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A new tiny *Leptochiton* (Mollusca: Polyplacophora) from the Persian Gulf

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ABSTRACT. One more tiny chiton of the genus *Leptochiton* is described from the shallow water of the Persian Gulf. The new species *Leptochiton* ***persianus*** sp. n. differs from other species of the genus living on coral reefs in shape of the tail valve with subcentral mucro, long central and first lateral teeth of radula, and round median denticle of the head of the major lateral tooth.

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Новый крошечный хитон (Mollusca: Polyplacophora) из Персидского залива

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РЕЗЮМЕ. Еще один крошечный хитон рода *Leptochiton* (*L.* ***persianus*** sp. nov.) описан из мелководья Персидского залива. Новый вид отличается от других видов этого рода, живущих на коралловых рифах, формой хвостового щитка; длинными центральными и первыми латеральными зубами радулы и закругленным средним зубцом наконечника крючкового зуба.

Introduction

According to Kaas and Van Belle [1988], nine species of chiton were known in the Persian Gulf. Most of them were found near Qatar and Kuwait. All of them belong to Chitonida, and no species of the genus *Leptochiton* was found in the Persian Gulf. Most leptochitonids live in cold or temperate waters, in shallow or deep waters at high latitudes or in deep waters at low latitudes. Only a few species from the genus *Leptochiton* live in shallow warm waters among tropical animals, including tropical corals. These are *Leptochiton nierstraszi* Leloup, 1981 from the Indian Ocean, *L. hiriensis* Schwabe et Lozouet, 2006, from the Polynesian region of the Pacific and *L. muelleri* Sirenko et Schwabe, 2011 from the Sri Lanka and Vietnam, *L. pumilus* Sirenko et Saito 2020 from Philippines and Papua New Guinea and *L. myeikensis* Saito et Aung 2021 from the Andaman Sea [Leloup 1981; Kaas, Van Belle, 1985; Schwabe, Lozouet 2006; Sirenko, Schwabe 2011; Sirenko 2014; Sirenko, Saito, 2020; Saito, Aung, 2021]. One more new species described below belongs to this group of tiny primitive chitons.

Material and methods

Material was found among marine mollusc specimens collected in the Persian Gulf in 1903-1904 and donated by a zoologist, N. A. Zarudny to the Zoological Museum in Saint Petersburg at the beginning of the twentieth century. They are now deposited in the Zoological Insitute of Rusian Academy of Sciences, St. Petersburg, Russia. In the material 11 tiny chitons were found. Examination shows that they belong to a new species**.**

Two chitons were prepared for study under Scanning Electron Microscopy (SEM) and light microscopy by using common method described in Sirenko and Saito [2020].

Abbreviations: BL body length. ZIN Zoological Institute of Russian Academy of Sciences, St. Petersburg, Russia.

Taxonomy

Class Polyplacophora Gray, 1821
Subclass Neoloricata Bergenhayn, 1955
Order Lepidopleurida Thiele, 1909
Family Leptochitonidae Dall, 1889

Genus *Leptochiton* Gray, 1847

Type species: *Chiton cinereus* Montagu, 1803 (Linnaeus, 1767) = *Leptochiton asellus* (Gmelin,

