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Indonesian chitons of the genera *Belknapchiton* Sirenko, Saito et Schwabe, 2022 and *Leptochiton* Gray, 1847 (Mollusca: Polyplacophora: Leptochitonidae)

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ABSTRACT. On the basis of the collections of the R/V *Vityaz* in the Banda Sea, Indonesia, a review of the chiton fauna of the genera *Belknapchiton* and *Leptochiton* was carried out. *Leptochiton commandorensis*, until now known only from the northern Pacific near the Commander Islands, is here added to the four known Indonesian deep sea species. This species turned out to be with juveniles in the pallial groove. A scanning electron microscope study of the collected specimens of *B. giganteus* made a corrected, supplemented description of this rare species possible. The age variability of the valves shape and shell sculpture of the two collected species was studied. Particular attention is paid to the age variability of the number of micraesthetes on the tegmentum grains and the position of the mucro.

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Индонезийские хитоны родов *Belknapchiton* Sirenko, Saito et Schwabe, 2022 и *Leptochiton* Gray, 1847 (Mollusca: Polyplacophora: Lepidopleuridae)

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РЕЗЮМЕ. На основании сборов НИС Витязь в море Банда, Индонезия, проведен обзор фауны хитонов родов *Belknapchiton* и *Leptochiton*. К четырем известным глубоководным видам добавлен еще один *Leptochiton commandorensis*, до настоящего времени известный только из северной Пацифики, у Командорских островов. Этот вид оказался вынашивающим молодь в паллиальном желобке. Исследование под сканирующим электронным микроскопом собранных экземпляров *B. giganteus* позволило дать исправленное и дополненное описание этого редкого вида. Изучена возрастная изменчивость формы щитков и скульптуры раковины двух собранных видов. Особое внимание уделено возрастной изменчивости числа микраэстетов на зернах тегментума и положения мукро.

Introduction

The Coral Triangle zone, which is characterized by high diversity of marine animal species [Allen, 2007], comprises also the Indonesian and Philippine waters. While 17 chiton species of the genus *Leptochiton* Gray, 1847 occur in the Philippines [Sirenko, 2020], only four species formerly included in *Leptochiton* are so far known from Indonesian waters: *Leptochiton setigera* (Nierstransz, 1905), *L. rissoi* (Nierstrasz, 1905), *Belknapchiton giganteus* (Nierstrasz, 1905) and *B. simplex* (Nierstrasz, 1905) [Nierstrasz, 1905; Kaas, Van Belle, 1985].

Information on the age variability of shell shields, perinotum armament, radula teeth, and gills in chitons is very important in identification of the taxa. However, there are relatively few works devoted to these problems [Sirenko, Minichev, 1975; O'Neill, 1984; Sirenko, 1990,1992, 2014; Sirenko *et al*., 2016, 2022]. The only sample from the Banda Sea collected by the expedition on the R/V *Vityaz* contained chitons of different age groups, which allowed determination of their age variability.

Material and methods

The present material is from a single sample collected by Sigsbee trawl at station 6778 in the Banda Sea during the 54th cruise of the R/V *Vityaz* in 1973.

In five specimens of *Belknapchiton giganteus* (including paralectotype) and two specimens of *L. commandorensis* the number of gills was counted. Three specimens of *B. giganteus* and two specimens of *Leptochiton commandorensis* selected for a scanning electron microscopy (SEM) study were boiled in 7% KOH for 5–6 minutes, and then boiled twice in fresh water or (small one) were treated with Sodium hypochlorite (NaOCl) with a control under microscope and then rinsed in fresh water. From these selected specimens several valves (usually valves I,

II, IV, V and VIII), half of the radula and a portion of the girdle were chosen for a Scanning Electron Microscope FEI SEM Quanta 250 scan. The remains of radulae and girdles were dried and put in Canada balsam for examination under a light microscope. For three specimens of *B. giganteus* and two specimens of *L. commandorensis* the number of aesthete pores was counted, and the ratio of width of the jugal sinus to the width of the apophyses as well as the ratio of the length of the antemucronal area to the length of the postmucronal area was determined.

Abbreviations: BL, body length. INCB, Naturalis Biodiversity Center, Leiden, Netherlands. ZIN (formerly ZISP), Zoological Institute of Russian Academy of Sciences, St. Petersburg, Russia. ZMA, Zoölogisch Museum Amsterdam, Netherlands (now material is deposited in Naturalis Biodiversity Center, Leiden).

Taxonomy

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

Genus *Belknapchiton* Sirenko, Saito & Schwabe, 2022

Type species. *Leptochiton belknapi* Dall, 1878, by original designation [Sirenko *et al.*, 2022].

Genus distribution. Pacific, Indian and Atlantic oceans. Pacific Ocean, from Asia to America and from Bering Sea to south Australia and New Zealand, Pliocene–Recent, 92–4600 m, mainly deeper than 200 m.

Belknapchiton giganteus (Nierstrasz, 1905) (Figs 1–9)

Lepidopleurus giganteus Nierstrasz, 1905: 3, pl. 1, figs 1, 2, pl. 2, figs 39–43.
Leptochiton alveolus.– Ferreira, 1979: 157, figs 15, 16, *not Chiton alveolus* Lovén, 1846.
Leptochiton (*Leptochiton*) *alveolus*. – Kaas, Van Belle, 1985: 36, *not C. alveolus* Lovén, 1846.
Leptochiton (*Leptochiton*) *belknapi*. – Kaas, Van Belle, 1987: 24, *not C. belknapi* Dall, 1878.
Leptochiton giganteus. – Sirenko, 2015: 154.
Belknapchiton giganteus. – Sirenko *et al.*, 2022: 103.

Type material. Lectotype (ZMA.MOLL.138622), and 2 paralectotypes (ZMA.MOLL.138611), designated by Ferreira [1979].

Type locality. Indonesia, the Banda Sea, 6°24'S, 124°39'E, 2798 m.

Material examined. Lectotype (BL 42 mm) and 2 paralectotypes (BL 25 and 33 mm). Indonesia, Banda Sea, R/V *Vitjaz*, cruise 54, stn. 6778, 5°15'S, 128°25'E, 3200 m, 4 spms, BL 5.0–26.0 mm, 11.04.1973.

Distribution. The species is only known from two stations in the Banda Sea, Indonesia, 2798–3200 m.

Revised diagnosis. Animal elevated, intermediate valves rather wide, carinated, not beaked, tail valve triangular, mucro postmedian, postmucronal slope convex; tegmentum sculptured by small elongate granules arranged in quincunx; each granule with one megalaesthete and 8 micraesthetes; dorsal scales without ribs or rarely with 1–3 obsolete longitudinal riblets; central tooth of radula wide, major lateral teeth with sharply pointed, unidentate head, 13–14 gills per side.

Amended description. Chiton large (BL of the lectotype 42 mm) elongate oval in outline. Valves carinated, moderately elevated (elevation ratio 0.34–0.40 in valve V), not beaked. Tegmentum white in color.

Head valve semicircular, wider than tail valve, posterior margin widely V-shaped. Second valve oval, anterior and posterior margins convex. Other intermediate valves almost rectangular, lateral areas not raised, anterior margin slightly concave in central part, posterior margin weakly convex, lateral areas not raised. Tail valve triangular, mucro postmedian, antemucronal slope slightly convex, postmucronal slope concave.

Tegmentum uniformly sculptured with elongate-oval granules in central areas, or rounded ones in head valve and lateral areas of intermediate valves, arranged quincuncially, each granule with one megalaesthete and 8 micraesthetes. Surface of tegmentum in central areas between granules smooth.

Articulamentum well developed, apophyses small, widely separated, subtriangular in valves II–VII, more or less trapezoidal in tail valve, jugal sinus wider than apophyses.

Girdle narrow (0.7 mm near valve V), dorsally covered with elongate, pointed scales, without ribs or rarely with 1–3 obsolete longitudinal riblets (60 x 32 μm), Sutural and marginal needles smooth, not numerous, flattened (140 x 30 μm). Ventral scales lanceolate, smooth (80 x 30 μm).

Radula of specimen with BL 21 mm is 6.6 mm long with 32 transverse rows of mature teeth. Central tooth wide with round, narrow blade, major lateral teeth with sharply pointed, unidentate head.

Thirteen gills per side extending from valve VII to anus in specimen with BL 21 mm. Nephridiopore situated between twelve and thirteen gills, gonopore situated between thirteen and fourteen from tail gills in lectotype.

Remarks. This species is most similar to *Belknapchiton bergenhayni* (Saito, 2011) which also has 8 micraesthetes per granule, but differs from it by the absence or very absolete riblets in

