



Lepidochitona granpoderi sp. nov. (Mollusca: Polyplacophora) from the Atlantic coast of Morocco

Lepidochitona granpoderi sp. nov. (Mollusca: Polyplacophora) с Атлантического побережья Марокко

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Abstract. A new chiton species, *Lepidochitona granpoderi* sp. nov., is described from the Atlantic coast of Morocco. It differs from other congeners in having 5–7 very short vestiges of ribs converging apically on the dorsal girdle corruscules and longitudinal rows of granules converging to jugum in the central and antemucronal areas of the valves.

Резюме. Новый вид хитона *Lepidochitona granpoderi* sp. nov. описан с атлантического побережья Марокко. Он отличается от других представителей того же рода наличием 5–7 очень коротких рудиментов ребер сходящихся к вершине дорсальных корpusкул и продольных рядов гранул, сходящихся к югуму в центральных и антемукрональных полях щитков.

Key words: chitons, Atlantic Ocean, Lepidochitonidae, *Lepidochitona*, new species

Ключевые слова: хитоны, Атлантический океан, Lepidochitonidae, *Lepidochitona*, новый вид

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Introduction

The species of the genus *Lepidochitona* Gray, 1821 have very wide disjunctive range. They inhabit the Mediterranean Sea, the eastern part of the Atlantic Ocean, the north-western part of the Indian Ocean, South Africa, the Caribbean Sea, and the Pacific part of Central America.

The molluscan fauna of West Africa is well known, including Polyplacophora (chitons), both for the African coasts from Mauritania to the Gulf of Guinea (Adanson, 1757; Rochebrune, 1881a; Stearns, 1893; Dautzenberg & Fischer, 1906; Dautzenberg, 1910, 1912; Nickles, 1950; Leloup, 1959, 1968a, 1968b; Talavera, 1975; Bernard, 1984; Kaas & Strack, 1986, Strack, 2003; Sliker, 2000; Ardovini & Cossignani, 2004; Anseeuw & Verstraeten, 2009) and for the fac-

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ing islands: the Canaries (Orbigny, 1839; Shuttleworth, 1853; Gray, 1854; Dautzenberg, 1890; Bergenhayn, 1931; Belle, 1984a; Strack, 1987; Kaas, 1991; Hernández & Rolán, 2011), Madeira (Nobre, 1894; Watson, 1897; Belle, 1985; Segers et al., 2009), and the more distant Azores (Dautzenberg, 1889; Nobre, 1924, 1930; Belle, 1984b; Strack, 1991; Avila et al., 2000a, 2000b; Avila & Albergaria, 2002; Segers, 2002; Avila, 2003; Avila & Sigwart, 2013) and Cape Verde (Rochebrune, 1881b; Saunders, 1977; Strack, 2005).

On the contrary, very little is known about the chiton fauna north of Western Sahara, namely, as far as we know, only reports by Altimira (1978a, 1978b) on *Leptochiton* cf. *odhneri* (Bergenhayn, 1931), Pizzini & Tringali (1993) on *Leptochiton cimicoides* (Monterosato, 1879), and Kaas (1991) on three species collected during the CANCAP expeditions northeast of Cape Yubi: *Leptochiton odhneri* (Bergenhayn, 1931), *Callochiton septem-valvis euplaeae* (O.G. Costa, 1829) and *Callistochiton pachylasmae* (Monterosato, 1879).

The discovery of a new species of chiton from Western Sahara therefore constitutes a further contribution to the knowledge of the chiton fauna of this area.

Material and methods

The material examined was collected in different locations of Western Sahara and Morocco, listed below. Locality 1: collected in April 2005 by Gilles Granpoder in Tarfaya, a coastal town located at the level of Cape Juby in western Morocco, approximately 20 miles north of the border of Western Sahara, under stones at low tide; locality 2: collected in October 2012 by Jean-Louis Deleamarre on Dune Blanche, Dakhla Bay, Western Sahara, on dead shells in sand; locality 3: collected in October 2012 by Jean-Louis Deleamarre at La Sarga village, Dakhla Bay, Western Sahara, on dead shells in sandy bottom, 0.5 m below sea level.