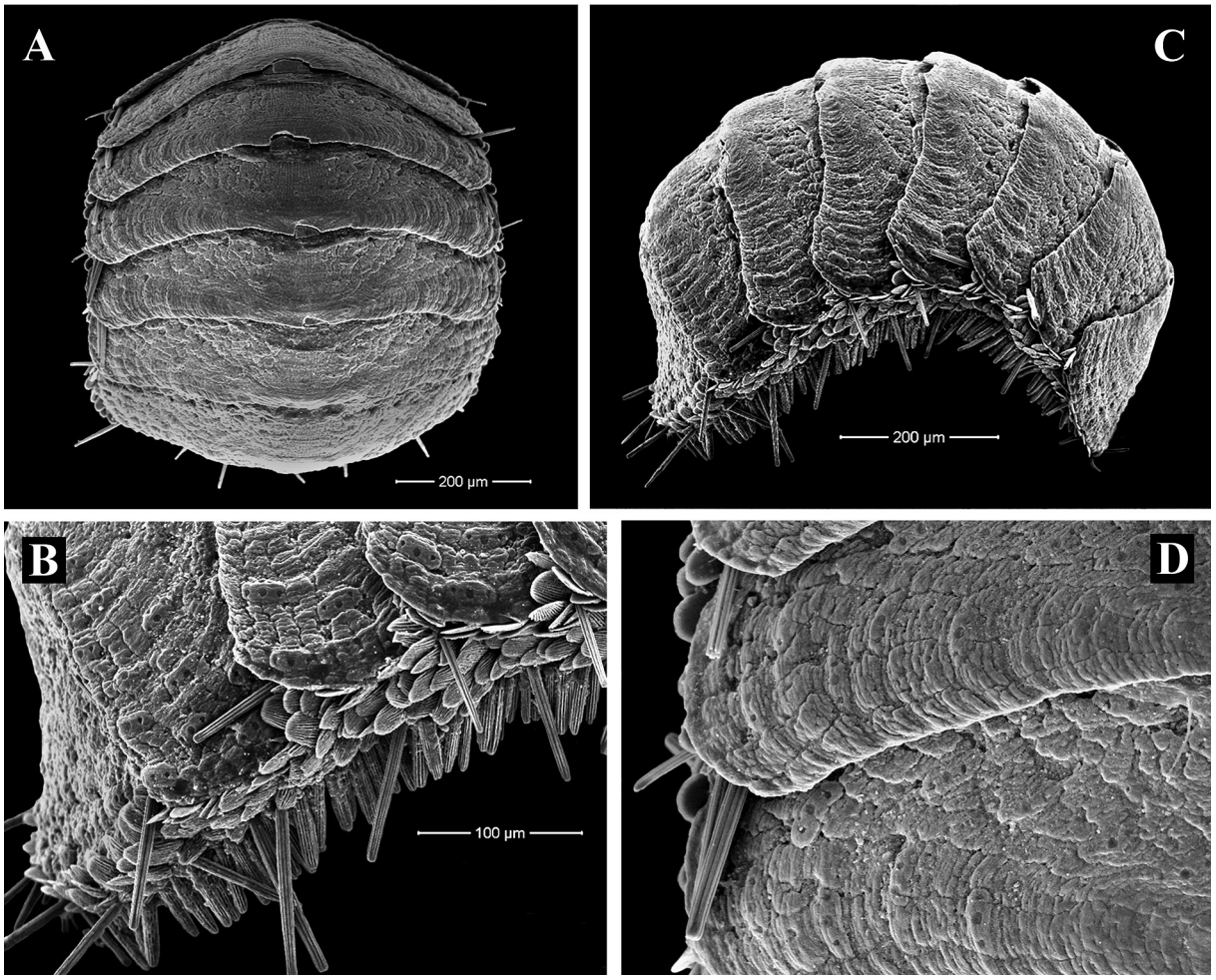

FIG. 1. *Leptochiton* ***persianus*** sp. nov., paratype (ZIN No. 2439), Persian Gulf, Indian Ocean, BL–2.0 mm. **A**. Whole specimen, dorsal view. **B**. Valve V, VI, VII,VIII, lateral view, dorsal scales, sutural and marginal needles and marginal scales. **C**. Whole specimen, lateral view. **D**. Valve IV, V, dorsal view and sutural needles.

РИС. 1. *Leptochiton* ***persianus*** sp. nov., паратип (ZIN No. 2439), Персидский залив, Индийский океан, BL–2.0 mm. **A**. Целый экземпляр, вид сверху. **B**. Щитки V, VI, VII,VIII, вид сбоку, дорсальные чешуйки, сутуральные и маргинальные иглы и маргинальные чешуйки. **C**. Целый экземпляр, вид сбоку. **D**. Щитки IV, V, вид сверху и сутуральные иглы.

1791) *fide* Lovén, 1846, subsequent designation by Gray 1847.

Genus distribution. Worldwide, Carboniferous—Recent.

Leptochiton ***persianus*** sp. nov.
(Figs 1–4)

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Type material. Holotype (ZIN No 2438), and 10 paratypes (ZIN No 2439).

Type locality. Indian Ocean, the northern part of the Persian Gulf, the Iranian coast.

Etymology. After the Persian Gulf.

Distribution. Only known from the type locality.

