SPIXIANA	33	1	1–11	München, Juli 2010	ISSN 0341–8391

Two new species of dorid nudibranchs from the Gulf of California (Mar de Cortés), Baja California, Mexico

(Mollusca, Opisthobranchia)

Ángel Valdés & Hans Bertsch

Valdés, Á. & Bertsch, H. 2010. Two new species of dorid nudibranchs from the Gulf of California (Mar de Cortés), Baja California, Mexico (Mollusca, Opisthobranchia). Spixiana 33(1): 1-11.

Two new species of dorid nudibranchs from the Gulf of California are described based on specimens collected from Bahía de los Ángeles, Baja California, Mexico. *Diaulula nivosa* n. sp. is most similar to *Diaulula sandiegensis* but it is differentiated by the presence of a number of small white spots on the dorsum that correspond to the apices of the caryophyllidia and the absence of dark rings. *Peltodoris rosae* n. sp. is characterized by a yellowish background color with dark patches, white spots, and yellowish tripinnate gills. This species is differentiated from *Peltodoris mullineri*, another species from the Gulf of California, by the presence of dark rounded patches on the dorsum and vaginal glands.

Dos especies nuevas de dóridos nudibranquios son descritas para el Golfo de California, en base a especimenes recolectados en Bahía de los Ángeles, Baja California, México. La especie más similar a *Diaulula nivosa* esp. n. es *Diaulula sandiegensis* pero se diferencian por la presencia de numerosos pequeños puntos blancos en el dorso de la primera, que corresponden a los ápices de los cariofilídeos, y por la ausencia de anillos oscuros. *Peltodoris rosae* esp. n. se caracteriza por tener una coloración general amarillenta con manchas oscuras, puntos blancos y hojas branquiales tripinnadas de color amarillento. Esta especie se diferencia de *Peltodoris mullineri*, otra especie del Golfo de California, por la presencia de manchas oscuras redondeadas y glándulas vaginales.

Ángel Valdés, Department of Biological Sciences, California State Polytechnic University, 3801 West Temple Avenue, Pomona, California 91768, USA; e-mail: aavaldes@csupomona.edu

Hans Bertsch, Departamento de Ingeniería en Pesquerías, Universidad Autónoma de Baja California Sur, La Paz, Baja California, CP 23080, México. Mailing address: 192 Imperial Beach Boulevard, Imperial Beach, California 91932, USA; e-mail: hansmarvida@sbcglobal.net

Introduction

The opisthobranch fauna of Bahía de los Ángeles (abbreviated BLA) is highly diverse. During the 10-year period of January 1992 through 1 December 2001, 6095 specimens of 81 different species were identified and measured at the shore sites of Punta la Gringa and Cuevitas (located approximately 10 and 12 km respectively north of the town of BLA) during 229.3 hours of scuba diving research (Bertsch 2008). Because of its diversity and accessibility, BLA has been the focus of numerous contributions to the systematics of opisthobranchs in the Gulf of California. For instance, the type localities of 11 nudibranch

species are in the BLA area: *Okenia angelensis* Lance, 1966 (named from the "lowest intertidal zone" at BLA); *Cerberilla pugnoarena* Collier & Farmer, 1964 and *Eubranchus cucullus* Behrens, 1985 (both named from Puerto Refugio, Isla Ángel de la Guarda); *Nembrotha hubbsi* Lance, 1968 (Isla Ventana), now a junior synonym of *Tambja eliora* (Marcus & Marcus, 1967); *Cuthona longi* Behrens, 1985 (Isla Rasa); *Dendrodoris stohleri* Millen & Bertsch, 2005 (Herradura); five species from Punta la Gringa: *Bajaeolis bertschi* Behrens & Gosliner, 1988; *Polycerella glandulosa* Behrens & Gosliner, 1988; *Trapania goslineri* Millen & Bertsch, 2000; *Peltodoris lancei* Millen, in Millen & Bertsch, 2000; *Okenia angelica* Gosliner & Bertsch, 2004.

According to Bertsch et al. (1998), the unique characteristics of BLA account for this high opisthobranch diversity. Outside the bay, there are upwelling processes caused by currents and tidal flow between Isla Ángel de la Guarda and the peninsula. Inside the bay, a number of islands provide distinct habitats for marine organisms. For instance, the opisthobranch communities on the islands are different from those at peninsular shore sites inside the bay, such as Punta la Gringa (Bertsch et al. 1998).

The junior author has been conducting a 20-year long-term taxonomic and ecological study of opisthobranchs at BLA. This research has yielded not only the descriptions of new species, but significant information about the biogeography and distribution, community structure, ecology and natural history of nudibranchs (see Bertsch 1991, 1993, 1995a, 1995b, 1997, 2002a, 2002b, 2003; Bertsch, Miller & Grant 1998; Millen & Bertsch 2000).

The new species described here constitute another contribution to the knowledge of the marine diversity in this Mexican-government protected region. The species' rareness and distinctness demand naming them, to actualize the species inventory needed for the conservation management plans of the Reserva de la Biósfera Bahía de los Ángeles and the Área de Protección de Flora y Fauna Islas del Golfo de California en Baja California.

Materials and methods

The material examined was collected at Punta la Gringa (BLA). Bahía de los Ángeles is located about 670 km south of the U.S./Mexican border (Fig. 1). Punta la Gringa is situated 10 km north of the small town of Bahía de los Ángeles (BLA) (both the bay and the town have the same Spanish name).

The specimens are deposited at the Natural History Museum of Los Angeles County (LACM). Specimens were dissected by making a dorsal incision. 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 junior author.

Species descriptions

Discodorididae Bergh, 1891

Discodorididae Bergh, 1891: 129. Type genus: *Discodoris* Bergh, 1877.

Diaulula Bergh, 1878

Diaulula Bergh, 1878: 567. Type species: *Doris sandiegensis* Cooper, 1863, by monotypy.

Anisodoris Bergh, 1898: 508. Type species: *Doris punctuolata* d'Orbigny, 1837, by subsequent designation by O'Donoghue (1926).

Diagnosis. Body flexible. Dorsum covered with elongate caryophyllidia. Caryophyllidia with small lateral cilia. Rhinophoral and branchial sheaths low. Prostate flattened, with two portions. Penis and vagina unarmed. Labial cuticle smooth. Radular teeth hamate and smooth.

