

A new South African *Leptochiton* (Mollusca: Polyplacophora: Lepidopleurida)

Boris SIRENKO

Zoological Institute, Russian Academy of Sciences, Universitetskaya nab.1, St. Petersburg,
199034, RUSSIAN FEDERATION, e-mail: marine@zin.ru

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ABSTRACT. A new chiton species of the genus *Leptochiton* is described from the intertidal zone of False Bay, South Africa. The new species is distinguishable from other congeneric species by ribbed ventral scales, a wide tail valve and the number of micraesthetes per each megal aesthete.

Introduction

There are 6 species in genus *Leptochiton* [*L. sykesi* (Sowerby III, 1903), *L. chariessa* (Bernard, 1963), *L. dispersus* Kaas 1985, *L. permolestus* Kaas, 1985; *L. meiringae* Kaas, 1985 and *L. hodgsoni* (Sirenko, 2000)] [Kaas, 1985; Kaas, Van Belle, 1985, 1987; Sirenko, 2000, 2015] that inhabit the sea floor near South Africa. Five of them live at depths of 70 to 433 m. *L. hodgsoni* was found in the intertidal zone. This species was originally attributed to the genus *Parachiton* Thiele, 1909 [Sirenko, 2000]. However, later, Hiroshi Saito wrote me that the species belongs to the genus *Leptochiton* because its radula is different from that of the species of *Parachiton*, and I agreed with him.

The new species described below was collected along with *L. hodgsoni* in the False Bay near the Simons Town.

Material and methods

Specimens for this study were collected by Igor Smirnov and the author during two expeditions in 1996 and 2000 to False Bay, south of South Africa, Indian Ocean.

The chitons were fixed in 75% ethanol. Two specimens were disarticulated. Valves, armature of girdle and radula of examined specimens were boiled for 10-15 minutes in 7% KOH solution to remove organic material for scanning electron microscopy (SEM). Portions of radula and the girdle were embedded in Canada balm for examination under the light microscope.

All type specimens are deposited in the Zoological Institute of the Russian Academy of Sciences, St. Petersburg (ZISP).

Systematics

Class Polyplacophora Gray, 1821
Subclass Loricata Schumacher, 1817
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 smirnovi sp. nov.
(Figs 1-6)

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Type material. Holotype (ZISP 2260), now disarticulated consisting of SEM stub of valves I, IV, V, VIII, part of perinotum and radula, mount of part of perinotum and radula and vial with other valves, and also five paratypes (ZISP 2261, 2262).

Type locality. Indian Ocean, South Africa, False Bay, Sunny Cove, intertidal, under stones (23.05.1996).

Material examined. Indian Ocean, South Africa, False Bay, Sunny Cove, 34°07'59''S, 18°25'59''E, intertidal, stones, holotype (ZISP 2260), body length 5.3 mm, 2 paratypes (ZISP 2261) body length 6.0-7.1 mm, 11.03.2000, leg. I. Smirnov and B. Sirenko and in the same place, 3 paratypes (ZISP 2262) body length 6.2-7.5 mm, 23.03.1996, leg. I. Smirnov and B. Sirenko.

Distribution. Only known from the type locality.

Diagnosis. Animal of a small size. Valves slightly elevated, rounded. Tail valve wider than the head valve, mucro subcentral. Tegmentum with flattened oval granules arranged in longitudinal rows in the central area of intermediate valves and the antemucronal area of the tail valve and quincuncially in other areas. Each granule with one megal aesthete

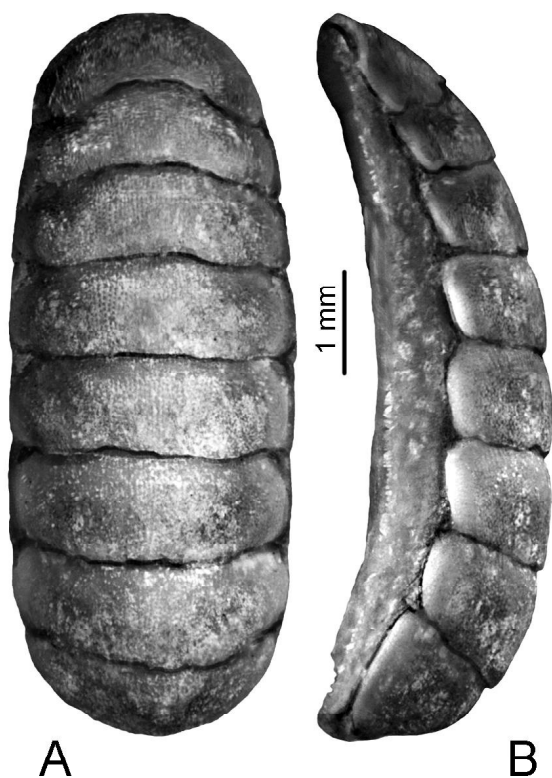


FIG. 1. *Leptochiton smirnovi* sp. nov., Indian Ocean, South Africa, False Bay, Sunny Cove, paratype (ZISP 2262), BL – 7.5 mm; **A**, whole animal, dorsal view; **B**, whole animal, lateral view.

