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Deshayesiella spicata (Berry, 1919) (Mollusca: Polyplacophora), a valid species

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ABSTRACT. The validity of the enigmatic eastern Pacific chiton *Deshaysiella spicata* (Berry, 1919) is established, this species is redescribed, illustrated and compared with related species in the western Pacific Ocean, as well as the similar appearing *Oldroydia percrassa* (Dall, 1894) from Californian waters. Geographic and bathymetric ranges are characterized and the living animal is illustrated.

Introduction

The nominal species *Hanleya spicata* was described by S. Stillman Berry [1919] from a single juvenile specimen. The holotype (Fig. 1A-C) is very small (4.5 × 2.0 mm) and was preserved in balsam. The senior author noted "numerous rounded tubercles irregularly scattered over the lateral areas but over the central areas slightly smaller and deposed in 14-16 ill-defined, slightly oblique, longitudinal series most crowded and irregular near the jugum", (and) "elongate, dagger-like, marginal spinelets and a few scattered needle-like spines, often over twice the length of the marginal spicules, some of these distributed here and there over the general surface of the girdle, but the greater proportion occurring in loose groups of 5-8 at each suture, where they extend well up between the valves" (Fig. 1C).

Berry described the unique specimen as a new species but cautioned: "eventually *H. spicata* may prove only a variant of the older species (*Hanleya hanleyi*)..." perhaps because of doubts, Dall [1921] and Oldroyd [1927] cited *H. spicata* Berry, as a subspecies of *Hanleya hanleyi* (Bean in Thorpe, 1844). Cowan [1964] reported 40 specimens of *Hanleya hanleyi* from Queen Charlotte Sound, B. C., but recent examination of these by the junior author has revealed them instead to be *Hanleyella oldroydi* (Dall, 1919). Ferreira [1979] concluded that no members of the genus *Hanleya* are present in Pacific waters and placed *spicata* as a junior synonym of *Oldroydia percrassa* (Dall, 1894). Kaas and Van Belle [1985] agreed with Ferreira and retained *spicata* as a junior synonym of *O. percrassa*. In 1995, while working in the California museums, the senior author found two different species among material identified as *O. percrassa*. The first of them matched the diagnosis of *O. percrassa* with a long jugal area characteristically projecting forward for almost half the length of the tegmentum. The remaining specimens were alike in lacking long, distinct and projecting jugal area; instead their valves were very similar to other members of the genus *Deshayesiella*. We tried to study the holotype of *Hanleya spicata* at the Santa Barbara Museum of Natural History. Unfortunately it was not possible to see the anterior portion of the jugal area because the whole specimen is imbedded in balsam and the valves overlap each other.

The tegmental sculpture and girdle armature of our second species are otherwise very similar to the holotype of *H. spicata*. We found four specimens of *Deshayesiella spicata* in three California museums and subsequently 6 additional specimens have been recovered (see Material examined). A redescription of *Deshayesiella spicata* follows.

Acronyms used in the text are as follows: CASIZ, California Academy of Sciences, Invertebrate Zoology; LACM, Los Angeles County Museum of Natural History; RBCM, Royal British Columbia Museum; SBMNH, Santa Barbara Museum of Natural History; RNC, personal collection of Roger N. Clark.

Taxonomy

Class Polyplacophora Gray, 1821
Subclass Loricata Shumacher, 1817
Order Lepidopleurida Thiele, 1910
Suborder Lepidopleurina Thiele, 1910

