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Two New Species of Nudibranch Mollusks from the Tropical Eastern Pacific of Mexico

Terrence M. Gosliner [1] and Hans Bertsch [2]

[1] *Department of Invertebrate Zoology, California Academy of Sciences, 55 Music Concourse Drive, San Francisco, CA 94118, U.S.A. E-mail: tgosliner@calacademy.org*;
[2] *192 Imperial Beach Blvd., Imperial Beach, CA 91932, U.S.A. E-mail: hansmarvida@sbcglobal.net*

Two new species of nudibranch gastropods are described from the Bahía de los Ángeles region of the Sea of Cortez, Baja California, México. *Rostanga ghiselini* sp. nov. is known from two specimens found 25 years apart. It is immediately recognizable and distinct from all other *Rostanga* species by its bright red coloration with large densely packed black spots and conical rhinophores with transverse lamellae. Internal differences, especially the form of the bifurcate radular teeth, also distinguish this species. Differences between *R. ghiselini* and the sympatric *R. pulchra* are noted. *Tenellia ivetteae* sp. nov., known from Mexico and Costa Rica, is characterized by a uniformly translucent white body with light yellowish pigment occupying the digestive gland of the cerata. The cerata are short and rounded. The uniseriate radula teeth have 4–7 elongate denticles on either side of the wide central cusp. The penis is armed with a short cuticular stylet.

Se describen dos especies nuevas de gasterópodos nudibranquios de la Bahía de los Ángeles en la región del Mar de Cortés, Baja California, México. De *Rostanga ghiselini* sp. nov. se conocen dos especímenes que fueron encontrados durante a lo largo de 25 años. Esta se reconoce inmediatamente y se le distingue de las otras especies de *Rostanga* por su coloración rojo brillante con grandes manchas de puntos negros agrupados densamente, y rinóforos cónicos con lamelas transversales. Las diferencias internas, en especial la forma bifurcada de los dientes radulares, también es algo que distingue a esta especie. Se describen las diferencias entre *R. ghiselini* y su simpátrica *R. pulchra*. *Tenellia ivetteae* sp. nov., conocida desde México y Costa Rica, se caracteriza por su cuerpo blanco uniformamente translúcido con pigmentos amarillos claros que ocupan la glándula digestiva de la cerata. Los cerata son cortos y redondeados. Los dientes radulares uniseriados tienen de 4 a 7 dentículos largos en cada lado de la ancha cúspide central. El pene está armado con un estilete corto cutícular.

KEYWORDS: Nudibranchs, gastropods, Panamic, new species, biodiversity, Gulf of California

The heterobranch sea slug fauna of the Pacific coast of Mexico has received considerable attention in recent years and many new taxa have been described (Gosliner and Bertsch, 2004; Bertsch, Valdés and Gosliner, 2009; Angulo-Campillo and Bertsch, 2013; Carmona, Pola, Gosliner and Cervera, 2014; Pola, Sánchez-Benítez, and Ramiro, 2014; Hoover, Lindsay, Goddard and Valdés, 2015), but many new species still remain undescribed (Behrens and Hermosillo, 2005; Camacho-García, Gosliner and Valdés, 2005).

Studies on the systematics of dorid nudibranchs of the genus *Rostanga* have added many new species to the genus, primarily based on specimens from Australia and the Indo-Pacific (Rudman and Avern, 1989) and from southern Africa (Garavoy, Valdés and Gosliner, 2001). An additional three species of *Rostanga* have been described since then: *R. ankyra* from the deep Pacific (Valdés, 2001); *R. alisae* Martynov, 2003, from the Russian Pacific; and *R. crocea* from Ghana (Edmunds, 2011). Thus far, only a single species of *Rostanga*, *R. pulchra* MacFarland, 1905, has been described from the eastern Pacific, where it is known from Alaska to Chile (Camacho-García, Gosliner and Valdés, 2005; Schrödl and Grau, 2006). The Galápagos Islands *Rostanga* sp. in Camacho-Garcia et al. appears to be a *Diaulula* sp., based on dissection of the radula (present study).

Recently, the Family Fionidae has been radically revised, combining most species of Tergipedidae, Calmidae and Eubranchidae into a single family (Cella, Carmona, Ekimova, Chichvarkhin, Schepetov and Gosliner, 2016) and realigning many of the genera within the family. As a result, most species previously considered as members of *Cuthona* Alder and Hancock, 1855 were transferred to *Tenellia* Costa, 1866. Of the 39 species of Fionidae found on the Pacific Coast of North America (Behrens and Hermosillo, 2005), only 13 were sequenced in Cella et al. (2016). They include species in the genera *Eubranchus* (*E. olivaceus* (O'Donoghue, 1922)), *Cuthona* (*C. nana* (Alder and Hancock, 1842)), *Tenellia* (*T. adspersa* (Nordman, 1845), *T. albocrusta* (MacFarland, 1966), *T. columbiana* (O'Donoghue, 1922), *T. flavovulta* (MacFarland, 1966), *T. fulgens* (MacFarland, 1966), *T. lagunae* (O'Donoghue, 1926) and *T. pustulata* (Alder and Hancock, 1854)), *Cuthonella* (*C. concinna* (Alder and Hancock, 1843) and *C. cocoachroma* (Williams and Gosliner, 1979)) and *Fiona* (*F. pinnata* (Eschscholtz, 1831)). None of the species found within the Gulf of California have been investigated by molecular studies. Despite confirmation from molecular data, a series of morphological criteria for differentiating the members of the revised genera were proposed by Cella et al. (2016).

Since the work of Behrens and Hermosillo several additional species of Fionidae (as Tergipedidae) from the tropical eastern Pacific have been described. Camacho García et al. (2005) included six undescribed species of *Cuthona*, not included in Behrens and Hermosillo. Hermosillo and Valdés (2007) described three new species of *Cuthona* and one new species of *Eubranchus*. *Cuthona destinayae* Hermosillo and Valdés, 2007 was included in Behrens and Hermosillo as *Cuthona* sp. 4 and by Camacho García et al. as *Cuthona* sp. 2. *Cuthona millenae* Hermosillo and Valdés, 2007 was included in Behrens and Hermosillo as *Cuthona* sp. 5 and in Camacho García et al. as *Cuthona* sp. 8. *Cuthona behrensi* Hermosillo and Valdés, 2007 was included in Camacho García et al. as *Cuthona* sp. 9. *Eubranchus yolandae* Hermosillo and Valdés, 2007 was not included in either of the above mentioned field guides. *Cuthona riosi* Hermosillo and Valdés, 2008 was included in Behrens and Hermosillo as *Cuthona* sp. 2.

Methods

Specimens of the two species described here were collected beginning in 1992 and most recently in March, 2017 at Bahía del los Ángeles, México. Specimens from the 1990s were preserved in either 10% formalin or Bouin's fixative for proper preservation of anatomical structures. The most recently collected specimen of *Rostanga* was preserved entirely in 95% ethanol for later molecular study.

