

Two New Species of Dorid Nudibranchs (Mollusca, Opisthobranchia) from Bahía de Banderas and La Paz, Mexico

Alicia Hermosillo¹ and Ángel Valdés²

¹ *Universidad de Guadalajara, Centro Universitario de Ciencias Biológicas y Agropecuarias, Las Agujas, Zapopan, Jalisco, México; Email: alicia_hg@prodigy.net.mx;* ² *Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, California 90007, USA; Email: avaldes@nhm.org.*

Two new species of dorid nudibranchs from the Pacific coast of Mexico are described based on specimens collected from Bahía de Banderas and one specimen from La Paz. *Trapania goddardi* sp. nov. is most similar to *Trapania goslineri* (Millen and Bertsch, 2000) and *Trapania inbiotica* (Camacho and Ortea, 2000), but it is differentiated by the absence of yellow markings on the extra-rhinophoral and extra-branchial processes and the presence of marginal, large cusps on the radular teeth. *Paradoris lopezi* sp. nov. is characterized by a pale grayish-tan background color with reddish tubercles. This species is differentiated from other species of *Paradoris* from the Pacific Ocean by the presence of the external coloration mentioned above, the presence of two accessory glands and a single accessory sac with a spine, and the number and morphology of radular teeth and jaw elements.

KEY WORDS: Goniodorididae, Discodorididae, Tropical eastern-Pacific.

RESUMEN

Dos especies nuevas de dóridos nudibranchios son descritas para la costa Pacífica de México, en base a especímenes recolectados en Bahía de Banderas y un espécimen en La Paz. Las especies más similares a *Trapania goddardi* esp. nov. son *Trapania goslineri* (Millen y Bertsch, 2000) y *Trapania inbiotica* (Camacho y Ortea, 2000), pero se diferencian por la ausencia de manchas amarillas en los apéndices extra-branchiales y extra-rinofóricos, y por la presencia de cúspides marginales en los dientes de la rádula. *Paradoris lopezi* esp. nov. se caracteriza por tener una coloración general grisáceo pardo claro con tubérculos rojizos. Esta especie se diferencia de otras especies de *Paradoris* del Océano Pacífico por la coloración externa antes mencionada, la presencia de dos glándulas accesorias y un saco accesorio con una espina, así como por el número y forma de los dientes radulares, y de los elementos de la armadura labial.

PALABRAS CLAVE: Goniodorididae, Discodorididae, Pacífico Este tropical.

There has been a significant lack of information on the diversity and opisthobranch faunal composition in Bahía de Banderas, Mexico. Only a few papers have been published on the opisthobranchs from the northern coast of the bay, situated in the state of Nayarit (Sphon and Mulliner 1972; Bertsch et al. 1973; Bertsch 1978, 1980; Bertsch and Kerstitch 1984; Ferreira and Bertsch 1975), and Isla Isabel (Ortea and Llera 1981); and there are no published studies on the opisthobranchs from the central and southern sections of the bay, in the state of Jalisco.

A recent survey by the senior author has revealed a diverse opisthobranch fauna in Bahía de Banderas, including numerous undescribed species (Hermosillo-González 2003). Ninety-six species represented by over 20,000 specimens were identified in the field or collected, including 20 new records for this area, revealing a previously undocumented diverse fauna. In this paper we describe two new species collected during the survey.

MATERIALS AND METHODS

Most of the material examined was collected in several localities in Bahía de Banderas, Mexico, by the senior author. Bahía de Banderas is located on the west coast of México, in the states of Jalisco and Nayarit. Its large surface, over 1,000 km², makes it the largest bay along the Pacific coast of mainland México. Punta Mita and Cabo Corrientes, 42 kilometers apart, delimit Bahía de Banderas to the north and south respectively.

The specimens are deposited at the Department of Invertebrate Zoology and Geology of the California Academy of Sciences, San Francisco (CASIZ) and the Malacology Section of the Natural History Museum of Los Angeles County (LACM). Specimens were dissected and the internal features were examined and drawn using a dissecting microscope with a camera lucida. A portion of the mantle was critical-point dried for the Scanning Electron Microscope (SEM). The buccal mass was removed and dissolved in 10% sodium hydroxide until the radula was isolated from the surrounding tissue. The radula was then rinsed in water, dried, and mounted for examination with the SEM. Features of living animals were recorded from field photographs by the senior author.

SPECIES DESCRIPTIONS

Family Discodorididae Bergh, 1891

Genus *Paradoris* Bergh, 1884

TYPE SPECIES: *Paradoris granulata* Bergh, 1884, by monotypy.

Paradoris lopezi Hermosillo and Valdés, sp. nov

(Figs. 1A–B, 2–3)

MATERIAL EXAMINED.—HOLOTYPE: Punta de Pichilingue (24°21.25'N 110°17.001'W), La Paz, Baja California Sur, Mexico, 31 October 2004, 1 specimen 32 mm long, collected under coral rubble at 1 m depth (CASIZ 171661). PARATYPE (1): Majahuitas (20°29.111'N 105°35.057'W), Bahía de Banderas, Jalisco-Nayarit, Mexico, 10 March 2004, 27 mm long, collected under a rock at 12 m depth (LACM 3041).