The following abbreviations are used: BA – collection of Bruno Anseeuw; BD – collection of Bruno Dell'Angelo; BL – body length; GG – collection of Gilles Grandpoder; ZIN – Zoological Institute of the Russian Academy of Sciences, St Petersburg, Russia.

Taxonomy

Class **Polyplacophora** Gray, 1821

Subclass **Neoloricata** Bergenhayn, 1955

Order **Chitonidae** Thiele, 1909

Suborder **Acanthochitonina** Bergenhayn, 1930

Superfamily **Mopaliioidea** Dall, 1889

Family **Lepidochitonidae** Iredale, 1914

Genus **Lepidochitona** Gray, 1821

***Lepidochitona granpoderi* sp. nov.**

(Figs 1–5)

Holotype. **Morocco**, *Tarfaya Prov.*, locality 1, Tarfaya town, c. 20 miles north of border of Western Sahara, under stones at low tide, IV.2005, Gilles Granpoder leg. (ZIN, No. 2425).

Paratypes. Western Sahara, locality 2, Dune Blanche, Dakhla Bay, on dead shells in sand, X.2012, Jean-Louis Deleamarre leg., 2 specimens (ZIN, No. 2430).



Fig. 1. *Lepidochitona granpoderi* sp. nov., holotype, habitus.