At the California Academy of Sciences, dissections were completed, and drawings of anatomical structures were accomplished using a Nikon SMZ-U binocular microscope with drawing tube. Buccal masses, containing the jaws, radula and connective tissue, were carefully extracted from specimens with the aid of a dissecting microscope and forceps. The mass was placed in 10% sodi-

um hydroxide (NaOH), allowed to soak for 4–24 hours and then rinsed in ddH_20 or deionized H_20. Once all connective tissue was removed, the radula and jaw were dried and mounted for examination by scanning electron microscope (SEM). Reproductive systems were carefully removed, examined and sketched under a dissecting microscope with a camera lucida. Caryophyllidia and penial morphology was also examined by SEM and dissected organs were mounted on stubs and air-dried. Structures were then coated with gold/palladium using a Cressington 108 Auto vacuum sputter coater. Scanning electron micrographs were produced using a Hitachi SU3500 scanning electron microscope. Specimens and dissected structures were deposited at the California Academy of Sciences in the Invertebrate Zoology Department collection (CASIZ).

Species Descriptions

Family Discodorididae Bergh, 1891

Genus *Rostanga* Bergh, 1879

Type species: *Doris coccinea* Forbes, 1848 (=*Doris rubra* Risso, 1818), by monotypy.

***Rostanga ghiselini* Gosliner and Bertsch sp. nov.**

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Figures 1A,B, 2, 3, 4A

Reddish dorid: Bertsch, 2008:337.

Rostanga sp.: Bertsch, 2014:177; Bertsch and Aguilar Rosas, 2016:275 (photo).

Material examined.— Holotype: CASIZ 220373, dissected and subsampled for molecular study, 10 m depth, Punta Gringa, Bahía de los Ángeles, Baja California, Gulf of California, México, 25 March 2017, Craig Hoover.

Comparative material examined: Rostanga pulchra: One specimen, CASIZ 097529, Punta Vicente Roca, Isla Isabela, Galápagos Islands, 14 May 1994, Paul Humann.

Additional observations: One specimen, Bahía San Luis Gonzaga, Baja California, Gulf of California, México, 11 December 1962, Wesley M. Farmer (photo M321). One specimen, 5 m depth, Punta la Gringa, Bahía de los Ángeles, Baja California, Gulf of California, México, 12 mm, 24 October 1986, H. Bertsch. One specimen with egg mass, 3 m depth, Punta la Gringa, Bahía de los Ángeles, Baja California, Gulf of California, México, 20 mm, 14 March 1992 (HB photo M3895). One animal, 6 m depth, Punta la Gringa, Bahía de los Ángeles, Baja California, Gulf of California, México, 15 mm, 21 December 1994, H. Bertsch (HB photo M4639); One animal, 3 m depth, Punta la Gringa, Bahía de los Ángeles, Baja California, Gulf of California, México, 16 mm, 24 December 1995, Hans Bertsch (HB photo M4789); One specimen, Cuevitas, Bahía de los Ángeles, Baja California, Gulf of California, México, l0 mm, 6 April 1990, H. Bertsch (HB photo M3243). One specimen, 4 m depth, Cuevitas, Bahía de los Ángeles, Baja California, Gulf of California, México 10 mm, 20 March 1994, H. Bertsch. One animal, 3 m depth, Cuevitas, Bahía de los Ángeles, Baja California, Gulf of California, México, 8 mm, 20 December 1994, H. Bertsch (HB photo M4618). One specimen, 5 m depth, s. w. Isla Ventana, Bahía de los Ángeles, Baja California, Gulf of California, México, 15 mm, 24 February 1997, H. Bertsch (HB photo M5402). One specimen, Guaymas, Sonora, México, 30 November 1975, Leroy H. Poorman (photo M 2947).

Geographical distribution.— Thus far, known only from Bahía San Luis Gonzaga and Bahía de los Ángeles, Baja California, and Guaymas, Sonora, all within the Gulf of California, México.

Etymology.— This species is named for our colleague and mentor, Michael T. Ghiselin, a

superb teacher, scientist, philosopher, historian and friend.

Description.— *External morphology.* The living (Fig. 1A–B) holotype (Fig. 1A–B) was approximately 30 mm in length and 20 mm wide. The general body color is red to reddish orange with a series of large, well-spaced black spots present on the dorsal surface. The perfoliate rhinophores are conical with a series of 10–14 horizontal lamellae. The gill is composed of 7 bipinnae branches. The rhinophores and gill are the same color as the rest of the body. The body shape is oval. The notum is covered with a series of densely packed caryophyllidia (Fig 2A). Each caryophyllidium bears 5–6 calcareous spines with a small ciliated tubercle located in its center. The anal papilla is situated within the circle of the branchial plume. The anterior border of the foot is labiate and notched. The foot is wide relative to the mantle margin. The oral tentacles are well-formed and appear conical in shape.

Buccal armature: The labial cuticle is smooth with two small rectangular areas where chitinous jaws are present. The jaws contain numerous rodlets that are elongate and have a broader apical end (Fig. 2B). The radular formula of the holotype is 73 X 67.25.1.0.1. 25.67 (Fig. 2C). The innermost lateral teeth are deeply