EXTERNAL MORPHOLOGY.—The maximum length of the living animal is 32 mm. The preserved holotype measures 22 × 12 mm. The body shape is oval with an irregular mantle margin. The notum is larger than the foot, covering it completely (Figs. 1A–B). The gill is composed of 7 tripinnate leaves and is retractable into an irregular sheath, which is slightly inclined posteriorly. The anus is located in the middle of the branchial plume. The rhinophores have 15 conspicuous lamellae and are retractable into irregular sheaths. The dorsum is porous and lacks caryophyllidia (Fig. 2E), but it is covered with irregular tubercles of different sizes. There are a few larger tubercles on the center of the dorsum and smaller and more abundant tubercles towards the mantle margin. Minute tubercles cover the entire surface of the dorsum. Ventrally, the anterior border of the foot is notched and grooved. The oral tentacles are conical and not grooved.

The color of the body is pale grayish-tan with the smaller tubercles having the same color as the rest of the body (Fig. 1A). On closer inspection, minute dark ringlets composed of black specks

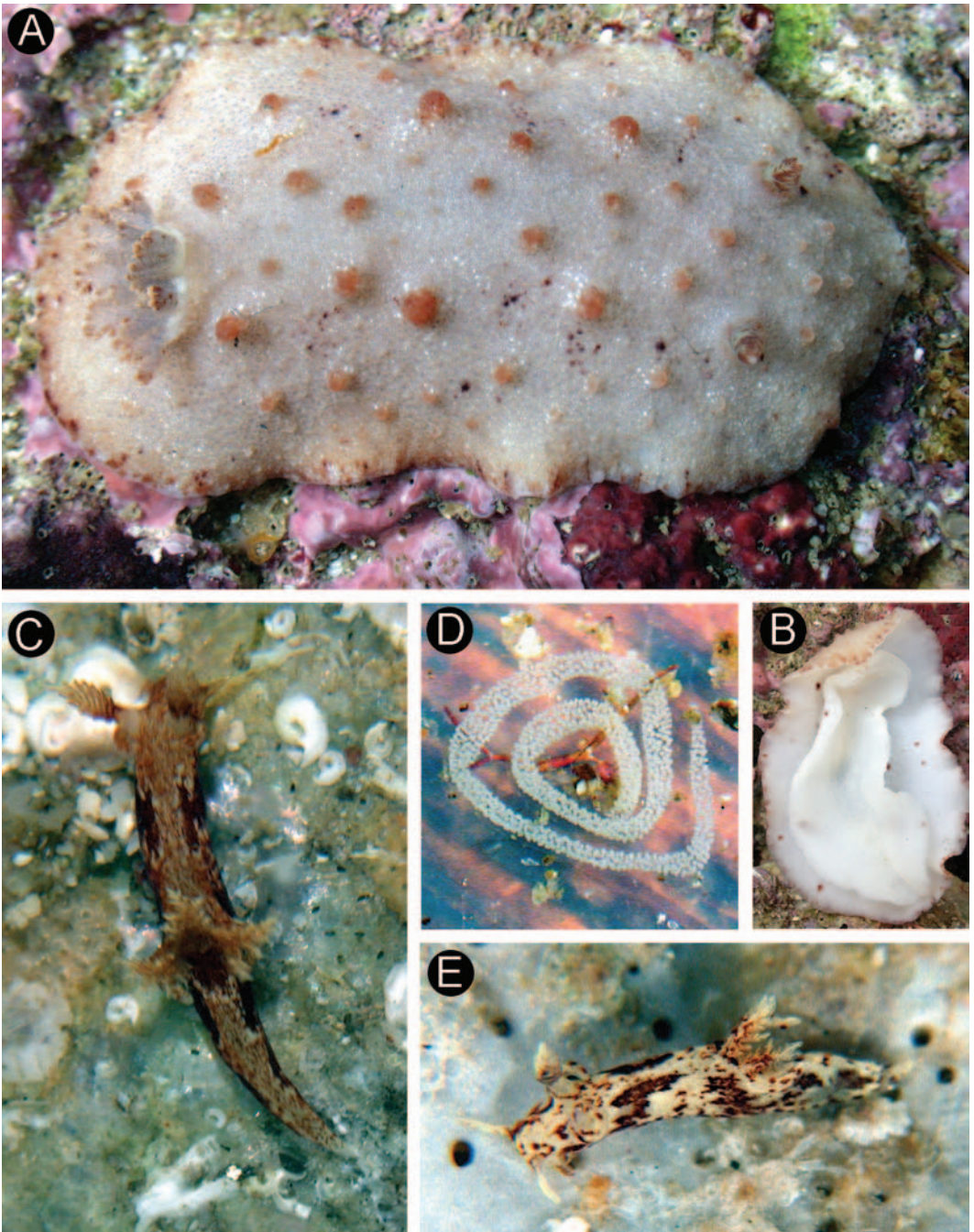


FIGURE 1. Living animals and egg mass. (A) *Paradoris lopezi* sp. nov, dorsal view of the paratype (LACM 3041). (B) Same specimen, ventral view. (C) *Trapania goddardi* sp. nov, holotype (LACM 3039). (D) *Trapania goddardi* sp. nov, egg mass. (E) *Trapania goddardi* sp. nov, lighter paratype (CASIZ 171662).

and white flecks can be observed. A few irregularly distributed large black spots can be observed on the dorsum. The larger tubercles in the center of the dorsum are of a dark reddish-orange. The mantle margin is encircled by a blotchy tan line. The branchial leaves are clear grayish-tan with darker tips. The rhinophores have a clear stalk with dark lamellae. The ventral side of the body is white with a few tan spots; color varies among individuals from pale to dark grayish-tan.