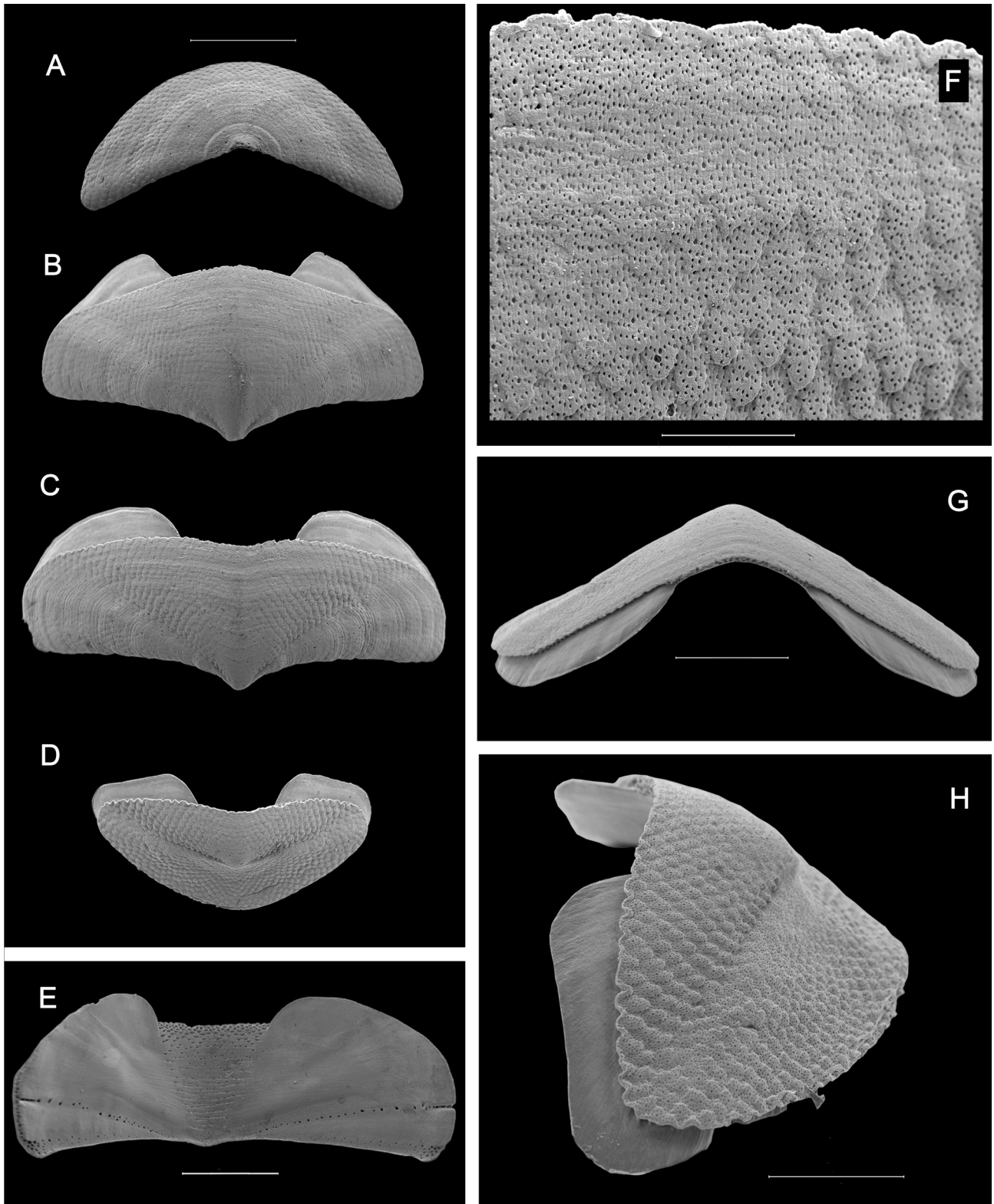


Fig. 2. *Lepidochitona granpoderi* sp. nov., holotype, details of structure. **A**, valve I; **B**, valve II; **C**, valve V; **D**, valve VIII; **E**, valve IV; **F**, valve V, tegmentum sculpture in pleural and jugal areas; **G**, valve V; **H**, valve VIII. Dorsal (A–D), ventral (E), rostral (G) and lateral (H) view. Scale bars: 1 mm (A–E, G), 200 μm (F), 500 μm (H).