Diagnosis. Animal minute, elongate-oval. Valves are rounded, not beaked, moderately elevated, while tail valve is very high with subcentral mucro, length of antemucronal area larger than length of postmucronal area, lateral area do not rise. Tegmentum sculptured with oval or rounded, flattened granules arranged in longitudinal rows in central areas of intermediate valves and in antemucronal area of tail valve. In other areas granules arranged in quincuncial pattern. Each granule with 1 megalaesthete and 2–4 micraesthetes. Girdle densely covered with dorsal scales with 13-14 ribs; sutural and marginal needles narrow, ribbed and bluntly pointed. Central and first lateral teeth of radula long, major lateral teeth of radula with tridentate cusp.

Description. Holotype 2.0 mm, elongate oval. Valves moderately elevated, dorsal elevation 0.40, dorsum evenly rounded, not beaked. Head valve semicircular. Intermediate valve short, rectangular, side margin rounded, lateral areas hardly rised; anterior and posterior margin nearly straight. Tail valve very high, mucro subcentral, length of antemucronal

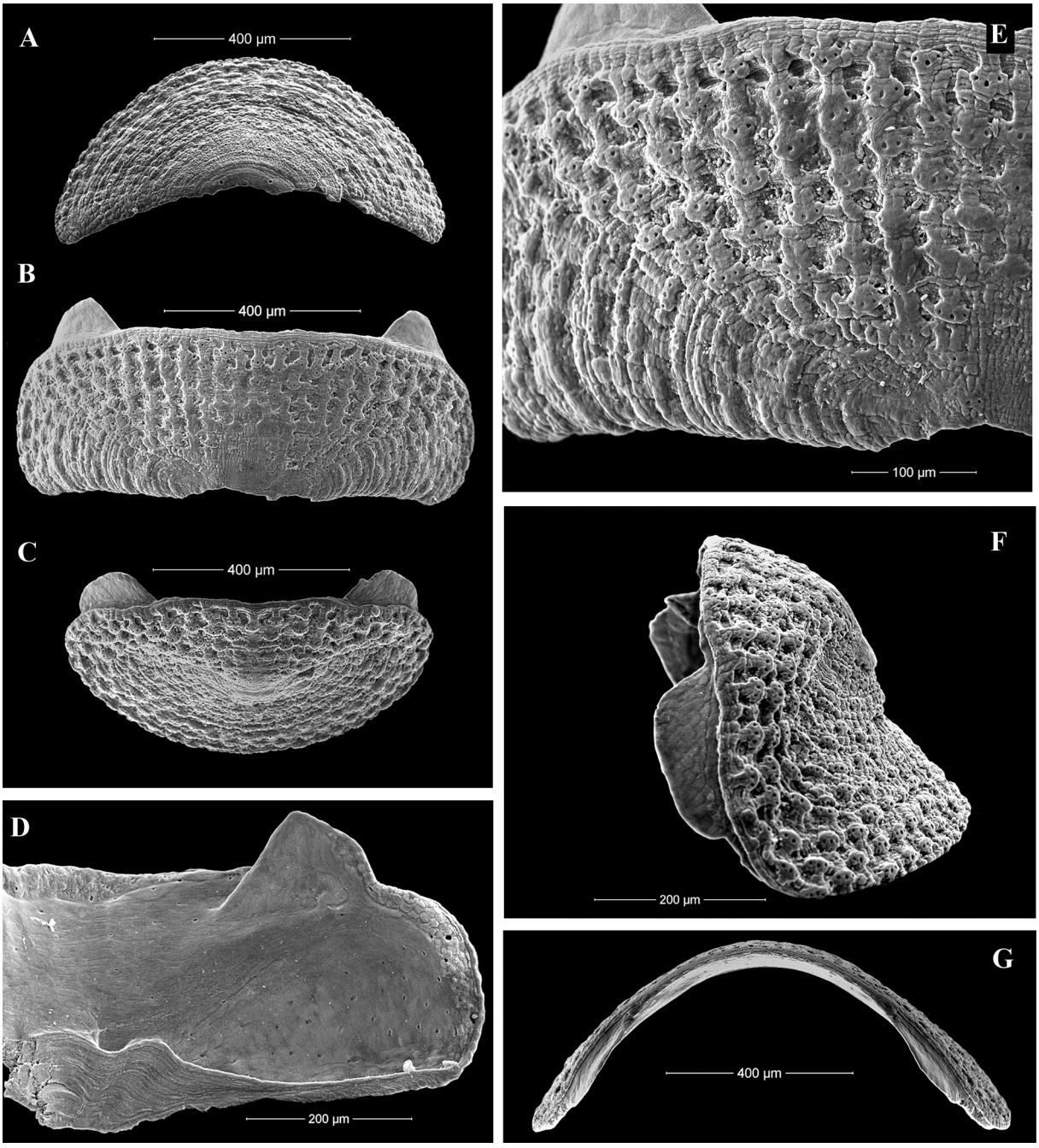