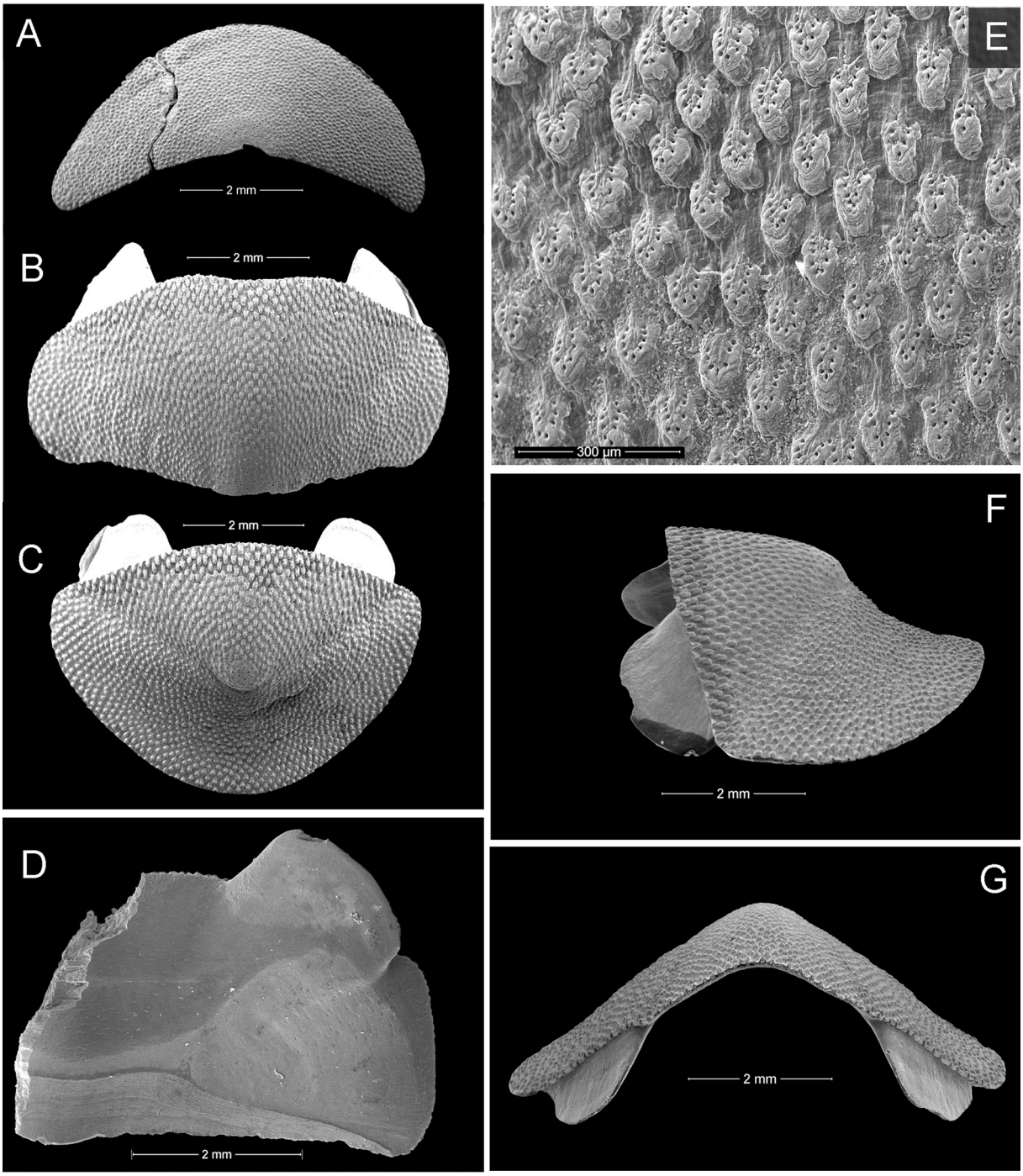

FIG. 1. *Belknapchiton giganteus,* Banda Sea, Indonesia, 3200 m, BL–21.0 mm. **A.** Head valve, dorsal view. **B.** Valve V, dorsal view. **C.** Valve VIII, dorsal view. **D.** Part of valve IV, ventral view. **E.** Valve V, tegmentum sculpture in central area. **F.** Tail valve, lateral view. **G.** Valve V, frontal view.

РИС. 1. *Belknapchiton giganteus,* море Банда, Индонезия, 3200 м, BL–21,0 мм. **A.** 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 поле. **F.** Хвостовой щиток, вид сбоку. **G.** Пятый щиток, вид спереди.

dorsal scales (vs 10–12 well developed riblets in *B. bergenhayni*), and the absence of small longitudinal grooves between the granules (vs small longitudinal grooves between the granules in the central area of the intermediate valves in *B. bergenhayni*).

Six specimens of *B. giganteus* of different sizes with BL 5.0–42.0 mm allowed the study of the age variability of some features of this species (Table 1).

With increasing body size, the number of gills naturally increases from 5 in chitons with a body length of 5.0 mm to 16 in the 42.0 mm long lectotype. With the growth of the body, the apophyses

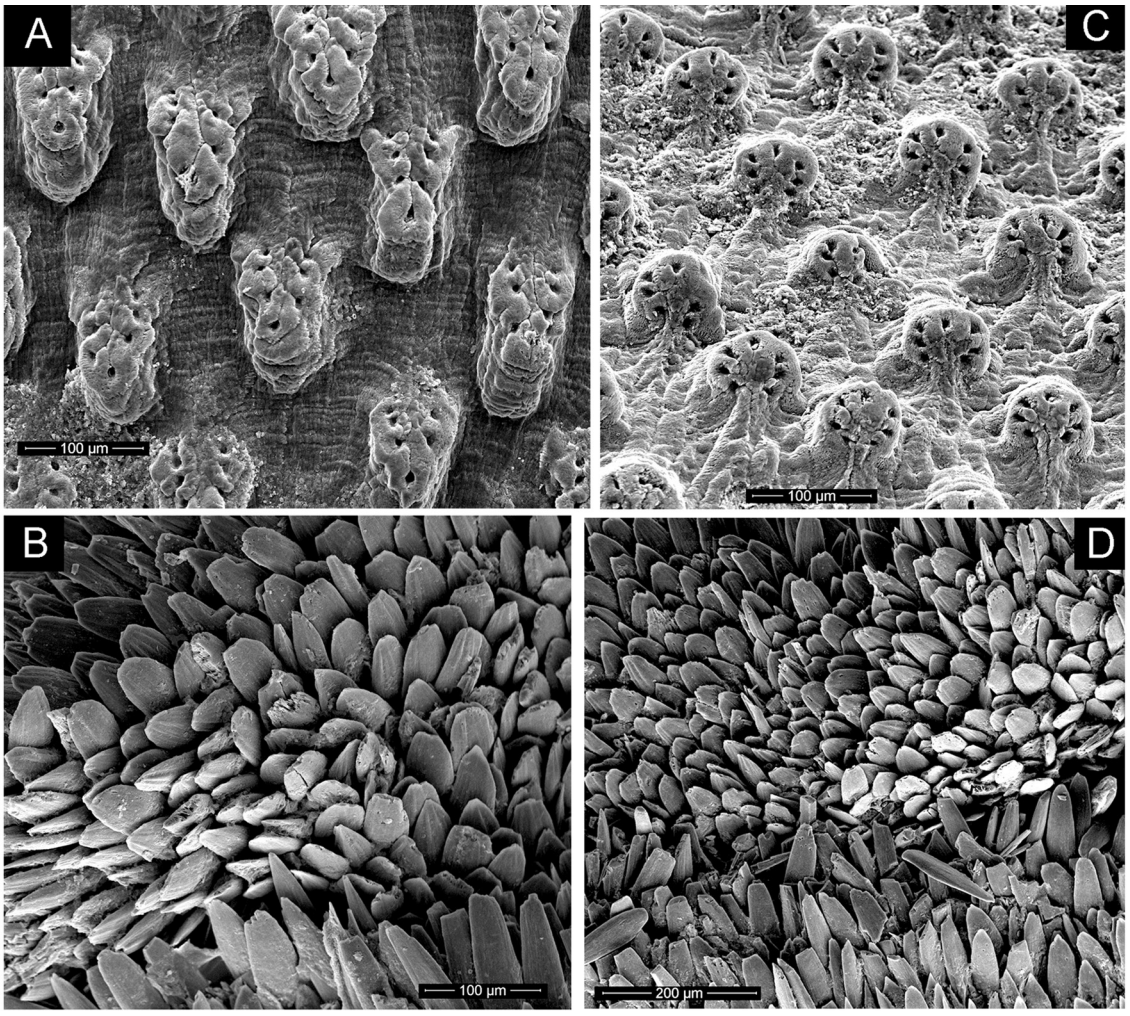

FIG. 2. *Belknapchiton giganteus,* Banda Sea, Indonesia, 3200 m, BL–21.0 mm. **A.** Valve V, tegmentum sculpture in jugal area. **B.** Dorsal and ventral scales. **C.** Valve I, tegmentum sculpture. **D.** Dorsal scales, marginal needles and ventral scales.

РИС. 2. *Belknapchiton giganteus,* море Банда, Индонезия, 3200 м, BL–21,0 мм. **A.** Пятый щиток, скульптура тегментума на югальном поле. **B.** Дорсальные и вентральные чешуйки. **C.** Головной щиток, скульптура тегментума. **D.** Дорсальные чешуйки, маргинальные иглы и вентральные чешуйки.

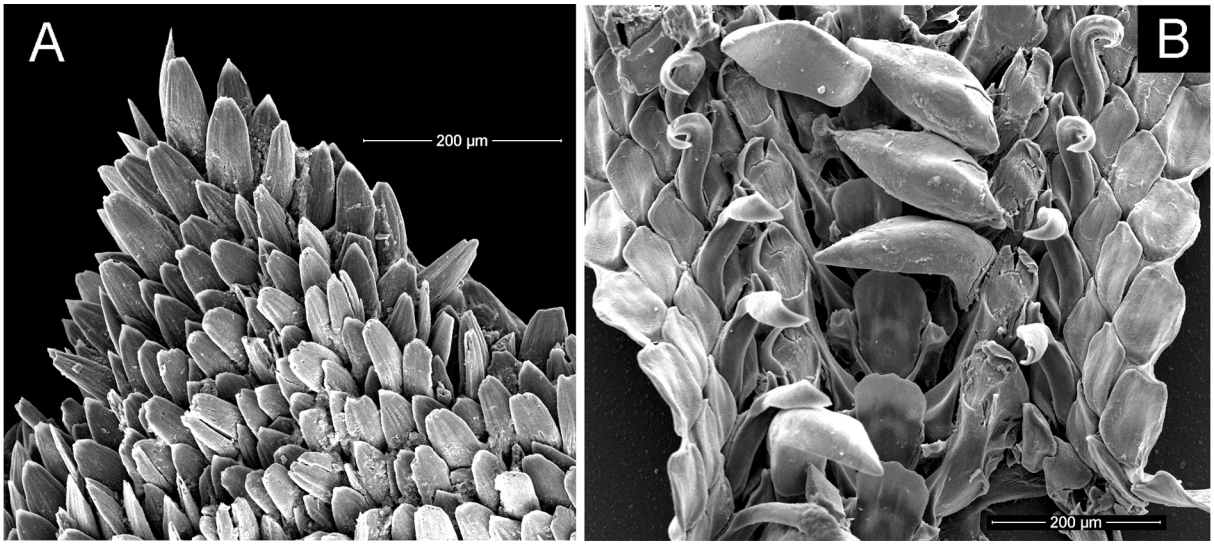

FIG. 3. *Belknapchiton giganteus*, Banda Sea, Indonesia, 3200 m, BL–21.0 mm. **A.** Dorsal scales near suture. **B.** Radula.