INTERNAL ANATOMY.— The oral tube is small and short, with six strong retractor muscles attached posteriorly (Fig. 3C). The buccal bulb is about twice as large as the oral tube, rounded, with a conspicuous radular sac emerging from the posterior ventral surface and pointing upwards. There is a pair of retractor muscles attached to the sides of the buccal bulb. There are two elongate and folded salivary glands attached to the buccal mass, near the esophageal insertion.

The radular formula is $23 \times 17.0.17$ in a 27 mm long specimen (LACM 3041). There is no rachidian tooth. The innermost lateral teeth are simple hooks with a long, curved cusp and no denticles (Fig. 2A). The mid-lateral teeth change abruptly in size, becoming larger at about teeth 3–4; the cusps of the mid-lateral teeth are also shorter and the base longer and more curved than those of the inner teeth (Fig. 2B). The outer teeth are smaller and have a short triangular cusp; the outermost tooth of each row is reduced to a simple plate (Fig. 2C). The labial cuticle has a pair of jaws composed of numerous, irregular rodlets (Fig. 2D).

REPRODUCTIVE SYSTEM.— The reproductive system is triaulic (Figs. 3A–B). The narrow preampullary duct widens into a long and convoluted ampulla that has three folds. The ampulla narrows abruptly into the distal portion and connects to the female glands and the prostate. The prostate is broad, glandular and folded, with two regions clearly differentiated. The prostate narrows into the deferent duct, which is a long, extremely narrow and irregularly coiled tube that opens in a large common atrium with the vagina. The penis is unarmed. The vagina is a long, thin tube that tapers proximally and runs over the female gland to enter the large, spherical bursa copulatrix. The seminal receptacle is rounded and connects serially to the bursa copulatrix.

GEOGRAPHIC RANGE.— This species is only known from Bahía de Banderas, Jalisco-Nayarit, Mexico and La Paz, Baja California Sur, Mexico.

NATURAL HISTORY.— This species is found in the shallow subtidal (12 m depth) under rocks. Individuals produce a milky substance when disturbed.

ETYMOLOGY.— The specific name is dedicated to the memory of the father of the second author, Ángel Valdés López, who passed away in August 2003.

REMARKS.— *Paradoris lopezi* has all the features characteristic of the genus *Paradoris* (see Valdés 2002) as follows: anterior border of the foot notched and grooved; dorsum covered with simple tubercles, stiffened by integumentary spicules; labial cuticle armature with rodlets; radula composed of simple, strong, hamate teeth, which have a short cusp and lack denticles; reproductive system with a flattened, granular prostate, having two well differentiated regions, and a series of accessory glands and/or accessory sacs containing copulatory spines; penis and vagina devoid of hooks.

Four other species of *Paradoris* are known from the Pacific Ocean, but none has previously been reported from the eastern Pacific. These four species are: *Paradoris leuca* Miller, 1995 from New Zealand, *Paradoris tsurugensis* Baba, 1986, from Japan, and *Paradoris araneosa* Valdés, 2001 and *Paradoris imperfecta* Valdés, 2001, both from New Caledonian deep waters.

Paradoris leuca differs from *P. lopezi* by lacking accessory glands and copulatory sacs armed with spines (see Miller 1995). Other differences are the shape of the jaw elements, which have a triangular cusp in *P. leuca* and are rounded or irregular in *P. lopezi*. Externally, the dorsal tubercles of *P. leuca* are smaller than those of *P. lopezi*.

Paradoris tsurugensis is the most similar species to *P. lopezi* in external morphology and col-