Remarks. Very little is known about the biology of species of *Diaulula*. Bergh (1878) introduced the genus *Diaulula* Bergh, 1878 based on *Doris sandiegensis* Cooper, 1863, originally described by Cooper (1863). The main characteristics of this genus are the presence of a villous, silky dorsum, anterior border of the foot notched and grooved, tripinnate branchial leaves, absence of jaws, presence of a large prostate and penis unarmed.

The genus *Anisodoris* Bergh, 1898 was described as a member of the family Archidorididae, which differs from the "typical" archidoridids by the presence of a larger prostate (Bergh 1898). In the short diagnosis of this genus, Bergh (1898) also indicated that the penis is unarmed, and that this feature separates *Anisodoris* from *Homoiodoris* Bergh, 1880 (originally described by Bergh, 1880). The genus *Anisodoris* was based on several species, including *Anisodoris punctuolata* (d'Orbigny, 1837), *Anisodoris variolata* (d'Orbigny, 1837), *Anisodoris marmorata* Bergh, 1898, and *Anisodoris tessellata* Bergh, 1898 (originally described by d'Orbigny, 1835-46 [1837] and Bergh, 1898). Subsequently O'Donoghue (1926) selected *A. punctuolata* to be the type species. An ana-

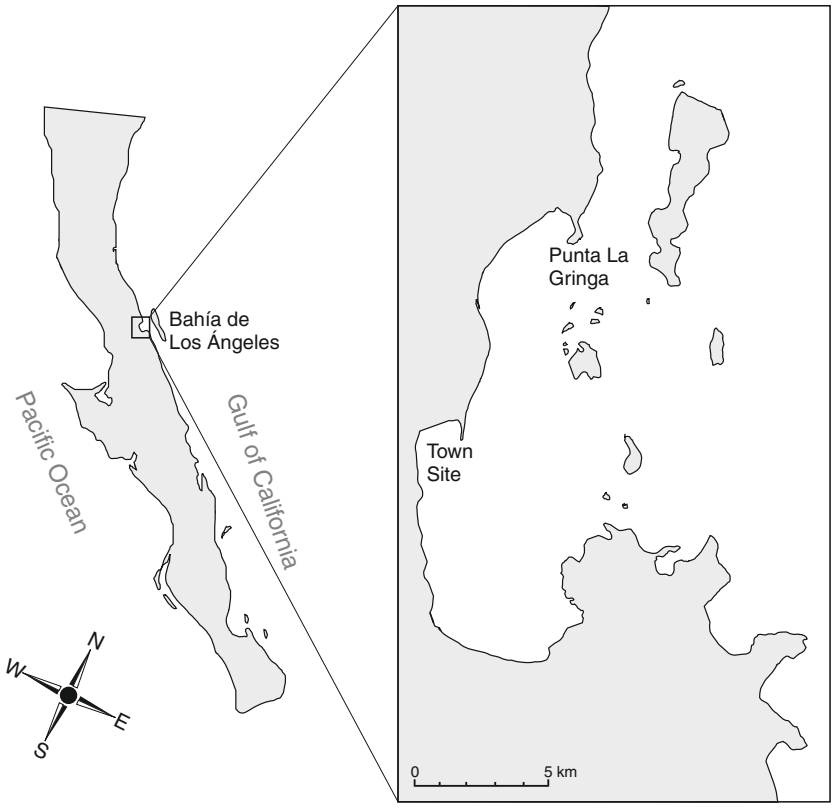

Fig. 1. Maps of the Baja California Peninsula, Mexico (left) and Bahía de los Ángeles (right).

tomical examination of newly collected specimens of *A. puctuolata* showed that it has the same features as members of *Diaulula* (see Valdés & Gosliner 2001), and these two genus names are synonyms. The genus name *Anisodoris* has been used to include species with large, simple dorsal tubercles (Millen 1982; Schrödl 1997, 2000) that do not fit the characteristics of the type species. Most of the species previously assigned to *Anisodoris* probably belong to the genera *Peltodoris* Bergh, 1880 or *Archidoris* Bergh, 1878 so at this point it is not possible to provide a complete list of the species in this genus. Both *Peltodoris* and *Archidoris* differ from *Diaulula* by lacking caryophyllidia.

Diaulula nivosa spec. nov.
Figs 2A, 3, 4

Material examined. Holotype: Punta la Gringa, Bahía de los Ángeles, Gulf of California, Baja California, México (29°02.57' N; 113°32.3' W), 23 July 1995, 1.8 m depth, 17 mm long alive, leg. Hans Bertsch (LACM 3029).

External morphology. The body is oval to elongate (Fig. 2A), with the posterior end of the foot covered by the mantle. The dorsum is covered with caryophyllidia about 150 µm long (Fig. 3D). Most of the caryophyllidia of the preserved holotype were partially deformed, probably due to preservation, but in some areas ciliated tubercles were clearly visible surrounded by a ring of spicules. The body is brownish orange with four black patches situated between the rhinophores and the gill, two on each side of the viscera hump. The caryophyllidia have a white apex, more conspicuous in those near the center of the dorsum. The rhinophoral sheaths are elevated and inflated. The rhinophores are the same color as the dorsum, with the apex white. The gill is composed of six tripinnate branchial leaves, which are pale gray to white.

The anterior border of the foot is grooved and notched (Fig. 4B). The oral tentacles are long and conical.