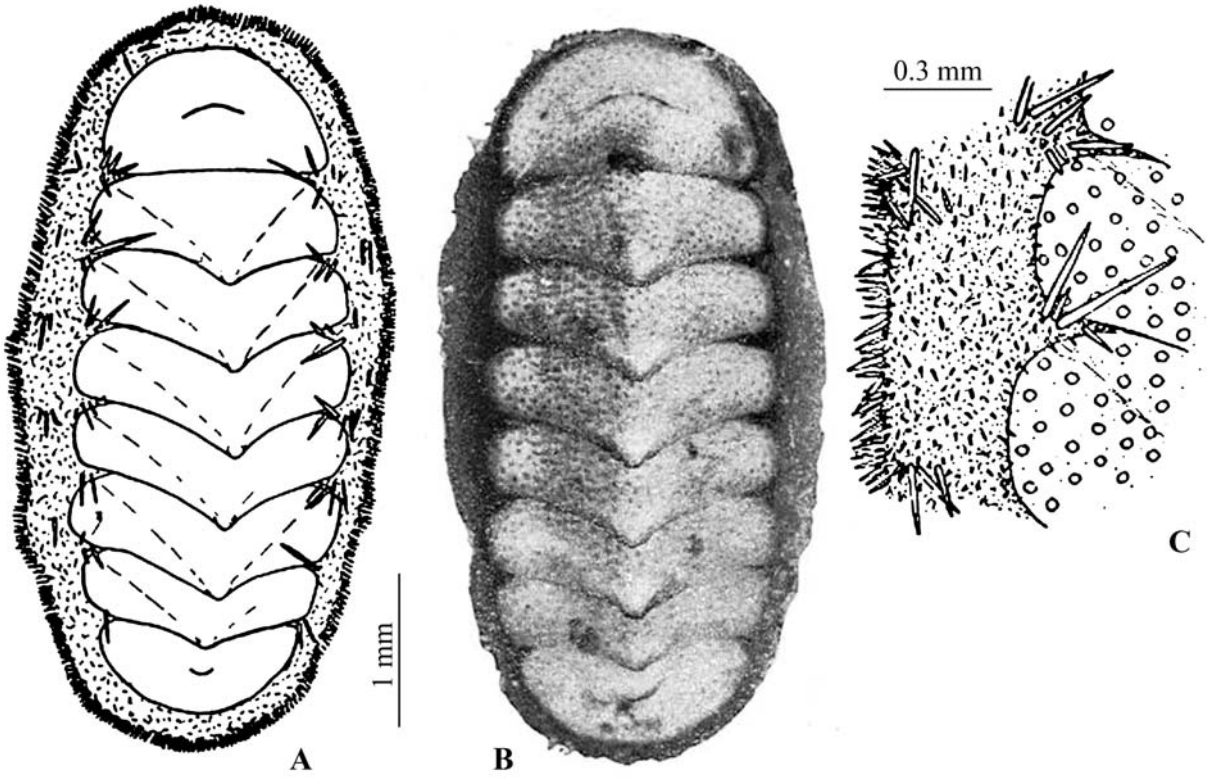

FIG. 1. *Deshaysiella spicata* (Berry, 1919). Holotype (after Berry, 1919). A — camera lucida drawing of the whole animal; B — photograph of the whole animal; C — close-up of girdle, camera lucida drawing.

РИС. 1. *Deshaysiella spicata* (Berry, 1919). Голотип (по Berry, 1919). A — рисунок целого животного; B — фотография целого животного; C — увеличенный участок перинотума.

Family Protochitonidae Ashby, 1925

Deshayesiella Carpenter MS, Dall, 1879

Deshayesiella spicata (Berry, 1919)

Hanleya spicata Berry, 1919: 7-10 text, figs. 5,6, pl. 1, fig. 3; Smith, 1947a: 7, 1947b: 18; Smith & Gordon, 1948: 205.

Hanleya hanleyi spicata; Dall, 1921: 188; Oldroyd, 1927: 253-254.

Type material: Holotype in balsam, SBMNH 4102 (S.S.B. 63). 4.5 mm in length.

Type locality: California, Monterey Bay, off Point Pinos, rock ledge, depth "probably 200 feet".

Additional material: 1, LACM 41-50 (ex AHF 1220-410), Anacapa Id., California (34°00'05''N, 119°26'40"W), 25-26 fms. 13 mm in length; 1, LACM 39-88 (ex AHF 984-39), Santa Barbara, California (33°22'08"N, 119°02'39"W), 39-42 fms. 12 mm in length; 1, CASIZ 2382, Mexico, Baja California Norte, Gulf of California, Salsipuedes Channel, 250 fms. 20 mm in length; 1, SBMNH 144483, S of Santa Rosa Id., 'Santa Rosa Flats' (33°51'03"N, 119°56'00"W), 52 fms. 16 mm; 1, RBCM 002-00062-005, "Kelvin Grove", S of Lions Bay, Howe Sound (N of Vancouver), British Columbia (46°27.0'N, 123°14.4'W), 67 ft. 28 mm in length; 1, RNC 1835, "Kelvin Grove", S of Lions Bay, Howe Sound (N of Vancouver), British Columbia (46°27.0'N, 123°14.4'W), 70-80 ft, 34 mm in length; 4, RNC 2174, Point Loma, California (32°48.506N, 117°21.254W), 93 m, 12-17 mm in length.