РИС. 3. *Belknapchiton giganteus,* море Банда, Индонезия, 3200 м, BL–21,0 мм. **A.** Сутуральные иглы и дорсальные чешуйки. **B.** Радула.

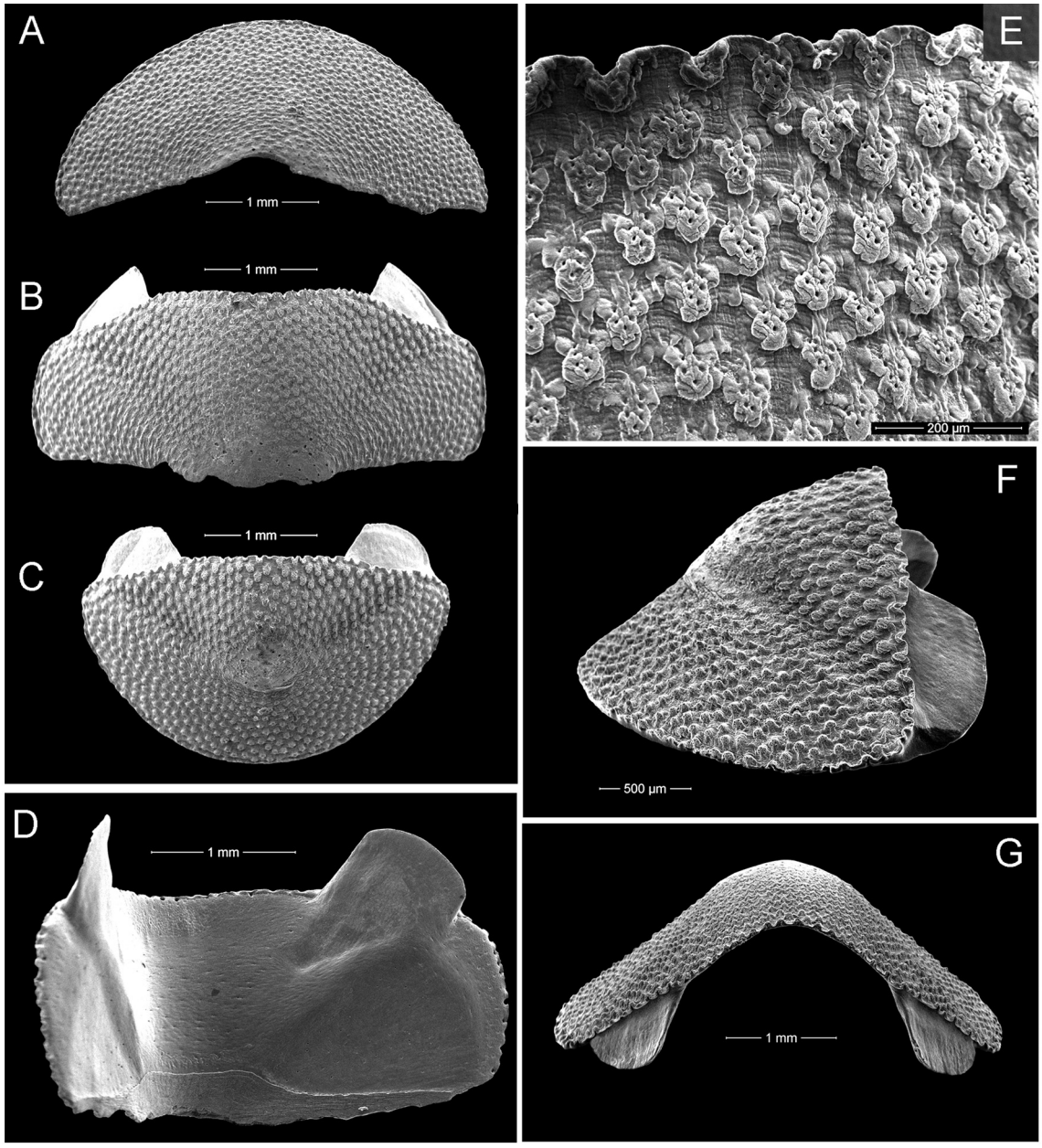

FIG. 4. *Belknapchiton giganteus*, Banda Sea, Indonesia, 3200 m, BL–10.0 mm. **A.** Head valve, dorsal view. **B.** Valve V, dorsal view. **C.** Valve VIII, dorsal view. **D.** Valve IV, ventral view. **E.** Valve V, tegmentum sculpture in jugal area. **F.** Tail valve, lateral view. **G.** Valve V, frontal view.

РИС. 4. *Belknapchiton giganteus*, море Банда, Индонезия, 3200 м, BL–10,0 мм. **A.** 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 югальном поле. **F.** хвостовой щиток, вид сбоку. **G.** пятый щиток, вид спереди.

Table 1. Age variability of some features of gills, and different parts of valves in *B. giganteus.*

Таблица 1. Возрастная изменчивость некоторых признаков жабр и различных частей щитков у *B. giganteus.*

BL of studied specimens (mm)	Number of gills	Ratio of width of jugal sinus to width of apophyses	Ratio of length of antemucronal area to length of postmucronal area of tail valve	Number of micraesthetes per granule
5.0	5	1.85	1.59	2–4
10.0	9	1.81	1.29	6
21.0	13	1.60	1.08	8
26.0	14	1.41	1.16	-
33.0 (paralectotype)	15	1.18	1.17	-
42.0 (lectotype)	16	-	-	-

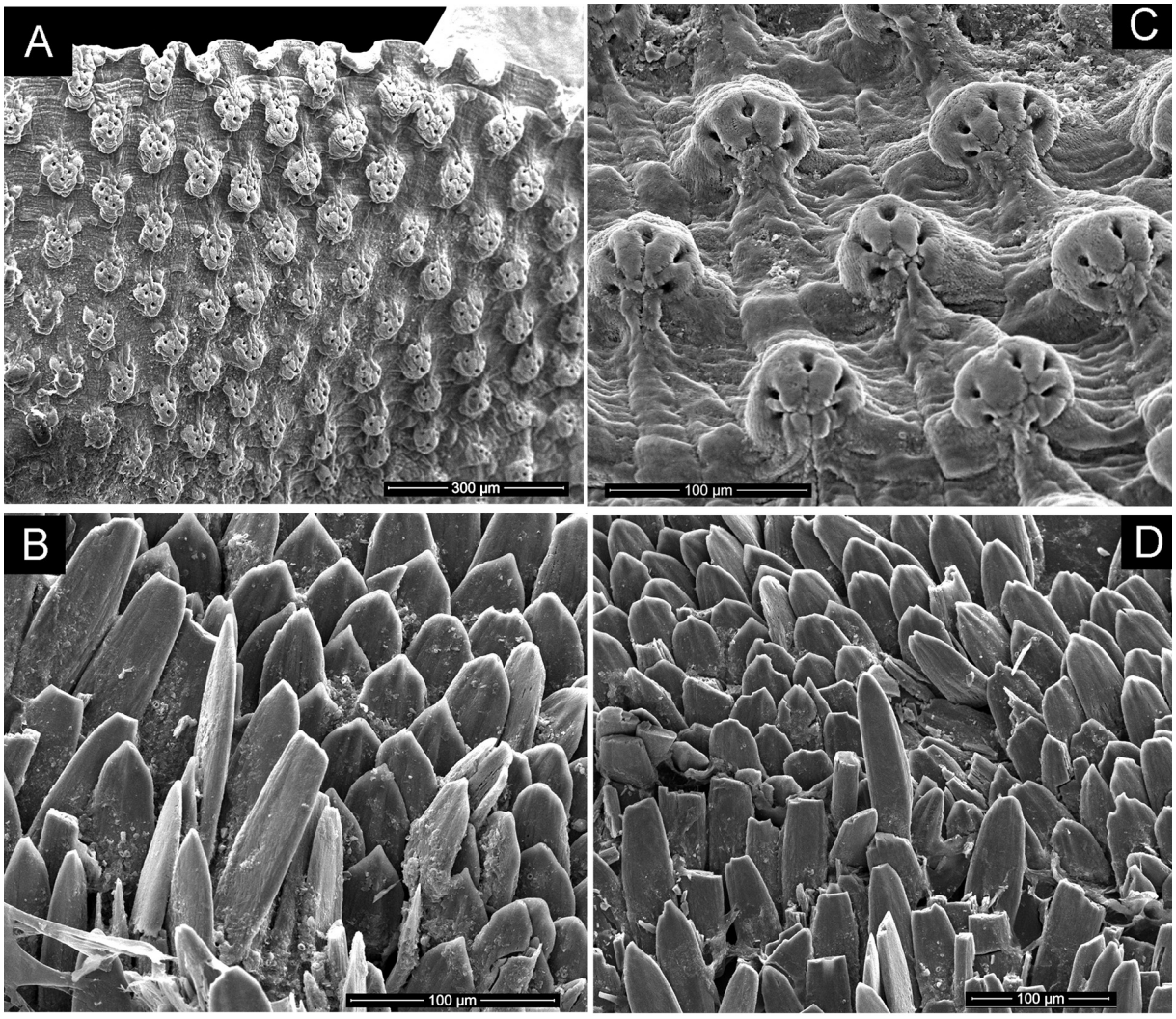

FIG. 5. *Belknapchiton giganteus,* Banda Sea, Indonesia, 3200 m, BL–10.0 mm. **A.** Valve V, tegmentum sculpture in central and lateral areas. **B, D.** Dorsal scales, marginal needles and ventral scales. **C.** Valve I, tegmentum sculpture in middle of valve.

РИС. 5. *Belknapchiton giganteus,* море Банда, Индонезия, 3200 м, BL–10,0 мм. **A.** Пятый щиток, скульптура тегментума на центральном и латеральном полях. **B, D.** Дорсальные чешуйки, маргинальные иглы и вентральные чешуйки. **C.** Головной щиток, скульптура тегментума.

gradually expand, while the ratio of the width of the jugal sinus to the width of the apophysis decreases. Also, with an increase in body size, the postmucronal area lengthens more quickly compared to the antemucronal area and the number of micraesthetes on granules increases from 2–4 in chitons with BL 5.0 mm up to 8 in chitons with BL 21.0 mm. In addition, the granule size in the central areas increases with size from 50 µm in chitons with a body length of 5.0 mm to 75 µm in individuals with a body length of 21.0 mm and also the distance between neighboring grains increases with size. Small chitons with a body length of 5.0 mm have rounded shell valves, which become carinated with larger sizes.