РИС. 1. *Leptochiton smirnovi* sp. nov., Индийский океан, Южная Африка, залив Фолс, Санни Коув, паратип (ZISP 2262), длина тела 7,5 мм: **A**, вид животного сверху; **B**, вид животного сбоку.

and four micraesthetes in front of megal aesthete. Dorsal scales wide, round at top, with 16-17 distinct ribs, marginal spicules long, pointed, with 16 distinct ribs arranged around the spicule, ventral scales elongate, pointed, with 6-7 ribs on dorsal side. Radula with numerous transverse rows of very small teeth. Central teeth narrow, major lateral teeth with long tridentate cusp, median denticle largest. Eight gills per side extending from the end of valve VI to anus.

[**Диагноз.** Животное маленькое. Щитки раковины слабо приподняты. Хвостовой щиток шире чем головной, мукро почти центральное. Тегментум с плоскими овальными гранулами, расположенными продольными рядами на центральных полях промежуточных щитков и на переднем поле хвостового щитка и в шахматном порядке на остальных полях. Каждая гранула с 1 мегалоэстетом и расположенными впереди 4 микроэстетам. Дорсальные чешуйки широкие, закругленные на вершине с 16-17 отчетливыми ребрами, маргинальные спикулы длинные, с 6-7 ребрами на дорсальной стороне. Радула с многочисленными поперечными рядами очень мелких зубов. Центральный зуб узкий, крючковой зуб с трехзубцовым наконечником. С каждой стороны по 8 жабр, протянувшихся от конца 6 щитка до анального отверстия.]

Table 1. Body length and width of valves of *Leptochiton smirnovi* sp. nov.

Табл. 1. Длина тела и ширина щитков *Leptochiton smirnovi* sp. nov.

Specimen	Body length (mm)	Width of valves (mm)		
		I	V	VIII
Holotype	5.3	2.0	2.3	2.1
Paratype 1 (ZISP 2262)	7.0	2.3	2.85	2.4
Paratype 2 (ZISP 2262)	7.5	2.5	3.1	2.7

Description. Holotype 5.3 x 3.8 mm. Shell elongate-oval, moderately elevated (elevation ratio in valve V – 0.33). Valves thin, rounded, not beaked, color of tegmentum white, covered with yellow deposits on it (Fig. 1).

Head valve semicircular. Intermediate valves rectangular, short and wide, anterior and posterior margins nearly straight not beaked, lateral margins rounded. Tail valve wider than head valve, with subcentral mucro, antemucronal slope slightly convex, postmucronal slope weakly concave near mucro (Figs 2, 5).

Tegmentum sculptured with flattened oval densely spaced granules, arranged in about 46 longitudinal rows in the central area of intermediate valves and antemucronal area of tail valve, and quincuncially in other areas (Figs 2E; 5E). Each granule has one megal aesthete and four (rarely 5) micraesthetes (Fig. 6J).

Articulamentum moderately developed, apophyses short, width of apophyses less than width of jugal sinus (Figs 2D; 5D).

Girdle rather narrow (about 0.6 mm wide near valve V in holotype), dorsally covered with wide, round topped curved scales (53-56 x 42-44 μ m) with 16-17 distinct ribs (Figs 3A, C; 6B). Intersegmental area with 1-2 long needles (110 x 15 μ m) with ribs (Fig. 6A). Marginal flattened needles (86-90 x 14-15 μ m) pointed with 14 ribs around the needle. Ventrally girdle covered with elongate, pointed scales (Figs 3B; 6D). Those near margin and middle of girdle 65-70 x 21 μ m with 7-8 ribs arranged up to base of scale, but those near pallial groove 51 x 18 μ m and with 5-6 ribs on top.

Radula of holotype is 1.4 mm long with about 130 transverse rows of very small mature teeth. Central teeth narrow, with well developed blade and small base, first lateral teeth elongate, major uncinal teeth elongated, with lanceolate blade, major lateral teeth with long, narrow tridentate cup, central denticle largest (Figs 3D; 4A, B; 6 E-I).