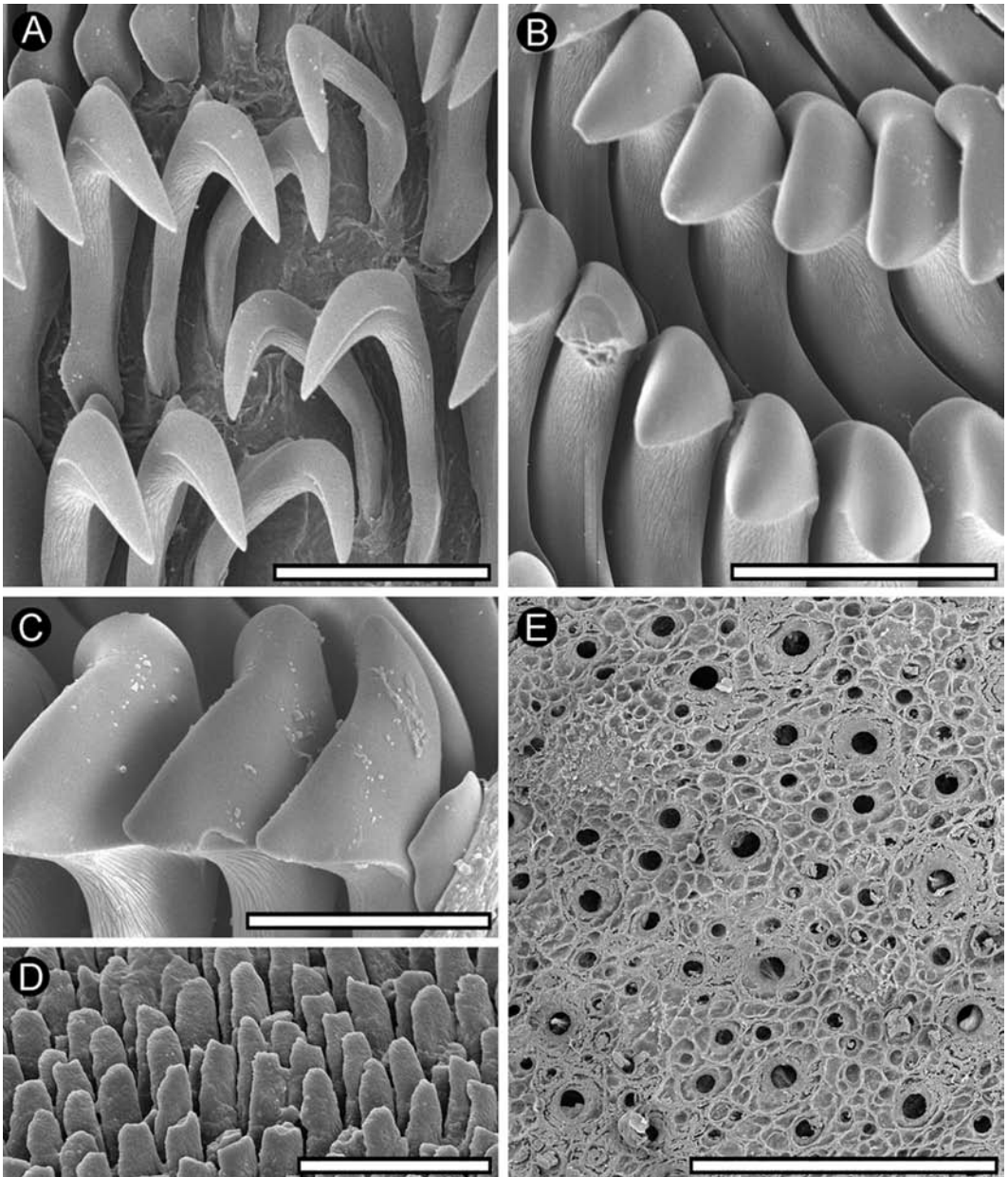


FIGURE 2. *Paradoris lopezi* sp. nov., paratype (LACM 3041), Scanning Electron Micrographs of radula, jaws, and dorsum. (A) Innermost lateral teeth, scale bar = 100 μ m. (B) Mid-lateral teeth, scale bar = 100 μ m. (C) Outermost lateral teeth, scale bar = 50 μ m. (D) Jaw rodlets, scale bar = 30 μ m. (E) Dorsum, scale bar = 500 μ m.

oration. Both species share a grayish background color with large yellowish-orange dorsal tubercles. However, the tubercles of *P. tsurugensis* are lighter than those of *P. lopezi*, and in the former species they are surrounded by a darker line and often have a darker central area. The tubercles of *P. lopezi* are uniformly dark reddish-orange. Anatomically, *P. tsurugensis* is distinguishable from *P.*