Belknapchiton simplex (Nierstrasz, 1905)

Lepidopleurus simplex Nierstrasz, 1905: 4, pl. 1, fig. 3, pl. 2, figs 44–47.

Leptochiton alveolus. – Ferreira, 1979: 152, fig 14, *non Chiton alveolus* Lovén,1846.

Leptochiton (*Leptochiton*) *alveolus*. – Kaas, Van Belle, 1985: 36, fig. 14, *non Chiton alveolus* Lovén,1846.

Leptochiton (*Leptochiton*) *belknapi*. – Kaas, Van Belle, 1987: 10, fig. 24, *non Leptochiton belknapi* Dall, 1878.

Belknapchiton simplex. – Sirenko *et al.*, 2022: 104.

Type material. Lectotype (ZMA.MOLL.138623), and paralectotype (ZMA.MOLL.138612), designated by Ferreira [1979].

Type locality. Indonesia, Strait of Macassar, 0°34.6’N, 119°8.5’E, 1301 m.

Distribution. Only known from the type locality.

Remarks. This species differs from other relatives by dorsal scales with six longitudinal ribs and carinated valves. It is necessary to compare this species with *B. japonicus* (Thiele, 1909), which is widespread not only off the coast of Japan, but

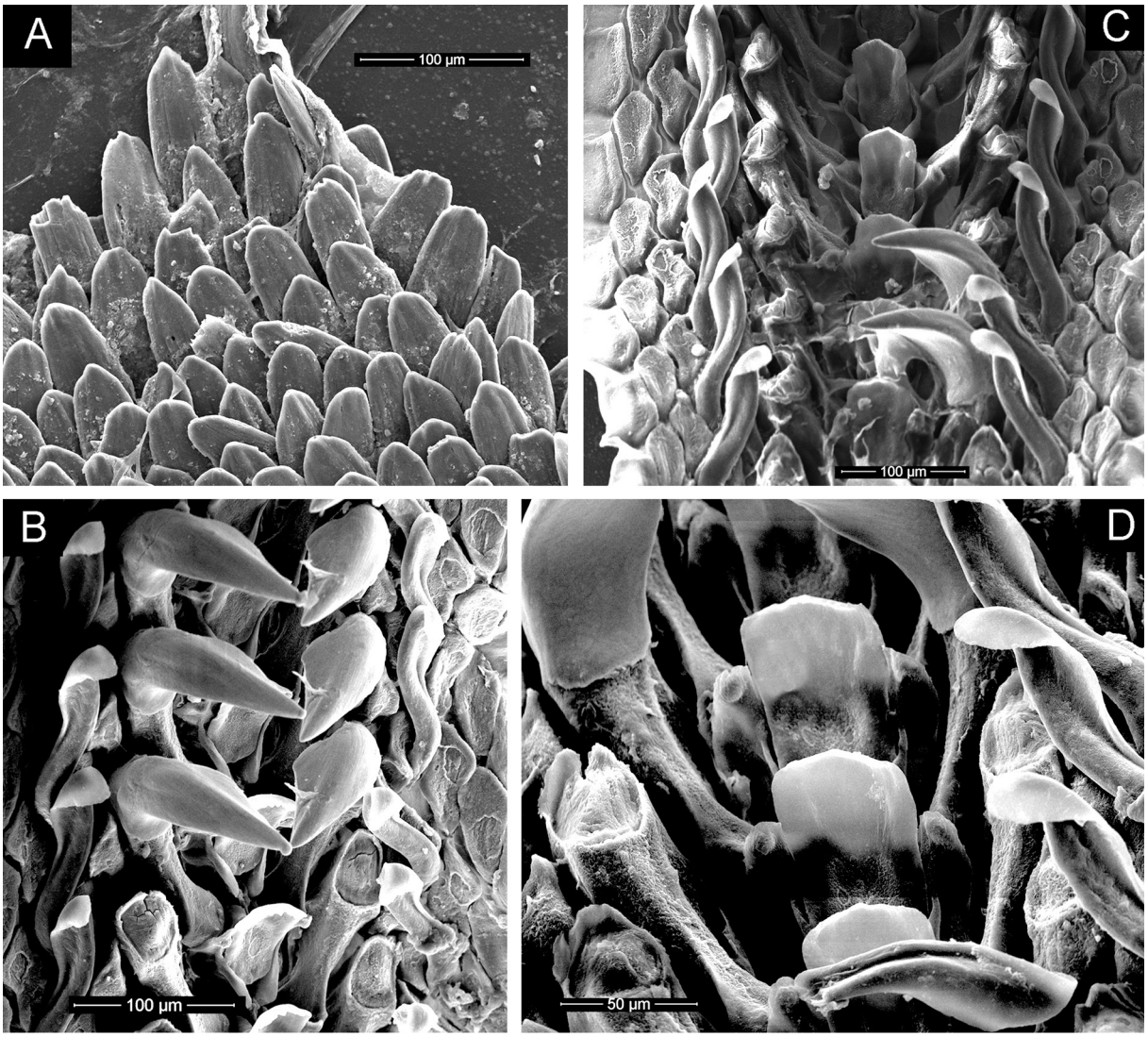

FIG. 6. *Belknapchiton giganteus,* Banda Sea, Indonesia, 3200 m, BL–10.0 mm. **A.** Dorsal scales in sutural part of perinotum. **B, C.** Radula. **D.** Central, first and major lateral, and uncinal teeth of radula.

РИС. 6. *Belknapchiton giganteus,* море Банда, Индонезия, 3200 м, BL–10,0 мм. **A.** Дорсальные чешуйки в центральной части перинотума. **B, C.** Радула. **D.** Центральные, первые и большие латеральные и унцинальные зубы радулы.

also off New Caledonia and the Solomon Islands [Sirenko, 2016].

Genus *Leptochiton* Gray, 1847

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

Genus distribution. Worldwide, Carboniferous–Recent, intertidal to 7657 m.

Leptochiton commandorensis Sirenko, 2017 (Figs 10–15)

Leptochiton sp.1. – Sirenko, 2013: 148.
Leptochiton commandorensis Sirenko, 2017: 114, figs 6–8.

Type material. Holotype (ZISP 2254)

Type locality. North-western Pacific, near Commander Islands, 54°57.4’–54°57.8’N, 165°47.8’–165°52.0’E, 4805–3724 m, pebbles and mud.

Material examined. Holotype. Indonesia, Banda Sea, R/V *Vitjaz*, cruise 54, stn. 6778, 5°15’S, 128°25’E, 3200 m, 2 spms, BL 5.0–13.0 mm, 11.04.1973.

Distribution. Only known from the Commander Islands, 4805–3724 m and the Banda Sea, 3200 m.

Remarks. The study of the two Indonesian specimens and their comparison with the holotype (BL 17.0 mm) revealed a fairly close similarity in the shape and sculpture of the shell, gills, girdle armature and radula teeth of the holotype with the larger Indonesian specimen and some differences between the smaller Indonesian chiton and the two large ones. The differences of a small specimen relate mainly to the shape of the tegmentum granules, which are

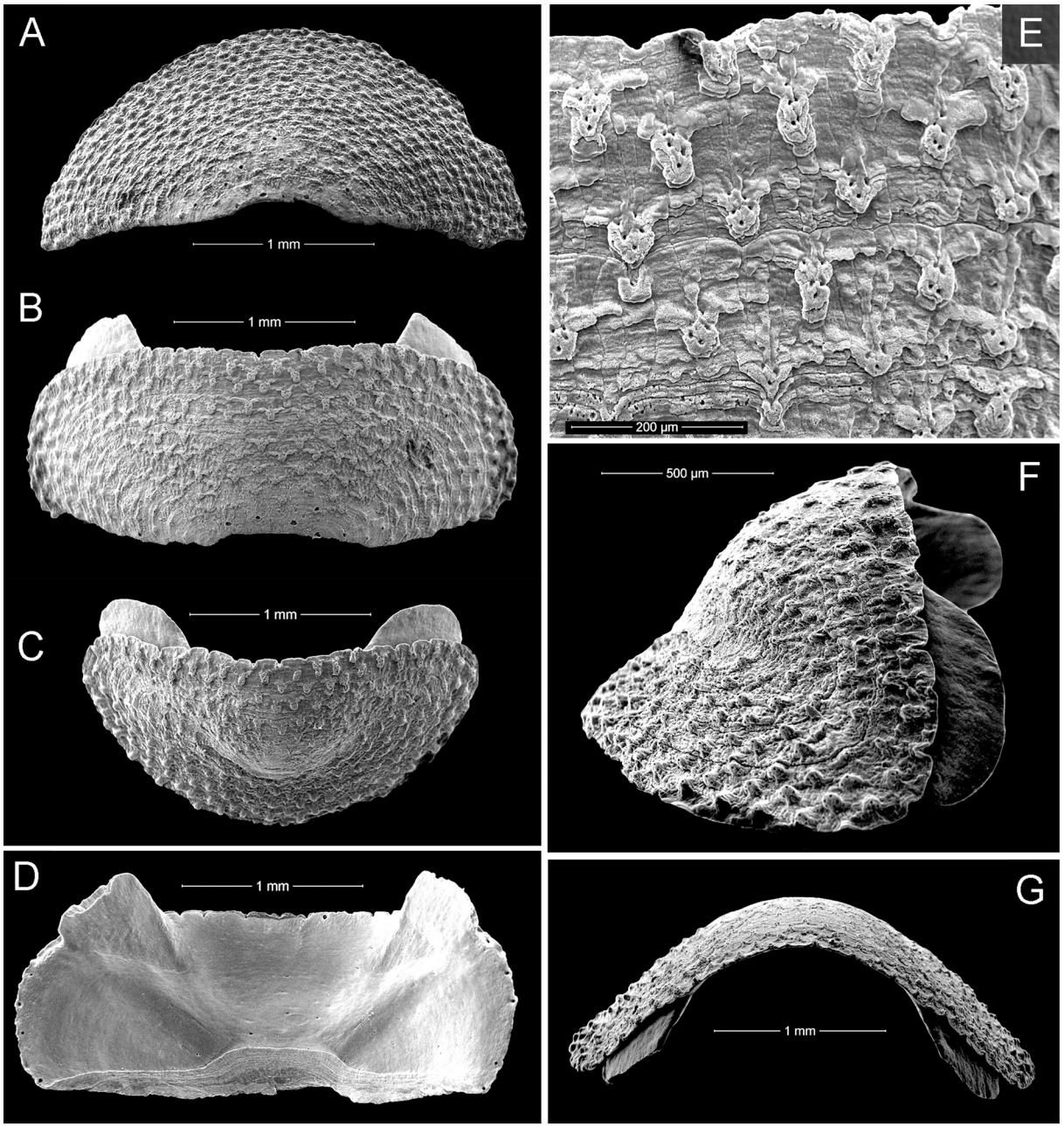

FIG. 7. *Belknapchiton giganteus,* Banda Sea, Indonesia, 3200 m, BL–5.0 mm. **A.** Head valve, dorsal view. **B.** Valve V, dorsal view. **C.** Valve VIII, dorsal view. **D.** Valve IV, ventral view. **E.** Valve V, tegmentum sculpture in jugal area. **F.** Tail valve, lateral view. **G.** Valve V, frontal view.