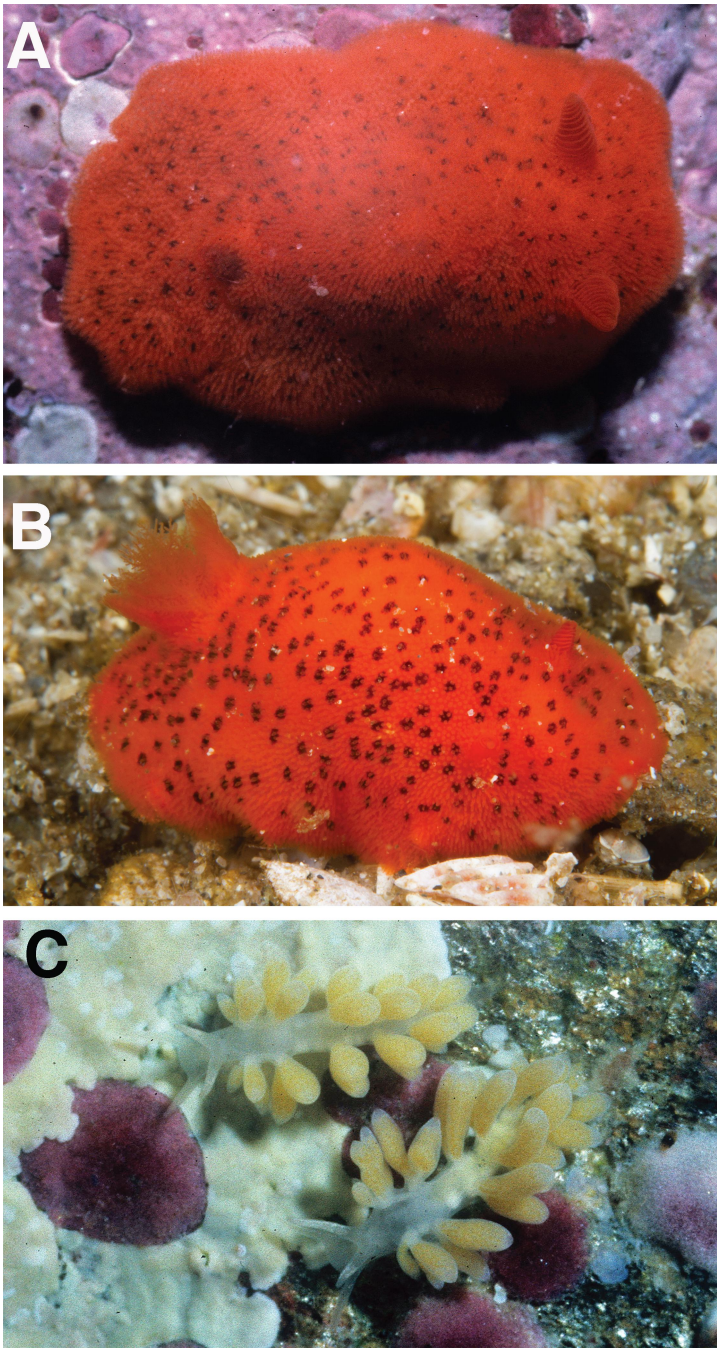

Figure 1. Living animals. A. *Rostanga ghiselini* sp. nov., specimen from Punta Gringa, Bahía de los Angeles, 14 March 1992, photo by Hans Bertsch. B. *Rostanga ghiselini* sp. nov., holotype specimen from Punta Gringa, Bahia de los Angeles, 25 March 2017, photo by Craig Hoover. C. *Tenellia ivetteae* sp. nov., holotype, CASIZ 220143 (upper animal) and paratype, CASIZ (lower animal), from Punta Gringa, Bahia de los Angeles, 30 June 1992, photo by Hans Bertsch.

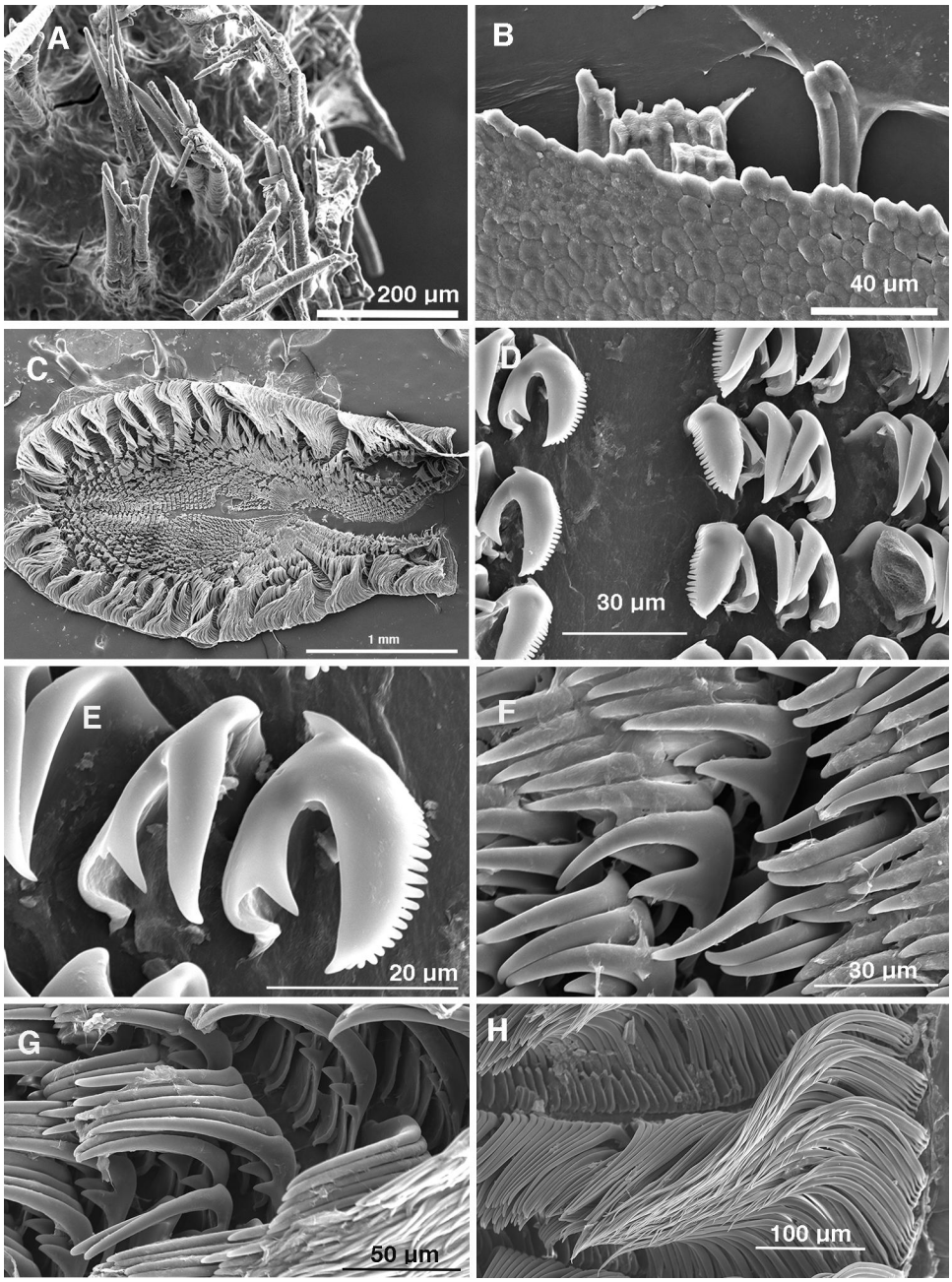

FIGURE 2. Scanning electron micrographs, *Rostanga ghiselini* sp. nov., holotype, CASIZ 220373. A. Caryophyllidia. B. Jaw rodlets. C. Entire radula. D. Inner lateral teeth and rachis. E. First and second lateral teeth. F. Middle lateral teeth. G. Elongate middle to outer lateral teeth. H. Outer lateral teeth.

arched and bifurcate with an inner denticulate lobe and an outer acutely pointed secondary cusp (Figs. 2E, 3C). The inner denticulate lobe has about 8–21 denticles along its inner margin. The next several inner lateral teeth are similar in shape to the innermost tooth (Figs. 2D, 3B), but lack denticles on the inner margin. At about tooth number 7 or 8, the bifid cusps become more elongate with the inner cusp longer than the outer one (Fig. 2F). At about tooth 25, the primary cusp is about ten times longer than the secondary cusp (Figs. 2G, 3D). The next 67 or so teeth are narrow (Fig. 2H) and elongate with a bifid cusp near the apex of the narrow apices (Fig. 3A).