Eight gills per side arranged from valve VI to anus.

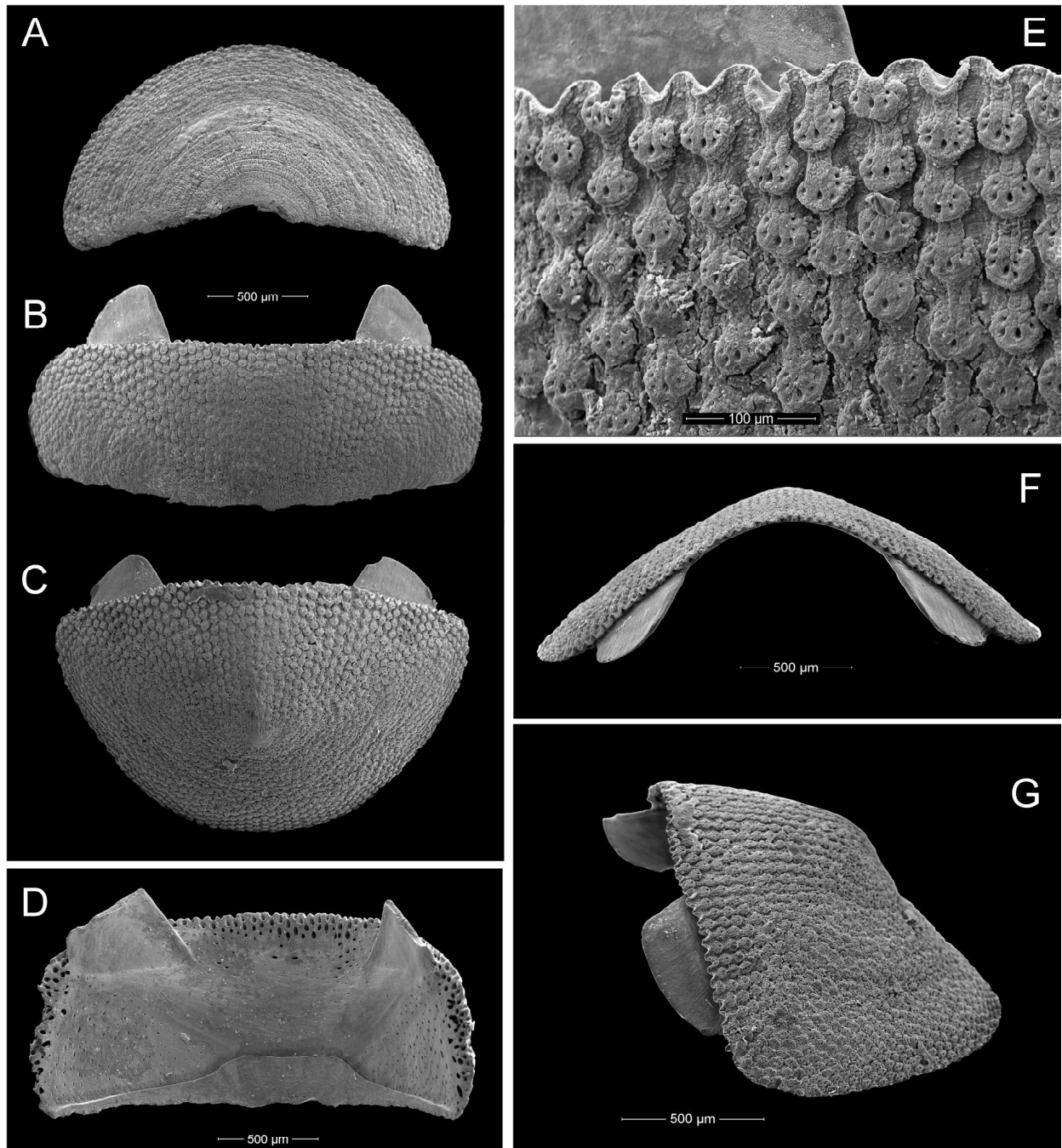


FIG. 2. *Leptochiton smirnovi* sp. nov., Indian Ocean, South Africa, False Bay, Sunny Cove, holotype, BL – 5.3 mm: **A**, valve I, dorsal view; **B**, valve V, dorsal view; **C**, valve VIII, dorsal view; **D**, valve IV, ventral view; **E**, valve V, tegmentum sculpture in central area; **F**, valve V, rostral view; **G**, valve VIII, lateral view.