РИС. 7. *Belknapchiton giganteus,* море Банда, Индонезия, 3200 м, BL–5,0 мм. **A.** 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 югальном поле. **F.** хвостовой щиток, вид сбоку. **G.** пятый щиток, вид спереди.

less elevated and more flattened in a small chiton than in large ones. As for *Belknapchiton giganteus*, age-related variability is observed in the gradual elongation of the postmucronal area compared to the antemucronal area. The ratio of the length of the antemucronal area to the length of the postmucronal area in the tail valve in chitons with BL 5.0, 13.0 and 17.0 mm are 1.51, 1.30 and 1.16 respectively. It is important to note here that *L. commandorensis*, unlike *B. giganteus*, retains a constant number of aesthetes per tegmenum granule equal to 3 with age. The smallest of the available individuals (BL 5.0 mm) turned out to be a brooding female, as it yielded three 8-valved juveniles measuring 800 x 630 µm in the pallial groove. This is the second brooding record in a deep-sea chitons after *Leptochiton incubatus* Sirenko, 2017 [Sirenko, 2017].

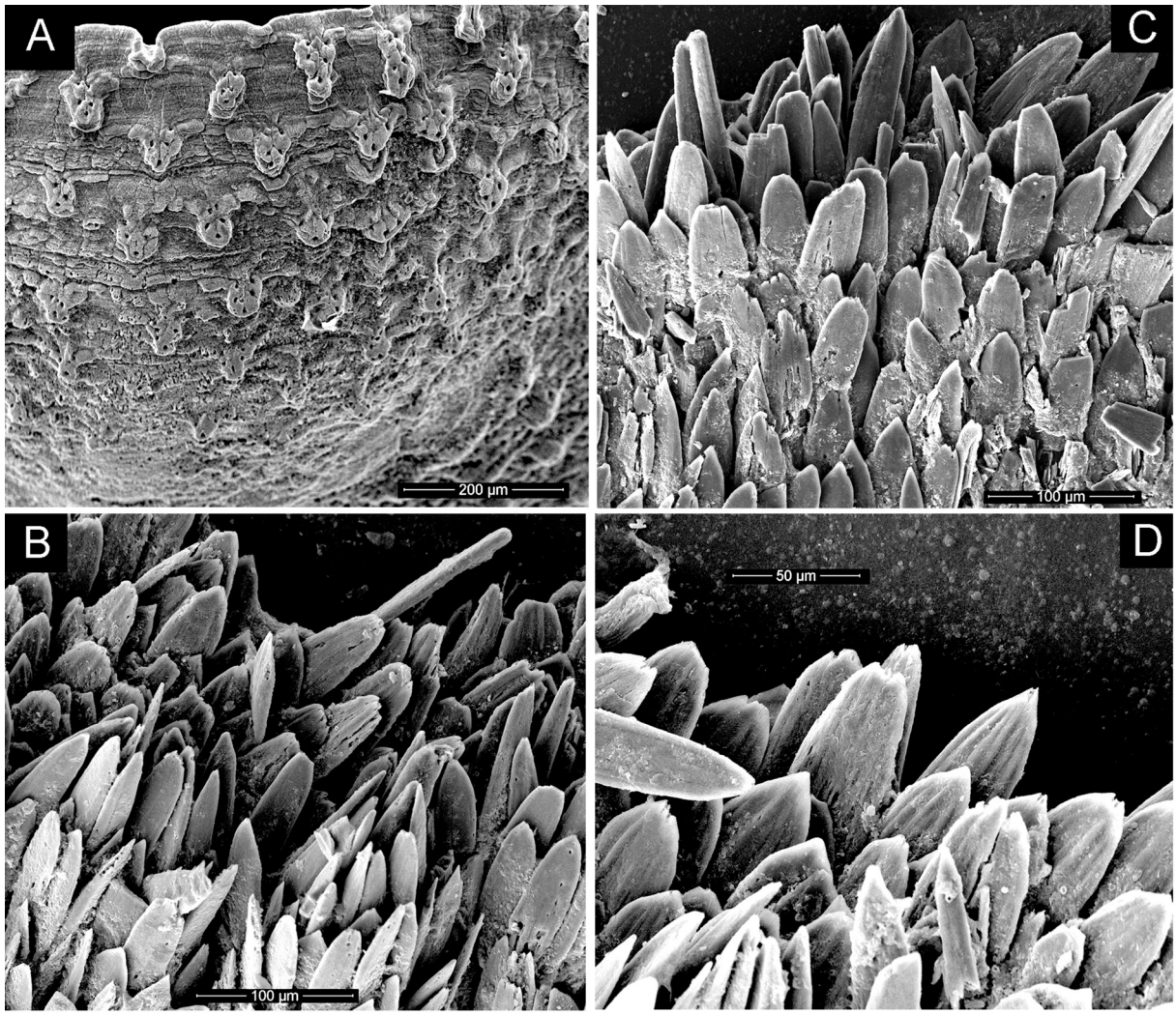

FIG. 8. *Belknapchiton giganteus,* Banda Sea, Indonesia, 3200 m, BL–5.0 mm. **A.** Tail valve, tegmentum sculpture in antemucronal area. **B.** Dorsal scales and sutural needles. **C.** Dorsal and ventral scales and marginal needles. **D.** Dorsal scales.

РИС. 8. *Belknapchiton giganteus,*,море Банда, Индонезия, 3200 м, BL–5,0 мм. **A.** Хвостовой щиток, скульптура тегментума на антемукрональном поле. **B.** Дорсальные чешуйки и сутуральные иглы. **C.** Дорсальные и вентральные чешуйки и маргинальные иглы. **D.** Дорсальные чешуйки.

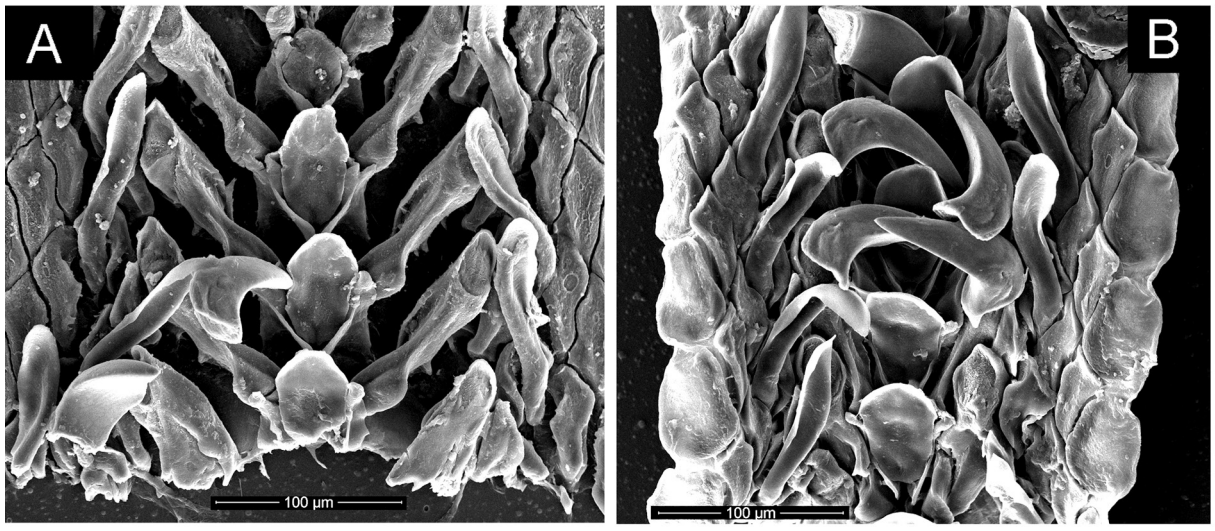

FIG. 9. *Belknapchiton giganteus,* Banda Sea, Indonesia, 3200 m, BL–5.0 mm. **A, B.** Radula.

РИС. 9. *Belknapchiton giganteus*, море Банда, Индонезия, 3200 м, BL–5,0 мм. **A, B.** Радула.