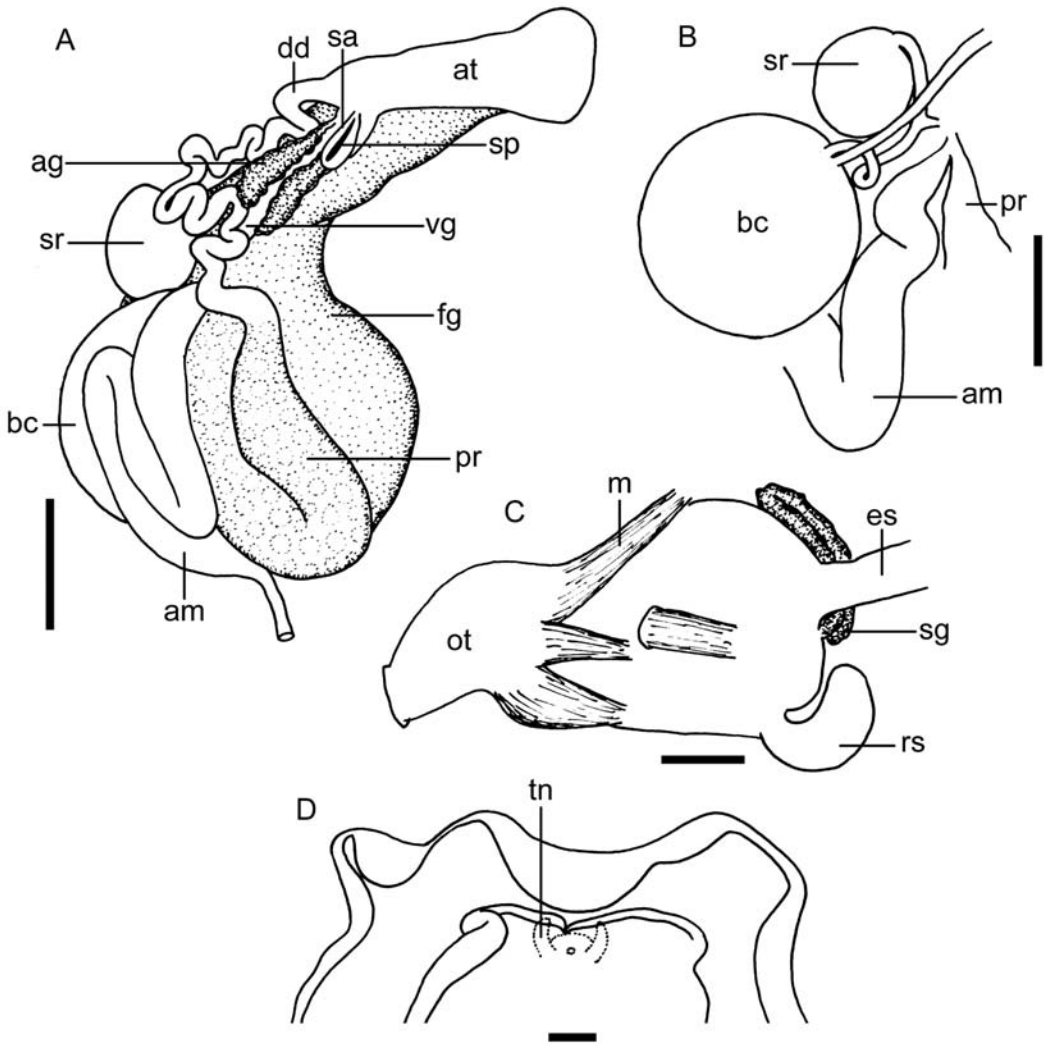


FIGURE 3. *Paradoris lopezi* sp. nov., paratype (LACM 3041), anatomy. (A) Reproductive system, scale bar = 1 mm. (B) Detail of several reproductive organs, scale bar = 1 mm. (C) Lateral view of the buccal mass, scale bar = 1 mm. (D) Ventral view of the anterior end of the foot, scale bar = 1 mm. Abbreviations: am, ampulla; at, genital atrium; ag, accessory gland; bc, bursa copulatrix; dd, deferent duct; es, esophagus; fg, female glands; ot, oral tube; pr, prostate; sg, salivary gland; rs, radular sac; sa, accessory sac; sp, copulatory spine; sr, seminal receptacle; tn, oral tentacle; vg, vagina.

lopezi in having two accessory glands and two copulatory sacs armed with spines (see Baba 1986), instead of two accessory glands and a single accessory sac. Also, *P. tsurugensis* has many more radular teeth than *P. lopezi* at comparable size. The radular formula of the former is $90 \times 20-25.0.20-25$ whereas it is $23 \times 17.0.17$ in the latter.

Paradoris araneosa is clearly distinguishable from *P. lopezi* by its external morphology and coloration. The dorsal tubercles of *P. araneosa* are smaller and more densely arranged than those of *P. lopezi*. Additionally, the color of the former is pale brown with a few large, dark brown spots scattered on the dorsal surface, and several, more numerous, small darker dots; the larger tubercles

are opaque white. This contrasts with *P. lopezi*, which is pale grayish-tan with the smaller tubercles having the same color as the rest of the body and the larger tubercles being dark reddish-orange.

Paradoris imperfecta differs from *P. lopezi* in lacking accessory glands and by having two accessory sacs (see Valdés 2001), instead of one. Externally, *P. imperfecta* lacks the large dorsal tubercles present in *P. lopezi*. Also, the color of the living animals is uniformly cream with a few, irregular, pale brown spots, and numerous small dark brown dots on the dorsal surface, which is very different from the pale grayish-tan color with dark reddish-orange tubercles of *P. lopezi*.

Family Goniadorididae H and A. Adams, 1854

Genus *Trapania* Pruvot-Fol, 1931

TYPE SPECIES: *Trapania fusca* (Lafont, 1874), by monotypy.

Trapania goddardi Hermosillo and Valdés, sp. nov

(Figs. 1C-E, 4-5)

MATERIAL EXAMINED.— HOLOTYPE: Islas Marietas (20°42.042'N, 105°33.878'W), Bahía de Banderas, Jalisco-Nayarit, Mexico, 17 April 2003, 7 mm long, collected on a wall at 9 m depth (LACM 3039). PARATYPES (2): Islas Marietas (20°42.042'N, 105°33.878'W), Bahía de Banderas, Jalisco-Nayarit, Mexico, 17 April 2003, 1 specimen 6 mm long, dissected (CASIZ 171662); Bajo de la Viuda (20°43.973'N, 105°23.544'W), Bahía de Banderas, Jalisco-Nayarit, Mexico, 18 November, 2003, 1 specimen 3 mm long collected on a wall at 12 m of depth, dissected (LACM 3040).

EXTERNAL MORPHOLOGY.— The maximum length of the living animal is 7 mm. The body is smooth, lacking tubercles, and elongate, wider in the middle region (Figs. 1C–E). The border of the mantle is reduced, undifferentiated. Each side of the body bears a digitiform extra-branchial process and a digitiform and posteriorly-curved extra-rhinophoral process. The non-retractile rhinophores are short and stout; they have no sheaths and bear 6–7 lamellae. The three branchial leaves are bipinnate and non-retractile. The anus closes the branchial circlet posteriorly. The digitiform oral tentacles are short, situated antero-laterally on the rounded cephalic region.

The color of the body is variable from off-white with irregular small brown blotches on the middle and sides of the dorsum to tan with darker blotches. The larger blotches are almost diamond shaped; the two anterior ones join in the middle of the dorsum. The density of the brown blotches can vary between individuals (Figs. 1C–E). The ventral side of the body is off-white. The oral tentacles, rhinophores, branchial leaves, posterior end of the foot, and extra-branchial and extra-rhinophoral processes are the same color as the rest of the body, off-white with some brown spots.

INTERNAL ANATOMY.— The radular formula is $17 \times 1.0.1$ in a 6-mm long specimen (LACM 3040). The radula consists of two series of 17 elongated lateral teeth (Fig. 4A). Each tooth has a long, sharp, hamate cusp displaced to the side of the radula, which generally curves inwards. Additionally, each tooth has a series of 4–6 large denticles with 1–3 smaller denticles intercalated between the larger ones.

The jaws have a single series of rodlets on the masticatory border (Fig. 4B); they have a single cusp and a wide base.