РИС. 2. *Leptochiton smirnovi* sp. nov., Индийский океан, Южная Африка, залив Фолс, Санни Коув, голотип, длина тела 5,3 мм: **A**, щиток I, с дорсальной стороны; **B**, щиток V, с дорсальной стороны; **C**, щиток VIII, с дорсальной стороны; **D**, щиток IV, с вентральной стороны; **E**, щиток V, скульптура тегмента на центральном поле; **F**, щиток V, вид с рострума; **G**, щиток VIII, вид сбоку.

Digestive tract contains fine, dispersed detritus and a little amount of very fine sand.

The paratypes of the new species have valves of the same proportions as the holotype (Table 1).

One of the paratypes (BL 7.0 mm) is a female with mature eggs (diameter about 200 µm), which occupies about 80% of the body cavity.

Remarks. The new species is similar to *Leptochiton peruvianus* Sirenko, 2015, *L. linseae* Sirenko, 2015, *L. compostellanum* Carmona Zalvide et Urgorri, 1999 and *L. sanmatiensis* (Güller, Liuzzi et Zelaya, 2015) [Sirenko, 2015; Carmona Zalvide, Urgorri, 1999; Güller *et al.*, 2015] if compared by its radula, dorsal scales and the structure of teg-

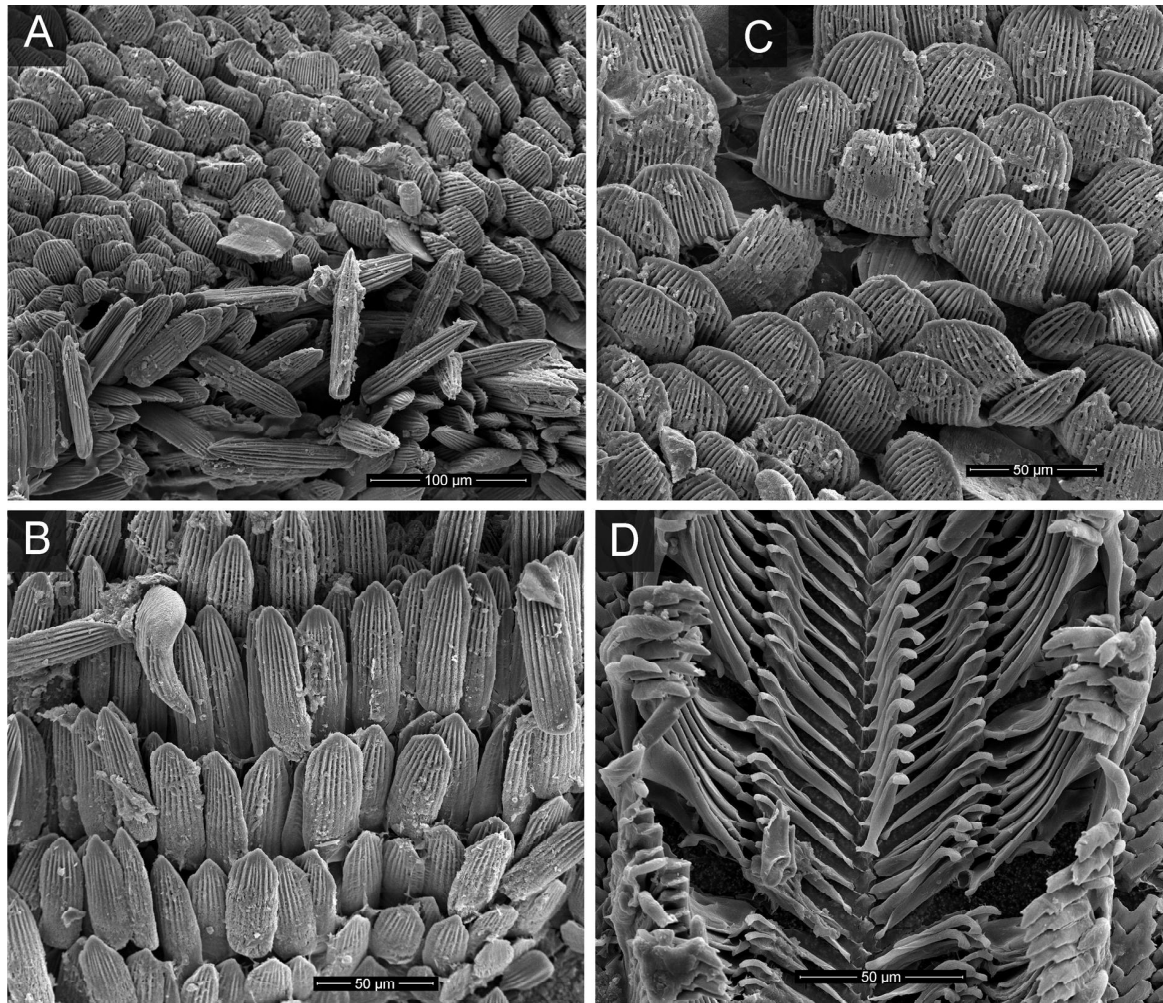


FIG. 3. *Leptochiton smirnovi* sp. nov., Indian Ocean, South Africa, False Bay, Sunny Cove, holotype, BL – 5.3 mm: **A**, dorsal scales, marginal needles and ventral scales; **B**, ventral scales; **C**, dorsal scales; **D**, radula.

РИС. 3. *Leptochiton smirnovi* sp. nov., Индийский океан, Южная Африка, залив Фолс, Санни Коув, голотип, длина тела 5,3 мм: **A**, дорсальные чешуйки, маргинальные иглы и вентральные чешуйки; **B**, вентральные чешуйки; **C**, дорсальные чешуйки; **D**, радула.

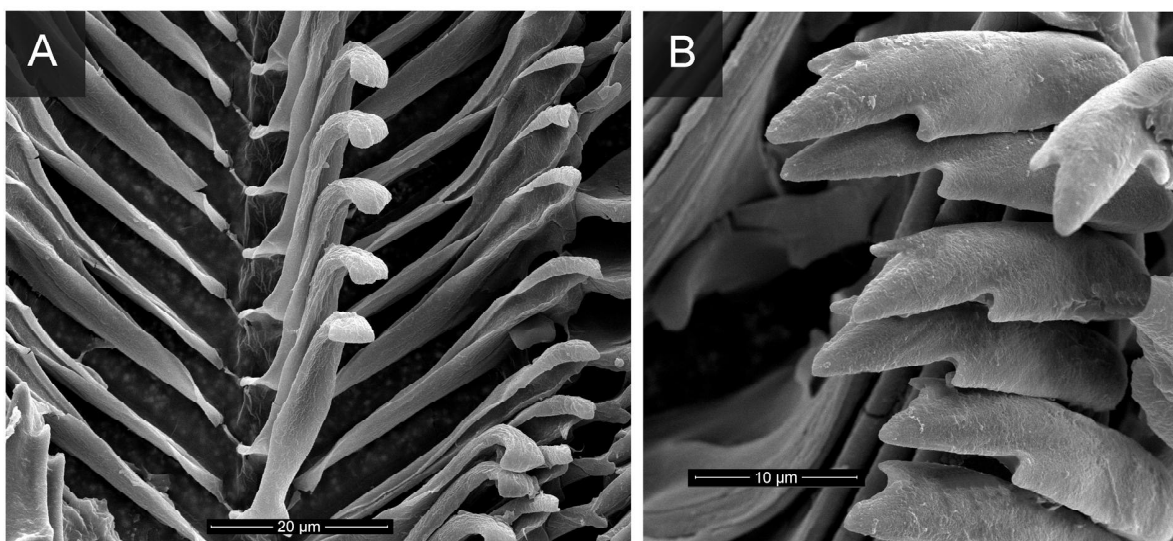


FIG. 4. *Leptochiton smirnovi* sp. nov., Indian Ocean, South Africa, False Bay, Sunny Cove, holotype, BL – 5.3 mm: **A**, central portion of radula; **B**, heads of major lateral tooth of radula.

РИС. 4. *Leptochiton smirnovi* sp. nov., Индийский океан, Южная Африка, залив Фолс, Санни Коув, голотип, длина тела 5,3 мм: **A**, центральная часть радулы; **B**, наконечники крючковых зубов радулы.