Reproductive System (Fig. 4A): Reproductive organs of the holotype fully mature. Ampulla thin, tubular, and strongly curved, narrowing somewhat before bifurcating into oviduct and vas deferens. Short oviduct entering female gland mass near albumen gland. Prostatic portion of vas deferens wide, curved and thin, partially enveloping bursa copulatrix. Prostatic portion narrowing abruptly as it transitions into muscular, ejaculatory portion. Ejaculatory portion long curved, narrow, entering short, narrow, slightly wider, penial bulb. Penial bulb adjacent to straight, narrow vaginal duct at common gonopore. Female gland mass consisting of large mucous gland and small membrane and albumen glands. Small, lobate vestibular gland situated near exit of mucous gland. Moderately long vagina leading to large spherical, thin-walled bursa copulatrix. Adjacent to vagi-

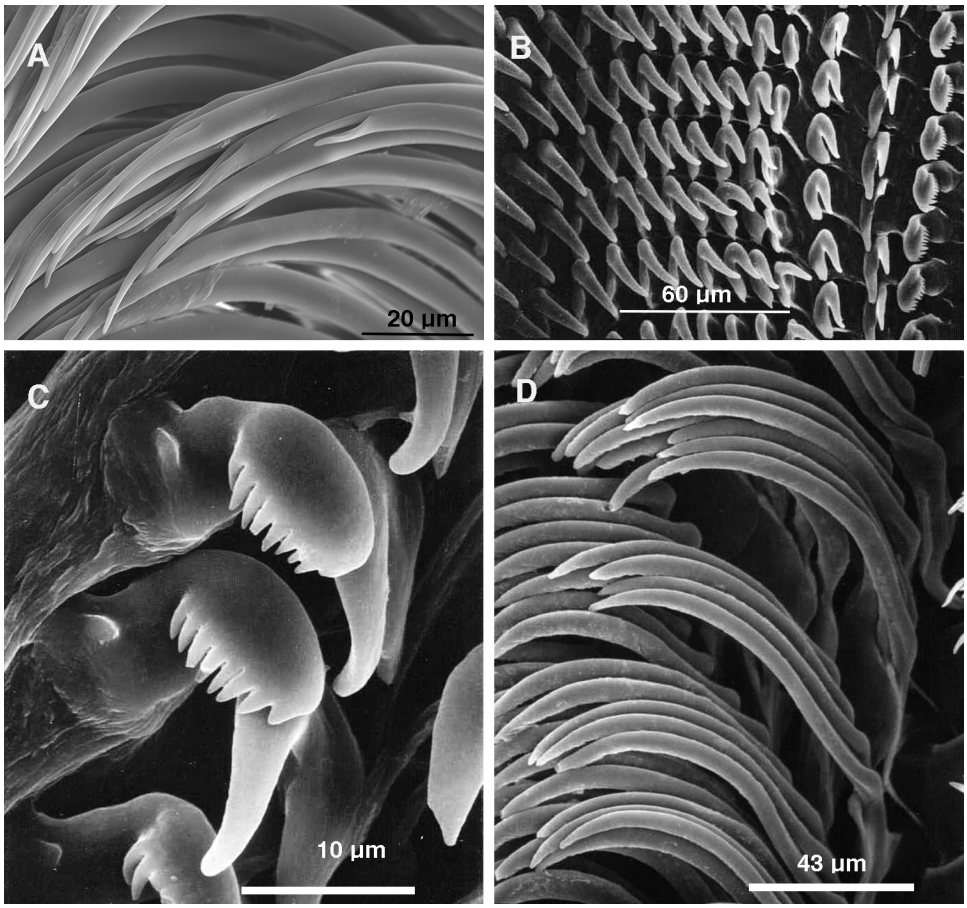

FIGURE 3. Scanning electron micrographs of *Rostanga ghiselini* sp. nov. A. Holotype, CASIZ 220373, detail of outer lateral teeth. B–D. Specimen from Punta Gringa, Bahía de los Angeles, 14 March 1992. B. Inner and middle lateral teeth. C. First and second lateral teeth. D. Elongate middle to outer lateral teeth.

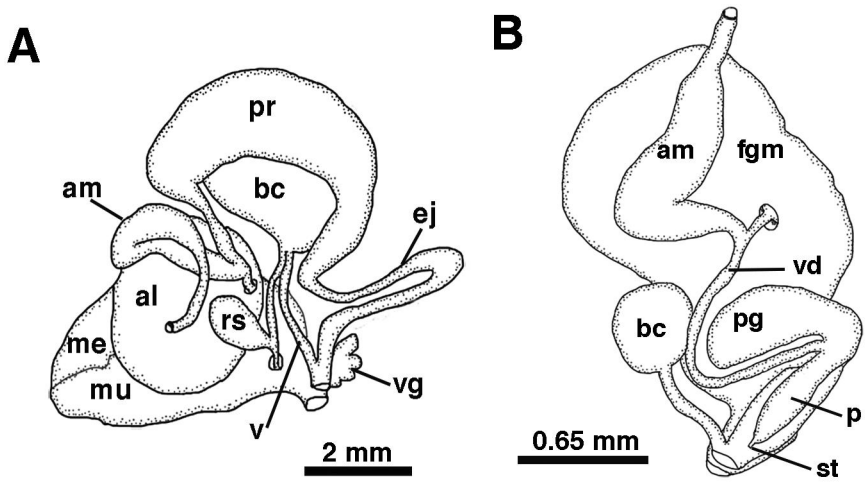

FIGURE 4. Reproductive anatomy. A. *Rostanga ghiselini* sp. nov., holotype, CASIZ 220373. B. *Tenellia ivetteae* sp. nov., paratype, CASIZ 222482. abbreviations: al-albumen gland, am ampulla, bc-bursa copulatrix, ej-ejaculatory portion of vas deferens, fg-female gland mass, me-membrane gland, mu-mucous gland, p-penis, pg-penial gland, pr-prostatic portion of vas deferens, rs-receptaculum seminis, st-penial stylet, v-vagina, vd-vas deferens, vg-vestibular gland. Scale = 1 mm.

na, long narrow uterine duct leading to smaller receptaculum seminis. Receptaculum seminis pyriform with short duct entering the female gland mass.

REMARKS.— *Rostanga ghiselini* differs from all other 23 described members of the genus. Most species of *Rostanga*, as in *R. ghiselini*, have a reddish or orange body color, except for *R. setidens* (Odhner, 1939) (whitish), *R. phepha* Garovoy, Valdés and Gosliner, 2001(white), *R. risbeci* Baba, 1991 (dark gray to black), *R. ankyra* Valdés, 2001 (white) and *R. crocea* Edmunds 2011 (yellow). Species of *Rostanga* have rhinophores of two basic forms, either conical with a series of transverse lamellae, as in most other dorid nudibranchs, including *R. ghiselini*, or broader rhinophores with nearly vertical lamellae (Table 1). Twelve species have transverse lamellae while 11 have vertical ones.