Redescription: Medium sized chitons, to 34 mm in length (Fig. 2); elongate-oval in outline; valves (Fig. 3) rather thick, subcarinated, beaked, slopes straight to slightly convex; tegmentum granulo-costate. Anterior valve (Fig. 3A, D) sub-crescent shaped, with concentric costae. Intermediate valves (Fig. 3B, E) with anterior portion of pleural areas reduced; pleural areas with granulose costae, lateral areas pustulose or nodulose in young animals, becoming pustulo-costate in larger animals; jugal area more or less smooth, anterior portion of jugum projecting. Posterior valve (Fig. 3C, F) semi-circular, antemucronal area with somewhat oblique rows of large coarse granules, coalescing with age into costae; mucro slightly ante-central; post-mucronal area with concentric costae, post-mucronal slope concave. Articulamentum (Fig. 3B-F), relatively thick, porcelainous, white; sutural laminae bluntly triangular in shape.

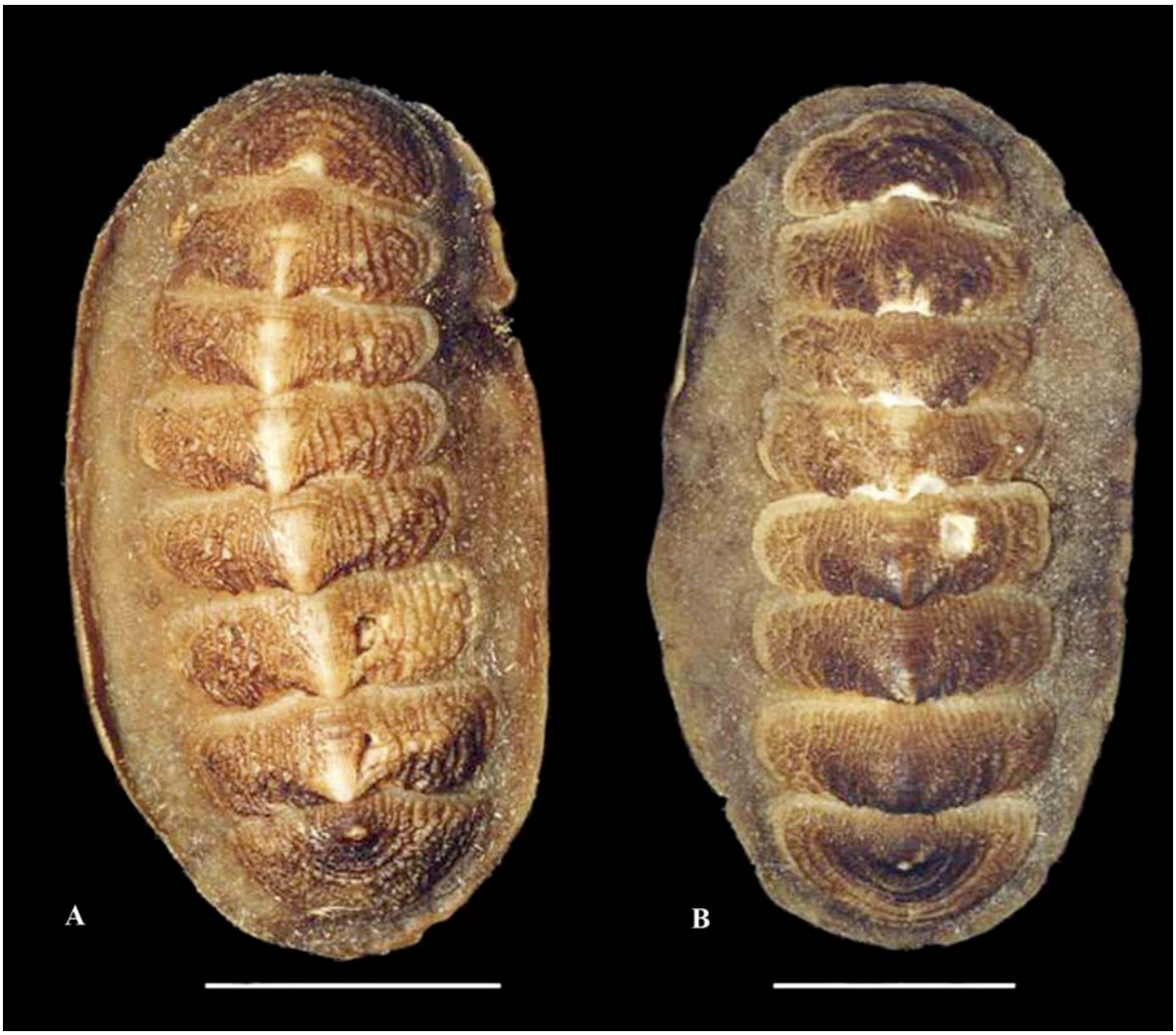

FIG. 2. *Deshaysiella spicata* (Berry, 1919), specimens from Howe Sound, British Columbia. Scale bar: 1 cm.

РИС. 2. *Deshaysiella spicata* (Berry, 1919), экземпляры из Хау Саунд, Британская Колумбия. Масштаб: 1 см.

Girdle (Fig. 4A) of moderate width, about 4.0 mm wide adjascent to valve V in animal with a body length of 34 mm. Dorsally covered with slender, smooth, straight, sharply pointed spicules 95-130 μm x 15-20 μm (Fig. 4 B) and randomly dispersed, much longer