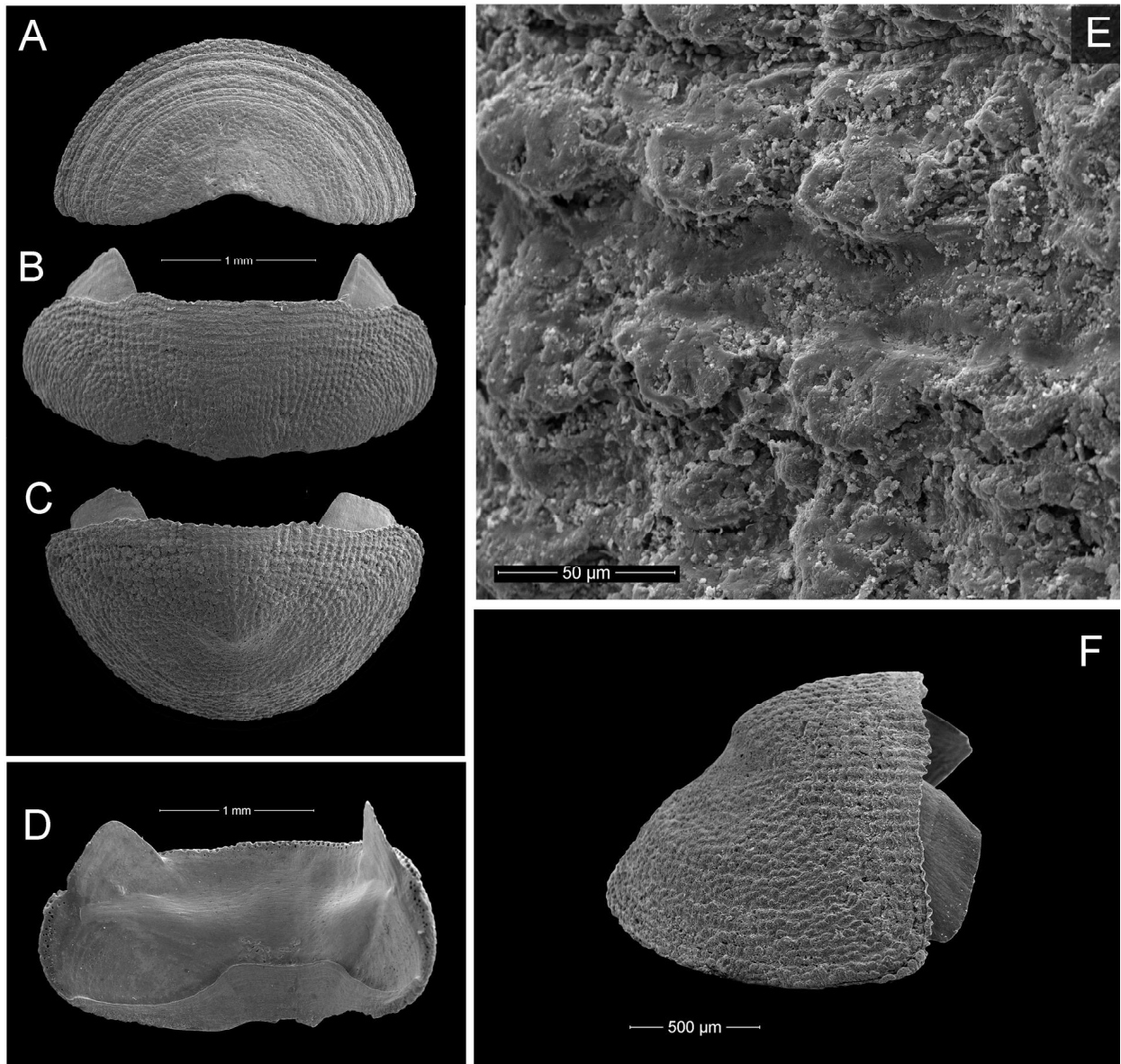


FIG. 5. *Leptochiton smirnovi* sp. nov., Indian Ocean, South Africa, False Bay, Sunny Cove, paratype (ZISP 2262), BL – 7.0 mm: **A**, valve I, dorsal view; **B**, valve V, dorsal view; **C**, valve VIII, dorsal view; **D**, valve IV, ventral view; **E**, valve V, tegmentum sculpture in central area; **F**, valve VIII, lateral view.

РИС. 5. *Leptochiton smirnovi* sp. nov., Индийский океан, Южная Африка, залив Фолс, Санни Коув, паратип (ZISP 2262), длина тела 7,0 мм: **A**, щиток I, с дорсальной стороны; **B**, щиток V, с дорсальной стороны; **C**, щиток VIII, с дорсальной стороны; **D**, щиток IV, с вентральной стороны; **E**, щиток V, скульптура тегментума на центральном поле; **F**, щиток VIII, вид сбоку.

mentum. *L. smirnovi* sp. nov. differs from the three latter species in having the tail valve wider than the head valve and ribbed ventral scales. The new species has four microaesthetes in each aesthete group whereas *L. linseae* and *L. compostellanum* have only two microaesthetes per each megal aesthete. *L. smirnovi* sp. nov. has a narrower cusp of the major lateral tooth and a longer first lateral tooth of the radula than *L. sanmatiensis*. The new species differs from *L. peruvianus* in having 8 gills and a shorter line of gills from valve VI to anus (vs. 11 gills extending from valve V to anus in *L. peruvianus*), ribbed ventral scales (vs. smooth scales in *L.*

peruvianus, 16-17 ribs on dorsal scales (vs. 10 ribs in *L. peruvianus*) and four microaesthetes per megal aesthete (vs. six microaesthetes in *L. peruvianus*).