REPRODUCTIVE SYSTEM.— The reproductive system is triaulic (Fig. 5A). The ampulla is pyriform and connects directly to the female gland and prostate. The prostate is wide and irregular in shape, with a single loop; it connects to the deferent duct, which opens into a common atrium with the vagina. The long, narrow vagina connects directly to the rounded bursa copulatrix (serial) near the insertion point of the smaller, round, seminal receptacle. The penis bears several rows of penial hooks of different sizes and shapes (Fig. 5B).

GEOGRAPHIC RANGE.—*Trapania goddardi* is known from the type locality in Bahía de Banderas, Jalisco-Nayarit and from Santa Cruz, Nayarit, Mexico.

NATURAL HISTORY.— This species is found intertidally and in the upper subtidal (maximum depth 12 m) on or under rocks. The cryptic coloration, which blends with the environment, and its small size make this species difficult to find. The egg mass is a clear string of large white eggs with two whorls (Fig. 1D). The size of the egg mass is 6.3 mm × 5.4 mm with an average width of 0.76

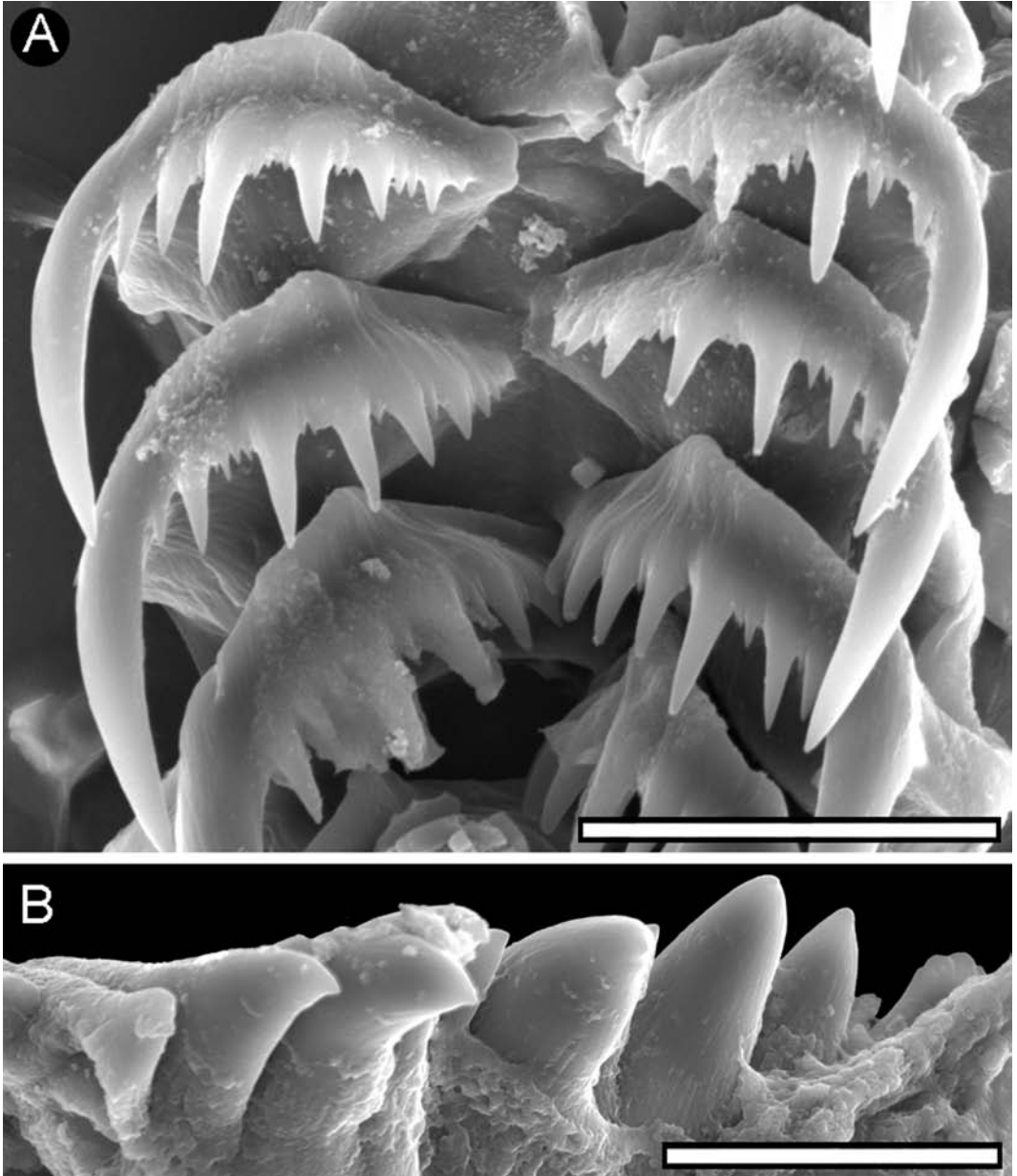


FIGURE 4. *Trapania goddardi* sp. nov, holotype (LACM 3039), Scanning Electron Micrographs of radula and jaws. (A) Radular teeth, scale bar = 20 μ m. (B) Jaw rodlets, scale bar = 20 μ m.

mm. The average diameter of the eggs is 0.135 mm. The average number of eggs per square mm is 56.

ETYMOLOGY.—The specific name is given in honor of Dr. Jeff Goddard who first found this species in 1985.