straight, needle-like spicules to 540 μm x 40 μm, rising from chitionous cusps (Fig. 4C). Marginal spicules needle-like, to 400 μm. Ventrally the girdle is clothed with imbricating, flat, distally pointed scales, short near inner margin, 40 × 20 μm, longer 90 × 30 μm in the middle of the (ventral side) of the girdle; scales with obsolete ribs (Fig. 4D).

The radula (Fig. 5) is typical for the genera *Deshayesiella* and *Oldroydia* [Sirenko, 1997]. An animal with body length of 28 mm has a radula 9.5 mm long with 41 mature rows of teeth. Central tooth oblong, shallowly sinuated at sides, well cusped with arcuate edge. Major laterals with bidentate cusp, the outer denticle larger than the inner one. Gills merobranchial and adanal, extending from the suture of valves six and seven to valve eight; number of gills increasing with animal size; animals 17 mm in length with 12-13 ctenidia per side.

Distribution: Canada, British Columbia, Howe Sound, north of Vancouver, Lions Bay (49°27'N, 123°14.4'W) to Mexico, Baja California Norte (Gulf of California side) Salsipuedes Channel (approx. 28°35'N, 112°55'W), 18-467 m.

Discussion: *Deshayesiella spicata* is closely related to *D. bidentata* Taki, 1938, and *Oldroydia percrassa.* It differs from *D. bidentata* by the shape of valves II-VII which are longer in *D. bidentata* than in *D. spicata. Oldroydia percrassa* has shorter pleural areas and a more distinct jugal area than *D.*