FIG. 2. *Leptochiton* ***persianus*** sp. nov., holotype (ZIN No. 2438), Persian Gulf, Indian Ocean, BL–2.0 mm. **A**. Head valve, dorsal view. **B**. Valve V, dorsal view. **C**. Valve, dorsal view. **D**. Valve IV, ventral view. **E**. Valve V, tegmentum sculpture in central and lateral areas. **F**. Tail valve, lateral view. **G**. Valve V, frontal view.

РИС. 2. *Leptochiton* ***persianus*** sp. nov., голотип (ZIN No. 2438), Персидский залив, Индийский океан, BL–2.0 mm. А. Головной щиток, вид сверху. **B**. Пятый щиток, вид сверху. **C**. Хвостовой щиток, вид сверху. **D**. Четвертый щиток, вид снизу. **E**. Пятый щиток, скульптура тегментума на центральном и боковом полях. **F**. хвостовой щиток, вид сбоку. **G**. пятый щиток, вид спереди.

area larger than length of postmucronal area, antemucronal area strongly convex, postmucronal slope a little concave directly behind the mucro.

Tegmentum granulose. On head valve, lateral areas of intermediate valves, and postmucronal area of tail valve granules oval, randomly arranged. Central areas of intermediate valves and antemucronal area of tail valve with longitudinal chains of roundish, flat, weakly raised granules, in central area 20 chains of granules. Each granule with 1 megalaesthete and 2–4 micraesthetes disposed in front of megalaesthete.

Articulamentum weekly developed, apophyses small, triangular in intermediate valves and trapezoid in tail valve, widely separated by more or less