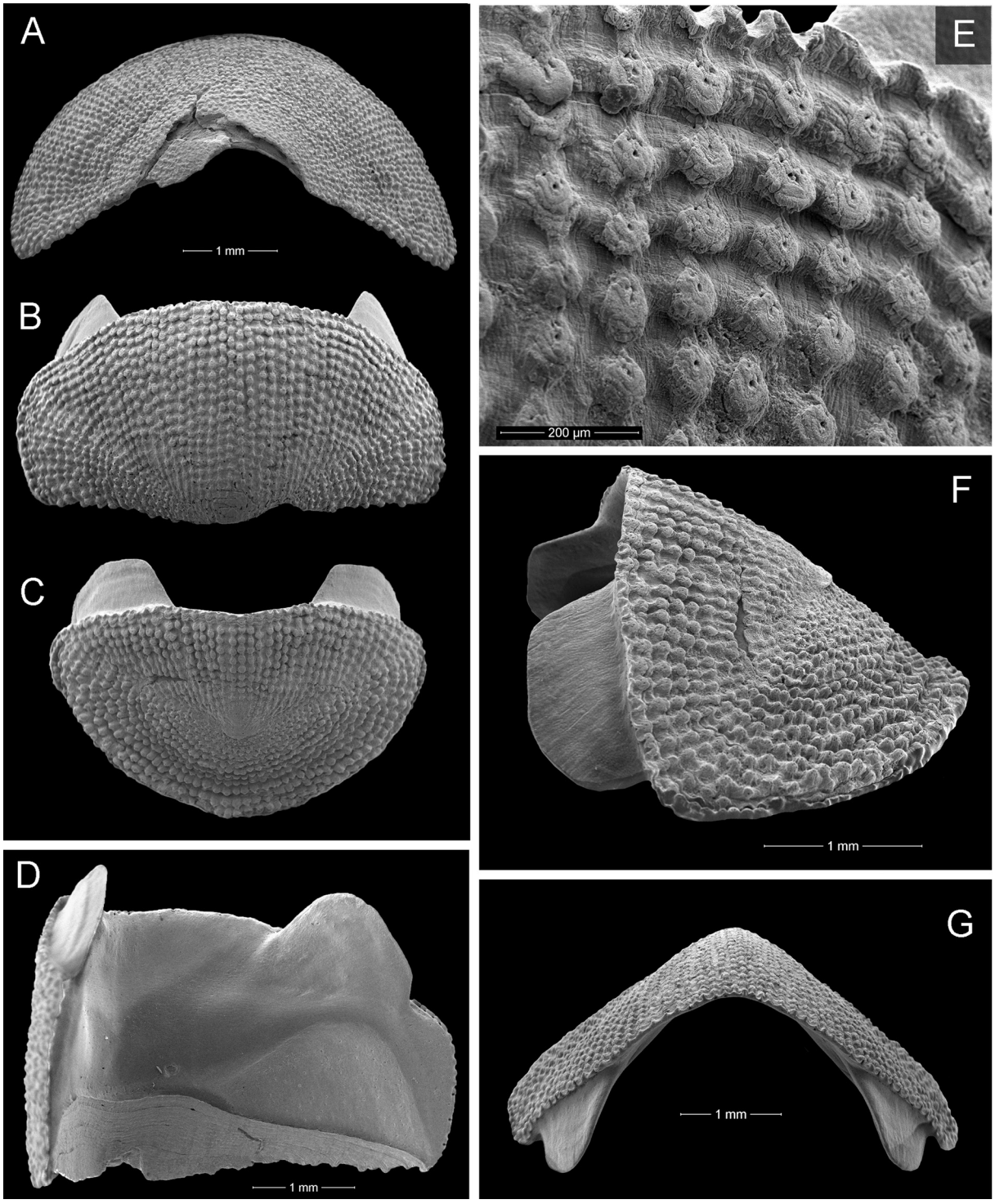

FIG. 10. *Leptochiton commandorensis,* Banda Sea, Indonesia, 3200 m, BL–13.0 mm. **A.** Head valve, dorsal view. **B.** Valve V, dorsal view. **C.** Valve VIII, dorsal view. **D.** Valve IV, ventral view. **E.** Valve V, tegmentum sculpture in central area. **F.** Tail valve, lateral view. **G.** Valve V, frontal view.

РИС. 10. *Leptochiton commandorensis*, море Банда, Индонезия, 3200 м, BL–13,0 мм. **A.** 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 поле. **F.** Хвостовой щиток, вид сбоку. **G.** Пятый щиток, вид спереди.

Leptochiton rissoi (Nierstrasz, 1905)

Lepidopleurus rissoi Nierstrasz, 1905: 6, figs 5, 52–55; Ferreira, 1979: 163, figs 30–32.

LLeptochiton (*Leptochiton*) *rissoi.* – Kaas, Van Belle, 1985: 110, fig. 48, map 24.

Type material. Lectotype (ZMA.MOLL 138601), designated by Ferreira, 1979.

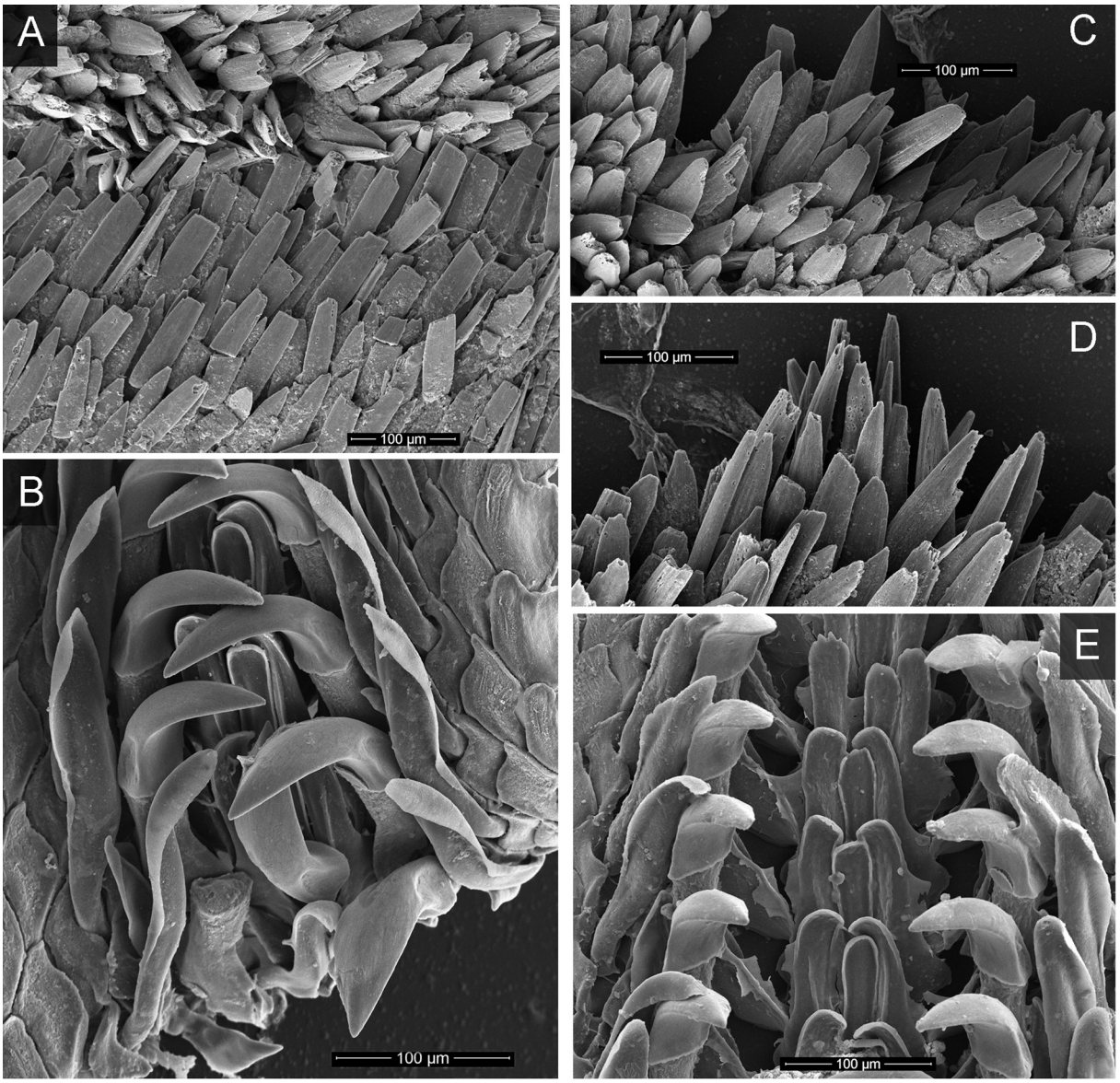

FIG. 11. *Leptochiton commandorensis* Banda Sea, Indonesia, 3200 m, BL–13.0 mm. **A.** Dorsal and ventral scales and marginal needles. B, **E.** Radula. **C.** Dorsal scales. **D.** Dorsal scales and needles.

РИС. 11. *Leptochiton commandorensis*, море Банда, Индонезия, 3200 м, BL–13,0 мм. **A.** Дорсальные и вентральные чешуйки и маргинальные иглы. B, **E.** Радула. **C.** Дорсальные чешуйки. **D.** Дорсальные чешуйки и иглы.

Type locality. Celebes Sea, N of Manado, Indonesia, 3°27.1'N 125°18.7'E, 2053 m (*Siboga*, St. 126).

Distribution. Indian Ocean (off Sumatra Island), Pacific Ocean, Philippines, Indonesia, New Guinea, Solomon Islands, 875–2120 m, more common deeper than 1000 m.

Remarks. The following morphological features of the lectotype were not mentioned in Nierstrasz [1905] and Kaas and Van Belle [1985]: the head valve is 1.2 times wider than the tail valve; the apophysis of the valve V is 1.3 times wider than the jugal sinus; the tegmentum granules are oval on the central area and round on the lateral areas with one megalaesthete and 6 micraesthetes; The head of the major lateral tooth of the radula is bidentate instead of unidentate as mentioned in Kaas, Van Belle [1985].

A study of the lectotype of this species (ZMA. MOLL 138601) and other available specimens indicate that the number of aesthetes in an aesthete group ranges from 6 to 20, regardless of body size. This variability together with a longitudinal arrangement of the granules is similar to *L. vietnamensis* Sirenko, 1998. The main difference between both species is the ratio of the width of the apophysis to the width of the jugal sinus, which is always greater than 1 in *L. rissoi* (vs less than 1 in *L. vietnamensis*).