Anatomy. The labial cuticle is smooth. The radular formula is 16 × 27.0.27 in the holotype (LACM 3029). Rachidian teeth are absent (Fig. 3A). The

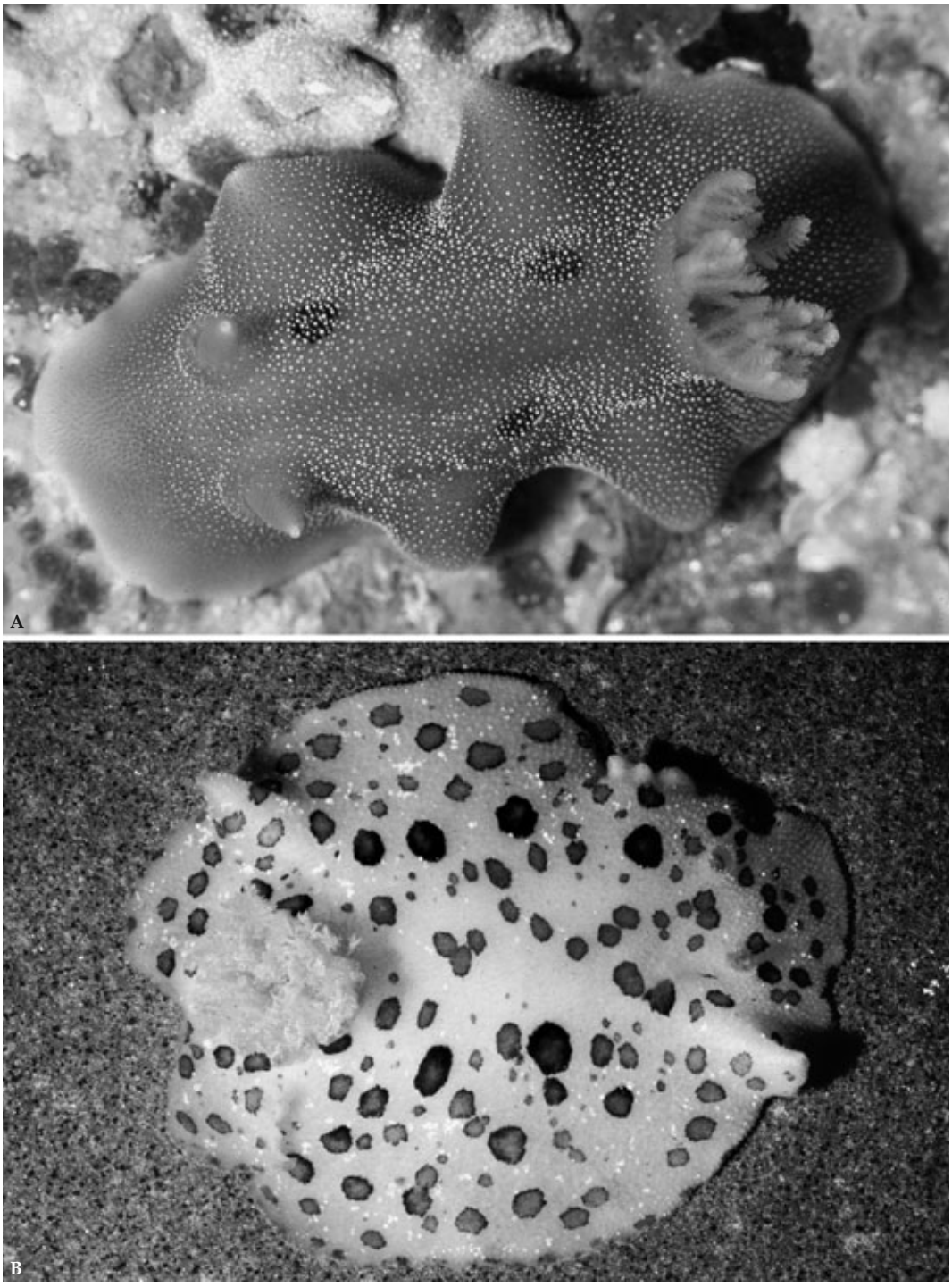

Fig. 2. Living animals. **A.** *Diaulula nivosa* spec. nov., holotype (LACM 3029). **B.** *Peltodoris rosae* spec. nov., holotype (LACM 3030).