Leptochiton smirnovi sp. nov. well differs from all other South African species of the genus.

L. sykesi differs from the new species in having bidentate head of major lateral tooth of radula and pointed narrow dorsal scales.

L. chariessa differs from the new species in having longitudinal rows of granules on head valve, lateral areas of intermediate valve and postmucronal area of tail valve.

L. dispersus differs from *L. smirnovi* sp. nov.

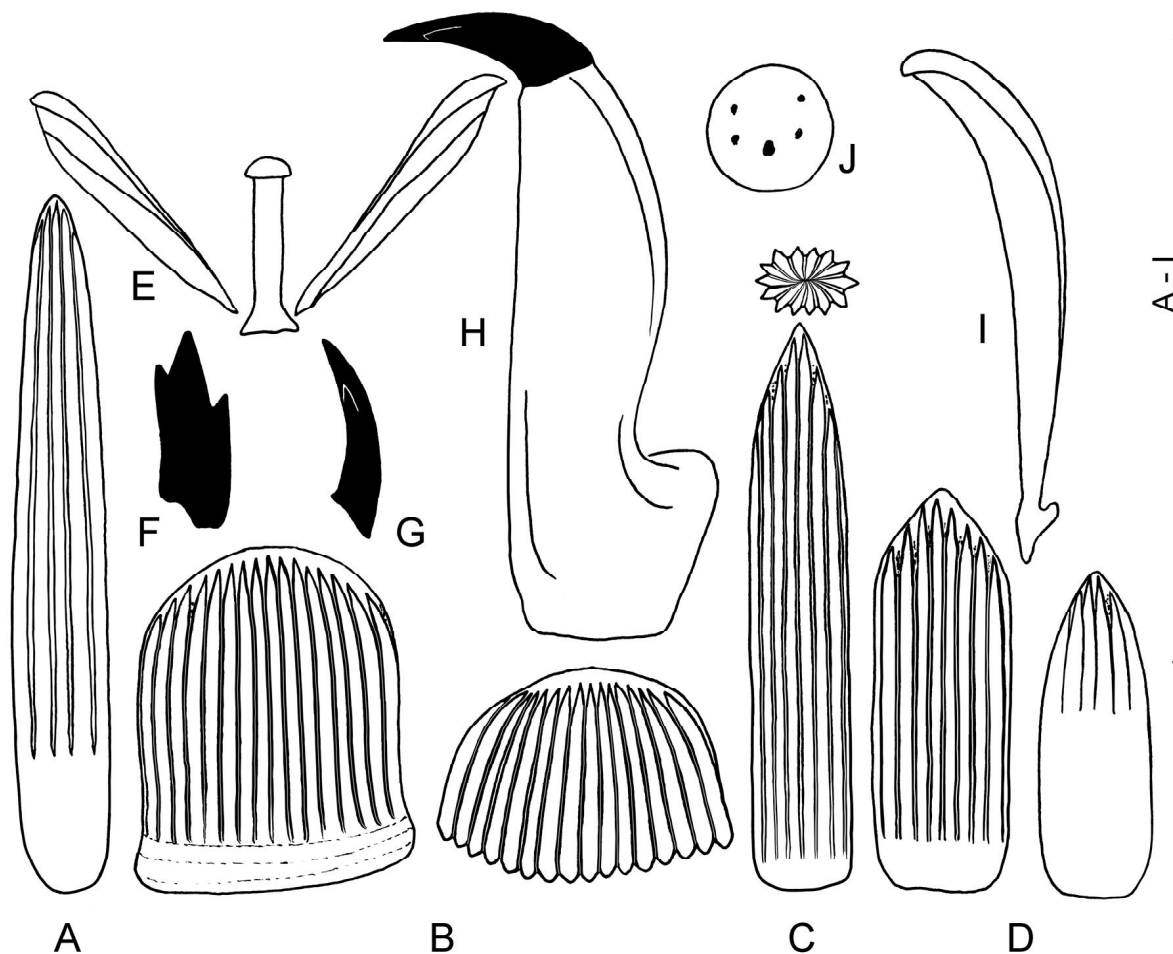


FIG. 6. *Leptochiton smirnovi* sp. nov., Indian Ocean, South Africa, False Bay, Sunny Cove, paratype (ZISP 2262), BL – 7.0 mm: A, intersegmental needle; B, dorsal scales; C, marginal needle; D, ventral scales; E, central and first lateral teeth of radula; F, G, heads of major lateral teeth of radula; H, major lateral tooth of radula; I, major lateral tooth of radula; J, aesthetes group. Scale bar: A-J 100 μ m