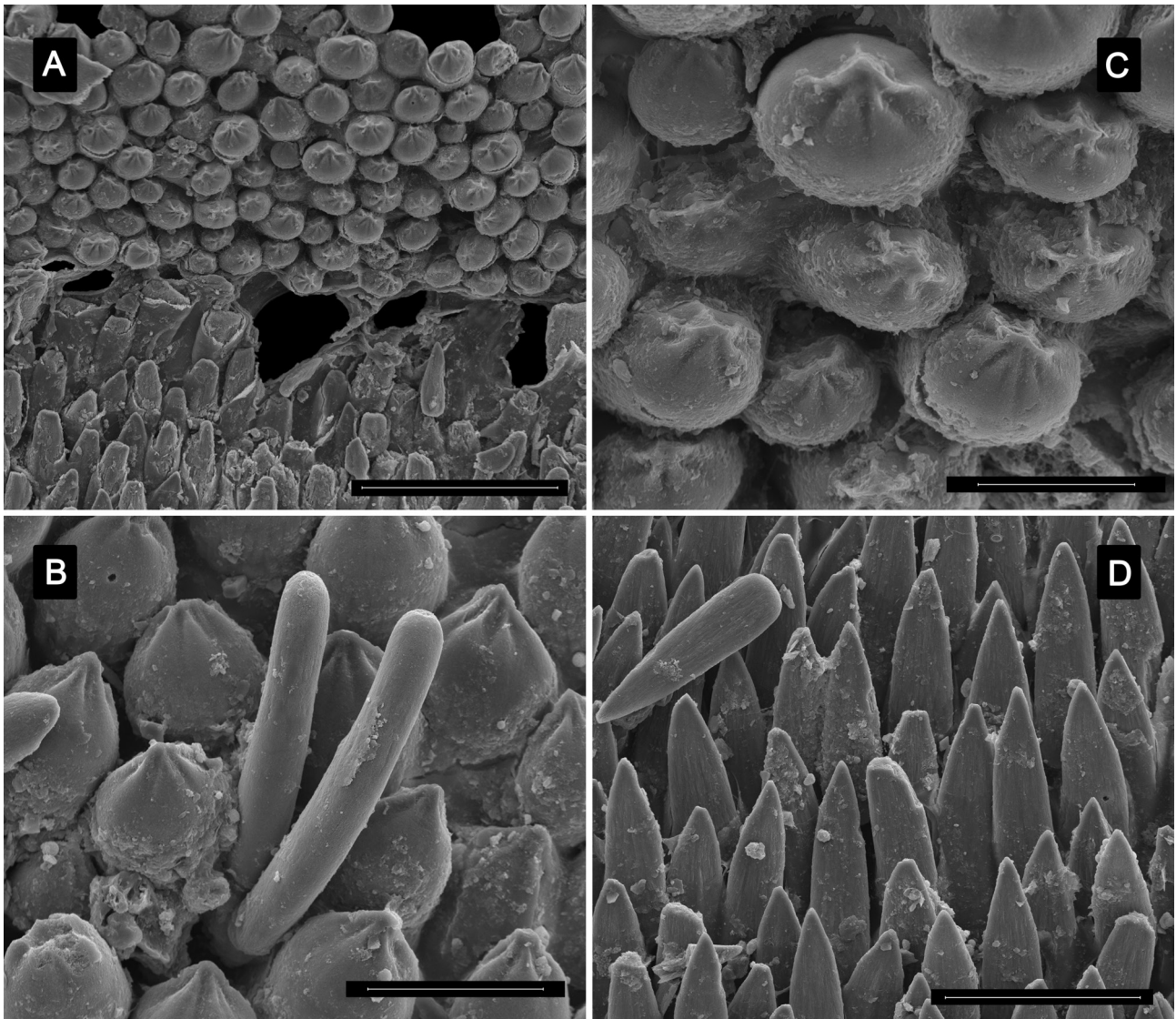


Fig. 3. *Lepidochitona granpoderi* sp. nov., holotype, details of structure. **A**, dorsal girdle corpuscles and ventral girdle scales; **B**, dorsal girdle spicules and tuft of needles; **C**, dorsal girdle spicules; **D**, ventral girdle scales. Scale bars: 100 μ m (A), 30 μ m (B), 20 μ m (C), 50 μ m (D).

Additional material examined. Eight specimens from locality 1, 6.0–3.0 mm (GG, BD 247 and BA 5302); four specimens from locality 2, 7.0–3.0 mm (BA 4289); three specimens from locality 3, 5.0–3.0 mm, (BA 4290). These specimens are excluded by us from the type series.

Note. The holotype and the paratype with BL 5.7 mm are now disarticulated and consist of the following parts: (1) SEM stubs of valves I, II, V, IV, VIII, a part of the perinotum and the radula; (2) slide-mounted parts of the perinotum and the radula; and (3) a vial with other valves.

Description. Animal of small size, holotype BL 8.3 mm (maximum size 10.6 mm), elongate oval,

moderately elevated, colour of tegmentum brownish, with numerous yellow flecks.

Measurements. BL 8.3 mm (holotype), 5.0 and 5.7 mm (paratypes).

Head valve semicircular, posterior margin widely V-shaped. Intermediate valves broadly rectangular, W/L 2.91 (2.18 in valve II), moderately elevated (H/W 0.29 in valve V), carinate in anterior profile, anterior margin sinuous (convex in valve II), side margins rounded, posterior margin almost straight, produced into a small apex (more pronounced in valve II), lateral areas slightly raised, not distinctly separated from cen-