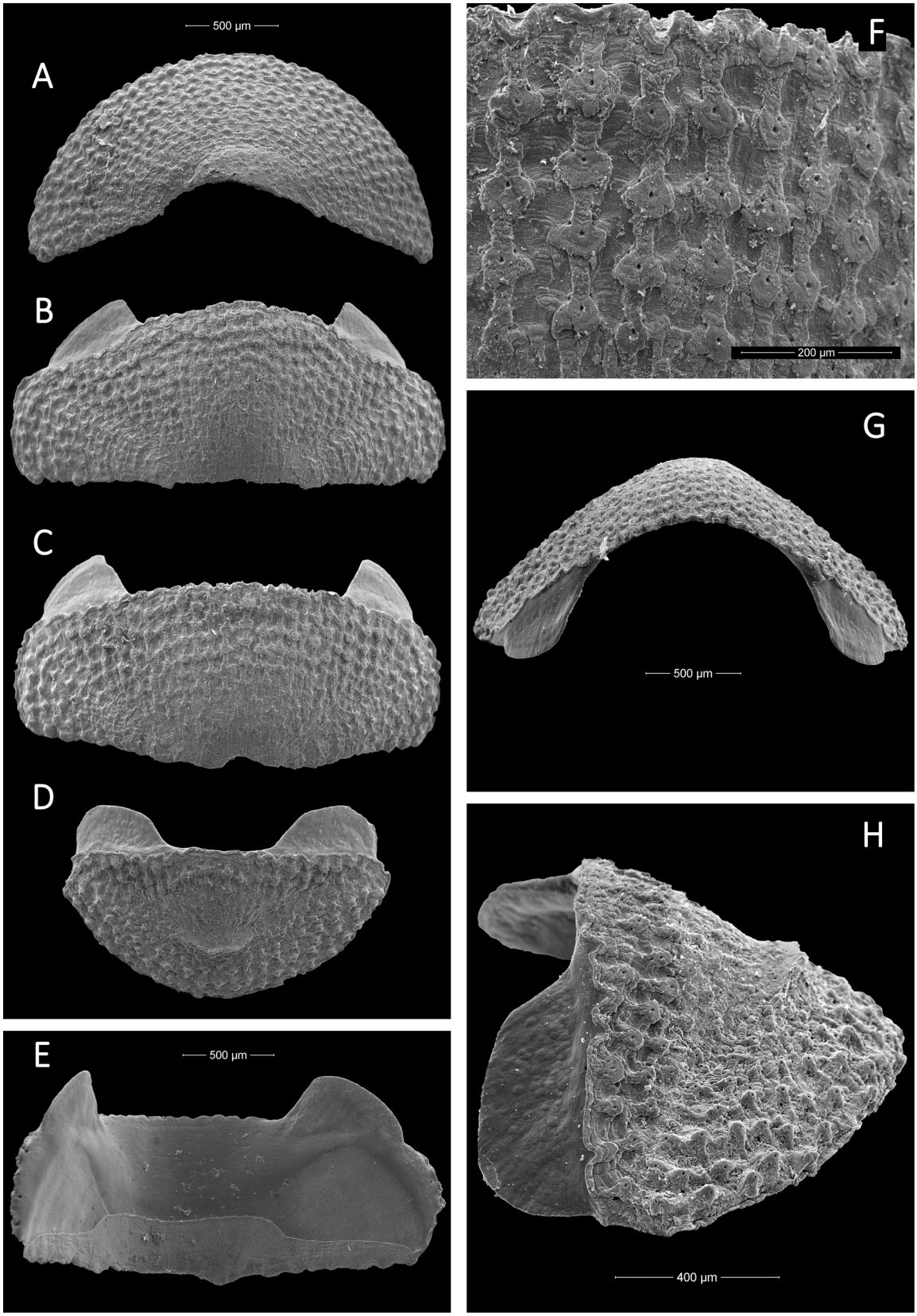

FIG. 12. *Leptochiton commandorensis,* Banda Sea, Indonesia, 3200 m, BL–5.0 mm. **A.** Head valve, dorsal view. **B.** Valve II, dorsal view. **C.** Valve IV, dorsal view. **D.** Valve VIII, dorsal view. **E.** Valve V, ventral view. **F.** Valve IV, tegmentum sculpture in central area. **G.** Valve IV, frontal view. H. Valve VIII, lateral view.

РИС. 12. *Leptochiton commandorensis*, море Банда, Индонезия, 3200 м, BL–5,0 мм. **A.** Головной щиток, вид сверху. **B.** Щиток II, вид сверху. **C.** Щиток IV, вид сверху. **D.** Щиток VIII, вид сверху. **E.** Щиток V, вид снизу. **F.** Щиток IV, скульптура тегментума на центральном поле. **G.** Щиток IV, вид спереди. H. Щиток VIII, вид сбоку.

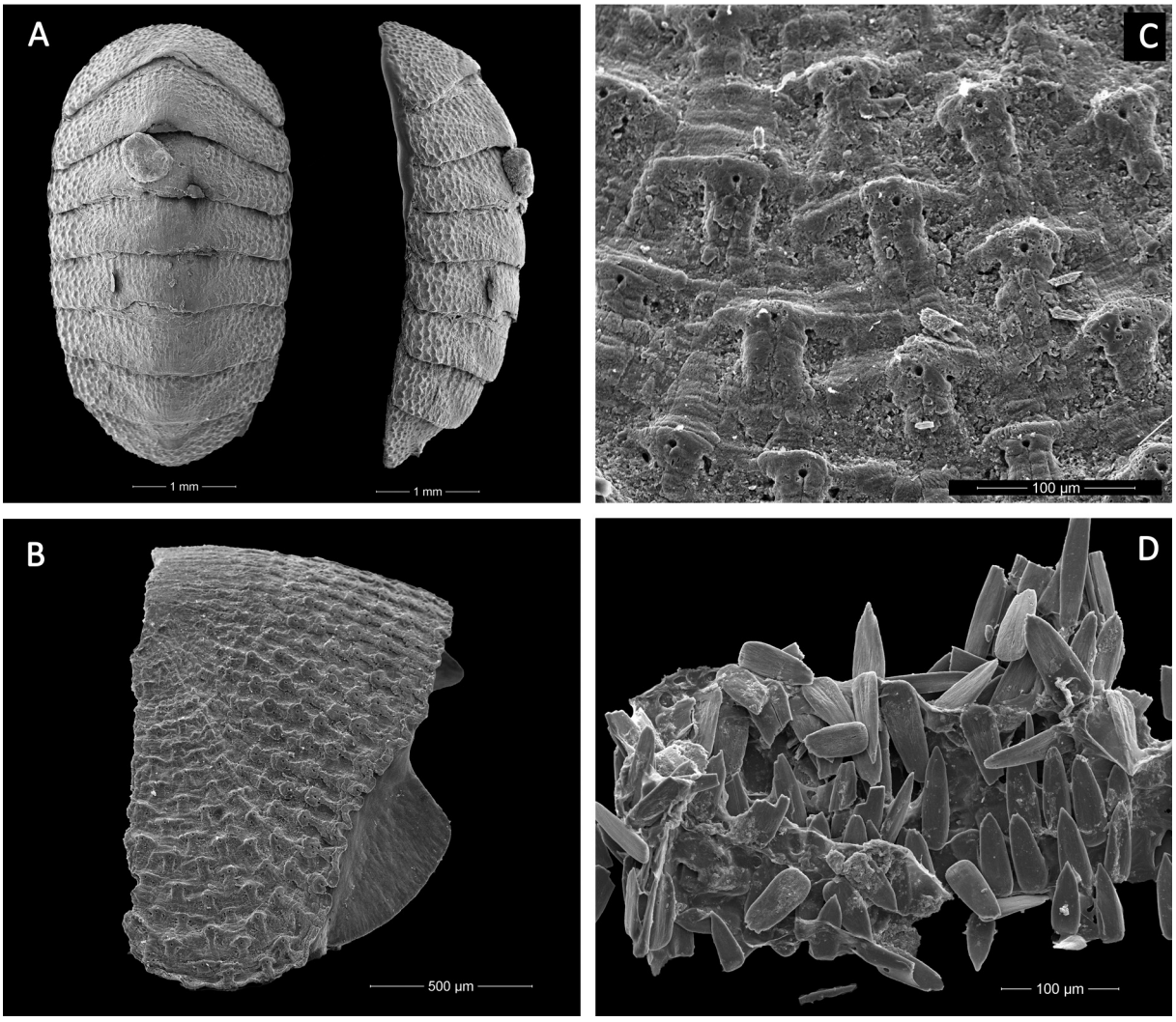

FIG. 13. *Leptochiton commandorensis,* Banda Sea, Indonesia, 3200 m, BL–5.0 mm. **A.** Whole specimen, dorsal and lateral views. **B.** Valve IV, lateral view. **C.** Valve IV, tegmentum sculpture in lateral area. **D.** Dorsal and ventral scales.

РИС. 13. *Leptochiton commandorensis*, море Банда, Индонезия, 3200 м, BL–5,0 мм. **A.** Целый экземпляр, вид сверху и сбоку. **B.** Щиток IV, вид сбоку, **C.** Щиток IV, скульптура тегментума на боковом поле. **D.** Дорсальные и вентральные чешуйки.

Leptochiton setiger (Nierstrasz, 1905)

Lepidopleurus (*Pilsbriella*) *setiger* Nierstrasz, 1905:11, pl. 1, fig. 7, pl. 3, figs 60–65.

Leptochiton (*Pilsbryella*) *setiger.* – Kaas, Van Belle, 1985: 161, fig. 74, map 22.

Type material. Lectotype (ZMA.MOLL.138607) designated by Kaas and Van Belle [1985], and 2 paralectotypes (ZMA.MOLL.138606, ZMA. MOLL.138625) (see below).

Type locality. Indonesia, Strait of Makassar, 0°34.6’N, 119°8.5’E, 1301 m. (*Siboga*, St. 88) The paralectotypes were found in the Sea Bali, 7°15’S, 115°15’.6’E, 289 m (*Siboga*, St. 12).

Distribution. Only known from the type locality of the lectotype.