РИС. 6. *Leptochiton smirnovi* sp. nov., Индийский океан, Южная Африка, залив Фолс, Санни Коув, паратип (ZISP 2262), длина тела 7,0 мм: А, интерсегментальная игла; В, дорсальные чешуйки; С, маргинальная игла; D, вентральные чешуйки; Е, центральный и первые латеральные зубы радулы; F, G, наконечники крючковой пластинки радулы; H, крючковая пластинка радулы; I, первая маргинальная пластинка радулы; J, эстетная группа. Масштаб: А-J 100 мкм.

in having unicuspid head of major lateral tooth of radula and bluntly pointed narrow dorsal scales.

L. meiringae differs from the new species in having radiating rows of granules in head valve, lateral areas of intermediate valve and postmucronal area of tail valve and bluntly pointed, narrow scales.

L. permodestus differs from *L. smirnovi* sp. nov. in having unicuspid head of major lateral tooth of radula and granules of tegmentum in central area of intermediate valves arranged in quincunx.

L. hodgsoni was included in the genus *Parachiton* owing to its long tail valve by Sirenko [2000]. But later I agreed with Hiroshi Saito who advised me to transfer the species in the genus *Leptochiton*. Indeed, species of the genus *Parachiton* have several features that differ them from species of *Leptochiton*, namely, radula with strong teeth and mas-

sive tridentate head of major lateral tooth, very fine sculpture of tegmentum, and very long tail valve. *Leptochiton hodgsoni* differs from *L. smirnovi* sp. nov. in having long tail valve, longitudinal rows of granules on head valve, lateral areas of intermediate valve and postmucronal area of tail valve and smooth (not ribbed) needles in dorsal and marginal portions of the girdle.

Etymology. Named after my friend Igor Smirnov (ZISP), a taxonomist of brittle stars, who accompanied me in South Africa and collected samples of chitons, including the holotype of this species.

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References

- Carmona Zalvide P., Urgorri V. 1999. Description of two new species of Mollusca Polyplacophora from the Iberian Atlantic coast: *Leptochiton* (L.) *gascognensis* Kaas and Van Belle, 1985 and *L. (L.) compostellanum* sp. nov. *Iberus*, 17(2): 97-107.
- Gray J.E. 1847 A list of the genera of recent Mollusca, their synonymy and types. *Proceedings of the Zoological Society London*, 15: 129-206.
- Güller M., Liuzzi M., Zelaya D.G. 2015. A new species of *Leptochiton* (Polyplacophora: Leptochitonidae) from the Southwestern Atlantic. *Malacologia*, 58(1-2): 147-155.
- Kaas P. 1985. Notes on Loricata (Mollusca) 11-14. *Zoologische Mededelingen*, Leiden, 59(25): 299-320, figs 1-68, maps 1-2.
- Kaas P., Van Belle R.A. 1985. *Monograph of living chitons* 1, E. J. Brill/W. Backhuys, Leiden, 240 p.
- Kaas P., Van Belle R.A. 1987. *Monograph of living chitons* 3, E. J. Brill/W. Backhuys, Leiden, 302 p.
- Lovén, S.L. 1846 Index molluscorum litora Scandinaviae Occidentalia habitantium. *Öfversigt Af Kungel Svenska Vetenskaps-Akademiens Förhandlingar*, 3: 134-160.
- Sirenko B. 2000. A new and unusual species of *Parachiton* (Mollusca, Polyplacophora) from South Africa. *African Zoology*, 35(1): 93-98.
- Sirenko B. 2015. Shallow and deep-sea chitons of genus *Leptochiton* Gray, 1847 (Mollusca: Polyplacophora: Lepidopleurida) from Peruvian and Chilean waters. *Zootaxa*, 4033(2): 151-202.

Новый южноафриканский *Leptochiton* (Mollusca: Polyplacophora: Lepidopleurida)

Б.И. СИРЕНКО

Зоологический институт РАН, Университетская наб. 16, 199034, Санкт Петербург; marine@zin.ru

Описывается новый вид панцирных моллюсков *Leptochiton smirnovi* из Южной Африки. Новый вид отличается от других видов рода ребристыми вентральными чешуйками, широким хвостовым щитком и числом микроэстетов на один мегалоэстет.

