Новый вид отличается от других родственных видов формой наконечника крючковой пластинки радулы, дорсальными чешуйками и передним положением мукро.