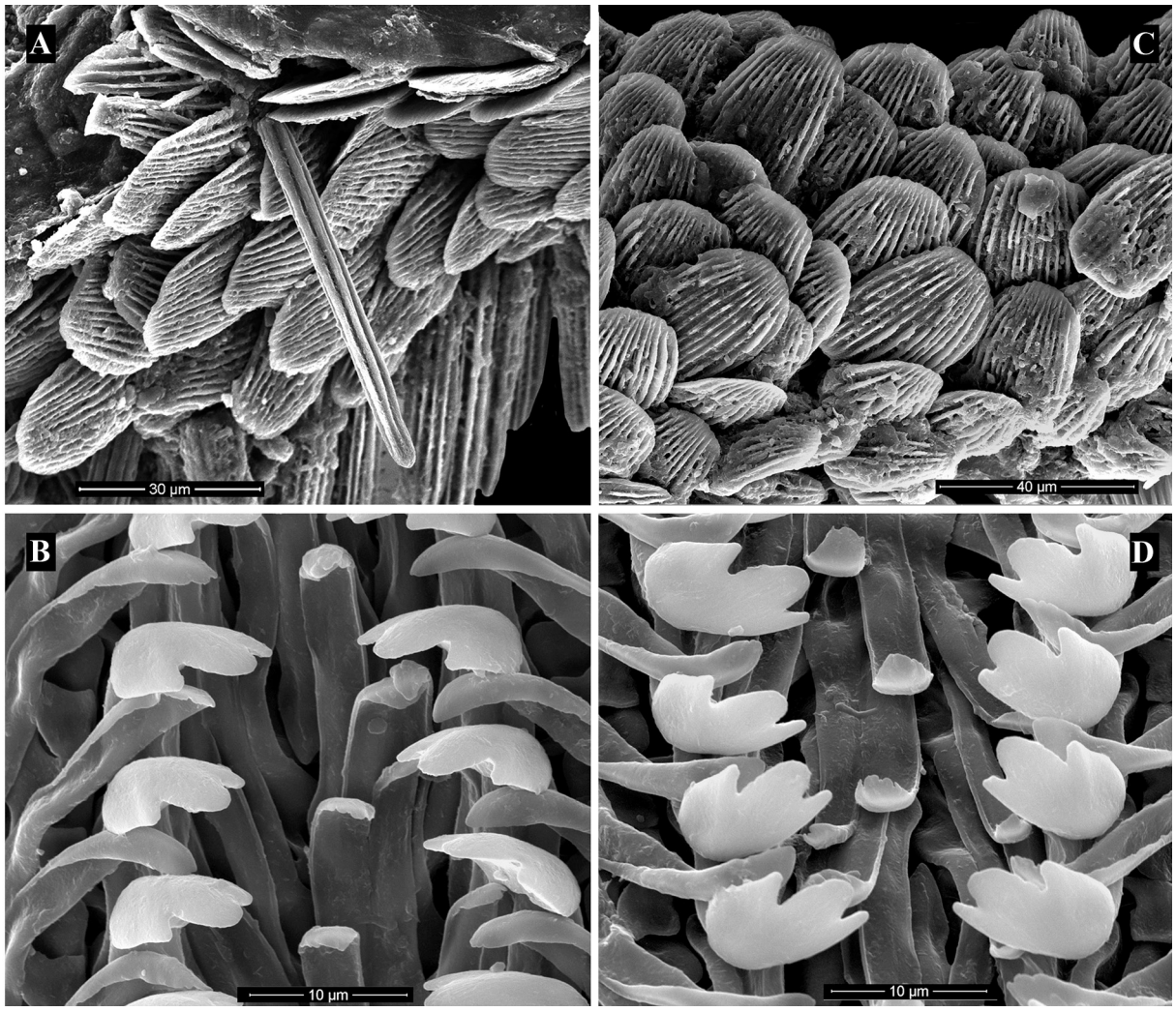

FIG. 3. *Leptochiton* ***persianus*** sp. nov., holotype (ZIN No. 2438), Persian Gulf, Indian Ocean, BL–2.0 mm. **A.** Sutural needle, dorsal scales and marginal scales. **B, D.** Central, first lateral, major lateral and uncinal teeth of radula. **C.** Dorsal scales.

РИС. 3. *Leptochiton* ***persianus*** sp. nov., паратип (ZIN No. 2438), Персидский залив, Индийский океан, BL–2.0 mm. **A.** Сутуральная игла, дорсальные чешуйки и маргинальные чешуйки. **B, D.** Центральные, первые латеральные, большие латеральные и унцинальные зубы радулы. С. Дорсальные чешуйки.

flat sinus. Ratio of width of jugal sinus to width of apophyses 2.05.

Girdle of holotype very narrow (about 0.1 mm near valve V), dorsally densely covered with small bluntly pointed, ribbed (with ca. 13–14 ribs) on dorsal side scales (38 x 25 µm). Sutural needles long, strongly ribbed (60–100 x 6–7 µm). Margin armed spicules of two kinds: long, ribbed rare needles similar with sutural ones and numerous finely ribbed on dorsal side (6–7 ribs) scales (50 x 10 µm) with a sharply pointed distal end. Ventral side of the girdle clothed with two kind of scales: broad scales (36 x 18 µm) with 6–7 short ribs in the distal half of the ventral part arranged in a row at the margin, and narrow oval scales (30 x 11 µm) obtusely pointed at distal end.

Radula of holotype 0.6 mm long with 51 transverse rows of mature teeth. Central tooth rectangular, about 3 times as long as wide, with a narrow blade; first lateral tooth narrow, about the same length as the central one, with small blade; major lateral teeth with thin tridentate cusp, median denticle round on top and much longer than others.

Holotype with 6 gills of nearly equal length on each side extending from valve VI to valve VIII

Remarks. New species superficially strongly resembles *L. muelleri*, but differs primarily by having long first lateral tooth which is as long as the central tooth (*vs.* first lateral tooth noticeably shorter that the central tooth in *L. muelleri*), subcentral mucro: length of the antemucronal area exceeds the length of the postmucronal area (*vs*. mucro anterior, antemucronal area is shorter than postmucronal area in *L. muelleri*), hardly raised lateral areas (*vs*. lateral area weakly raised in *L. muelleri*), and rounded tip of the median denticle of the head of the major lateral tooth of the radula (*vs*. sharply pointed at the top in *L. muelleri*).