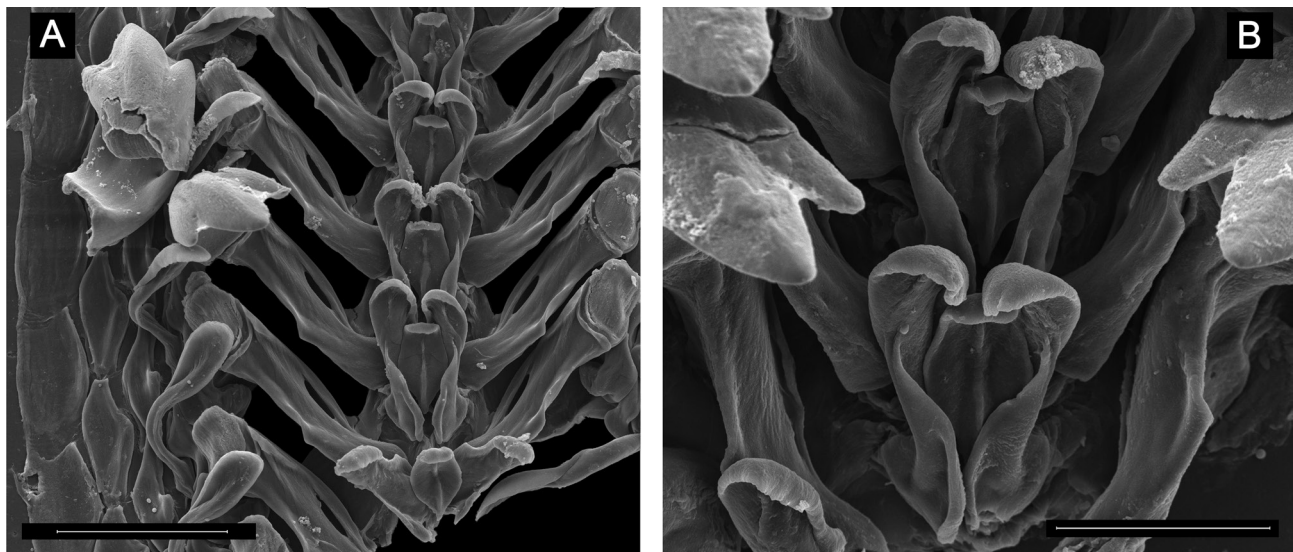


Fig. 4. *Lepidochitona granpoderi* sp. nov., holotype, details of structure. **A**, radula; **B**, central, first lateral and major lateral teeth of radula. Scale bars: 100 μ m (A), 50 μ m (B).

tral area. Tail valve triangular, W/L 2.68, anterior margin slightly concave, mucro subcentral, not prominent, antemucronal slope slightly convex, postmucronal slope slightly concave.

Tegmentum uniformly covered with very dense, oval, fused granules having maximum length 100 μ m or slightly more, arranged in somewhat irregular quincunx pattern, in central and antemucronal areas looking like forming more or less longitudinal rows converging anteriorly; a few concentric growth lines often discernible; granules less evident in jugal and lateral areas. Each granule bearing more or less central megal aesthete, many micraesthetes (up to 25 or more) irregularly arranged on surface of granules and also on all tegmentum surface.

Articulamentum white, with apophyses wide, triangular in valve II, rounded in valve III–VII and trapezoidal in tail valve. Slit formula 8/1/7, tooth short, blunt, inequidistant, slit rays clearly visible, eaves very spongy, a second slit ray located close to posterior margin on intermediate valves.

Girdle dorsally densely covered with small, slightly bent and more or less pointed calcareous corpuscles, about twice as long as wide, 60.0–63.0 x 26.0 μ m. corpuscle with 5–7 very short vestiges of ribs converging apically. Among them, several sparse, smooth, slightly curved spicules, solitary or in pairs, 63.0–65.0 x 12.0 μ m. Girdle with marginal fringe of long, straight, blunt-

ly pointed spines (145.0–150.0 x 47.0–50.0 μ m), those being ribbed on dorsal side and smooth on ventral side. Ventral scales about four times as long as wide, smooth, rounded basally, conical at apex, arranged in close radiating rows, 57 x 14 μ m.