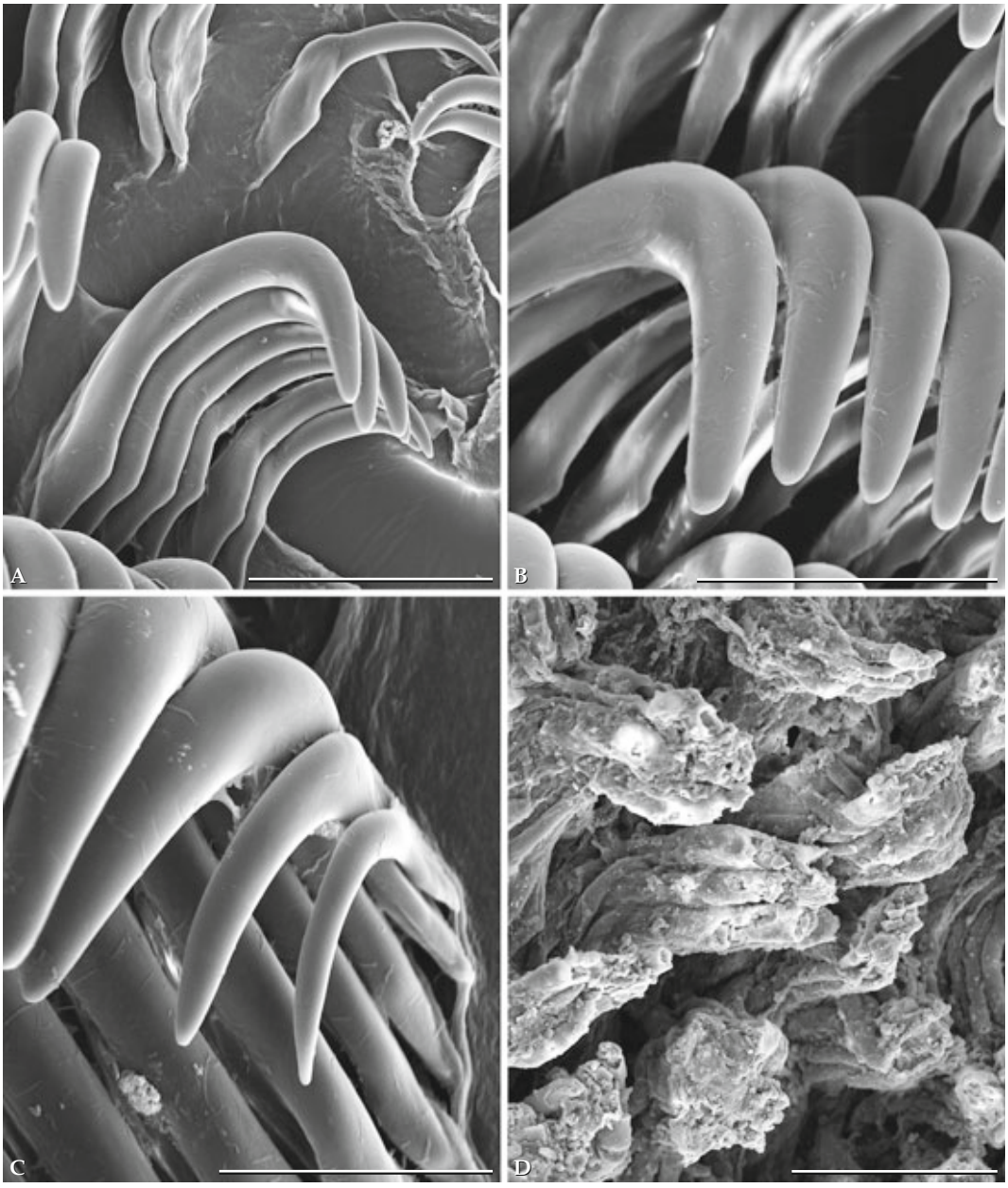

Fig. 3. *Diaulula nivosa* spec. nov., holotype (LACM 3029), Scanning Electron Micrographs of radula and dorsum. **A.** Innermost lateral teeth; scale bar: 100 µm. **B.** Mid-lateral teeth; scale bar: 100 µm. **C.** Outermost lateral teeth; scale bar: 50 µm. **D.** Caryophyllidia; scale bar: 100 µm.

lateral teeth are hamate, having a single cusp and lacking denticles (Fig. 3B). The teeth increase their size gradually towards the medial portion of the half-row. The outermost teeth are also hamate and lacking denticles (Fig. 3C).

The reproductive system is triaulic (Fig. 4A). The ampulla is very long and convoluted. It narrows into the oviduct, which enters the female glands near their nidamental opening. The prostate is large and granular. It is divided into two different portions

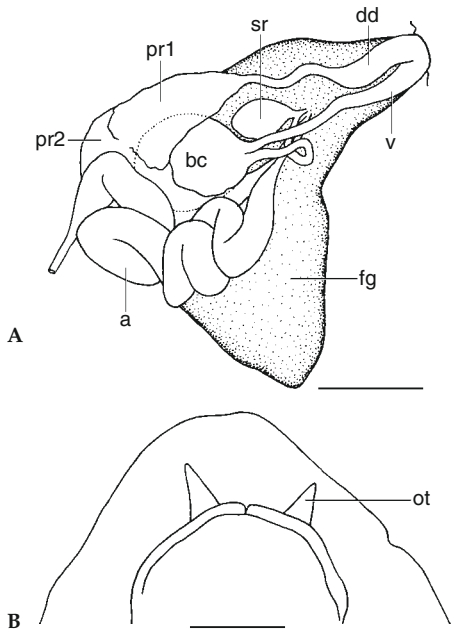

Fig. 4. *Diaulula nivosa* spec. nov., holotype (LACM 3029), anatomy. **A.** Reproductive system; scale bar: 1 mm. **B.** Ventral view of the mouth area; scale bar: 2 mm. Abbreviations: **a**, ampulla; **bc**, bursa copulatrix; **dd**, deferent duct; **fg**, female glands; **ot**, oral tentacle; **pr1**, distal prostate; **pr2**, proximal prostate; **sr**, seminal receptacle; **v**, vagina.

that are clearly distinguishable by their different texture and coloration. The deferent duct is long, and expands into the muscular ejaculatory portion. The deferent duct opens into a common atrium with the vagina. There are no penial hooks. The vagina is long and narrow. At its proximal end, the vagina connects to the large, oval bursa copulatrix. Another duct, which connects to the seminal receptacle and the uterine duct, leads from the bursa copulatrix. The bursa copulatrix is about five times as large as the seminal receptacle in volume (Fig. 4A).

Etymology. The species name *nivosa* is Latin for snowy, in reference to the frosty-looking white pigment on the dorsum of the living animal. It also commemorates a rare climatological event along the shores of the Sea of Cortez. On 3 April 1997, while driving to Punta la Gringa with Mike Miller and Paty Beller, the junior author saw snow on top of the mountains behind (immediately west of) the town of BLA.

Remarks. *Diaulula nivosa* has all the features characteristic of the genus *Diaulula* (see Valdés 2002), so it is regarded as a member of this taxon.

Diaulula nivosa is most similar to *Diaulula sandiegensis* (Cooper, 1863), which is distributed from Canada to the northern Pacific coast of Baja California (Cooper 1863; Behrens & Valdés 2001). *Diaulula sandiegensis* has a variable background external coloration, from white to orange (Behrens & Valdés 2001), but in all cases specimens have a series of dark rings on the dorsum. The rings may vary in number and coloration; in most specimens there are a few dorsal rings (between 4-8), which have a pale brown central area, whereas in northern specimens (from Canada) there are numerous small rings with a darker central area. In a few cases the central area of the rings is the same color as the rest of the dorsum.

The most distinctive features of *D. nivosa* are the presence of a number of small white spots on the dorsum that correspond to the apices of the caryophyllidia and the absence of rings. Internally, *D. nivosa* and *D. sandiegensis* differ in the absence of denticles on the outermost radular teeth in *D. nivosa*, but this characteristic is variable in *D. sandiegensis*.

The three other valid species of *Diaulula* found in the eastern Pacific are *Diaulula punctuolata* d'Orbigny, 1837, *Diaulula hispida* (d'Orbigny, 1837) and *Diaulula variolata* (d'Orbigny, 1837) from cold waters in South America (Chile and Argentina).