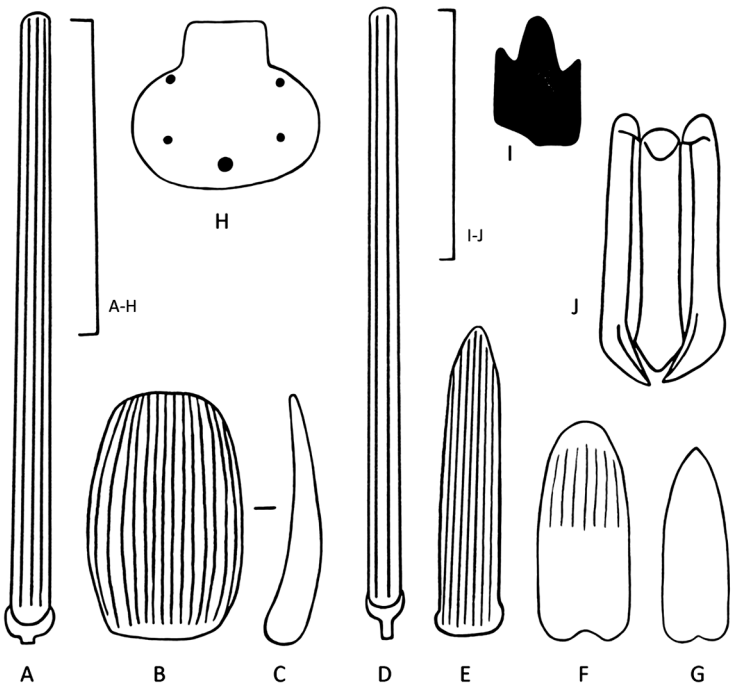

FIG. 4. *Leptochiton* ***persianus*** sp. nov., holotype (ZIN No. 2438), Persian Gulf, Indian Ocean, BL–2.0 mm. **A** Sutural needle. **B.** Dorsal scale, dorsal view. **C.** Dorsal scale, lateral view. **D.** Marginal needle. **E.** Long marginal scale. **F.** Broad ventral scale near margin. **G.** Ventral scale in middle part of hyponotum. **H.** Aesthete group. **I.** Head of major lateral tooth of radula. **J.** Central and first lateral teeth of radula. Scale bars: 50 μm. (A-H), 20 μm (I, J).

РИС. 4. *Leptochiton* ***persianus*** sp. nov., голотип (ZIN No. 2438), Персидский залив, Индийский океан, BL–2.0 mm. **A.** Межсегментная игла. **B.** Дорсальная чешуйка, вид сверху. **C.** Дорсальная чешуйка, вид сбоку. **D.** Маргинальная игла. **E.** Длинная маргинальная чешуйка. **F.** Широкая вентральная чешуйка у края. **G.** Вентральная чешуйка в средней части гипонотума. **H.** Эстетная группа. **I.** Наконечник крючковой пластинки радулы. **J.** Центральный и первый боковой зубы радулы. Масштабные линейки: 50 мкм (A-H), 20 мкм (I, J).

L. ***persianus*** sp. nov. differs from *L. nierstraszi* in having longitudinal arrangement of granules in entire central area of intermediate valves (*vs.* quincuncially arrangement of granules in jugal area in *L. nierstraszi*), tridentate cusp of major lateral teeth of radula (*vs.* unidentate cusp in *L. nierstraszi*).

New species differs from *L. hiriensis* in having widely separated granules in tegmentum (*vs.* close-packed granules in *L. hiriensis*), and no traceable commarginal sculpture (*vs.* strong commarginal ridges in valves of *L. hiriensis*).

L. ***persianus*** sp. nov. differs from *L. pumilus* in having central mucro (*vs.* anterior mucro in *L. pumilus*), in randomly arranged granules on head valve, lateral areas of intermediate valves, and postmucronal area of tail valve (*vs*. in radial rows in *L. pumilus*).

New species differs from *L. myeikensis* in having 5 pores of aesthetes in a granule (*vs*. 9–11 pores in *L. myeikensis*), randomly arranged granules on head valve, lateral areas of intermediate valves, and postmucronal area of tail valve (*vs*. in radial rows in *L. myeikensis*).

New species superficially resembles *L. scabridus* (Jeffreys, 1879) and differs from the latter, in having the tegmentum of the head valve, lateral areas of intermediate valves and postmucronal area of tail valve sculptured with granules arranged in a random manner (*vs.* the tegmentum of the mentioned areas is sculptured with granules arranged in radial lines in *L. scabridus*), higher tail valve (*vs.* low tail valve in *L. scabridus*), narrower dorsal scales (38 x 25 μm), without thickening of the base (*vs.* dorsal scales are wider (92 x 84 μm) with a noticeably thickened base in *L. scabridus*), and the lateral areas which are dominated by growth lines (*vs.* the lateral areas are covered with radial rows of granules in *L. scabridus*).

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