REMARKS.—The generic placement of *Trapania goddardi* is based on the shape of the body, which is elongate, wider in the middle, with a pair of extra-branchial and a pair of extra-rhinophoral processes; the radular morphology is also diagnostic with a single series of elongate lateral teeth with several pointed denticles and a larger outer cusp, and lacking a rachidian tooth.

There are three valid species of *Trapania* described for the eastern Pacific: *Trapania velox* (Cockerell, 1901) is known from California to the Pacific side of Baja California (Behrens 2004); *Trapania goslineri* Millen and Bertsch, 2000, is known from the Gulf of California, the outer coast of Baja California, and from the Pacific Coast of mainland Mexico in Bahía de Banderas (Hermosillo-González 2003); and *Trapania inbiotica* Camacho and Ortea, 2000 is known only from Costa Rica (Camacho and Ortea 2000). *Trapania goslineri* alone has been reported for an area that overlaps the known range of *T. goddardi*.

The three eastern Pacific species have a bright white background color and are easily distinguishable from *T. goddardi*. Both *T. velox* and *T. goslineri* have yellow markings on the oral tentacles, rhinophores, branchial leaves, extra-rhinophoral and extra-branchial processes, and on the dorsal portion of the posterior part of the foot (Millen and Bertsch 2000). Similar yellow markings can be observed in *T. inbiotica* except for the branchial leaves and rhinophores (Camacho and Ortea 2000). *Trapania goslineri* has black spots irregularly distributed over the entire body; *T. velox* has black lines and *T. inbiotica* red spots (Millen and Bertsch 2000). On the contrary, *T. goddardi* has an off-white background color, with various sizes and densities of brown spots, and it lacks black or red pigmentation. Also, the rhinophores, branchial leaves, extra-branchial and extra-rhinophoral processes, oral tentacles, and posterior end of the foot are the same color as the rest of the body, lacking yellow markings.

Internally, *Trapania goddardi* is easily distinguishable from the other eastern Pacific species of *Trapania*. The radula of *T. goddardi* is remarkably distinct by having an elongate and curved cusp situated on the outermost edge of the lateral teeth. *Trapania inbiotica* has denticles on the outer side of the cusp, a radular formula with 28 rows (Camacho and Ortea 2000), versus 17 in *T. goddardi*, and 21–24 inner denticles, many more than the 4–6 inner denticles of *T. goddardi*. *Trapania goslineri* has two outer denticles, a smaller one followed by a more elongate one; its radular formula is 37–41 and each tooth has 7–9 inner denticles. *Trapania velox* has a radular formula of 22–32 rows, with a long outer denticle and 8–11 inner denticles on each tooth (Millen and Bertsch 2000).

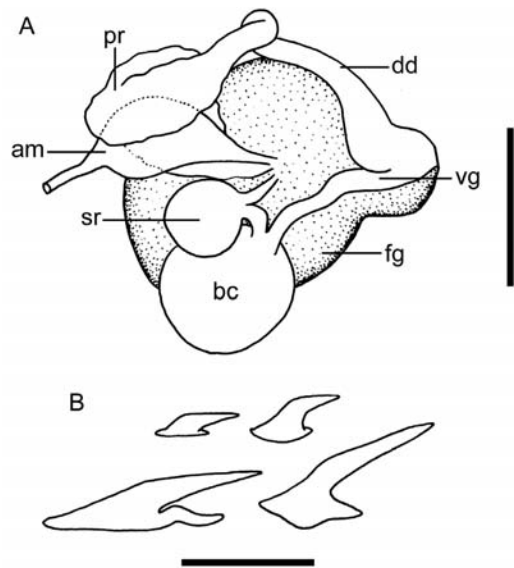


FIGURE 5. *Trapania goddardi* sp. nov., holotype (LACM 3039), anatomy. (A) Reproductive system, scale bar = 0.5 mm. (B) Penial spines, scale bar = 10 μ m. Abbreviations: am, ampulla; bc, bursa copulatrix; dd, deferent duct; fg, female glands; pr, prostate; sr, seminal receptacle; vg, vagina.

The reproductive system of *Trapania goddardi* is similar to the other species, except for *T. goslineri*, which has a semiserial bursa copulatrix (Millen and Bertsch 2000), whereas in *T. goddardi* it is serial.

There are two Indo-West Pacific species that have a white and brown coloration with patches: *Trapania brunnea* Rudman, 1987 and *Trapania safracornia* Fahey, 2004. The reproductive systems of *T. brunnea*, *T. safracornia* and *T. goddardi* are similar, but their external colorations are very different. *Trapania brunnea* has well-defined bright white blotches on a dark brown background (Rudman 1987). *Trapania safracornia* has a brown color with symmetrical white patches between the rhinophores, gill and posterior end of dorsum; the white patch on the gill area is saddle shaped (Fahey 2004) as opposed to the diamond shaped tan blotches of *T. goddardi*. The rhinophores of *T. brunnea* are brown in color with a white tip, slender and have a long tip that protrudes from the clavus; the rhinophores of *T. safracornia* are translucent with a red clavus and a white tip, whereas *T. goddardi* has stout rhinophores, off-white in color with brown specks. *Trapania brunnea* has white processes with a brown band, *T. safracornia* has yellow processes while *T. goddardi* has off-white processes with tan specks. The gill of *T. brunnea* is white with brown and red specks, the gill of *T. safracornia* is translucent with a pink tinge, and the gill of *T. goddardi* is off-white with brown blotches.