Odhner (1926) transferred *Doris vestita* Abraham, 1877 to the genus *Diaulula*. According to Schrödl (1996), this species is externally very similar to *Diaulula punctuolata* and only distinguishable by having a smaller prostate. The original description of *D. vestita* (Abraham, 1877) contains no anatomical information. The redescription by Odhner (1926) of this species resembles *Diaulula punctuolata*. The drawings of the reproductive system illustrated by Odhner (1926, fig. 77) for *D. vestita* are very similar to those in descriptions by Valdés & Gosliner (2001, fig. 23) of *D. punctuolata*. Valdés & Muniain (2002) regarded *Diaulula vestita* as a probable synonym of *D. punctuolata*, which was confirmed by Schrödl's (2003) examination of the type of *D. vestita*.

Diaulula punctuolata and *D. hispida* clearly differ from the yellow-brown *Diaulula nivosa* in their external coloration. Illustrations of *D. punctuolata* and *D. hispida* by Schrödl (1996), showed that both are pale in coloration, the former is pale creamish-white with light brown spots and the latter is white or brownish. Both of them typically lack white pigment on the apex of the caryophyllidia, and have a more oval (wider) body.

Additionally, *D. hispida* is characterized by having a dorsal longitudinal ridge, which is unique to members of the genus *Atagema* J. E. Gray in M. E. Gray, 1850 (Valdés & Gosliner 2001). Bergh (1898) and Odhner (1926) transferred this species to the genus *Trippa* Bergh, 1877 on the basis of the presence of the dorsal ridge. The original descriptions of *Atagema* and *Trippa* (J. E. Gray in M. E. Gray 1842-50

[1850], and Bergh 1877) contain limited information, but re-examination of the type species allowed Valdés & Gosliner (2001) to synonymize these two taxa, *Atagema* being the senior name. Marcus (1959) considered that *D. hispida* fits better within the genus *Diaulula*, because of mouth morphology differences with species of *Trippa*. However, the drawings by Marcus (1959), showing a tubular prostate and a clear dorsal ridge, indicate the placement of *Diaulula hispida* within *Atagema*. Schrödl (2003) argued that despite these ambiguities, until more information is available, *D. hispida* may be retained within *Diaulula*.

Diaulula punctuolata was anatomically studied and illustrated by Valdés & Gosliner (2001, figs 22-23) and a description is not repeated here. These authors concluded that this species has the same features as other members of *Diaulula* and it should be transferred to this genus. Since *Doris punctuolata* is the type species of *Anisodoris*, this genus name became a junior synonym of *Diaulula*.

Diaulula variolata ranges in dorsal color from white to brownish (but not yellowish), often with numerous dark blotches. In further contrast to *D. nivosa*, it has larger-sized tubercles, white gills and rhinophores, and a pear-shaped receptaculum seminis (Schrödl 2003).

Diaulula greeleyi, originally described from Brazil (MacFarland 1909), was subsequently reported from several other Atlantic localities. Camacho-García & Valdés (2003) regarded the eastern Pacific species *Peltodoris nayarita* Ortea & Llera, 1981 as a synonym, based on the examination of specimens from the Pacific coast of Costa Rica and revision of the original description (Ortea & Llera 1981). Bertsch et al. (2000) reported its occurrence at Punta Eugenia, on the central Pacific coast of the Baja California peninsula. Camacho-García & Valdés (2003) also provided illustrations of the reproductive system and radula of this species based on Pacific material. *Diaulula greeleyi* differs from *Diaulula nivosa*, by having a darker background color, lacking dorsal rings on the dorsum, having unipinnate branchial leaves and having larger, more hooked-shaped outermost radular teeth.

Peltodoris Bergh, 1880

Peltodoris Bergh, 1880: 41. Type species: *Peltodoris atromaculata* Bergh, 1880, by subsequent designation by O'Donoghue (1929).

Phialodoris Bergh, 1889: 908. Type species: *Phialodoris podotria* Bergh, 1889, by monotypy.

Montereina MacFarland, 1905: 38. Type species: *Montereina nobilis* MacFarland, 1905, by original designation.

Diagnosis. Dorsum covered with simple tubercles, stiffened by integumentary spicules, which occasionally protrude from the dorsal surface in an irregular fashion. Head with two conical oral tentacles. Anterior border of the foot grooved and notched. Labial armature smooth. Radula composed of simple, hamate teeth. The outermost teeth may be simple or denticulate. Reproductive system with a flattened, granular prostate, having two well differentiated regions. Penis and vagina devoid of hooks. Vestibular or accessory glands absent.

Remarks. Bergh (1880) described the genus *Peltodoris* based on *Peltodoris atromaculata* Bergh, 1880. *Peltodoris* is characterized by having the dorsum covered with tubercles, finger-like oral tentacles, tripinnate gill, labial armature without jaws, radula with simple, hamate teeth, large prostate and penis and vagina unarmed. Bergh (1880) distinguished *Peltodoris* from *Discodoris* on the basis of the harder body consistency and especially because of the lack of jaws.

Eliot (1906) pointed out that *Peltodoris* differs from *Discodoris* just in lacking a labial armature (jaws) and it should be regarded as a subgenus of *Discodoris*. Later, Thompson (1975) synonymized *Peltodoris* with *Discodoris* with no justification. In the following years a few authors followed Thompson's authority and cited the type species of *Peltodoris* in the binomen *Discodoris atromaculata* (e. g., Cattaneo-Vietti et al. 1990). However, most authors maintained the usage of *Peltodoris* as a valid genus (Barletta 1981; Schmekel & Portmann 1982; Perrone 1992).

The phylogenetic analysis of the cryptobranch dorid nudibranchs carried out by Valdés (2002) indicated that *Discodoris* and *Peltodoris* belong in two different clades, and therefore the genus *Peltodoris* was retained as valid. However, a critical review of the literature based on the new available information is necessary to determine how many species assigned to *Discodoris* are actual members of *Peltodoris*.

Peltodoris rosae spec. nov.
Figs 2B, 5, 6

Material examined. Holotype: Punta la Gringa, Bahía de los Ángeles, Gulf of California, Baja California, México (29°02.57'N; 113°32.3'W), 14 June 1996, 5.8 m depth, 66 mm long alive, leg. Hans Bertsch (LACM 3030).