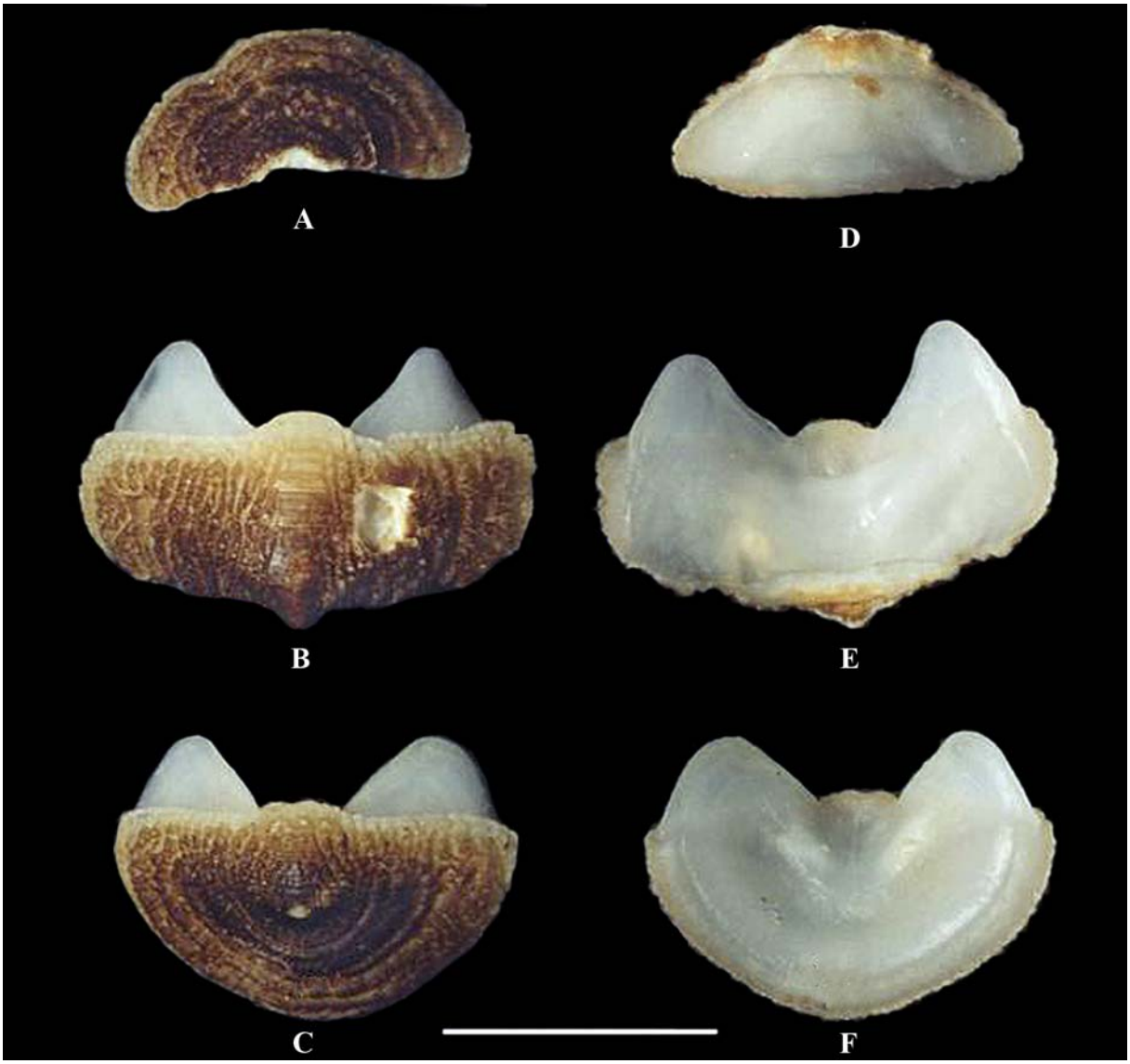

FIG. 3. *Deshaysiella spicata* (Berry, 1919), specimen from Howe Sound, British Columbia. Scale bar: 1 cm

РИС. 3. *Deshaysiella spicata* (Berry, 1919), экземпляр из Хау Саунд, Британская Колумбия. Масштаб: 1 см.

spicata, and the ratio of jugal length to the length of the postmucronal area in *D. spicata* is less than the same ratio in *O. percrassa.*

All but one species of the genus *Deshayesiella* live in the western Pacific, between Moneron Id. (near south Sakhalin Id.) (46°15'N) and the Philippine Sea (26°04'N). *D. spicata* and *Oldroydia percrassa* are found in the eastern Pacific. The combined range of both species is from Howe Sound, British Columbia, Canada (49°27'N) to the Gulf of California, Mexico (28°35'N). The genus *Deshayesiella* includes 5 known species: *D. curvata* (Carpenter MS, Pilsbry, 1892), *D. bidentata* (Taki, 1938), *D. sinica* (Xu, 1990), *D. spicata* (Berry, 1919) and *D.* sp. 1 (Philippine Sea, 26°04'65''N, 135°51'27''E, depth 480 m). The genus *Oldroydia* contains only one species, *O. percrassa* Dall, 1894 from California. Both genera were placed in the family Protochitonidae [Sirenko, 1997] for the notable similarity in the shape of the valves, and the sculpture of the tegmentum expressed in the presence of jugal and latero-pleural areas and coarse grains as in the genus *Protochiton* from the Miocene of Australia.