The radular teeth of *T. brunnea*, *T. safracornia*, and *T. goddardi* are similar, all having a long curved cusp situated on the outer edge of the lateral teeth. However, the number of primary and secondary denticles and size and shape of the large cusp are different in each species. The outer cusp of *T. goddardi* is proportionally longer compared to the width of the tooth than those of *T. safracornia* and *T. brunnea*. *Trapania safracornia* has 10–14 primary denticles per tooth with a smaller denticle between each pair of larger ones (Fahey 2004). *Trapania brunnea* has 15 denticles but the secondary denticles are not always present between the primary ones (Rudman 1987). *Trapania goddardi* has only 4–6 primary denticles which are considerably smaller than the outer cusp, and secondary denticles numbering up to three. The radular formula of the three species are 21 rows of teeth for *T. safracornia*; 30 for *T. brunnea* and 17 for *T. goddardi*. The jaws of these three species differ as well. *Trapania brunnea* has two rows of curved rodlets with sharp tips; *T. safracornia* has two rows of straight sharp rodlets; and *T. goddardi* has one row of rodlets with a single cusp and a wide base.

ACKNOWLEDGMENTS

We would like to acknowledge Roberto Chavez and Buceo Vallartech in Puerto Vallarta for funding the field work. Also our thanks to Carole and Julius Hertz for a critical review of the manuscript and the Instituto Técnico del Mar # 6 and the Centro Universitario de la Costa (Universidad de Guadalajara) for their support.

This research is part of the National Science Foundation supported project “Phylogenetic systematics of dorid nudibranchs,” through the PEET grant DEB-9978155 to Terrence M. Gosliner and the junior author. The SEM work was conducted at the LACM facility supported by the National Science Foundation under the MRI grant DBI-0216506.

REFERENCES

- BABA, K. 1986. Description of a new species of nudibranchiate Mollusca, *Paradoris tsurugensis*, Dorididae, from Japan. *Boletim de Zoologia* 10:1–8.
- BEHRENS, D.W. 2004. Pacific Coast Nudibranchs — Supplement II: New Species to the Pacific Coast and New Information on the Oldies. *Proceedings of the California Academy of Sciences* 55:11–54.

- BERTSCH, H. 1978. The Chromodoridinae nudibranchs from the Pacific coast of America. — Part II. The genus *Chromodoris*. *The Veliger* 20:307-327.
- BERTSCH, H. 1980. A new species of *Bornella* from tropical West-America. *Spixiana* 3:33-42.
- BERTSCH, H., AND A. KERSTITCH. 1984. Distribution and radular morphology of various nudibranchs (Gastropoda: Opisthobranchia) from the Gulf of California, México. *The Veliger* 26:264-273.
- BERTSCH, H., A.J. FERREIRA, W.M. FARMER, AND T.L. HAYES. 1973. The genera *Chromodoris* and *Felimida* (Nudibranchia: Gastropoda) in tropical west America: Distributional data, description of a new species, and scanning electron microscopic studies of radula. *The Veliger* 15:287-294.
- CAMACHO-GARCÍA, Y., AND ORTEA, J. 2000. A new species of *Trapania* (Nudibranchia: Goniodorididae) from the Pacific coast of Central America. *Revista de Biología Tropical* 48:317-322.
- CAMACHO-GARCÍA, Y., AND VALDÉS, A. 2003. Caryophyllidia bearing dorid nudibranchs (Mollusca, Nudibranchia, Doridacea), from Costa Rica. *Proceedings of the California Academy of Sciences* 54:65-79.
- FAHEY, S. 2004. A new species of *Trapania* (Nudibranchia: Goniodorididae) from Western Australia with comparisons to other Indo-West Pacific *Trapania*. *Zootaxa* 514:1-12.
- FERREIRA, A.J., AND H. BERTSCH. 1975. Anatomical and distributional observations of some opisthobranchs from the Panamic faunal province. *The Veliger* 17:323-330.
- HERMOSILLO-GONZÁLEZ, A. 2003. New distributional records of opisthobranch mollusks for Bahía de Banderas, México (Tropical Eastern Pacific). *The Festivus* 35:21-28.
- MILLEN, S.V., AND BERTSCH, H. 2000. Three new species of dorid nudibranchs from southern California, USA, and the Baja California Peninsula, México. *The Veliger* 43:354-366.
- MILLER, M.C. 1995. New species of the dorid nudibranch genus *Paradoris* Bergh, 1884 (Gastropoda: Opisthobranchia) from New Zealand. *Journal of Natural History* 29:901-908.
- ORTEA, J.A., AND E.M. LLERA. 1981. Un nuevo dórido (Mollusca: Nudibranchia) de la Isla Isabel, Nayarit, México. *Iberus* 1:47-52.
- RUDMAN, W. 1987. The genus *Trapania* (Nudibranchia: Goniodorididae) in the Indo-West Pacific. *Journal of Molluscan Studies* 53:189-212.
- SCHRÖDL, M. 2000. Revision of dorid Nudibranchia collected during the French Cape Horn Expedition in 1882-1883, with discussion of the genus *Geitodoris* Bergh, 1891. *The Veliger* 43:197-209.
- VALDÉS, A. 2001. Deep-sea dorid nudibranchs (Mollusca, Opisthobranchia) from the tropical West Pacific, with descriptions of two new genera and nineteen new species. *Malacologia* 43:237-311.
- VALDÉS, A. 2002. A phylogenetic analysis and systematic revision of the cryptobranch dorids (Mollusca, Nudibranchia, Anthobranchia). *Zoological Journal of the Linnean Society* 136:353-636.