Radula of holotype 2.5 mm long, with 30 transverse rows of immature teeth. Central tooth elongate, with small blade at apex; first lateral teeth longer than central one, bearing elongate, curved blade; major lateral teeth with tricuspidate head, central cusp larger than others.

Comparison. Although the general appearance of the species described here has some resemblance to that of some of the *Lepidochitona* species mentioned above, especially *L. cinerea* and *L. stroemfelti*, there are several differences that give grounds for describing it as a new species.

The sculpture of *Lepidochitona granpoderi* sp. nov. is particular, the granules very dense, fused, oval (maximum length 100 μ m or slightly more), each granule bears a more or less central megal aesthete and many micraesthetes (up to 25 or more) irregularly arranged on the surface of the granules and also on the entire tegmentum surface. *Lepidochitona cinerea* has smaller granules (70–85 μ m) and less number of the aesthete pores (10–15). *Lepidochitona stroemfelti* differs from the new species in having strong longitudinal ribs on the sides of dorsal scales and very long central denticle of the head of major lateral radula teeth.

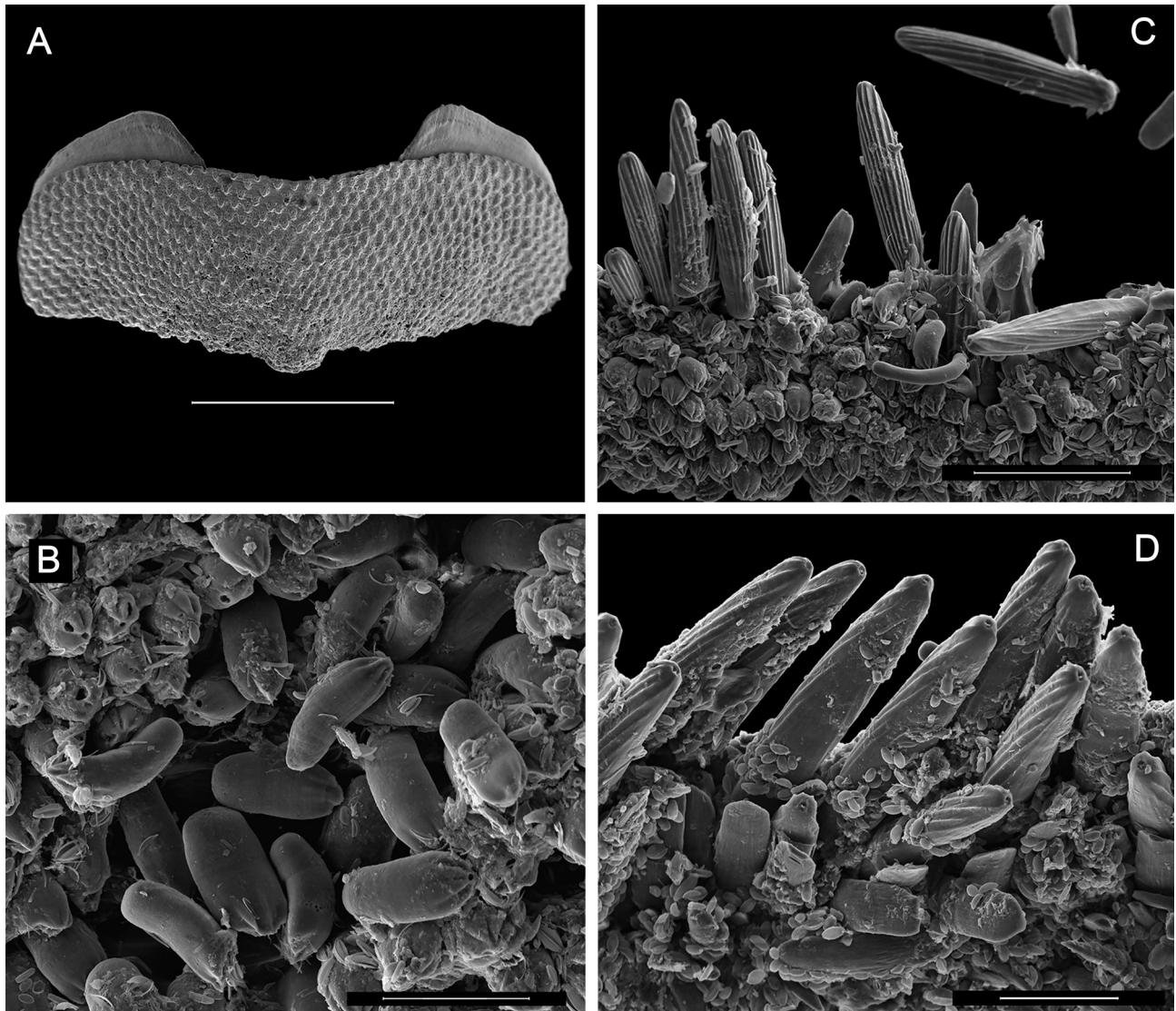


Fig. 5. *Lepidochitona granpoderi* sp. nov., paratype (ZIN, No. 2430), BL 5.7 mm, details of structure. **A**, valve V; **B**, dorsal girdle corpuscles; **C**, marginal girdle spines, dorsal girdle corpuscles and solitary, bent, smooth spine; **D**, marginal girdle spines and ventral girdle scales. Dorsal (**A**, **C**) and ventral (**D**) view. Scale bars: 1 mm (**A**), 50 μ m (**B**, **D**), 100 μ m (**C**).

The new species differs from other congeners in having 5–7 very short vestiges of ribs converging to the apices of the dorsal girdle corpuscles, and longitudinal rows of granules converging to the jugum in the central and antemucronal areas of the valves.