Species of the two genera are examples of a gradual reduction of the anterior portion of the pleural areas. The pleural areas of *D. curvata* and *D.*sp. 1 are complete, pleural areas of *D. bidentata, D. sinica* and *D. spicata* are weakly reduced, and the pleural areas in *Oldroydia percrassa* (Fig. 8A-C) is

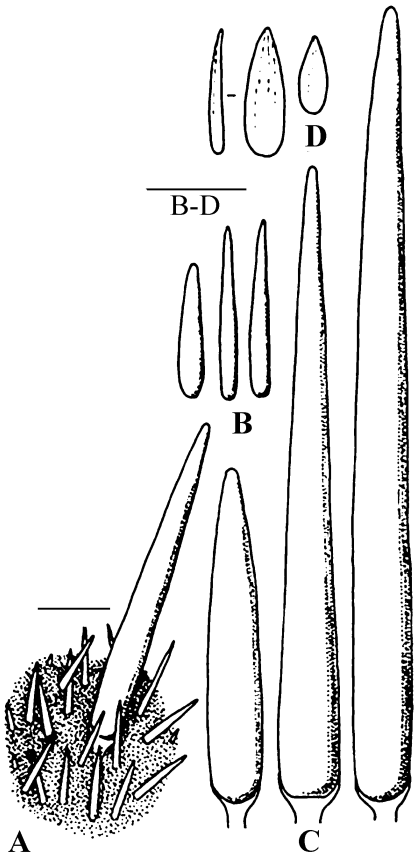

Fig. 4. *Deshaysiella spicata* (Berry, 1919), armature of girdle. A — part of dorsal side of girdle. B — dorsal spicules; C — dorsal needle-like spicules with chitinous cusp; D — ventral scales. Scale bars: 100 μm.

РИС. 4. Deshaysiella spicata (Berry, 1919), вооружение перинотума, A — вентральные чешуйки; B — дорсальные игловидные спикулы с хитиновой основой; C — дорсальные спикулы; D — часть дорсальной стороны перинотума. Масштаб: 100 мкм.

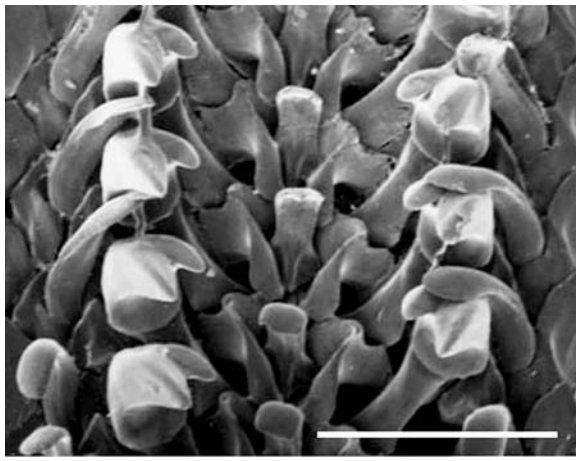

FIG. 5. *Deshaysiella spicata* (Berry, 1919), radula from 28 mm Howe Sound specimen. Scale bar: 500 μm.

РИС. 5. *Deshaysiella spicata* (Berry, 1919), радула 28 мм экземпляра из Хау Саунд. Масштаб: 500 мкм.

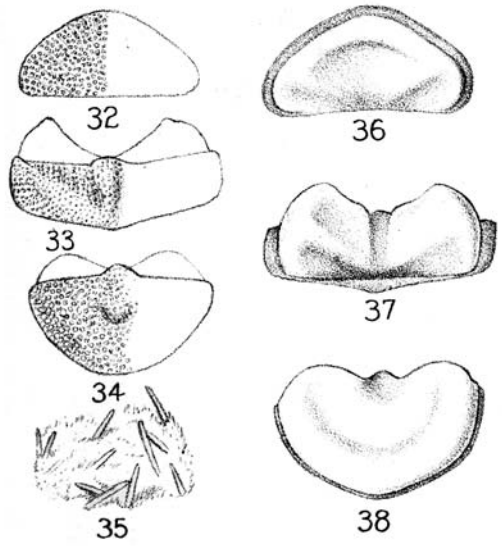

FIG. 6. after Pilsbry, 1892, Plate 2 figs. 32-38 (no figure captions or text).