Remarks. Sirenko [2020] already discussed the composition of the type specimens of this species . A thorough study of the lectotype and two paralectotypes revealed their morphological heterogeneity. The two paralectotypes differ from the lectotype in the arrangement of granules on the central areas in quincuncialy and in the absence of chitinous silky hairs between the valves, the main feature of this species, which served as the basis for the description of the subgenus *Pilsbryella* Nierstrasz, 1905. They most likely belong to the genus *Nierstraszella* Sirenko, 1992 for a number of morphological features: 1) arrangement of false tegmentum granules in a quincunx pattern, 2) subcarinated valves, 3) elongated dorsal spicules-scales, 4) a tridentate cusp of the major lateral tooth, which is typical for juvenile individuals of *Nierstraszella* [Sirenko, 1992] and 5) the paralectotypes were found on a piece of sunken wood which is a very typical substrate for *Nierstraszella*. By the way, two species of chitons: *Leptochiton longisetosus* Sigwart et Sirenko, 2012 and *L. dykei*

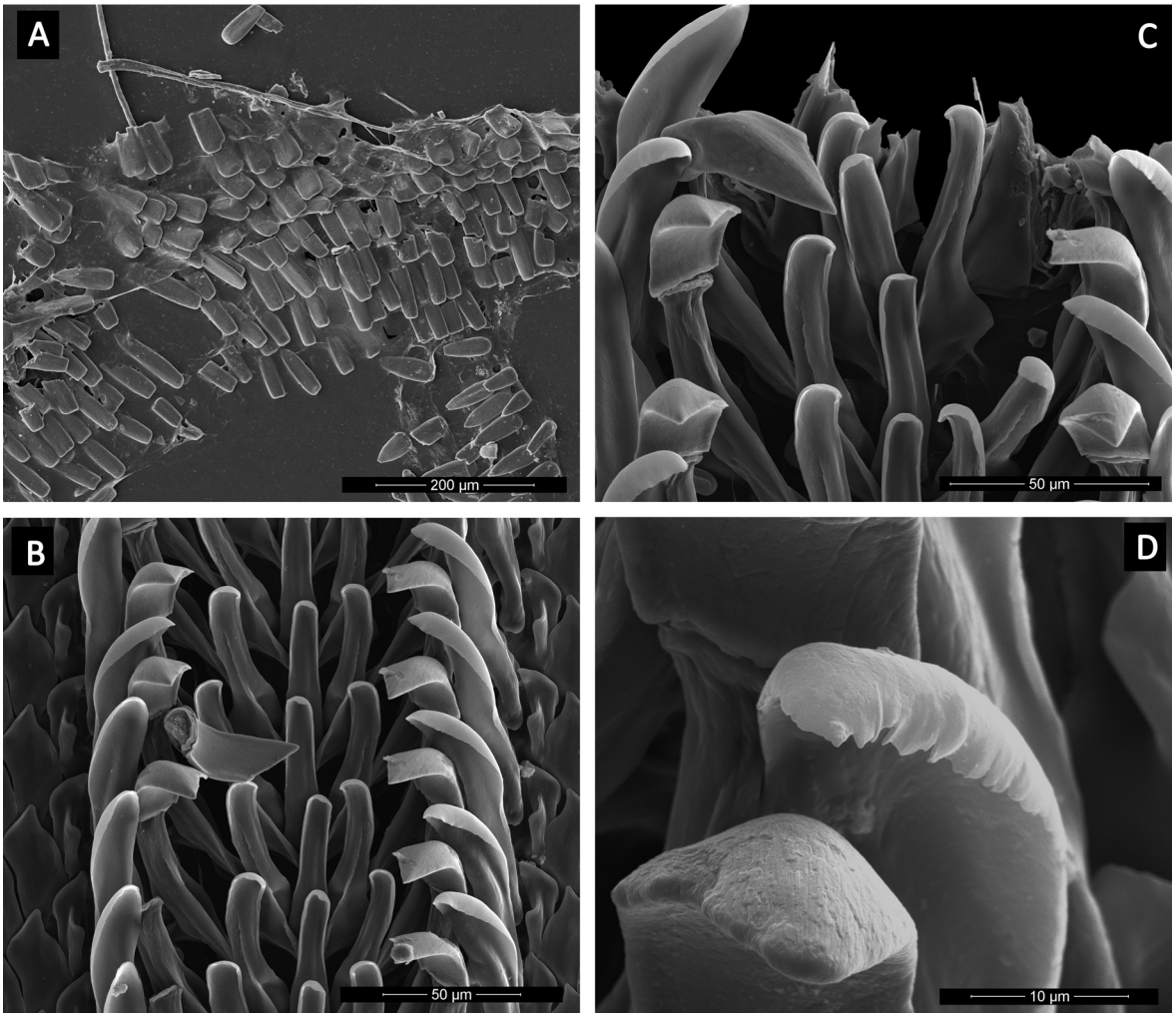

FIG. 14. *Leptochiton commandorensis,* Banda Sea, Indonesia, 3200 m, BL–5.0 mm. **A.** Dorsal and ventral scales. B, **C.** Radula. **D.** Major lateral and uncinal teeth of radula.

РИС. 14. *Leptochiton commandorensis*, море Банда, Индонезия, 3200 м, BL–5,0 мм. **A.** Дорсальные и вентральные чешуйки. B, **C.** Радула. **D.** Большой латеральный и унцинальный зубы радулы.

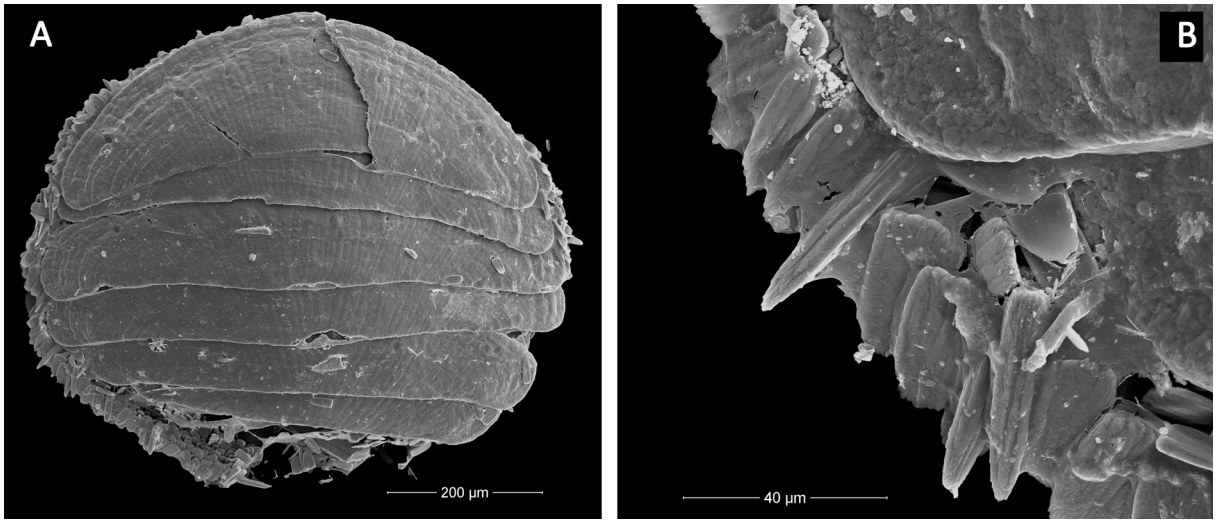

FIG. 15. *Leptochiton commandorensis*, Banda Sea, Indonesia, 3200 m, size 800 x 630 µm. **A.** Juvenile from pallial groove of female BL–5.0 mm, dorsal view. **B.** Dorsal scales and needles of the juvenile.

РИС. 15. *Leptochiton commandorensis*, море Банда, Индонезия, 3200 м, размер 800 x 630 мкм. **A.** Ювенил из паллиального желобка самки BL-5,0 мм, вид сверху. **B.** Дорсальные чешуйки и иглы ювенила.

Sigwart et Sirenko, 2012 [Sigwart, Sirenko, 2012] have long silky intersegmental bristles very similar to the hairs described by Nierstrasz for *Lepidopleurus* (*Pilsbryella*) *setiger*.

Discussion

The study of materials collected at station 6778 of the R/V *Vityaz* cruise 54 in the Banda Sea added a fifth species, *Leptochiton commandorensis* Sirenko, 2017 to the Indonesian deep-sea chiton fauna and confirmed the presence of *Belknapchiton giganteus* (Nierstrasz, 1905). The surprisingly low number of deep-sea leptochitonids in Indonesian waters, compared to 17 species in Philippine waters clearly indicates that the Indonesian waters are insufficiently studied. Taken further the neighboring regions of Japan (14 species), Taiwan (8 species), and the Papuan region (about 20 species) [Saito, 2017; Sirenko, 2017, 2018, and unpublished data] into account, one may expect a species number of the genera *Leptochiton* and *Belknapchiton* up to 15 in Indonesian waters.

For taxonomy, it is important to note the different results of the age variability of the number of micraesthetes per granule in *Belknapchiton giganteus* and *Leptochiton commandorensis*. In the first species, with size, there is a noticeable increase in the number of aesthetes on the granule, whereas in the second species, only two micraesthetes are constantly present, regardless of age. The number of micraestetes in the granule is an important feature in many species of the family Leptochitonidae. It should be noted that the number of aesthetes per granule is not always the same for all species of the same genus or group of species united by similar characters. For example, *Belknapchiton* contains both species with constant number of aesthetes equal to 3 – *B. macleani* (Sirenko, 2015), *B. kaasi* (Sirenko,1990), and species with increasing with age number of aesthetes up to 5 in *B. aequispinus* (Bergenhayn, 1933) and even up to 11-12 in *B.fijiensis* (Sirenko, 2016). Similar picture is observed in group of *L. sykesi* (Sowerby III, 1903), where along with species with constant set (3 aesthetes) – *L. laurae* Schwabe et Sellanes, 2010, *L ibanezi* Sirenko, 2016, there are species, which with age increase in number of aesthetes up to 5 in *L. sykesi* and even 7 in *L. medinae* (Plate, 1899).

It is also important to note a noticeable increase with size in the length of the postmucronal area compared with the length of the antemucronal field in *B. giganteus* and *L. commandorensis*, whereas in *Belknapchiton belknapi* with increasing size, on the contrary, there is a decrease in the postmucronal area compared with the length of antemucronal area [Sirenko et al., 2022]. The position of mucro, depending on the length of the areas under discussion, is also an important taxonomic feature.

Both of the above size-related changes should be taken into account when comparing related species and when identifying juveniles, since species descriptions and definitive keys are usually made for adult specimens.

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