The paratype (ZIN 2430) of the new species (BL 5.7 mm) has 16 gills on each side, which are arranged from the valve III to VII, and more developed granules in the lateral areas than in the holotype. This paratype turned out to be a female with mature eggs 210 μ m in diameter.

Distribution. Atlantic Ocean: Western Sahara and Morocco, from low tide up to a depths of 0.5 m.

Etymology. Named in honour of Gilles Granpoder, a French malacologist who provided us with the type material for this study.

Discussion

The genus *Lepidochitona* is well represented in the area between the Iberian Peninsula and the Gulf of Guinea, numbering 12 species, some of them have a limited distribution, i.e. *L. kaasi*

Carmona Zalvide et García, 2000 and *L. severianoi* Carmona Zalvide et García, 2000 are endemic to the Province of Cádiz (Spain), *L. iberica* Kaas et Belle, 1981 is endemic to Galicia (Spain), and *L. stroemfelti* (Bergenhayn, 1931) is endemic to the Canary Islands. The other seven species [*L. canariensis* (Thiele, 1909), *L. caprearum* (Scacchi, 1836), *L. cinerea* (Linnaeus, 1767), *L. monterosatoi* Kaas et Belle, 1981, *L. piceola* (Shuttleworth, 1853), *L. rolani* Kaas et Strack, 1986, and *L. simrothi* (Thiele, 1902)] have a wider distribution, of which the first four also live in the Mediterranean Sea. We do not consider one more species, *L. caboverdensis* Kaas et Strack, 1986, because, according to one of the authors (B. Sirenko), this species belongs to the genus *Chaetopleura* Shuttleworth, 1853 due to the presence of the ventral scales that are typical for the latter genus and some other genera of the suborder Chitonina and are not typical for *Lepidochitona* and other genera of the suborder Acanthochitoninae.

It should be noted that species of *Lepidochitona* often live in the surf zone, are often coloured like red alga of the genus *Lithothamnion* Heydrich, 1897 and therefore difficult to collect. We can expect an increase in the number of new species of this molluscan genus due to the use of new methods of collecting small chitons.

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