External morphology. The body is wide and oval (Fig. 2B), with the posterior end of the foot covered by the mantle. The dorsum is covered with spiculose tubercles between 100-300 µm long (Fig. 5D). The body is grayish orange to pale brown. The dorsum is covered with a number of rounded patches dis-

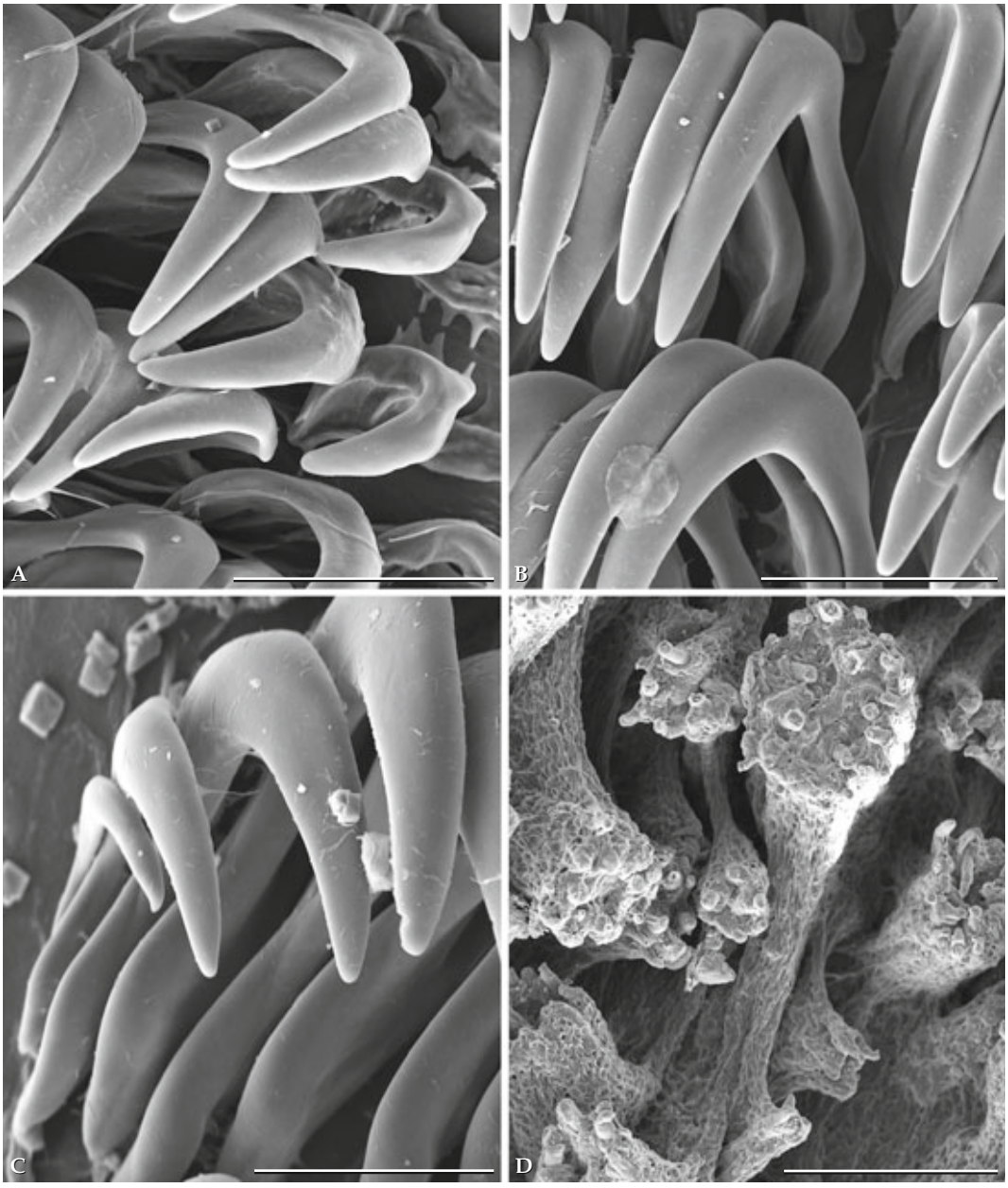

Fig. 5. *Peltodoris rosae* spec. nov., holotype (LACM 3030), Scanning Electron Micrographs of radula and dorsum. **A.** Innermost lateral teeth; scale bar: 100 µm. **B.** Mid-lateral teeth; scale bar: 100 µm. **C.** Outermost lateral teeth; scale bar: 50 µm. **D.** Dorsal tubercles; scale bar: 300 µm.

tributed irregularly all over the surface. The largest patches are black with the center dark brown, whereas the smallest are pale brown with a darker line surrounding them. There are also a number of small opaque white spots distributed all over the mantle margin, and a few on the central notal area. The rhinophores are dark brown with the apex white. The gill is composed of 8 tripinnate branchial leaves, which are grayish orange.

The anterior border of the foot is grooved and

notched (Fig. 6B). The oral tentacles are short and cylindrical with a rounded apex.

Anatomy. The labial cuticle is smooth. The radular formula is 29 × 40.0.40 in the holotype (LACM 3030). Rachidian teeth are absent (Fig. 5A). The lateral teeth are hamate, having a single cusp and lacking denticles (Fig 5B). The teeth increase their size gradually towards the medial portion of the half-row. The outermost teeth are also hamate and lacking denticles (Fig. 5C).

The reproductive system is triaulic (Fig. 6A). The ampulla is long and curved. It enters the female glands near their nidamental opening. The prostate is long and granular. It is divided into two different portions that are clearly distinguishable by their different texture and coloration. The deferent duct is long, and expands into the muscular ejaculatory portion. The deferent duct opens into a common atrium with the vagina. There are no penial hooks. The vagina is long and narrow. At its distal end, the vagina has a series of vaginal glands; at its proximal end the vagina connects to the large and oval bursa copulatrix. Another duct, which connects to the seminal receptacle and the uterine duct, leads from the bursa copulatrix. The bursa copulatrix is about twenty times as large as the seminal receptacle in volume (Fig. 6A).

Etymology. This species is named after Rosa del Carmen Campay Villalobos, wife of HB, for her marvelous support and encouragement of his "nudibranching" in the Sea of Cortez, and her many hours of concerned and attentive shore watch while he was underwater.

Remarks. *Peltodoris rosae* has all the features characteristic of the genus *Peltodoris* (see Valdés 2002), so *P. rosae* is regarded as a member of this taxon.