The buccal armature, both the jaws and radula, of most *Rostanga* species is distinctive. In six species, *R. ankyra*, *R. aureommala* Garovoy, Valdés and Gosliner, 2001, *R. crocea*, *R. elandsi* Garovoy, Valdés and Gosliner, 2001, *R. rosi* (Ortea, 1979) and *R. setidens* lack any trace of jaw rodlets, while the remaining species, including *R. ghiselini*, either have small areas of the labial cuticle with jaw rodlets or well developed rodlets. The inner lateral tooth of many species of *Rostanga* often contains a series of distinct denticles. This arrangement is found in 16 species of *Rostanga*, while five species have a bifid or simply hamate inner tooth. In *R. crawfordi* (as *R. australis*), Rudman and Avern (1989) noted that small specimens have a denticulate inner lateral whereas medium-sized or large specimens have an entirely smooth inner lateral. Of the species with a denticulate inner lateral tooth, only *R. ghiselini* and *R. rubra* have a secondary triangular cusp below the inner margin bearing numerous denticles. In *R. ghiselini* this cusp is far more pronounced than in *R. rubra* (Valdés and Gosliner, 2001; Edmunds, 2011). Also, in *R. rubra*, some of the middle lateral teeth near the point where the hamate teeth become more elongate, lack a secondary denticle, whereas all of them in *R. ghiselini* have a secondary denticle.

Rostanga ghiselini can be compared in detail with the only other species found in the eastern Pacific, *R. pulchra* MacFarland 1905. Both species are reddish orange in color, but *R. ghiselini* also has large black spots present on the notum. The rhinophores of *R. ghiselini* are conical with trans-

Table 1. Comparative morphology of *Rostanga* species.

Species	Rhinophoral lamellae	Jaw rodlets	Inner lateral	Middle lateral	Outer lateral	Vestibular gland
alisae	vertical	present	denticulate	smooth	multifid	absent
aliusrubens	vertical	present	denticulate	smooth, inners	multifid	absent
ankyra	transverse	absent	bifid	bifid	bifid	absent
anthelia	vertical	present	denticulate	smooth	multifid	?
arbutus	transverse	present	denticulate	denticulate	multifid	absent
aureomala	transverse	absent	bifid also rachidian present	bifid	bifid or trifid	absent
crawfordi	vertical	reduced	denticlulate or smooth	smooth	multifid	absent
bassia	vertical	present	denticulate	no denticles	multifid	absent
bifurcata	transverse	present	denticulate	denticulate	bifid	absent
byga	vertical	reduced	denticulate	smooth	multifid	absent
calumus	vertical	present	denticulate	no denticles	multifid	absent
crocea	transverse	absent	bifid	bifid	bifid	?
dentacus	transverse	reduced	denticulate	no denticles	undivided or bifid	absent
elandsia	transverse	absent	bifid	bifid	bifid	absent
ghiselini	transverse	reduced	denticulate	bifid	bifid	present
lutescens	transverse	present	denticulate	smooth	trifiid	present
muscula	vertical	reduced	denticulate	no denticles	multifid	present
orientalis	vertical	present	denticulate	no denticles	multifid	absent
phepha	transverse	reduced	bifid	smooth	bifid	absent
pulchra	vertical	reduced	denticulate	smooth	mutifid	absent
risbeci	transverse	reduced	denticulate	smooth	bifid	absent
rosi	transverse	absent	smooth	smooth	smooth	present
rubra	vertical	present	denticulate	bifid	bifid	absent
setidens	transverse	absent	smooth	smooth	bifid	absent

verse lamellae, whereas those of *R. pulchra* are broad with vertical lamellae. There are 6–7 bipinnate gill branches in *R. ghiselini* and 8–12 unipinnate branches in *R. pulchra.* Internally, the radular morphology of the two species differs. The innermost radula tooth is denticulate in both species but in *R. ghiselini* the tooth bears 8–21 denticles whereas in *R. pulchra* there are 7–9 denticles (Fig. 5E, F). In *R. ghiselini* all of the hamate teeth are strongly bifid whereas only the second tooth is bifid in *R. pulchra*. The 67 elongate outer teeth of *R. ghiselini* have bifid apices whereas the 25 elongate teeth have 3–6 fine apices in *R. pulchra* (Fig. 5H). The reproductive system is similar in both species with the exception that the vagina of *R. pulchra* is more elongate.

Valdés and Gosliner (2001) included *Boreodoris* Odhner, 1939 as a synonym of *Rostanga*, noting that the absence of jaws and a denticulate inner lateral tooth was not sufficient to warrant generic separation. Subsequently, Garavoy, Valdés and Gosliner (2001) described three new South African species of *Rostanga* that all had a bifid inner lateral tooth. Two of these species, *R. aureomala and R. elandsia*, lacked jaws, whereas *R. phepha* had distinctive jaw rodlets. Martynov (2003), stating that *Boreodoris* lacking jaws and lacking an innermost lateral tooth with denticulate flange, is sufficiently distinct from *Rostanga* and should be considered as a distinct genus. Based