РИС. 6. по Pilsbry, 1892, табл.2, рис. 32-38 (текст и подписи отсутствуют).

completely reduced. Characters of valves and girdle could reflect the diversification of species in this group. Probably the first species of *Deshayesiella* originated in the western Pacific from species related to *Protochiton*. During the Miocene, when the climate in the north Pacific was warmer than now, these rather warm water chitons could have lived throughout the northern Pacific, even extending to North America. The cooling that followed during the Upper Pliocene probably let to the eventual absence of species of *Deshayesiella* in the north Pacific between Asia and North America, so that now the genus has an amphi-Pacific distribution. *Oldroydia percrassa* could have originated from a common ancestor with *Deshayesiella spicata* as the result of a strong reduction of pleural areas. The radula and girdle of *O. percrassa* did not change so much as the shape of the valves.

The dominance of sponges in the diet of these species [Sirenko, 1997] suggests that the origination of this group was connected to the specialization of feeding on sponges.

Pilsbry [1892] in volume 14 of the Manual of Chonchology, plate 2, figures 32-38 illustrates probably a specimen of *Deshayesiella spicata*, however

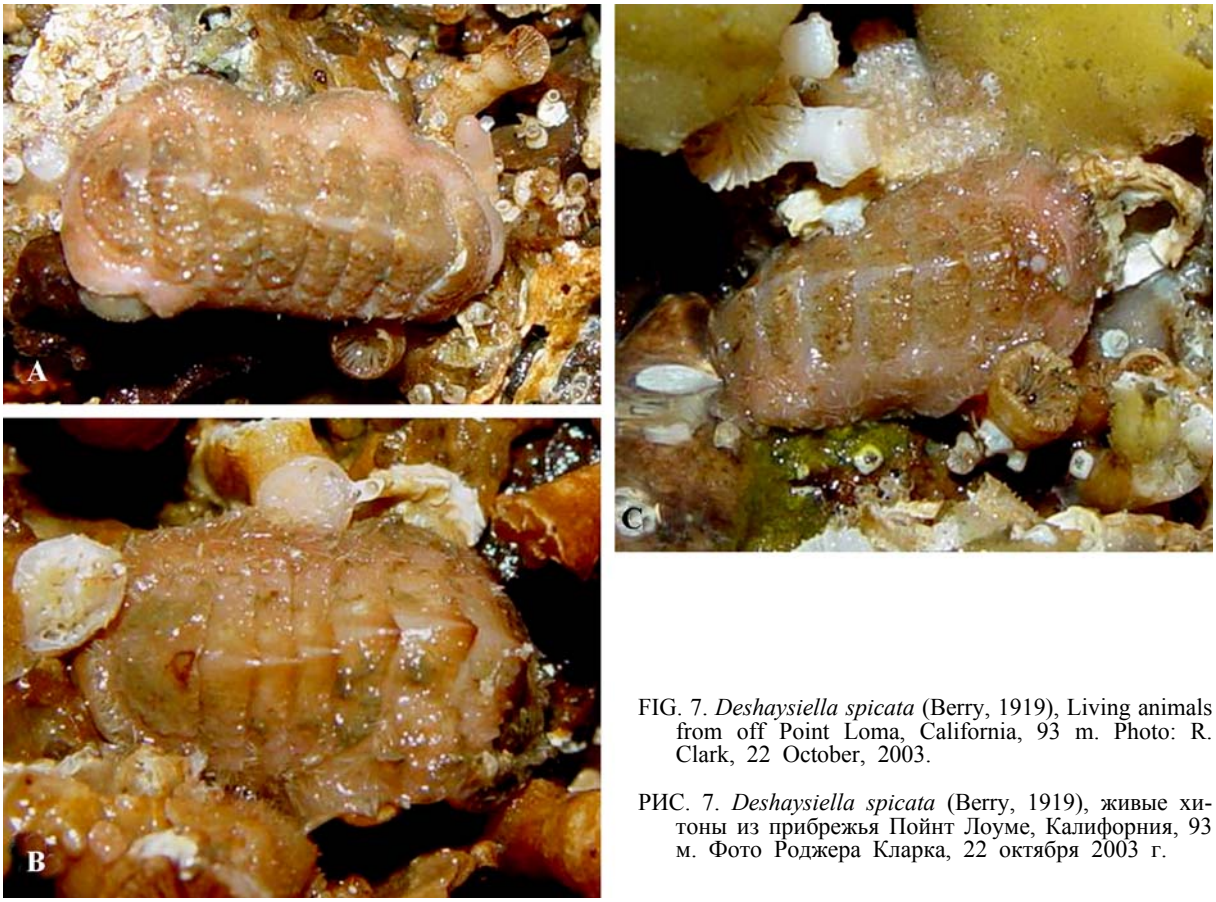

FIG. 7. *Deshaysiella spicata* (Berry, 1919), Living animals from off Point Loma, California, 93 m. Photo: R. Clark, 22 October, 2003.

РИС. 7. *Deshaysiella spicata* (Berry, 1919), живые хитоны из прибрежья Пойнт Лоуме, Калифорния, 93 м. Фото Роджера Кларка, 22 октября 2003 г.

there is no figure caption or text related to the figures (Fig. 6). Living animals *in situ* are illustrated in Figure 7 A-C.

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References

Berry S. S. 1919. Notes on West American chitons II. *Proceedings of the California Academy of Sciences*, Forth Series, 9(1): 1-36, figs.1-6, pls. 1-8.

Cowan I. McT. 1964. New Information on the distribution of marine Mollusca on the coast of British Columbia. *Veliger,* 7(2): 110-113.

Dall W. H. 1921. Summary of the marine shell bearing mollusks of the northwest coast of America, from San Diego, California to the Polar Sea, mostly contained in the collections of the United States National Museum, with illustrations of hitherto unfigured species. *Bulletin of the United States National Museum,* 112: 1-127, pls. 1-22.