The eastern Pacific species most similar to *Peltodoris rosae* is *Peltodoris mullineri* Millen & Bertsch, 2000, originally described from California and the Pacific coast of Baja California (Millen & Bertsch 2000). These two species have a yellowish background color with dark patches and yellowish tripinnate gills. However, the dorsal dark patches of *P. mullineri* are composed of aggregations of individual small spots, whereas the patches in *P. rosae* are solid colored. According to Millen & Bertsch (2000), *P. mullineri* shows little variability, and the three specimens examined were virtually identical. Other external differences between these two species include the presence of white spots on the mantle margin of *P. rosae* and a higher body profile of *P. mullineri*. Anatomical differences include the presence of vaginal glands in *P. rosae* and the proportionally larger bursa copulatrix.

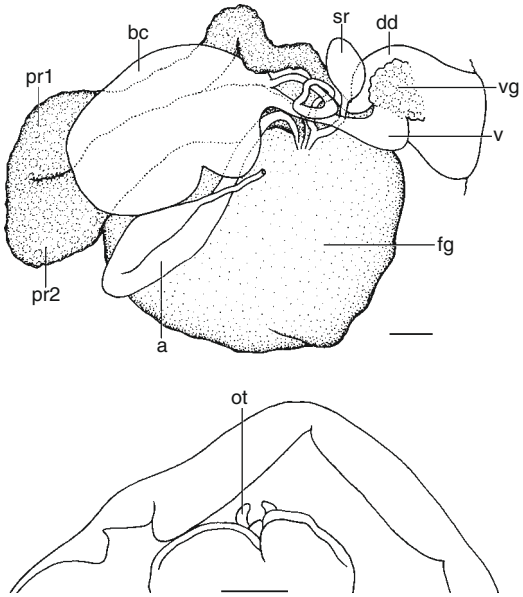

Fig. 6. *Peltodoris rosae* spec. nov., holotype (LACM 3030), anatomy. **A.** Reproductive system; scale bar: 1 mm. **B.** Ventral view of the mouth area; scale bar: 5 mm. Abbreviations: **a**, ampulla; **bc**, bursa copulatrix; **dd**, deferent duct; **fg**, female glands; **ot**, oral tentacle; **pr1**, distal prostate; **pr2**, proximal prostate; **sr**, seminal receptacle; **v**, vagina; **vg**, vaginal glands.

Peltodoris atromaculata, the type species of the genus *Peltodoris*, is a Mediterranean and northeastern Atlantic species characterized by having a whitish to pale cream general color with a number of dark brown or black large patches distributed on the entire dorsum, and varying in shape and size (see Valdés 2002). This pattern is different from the yellowish background color with smaller brown patches surrounded by black pigment in *P. rosae*. Internally, the mid-lateral radular teeth of *P. atromaculata* are more elongated and curved and the innermost lateral teeth are much shorter. The reproductive system of *P. atromaculata* has a much longer deferent duct than that of *P. rosae*. Additionally, *P. rosae* has a vaginal gland that is absent in *P. atromaculata*.

Another species assigned with certainty to *Peltodoris* is *Peltodoris nobilis*, a well-known species from the Pacific Coast of North America (see Valdés 2002). *Peltodoris nobilis* also has a yellowish background color with brown spots, but they are much smaller than those of *P. rosae* and concentrated only on the central area of the dorsum. Internally, *P. nobilis* is characterized by having a short prostate and lacking a vaginal gland, both different from *P. rosae*.

Other species previously assigned to *Anisodoris*

that could be members of *Peltodoris* are in need of further review. As mentioned above, at this point it is impossible to determine how many species are actual members of *Anisodoris*. Millen (1982) provided a list of the species assigned to *Anisodoris* summarized in a table, including color and anatomical information. None of the species have a coloration similar to that of *P. rosae*.

Acknowledgments

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 senior author. The SEM work was conducted at the facility supported by the National Science Foundation under the MRI grant DBI-0216506.

Tom Smith (of *Glossodoris tomsmithi* patronym) has accompanied the junior author on many research dives at BLA, including the holotype-finding dive of 14 June 1996.

References

Abraham, P. S. 1877. Revision of the anthobranchiate nudibranchiate Mollusca, with descriptions or notices of forty-one hitherto undescribed species. Proceedings of the Zoological Society of London 1877: 196-269, pls 27-30.

Barletta, G. 1981. Gasteropodi nudi (Pleurobranchomorpha, Sacoglossa, Aplysiomorpha e Nudibranchia). Quaderni della Civica Stazione Idrobiologica di Milano 9: 1-124.

Behrens, D. W. 1985. A new species of *Eubranchus* Forbes, 1838, from the Sea of Cortez, Mexico. The Veliger 28: 175-178.

– – & Gosliner, T. M. 1988. The first record of *Polycerella* Verrill, 1881, from the Pacific, with the description of a new species. The Veliger 30: 319-324.

– – & Valdés, A. 2001. The identity of *Doris* (s.l.) species MacFarland, 1966 (Mollusca, Nudibranchia, Discodoridídae): A persistent mystery from California solved. Proceedings of the California Academy of Sciences 52: 183-193.

Bergh, R. 1877. Malacologische Untersuchungen, Band 2, Theil 2, Heft 12. Pp. 495-546, pls 58-61 in: Semper, C. (ed.). Reisen im Archipel der Philippinen. Wiesbaden (Kreidel).

– – 1878. Malacologische Untersuchungen, Band 2, Theil 2, Heft 13. Pp. 547-601, pls 62-65 in: Semper, C. (ed.). Reisen im Archipel der Philippinen. Wiesbaden (Kreidel).

– – 1880. Malacologische Untersuchungen, Band 2, Theil 4, Suppl. 1. Pp. 1-78, pls A-F in: Semper, C. (ed.). Reisen im Archipel der Philippinen. Wiesbaden (Kreidel).

– – 1889. Malacologische Untersuchungen, Band 2, Theil 3, Heft 16. Pp. 815-872, pls 82-84 in: Semper, C. (ed.). Reisen im Archipel der Philippinen. Wiesbaden (Kreidel).