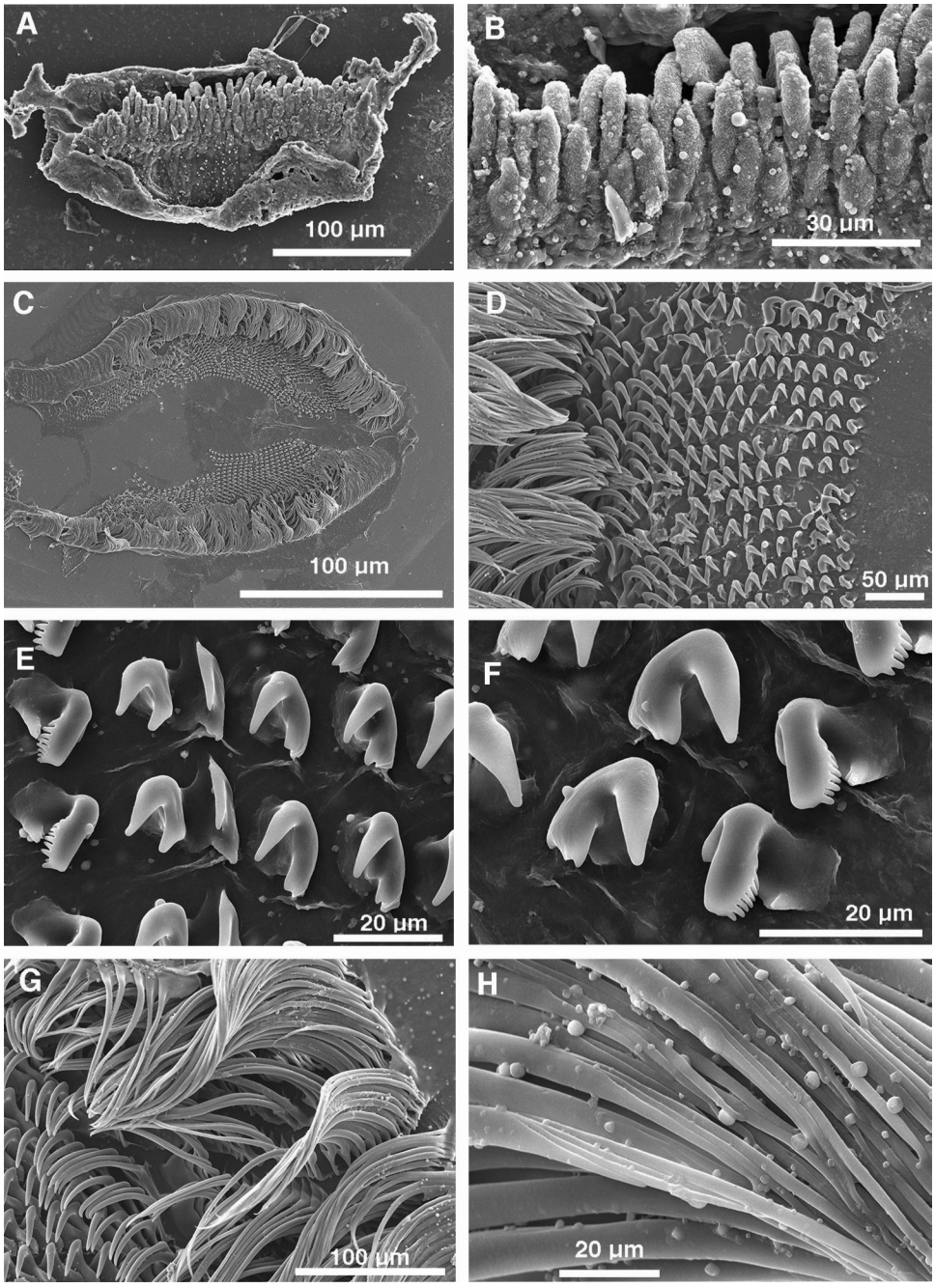

FIGURE 5. Scanning electron micrographs, *Rostanga pulchra* MacFarland, 1905, CASIZ 097525, Punta Vicente Roca, Galápagos Islands. A. Jaw. B. Jaw rodlets. C. Entire radula. D. Inner and middle lateral teeth and rachis. E. Inner lateral teeth. F. First and second lateral teeth. G. Outer lateral teeth. H. Outer lateral tooth apices.

on this distinction, he considered *R. aureomala*, *R. elandsia*, *R. phepha* and *R. ankyra* Valdés, 2001, together with *R. setidens* (Odhner, 1939), as members of *Boreodoris*. This distinction is not consistent since *Rostanga phepha* has well developed jaws with rodlets (as in *Rostanga*) but lacks an inner lateral tooth without a denticulate flange (as in *Boreodoris*). Two other species have radular morphology that is intermediate between the two forms. In *Rostanga crawfordi* (as *R. australis*) (Rudman and Avern, 1989), the inner radular in small specimens may have a denticulate flange but in larger specimens the inner lateral tooth is entirely smooth. This variability was also confirmed by Dayrat (2010). Similarly, in *Rostanga lutescens* (Bergh, 1905), the inner lateral tooth lacks a denticulate flange but the tooth has 1-5 denticles on the inner side and may have additional outer denticles (Johnson and Bertsch, 1985; Dayrat, 2010). Therefore, there are no consistent features that distinguish *Rostanga* and *Boreodori*s and they should, once again, be regarded as synonyms.

Family Fionidae Gray, 1857

Genus *Tenellia* A. Costa, 1866

Type species: *Tenellia mediterranea* A. Costa, 1866 (= *Tergipes adspersu*s Nordmann, 1845), by monotypy.

***Tenellia ivetteae* sp. nov.**

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(Figs. 1C, 4B, 6)

Cuthona sp.: Bertsch and Aguilar Rosas, 2016:301 (photo).
Cuthona sp. yellow: Bertsch, 2008:336; Bertsch, 2014:177.
Cuthona sp. 2: Hermosillo, 2006:44, 131, 134.
Cuthona sp. 3: Behrens and Hermosillo, 2005:131 (photo).
Cuthona sp. 4: Hermosillo, Behrens and Ríos-Jara, 2006:134 (photo).
Cuthona sp. 6: Camacho-García, Gosliner and Valdés, 2005:105 (photo).

Material examined.— Holotype: CASIZ 220143, 7 mm length, Punta la Gringa, Bahía de los Ángeles, Baja California, México, 30 June 1987, Sandra Millen. Paratypes: One specimen, CASIZ 222482 (dissected), Bahía de los Ángeles, Baja California, México, 30 June 1987, Sandra Millen; Three specimens, CASIZ 220142, 6 mm, 3 m depth, 20 June 1992 (HB photo M3968).

Additional records: Two specimens, 4 and 3 mm with egg masses, 4 m depth, Bahía de los Ángeles, Baja California, México, 25 July 1993; 1 animal, 3 mm, 10' deep, 31 October 2003. Twelve specimens, Majahuitas, Bahía de Banderas, Jalisco, México, between April 2002–April 2005, Alicia Hermosillo (Hermosillo, 2006: 134). One specimen, Punta Uvita, Punta Arenas, Costa Rica.

Geographical distribution.— Thus far, known only from Bahia de los Angeles, Baja California, and Bahía de Banderas, Jalisco, in México, and Punta Uvita, Pacific coast of Costa Rica.

Etymology.— This species is named in honor of Señorita Adriana Ivette Cadena, granddaughter of Señor Hans, who has helped with his research at Bahía de los Ángeles. She and her brothers and sisters—the children all around the world—remind us why we must do science and do it well: to present informed knowledge for informed decisions affecting their future and the life of our planet.

Description.— *External morphology:* The living animals (Fig. 1C) reach 7 mm in length. The body color is generally translucent white with dense opaque white spotting on the outer two-thirds of the rhinophores and oral tentalces. The digestive gland within the cerata is yellowish cream white throughout the length of the cerata with a translucent white apex. The opaque white ovotestis follicles can be seen through the translucent body. The rhinophores are smooth, thin and