Ferreira A. J. 1979. The family Lepidopleuridae (Mollusca: Polyplacophora) in the eastern Pacific. *Veliger,* 22(2): 145-165.

Kaas P., Van Belle R. A. 1985. *Monograph of Living Chitons,* Vol. 1, *Order Neoloricata:Lepidopleurina:* 1-240, figs. 1-95, maps 1-45 (E.J.Brill/Backhuys, Leiden).

Oldroyd I. S. 1927. Chitons. *In:* The marine shells of the west coast of North America. *Stanford University Publications, Geological Sciences,* 2(3): 246-323.

Pilsbry H. A. 1892. *Monograph of the Polyplacophora*. In: G. W. Tryon, *Manual of Conchology*, 14: 1-128, pls. 1-30.

Sirenko B. I. 1997. The importance of the development of articulamentum for taxonomy of chitons (Mollusca, Polyplacophora). *Ruthenica,* 7(1): 1-24.

Smith A. G. 1947a. Class Amphineura, Order Polyplacophora, families Lepidopleuidae and Lepidochitonidae. *Minutes Conchological Club of Southern California* (J. Q. Burch, ed.).66: 3-16.

Smith A. G. 1947b. Check list of west North American marine mollusks: Class Amphineura, Order Polyplacophora. *Minutes Conchological Club of Southern California,* (J. Q. Burch, ed.). 66: 17-19.

Smith A. G., Gordon M. jr. 1948. The marine mollusks and brachiopods of Monterey Bay, California and vicinity. *Proceedings of the California Academy of Sciences* Forth series, 26(8): 147-245, plts. 3, 4.

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Deshaysiella spicata (Berry, 1919) (Mollusca: Polyplacophora) — валидный вид

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РЕЗЮМЕ. Установлена валидность загадочного восточно-тихоокеанского хитона. *Deshaysiella spicata* (Berry, 1919). Этот вид переописан, для него даны рисунки и фото, а также сравнения с близкородственными видами из западной Пацифики, а также с внешне сходным видом *Oldroydia percrassa* (Dall, 1894) из калифорнийских вод. Представлены географические и батиметрические границы распространения, а также фотографии живых экземпляров в природе.

FIG. 8. *Oldroydia percrassa* (Dall, 1894), Monterey Bay, California, 12 m. Scale bar: 1 cm.

РИС. 8. *Oldroydia percrassa* (Dall, 1894), зал. Монтерей, Калифорния, 12 м. Масштабная линейка: 1 см.

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