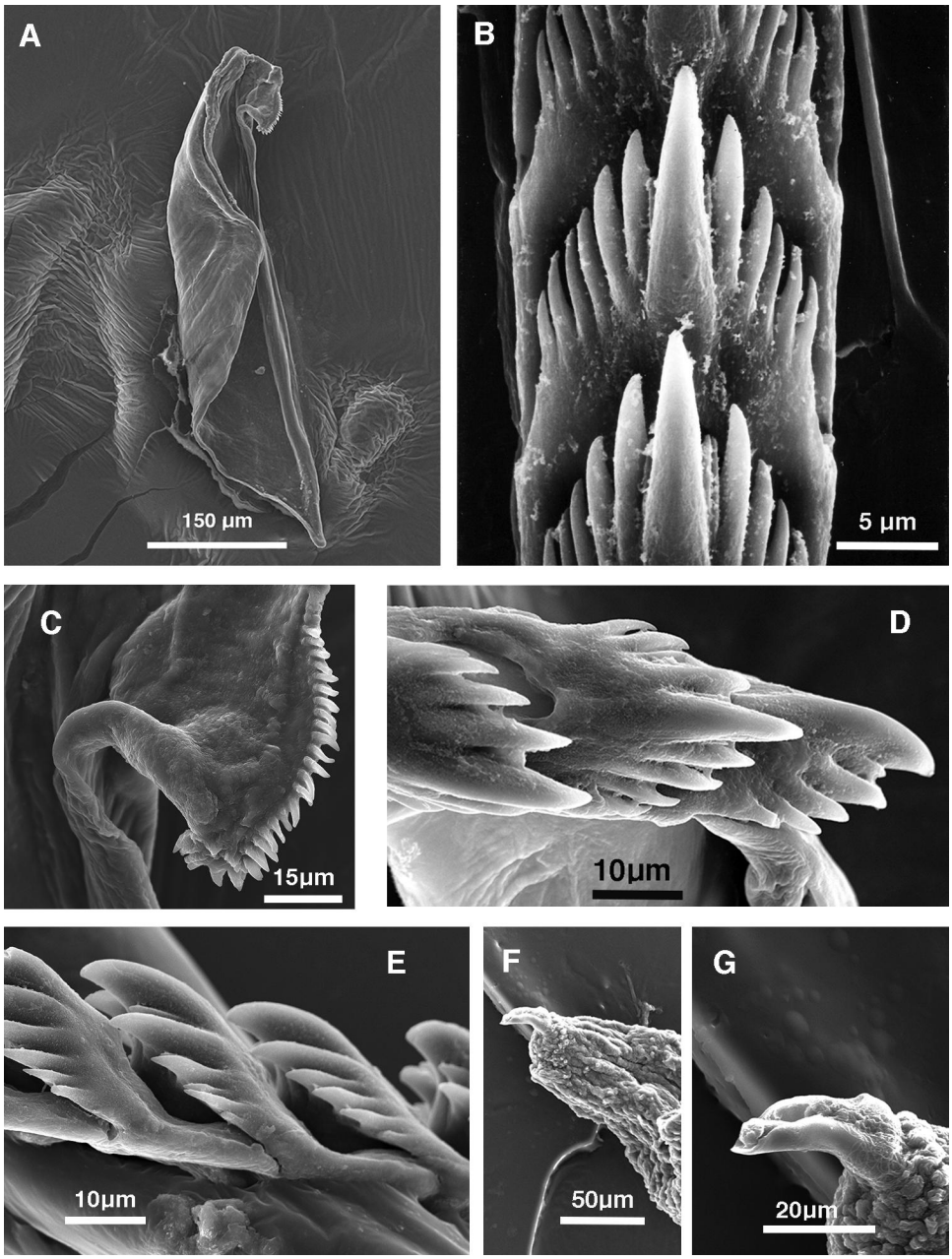

FIGURE 6. Scanning electron micrographs, *Tenellia ivetteae* sp. nov. A, C-G. paratype, CASIZ 222482. B. Specimen from Bahia de los Ángeles, 30 June, 1987. A. Entire jaw. B. Radular teeth, dorsal view. C. Masticatory border of jaw showing arrangement of denticles. D. Dorsal view of radular teeth. E. Lateral view of radular teeth. F. Apex of penis showing stylet. G. Detail of stylet.

cylindrical, slightly shorter than the narrower oral tentacles. The cerata are short and rounded with an acute apex where the cnidosac is located. They project outwards randomly, cover most of the notum, and are arranged in numerous linear rows. There are 3 rows in the precardiac ceratal rows. In four specimens, the three precardiac rows, beginning with the most anterior row, contain 1–4, 2–4, 3–4, cerata per row. After the interhepatic space, there are four postcardiac ceratal rows, each of which contains 1–4 cerata. The anus is acleioproctic, situated dorsally at the base of the upper ceras of the first postcardiac ceratal row. The genital opening is ventral to the first and second precardiac ceratal rows.

Buccal armature: The jaws are thin and elongate (Fig. 6A) with a long inner margin. The masticatory border of the jaw contains 31 simple acutely-pointed triangular denticles (Fig. 6C). The radular formula is 36 x 0.1.0 in the paratype specimen CASIZ . The central cusp is much wider and longer than the adjacent lateral denticles. There are 4–7 primary lateral cusps on either side of the wider central cusp (Figs. 6B, D, E) Secondary denticles between the primary lateral cusps are absent, although some denticles are shorter and narrower than the ones on either side of them.

Reproductive system: The reproductive system is androdiaulic (Fig. 4B). The ovotestis follicles contain a large female acinus surrounded by a series of smaller male acini. The ampulla is large and saccate and divides distally into the short oviduct and vas deferens that appears to have a glandular texture. The prostatic portion of the vas deferens is thin and narrows into a short, convoluted ejaculatory duct that joins the penis near the junction of the penial gland with the penial papilla. The penial gland is pyriform and curved, whereas the penial papilla is sausage-shaped, with a short, straight, cuticular penial stylet (Figs. 6F, G). The female glands are well-developed and small albumen and membrane glands are clearly visible, as is the larger mucous gland. A spherical bursa copulatrix is present at the distal end of the reproductive system and connects to the gonopore via a narrow elongate duct.

Remarks.— Despite the lack of suitably preserved specimens of this species for molecular study, the presence of morphological features strongly suggest that it is correctly placed in the genus *Tenellia*. In the recent revision of Fionidae, Cella et al. (2016), characterized *Tenellia* as including most members of the Fionidae having numerous well-separated ceratal rows with more than a single ceras per row. This is certainly the case in *T. ivetteae*. While it appears that not all species of *Tenellia* possess a penis armed with a straight penial stylet, the majority of species have this anatomical specialization, including *T. ivetteae*. Until fresh material is available to confirm the phylogenetic relationships and systematic status of *T. ivetteae*, we tentatively place it in *Tenellia*, based on the morphological attributes described above.

Tenellia ivetteae differs from all species of Fionidae previously documented from the temperate and tropical eastern Pacific. It is one of a handful of species that have whitish pigment as the predominant body color. Only *T. albocrusta* (MacFarland, 1966) and *T. riosi* (Hermosillo and Valdés, 2008) comb nov., have a similar external appearance. *Tenellia albocrusta* is found the eastern Pacific from Alaska to La Paz, in the Gulf of California (Berhens and Hermosillo, 2005). In this species, the body is covered by irregular patches of opaque white and encrustaceans of opaque white on the cerata. In *T. ivetteae*, the opaque white is found only on the outer portions of the rhinophores and oral tentacles. The digestive gland within the cerata in *T. albocrusta* is green to brown whereas it is pale yellow in *T. ivetteae*. *Tenellia riosi* is known from only from the Bahía Banderas region of México. As in *T. albocrusta*, *T. riosi* has opaque white patches on the notum that are absent in *T. ivetteae*. It also has a black digestive gland basally in the cerata and salmon pink gland more distally. The shape of the radular teeth differs in the three species. In *T. ivetteae*, the central cusp of the tooth is longer than the adjacent denticles, whereas it is much shorter than the adjacent denticles in *T. albocrusta* (MacFarland, 1966, pl. 67, figs. 13, 14) and slightly shorter

in *T. riosi* (Hermosillo and Valdés, 2008, fig. 3a–c). In *T. riosi* the outer denticles are markedly shorter than the inner ones, whereas they are more evenly graduated in the other two species. The reproductive systems of the three species also differ. In *T. albocrusta* (MacFarland, 1966, pl. 69, fig. 4) and *T. riosi* (Hermosillo and Valdés, 2008, fig. 2b), the prostatic portion of the vas deferens is much wider than the ejaculatory portion whereas they are about the same width in *T. ivetteae*. In *T. ivetteae* the bursa copulatrix is spherical and is found at the end of a long duct, whereas it is pyriform in both *T. albocrusta* and *T. riosi* and has a short duct in the latter species. In *T. ivetteae* the penial stylet is slightly curved where as it is sharply curved in *T. albocrusta* (MacFarland, 1966, pl. 69, fig. 4a) and appears to be absent in *T. riosi* (Hermosillo and Valdés, 2008).

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Literature Cited

Angulo-Campillo, O., and H. Bertsch, 2013. *Marionia kinoi* (Nudibranchia: Tritoniidae): a new species from the tropical eastern Pacific. *The Nautilus* 127(2):85–89.

Baba, K. 1991. Review of the genus *Rostanga* from Japan with the description of a new species (Nudibranchia: Doridiidae). *Venus* 50(1):43–54.

Behrens, D.W., and A. Hermosillo. 2005. *Eastern Pacific Nudibranchs. A Guide to the Opisthobranchs from Alaska to Central America*. Sea Challengers, Monterey, USA. 137 pp.

Bertsch, H. 2008. Opistobranquios. Pages 319–338 *in* G.E. Danemann and E. Ezcurra, eds., *Bahía de los Ángeles: Recursos Naturales y Comunidad. Línea Base 2007*. México, SEMARNAP, Instituto Nacional de Ecología, Pronatura Noroeste A.C., and San Diego Natural History Museum.

Bertsch, H. 2014. Biodiversity in La Reserva de la Biósfera Bahía de los Ángeles y Canales de Ballenas y Salsipuedes: naming of a new genus, range extensions and new records, and species list of Heterobranchia (Mollusca: Gastropoda), with comments on biodiversity conservation within marine reserves. *The Festivus* 46(5):158–177.

Bertsch, H., and L.E. Aguilar Rosas. 2016. *Invertebrados Narinos del Noroeste del México* / *Marine Invertebrates of Northwest Mexico*. Universidad Autónoma de Baja California, Instituto de Investigaciones Oceanológicas, Ensenada, México. 432 pp.

Bertsch, H., A. Valdés, and T.M. Gosliner. 2009. A new species of tritoniid nudibranch, the first found feeding on a zoanthid anthozoan, with a preliminary phylogeny of the Tritoniidae. *Proceedings of the California Academy of Sciences*, ser. 4, 60(11):431–446.

Camacho-García, Y., T.M. Gosliner, and Á. Valdés. 2005. *Field Guide to the Sea Slugs of the Tropical Eastern Pacific* / *Guia de Campo de las Babosas Marinas del Pacifico Este Tropical*. California Academy of Sciences, San Francisco, California, USA. 134 pp.

Carmona, L., M. Pola, T.M. Gosliner, and J.L. Cervera, 2014. The end of a long controversy: systematics of the genus *Limenandra* (Mollusca: Nudibranchia: Aeolidiidae). *Helgoland Marine Research* 68: 37–48.

Cella, K, L.Carmona, I. Ekimova, A. Chichvarkhin, D. Schepetov, and T. M. Gosliner. 2016. A radical solution: the phylogeny of the Family Fionidae. *PLoS One* DOI:10.1371/journal.pone.0167800:1–32.

Dayrat, B. 2010. A monographic revision of basal discodorid sea slugs (Mollusca: Gastropoda: NudibranchiaL Doridina). *Proceedings of the California Academy of Sciences*, ser. 4, 60 (suppl. 1):1–395.

Edmunds, M. 2011. Opisthobranchiate Mollusca from Ghana: Discodorididae. *Journal of Conchology* 40(6): 617-649.

Garovoy, J.B., A. Valdés, and T.M. Gosliner. 2001. Phylogeny of the genus *Rostanga* (Nudibranchia), with descriptions of three new species from South Africa. *Journal of Molluscan Studies* 67:131–144.

Gosliner, T.M., and H. Bertsch. 2004. Systematics of *Okenia* from the Pacific Coast of North America (Nudibranchia: Goniodorididae) with descriptions of three new species. *Proceedings of the California Academy of Sciences*, ser. 4, 55(22):414–430.

Hermosillo, A. 2006. *Ecología de los opistobranquios* (*Mollusca*) *de Bahía de Banderas, Jalisco-Nayarit, México*. Tesis de Doctorada, Universidad de Guadalajara, Centro Universitario de Ciencias Biológicas y Agropecuarias. viii + 151 pp.

Hermosillo, A., D.W. Behrens, and E. Ríos Jara. 2006. *Opistobranquios de México: Guía de babosas marinas del Pacífico, Golfo de California y las islas oceánicas*. CONABIO, México, D.F. 143 pp.

Hermosillo, A., and Á. Valdés. 2007. Five new species of aeolid nudibranchs (Mollusca, Opisthobranchia) from the Tropical Eastern Pacific. *American Malacological Bulletin* 22:119–137.

Hermosillo, A., and Á. Valdés. 2008. Two new species of opisthobranch mollusks from the tropical Eastern Pacific. *Proceedings of the California Academy of Sciences,* ser. 4, 59(13):521–532

Hoover, C., T. Lindsay, J.H.R. Goddard, and Á. Valdés, 2015. Seeing double: pseudocryptic species in the *Doriopsilla albopunctata-Doriopsilla gemela* species complex of the north-eastern Pacific. *Zoologica Scripta* doi:10.1111/zsc.12123

Johnson, S., and H. Bertsch. 1985. Rediscovery and redescription of *Rostanga lutescens* (Bergh, 1905), comb. nov. (Gastropoda: Nudibranchia). *The Veliger* 27(4):406–410.

Marcus, Er. 1958. On western Atlantic opisthobranchiate gastropods. *American Museum Novitates* 1906: 1–82.

Martynov, A. 2003. A new species of the genus *Rostanga*, Bergh, 1879 (Mollusca: Opisthobranchia) from the Peter the Great Bay, Japan Sea, with a discussion of the genus *Boreodoris*. *Ruthenica* 13 (2):141–147.

Perrone, A. 1991. Una nuova specie di nudibranchi dal golfo di Taranto: *Rostanga anthelia* nov. sp. (Opsithobranchia: Nudibranchia). *Bollettino Malacologico* 26(10–12):179–188.

Pola, M., M. Sánchez-Benítez, and B. Ramiro. 2014. The genus *Polycera* Cuvier, 1817 (Nudibranchia: Polyceridae) in the eastern Pacific Ocean, with redescription of *Polycera alabe* Collier and Farmer, 1964 and description of a new species. *Journal of Molluscan Studies* 80(5):551–561.

Rudman, W.B., and G.J. Avern, 1989. The genus *Rostanga* Bergh, 1879 (Nudibranchia: Doridídae) in the Indo-West Pacific. *Zoological Journal of the Linnean Society* 96:281–338.

Schrödl, M., and J. Grau, 2006. Nudibranchia from the remote southern Chilean Guamblin and Ípun island (Chonos Archipelago, 44-45°S), with re-description of *Rostanga pulchra* MacFarland, 1905. *Revista Chilena de Historia Natural* 79:3–12.

Valdés, A. 2001. Deep-sea cryptobranch dorid nudibranchs (Mollusca, Opisthobranchia) from the tropical West Pacific, with descriptions of two new genera and eighteen new species. *Malacologica* 43 (1-2): 237–311.