– – 1891. Die cryptobranchiaten Dorididen. Zoologische Jahrbücher, Abteilung für Systematik, Geographie und Biologie der Tiere 6: 103-144.

– – 1898. Die Opisthobranchier der Sammlung Plate. Zoologische Jahrbücher, Suppl. 4: 481-582, pls 28-33.

Bertsch, H. 1991. Seasonal, geographic and bathymetric distribution of opisthobranchs at Bahía de los Ángeles, Baja California, Mexico. Western Society of Malacologists Annual Report 23: 18.

– – 1993. Opistobranquios (Mollusca) de la costa occidental de México. Pp. 253-270 in: Salazar Vallejo, S. L. & González, N. E. (eds). Biodiversidad Marina y Costera de México. México (Comisión Nacional para el Conocimiento y Aprovechamiento de la Biodiversidad [CONABIO] y Centro de Investigaciones de Quinta Roo [CIQRO]).

– – 1995a. A three-year phenological analysis of subtidal populations of opisthobranch molluscs at Bahia de los Angeles, Baja California, México. Proceedings of the Pacific Division, American Association for the Advancement of Science 14: 34.

– – 1995b. Biogeographic microcosms: Ecological contrasts and variations in long-term regional faunal studies (Gulf of California, México). Annual Report of the Western Society of Malacologists 27: 4-5.

– – 1997. La historia natural de los opistobranquios en Bahía de los Ángeles, Baja California, México. P. 43 in: Resúmenes del III Congreso Latinoamericano de Malacología.

– – 2002a. The natural history of *Doriopsilla gemela* Gosliner, Schaefer and Millen, 1999 (Opisthobranchia: Nudibranchia), at Bahia de los Angeles, Baja California, México. Annual Report of the Western Society of Malacologists 33: 7-8.

– – 2002b. Bahía de los Ángeles. The Bottom Bunch Newsletter (May 2002): 3-5.

– – 2003. *Histiomena convolvula*: A gorgonian eater in Mexico's Sea of Cortez (and a sneaky taxonomy lesson!). The Bottom Bunch Newsletter (March 2003): 2-7.

– – 2008. Opistobranquios. Pp. 319-338 in: Danemann, G. D. & Ezcurra, E. (eds). Bahía de los Ángeles: Recursos Naturales y Comunidad. Línea Base 2007. Capítulo 11. Mexico (SEMARNAT, Pronatura Noroeste, SDNHM & INE).

– – , Angulo Campillo, O. & Arreola, J. L. 2000. New distributional records of opisthobranchs from the Punta Eugenia region of the Baja California peninsula: A report based on 1997-1998 CONABIO-sponsored expeditions. The Festivus 32: 99-104.

– – , Miller, M. D. & Grant, A. 1998. Notes on opisthobranch community structures at Bahía de los Angeles, Baja California, México. Opisthobranch Newsletter 24: 35-36.

Cattaneo-Vietti, R., Chemello, R. & Giannuzzi-Savelli, R. 1990. Atlas of Mediterranean nudibranchs. 264 pp., 14 pls, Rome (La Conchiglia).

Camacho-García, Y. & Valdés, A. 2003. Caryophyllidia-bearing dorid nudibranchs (Mollusca, Nudibranchia, Doridacea) from Costa Rica. Proceedings of the California Academy of Sciences 54: 65-79.

Collier, C. L. & Farmer, W. M. 1964. Additions to the nudibranch fauna of the east Pacific and the Gulf of California. Transactions of the San Diego Society for Natural History 13: 377-396, pls 1-6.

Cooper, J. G. 1863. Some genera and species of California Mollusca. Proceedings of the California Academy of Natural Sciences 2: 202-207.

D'Orbigny, A. 1835-46. Voyage dans l'Amérique Méridionale (le Brésil, la République Orientale de l'Uruguay, la République Argentine, La Patagonie, la République du Chili, la République de Bolivia, la République du Pérou), exécuté pendant les années 1826, 1827, 1828, 1829, 1830, 1831, 1832 et 1833. Volume 5, Part 3 (Mollusques). 758 pp., 85 pls, Bertrand (Paris). Dates of publication: pp. 1-48 [1835], pp. 49-184 [1836], pp. 185-376 [1837], pp. 377-408 [1840], pp. 409-488 [1841], pp. 489-758 + pls 1-85 [1846].

Eliot, C. N. 1906. Report upon a collection of nudibranchiata from the Cape Verde Islands, with notes by C. Crossland. Proceedings of the Malacological Society of London 7: 131-159, pl. 14.

Gosliner, T. M. & Behrens, D. W. 1986. Two new species and genera of aeolid nudibranchs from the tropical eastern Pacific. The Veliger 29: 101-113.

Gray, M. E. 1842-1850. Figures of molluscous animals, selected from various authors. Etched for the use of students. London (Longman, Brown, Green and Longmans). Dates of publication: vol. 1, pls 1-78 [1842]; vol. 2, pls 79-199 [1850]; vol. 3, pls 200-312 [1850]; vol. 4, pp. 1-124 [1850].

Lance, J. 1966. New distributional records of some northeastern Pacific Opisthobranchiata (Mollusca: Gastropoda) with descriptions of two new species. The Veliger 9: 69-81.

MacFarland, F. M. 1905. A preliminary account of the Doridídae of Monterey Bay, California. Proceedings of the Biological Society of Washington 18: 35-54.

– – 1909. The opisthobranchiate Mollusca of the Branner-Agassiz Expedition to Brazil. Leland Stanford Junior University Publications, University Series 2: 1-104, pls 1-19.

Marcus, Er. 1959. Lamellariacea und Opisthobranchia. Reports of the Lund University Chile Expedition 1948-49, No. 36. Lunds Universitets Årsskrift, Avd. 2, N.F. 55(6): 1-133.

Millen S. V. 1982. A new species of dorid nudibranch (Opisthobranchia: Mollusca) belonging to the genus *Anisodoris*. Canadian Journal of Zoology 60: 2694-2705.

– – & Bertsch, H. 2000. Three new species of dorid nudibranchs from Sothern California, USA, and the Baja California Peninsula, Mexico. The Veliger 43: 354-366.

Odhner, N. 1926. Die Opisthobranchien. Pp. 1-100, pls 1-3 in: Odhner, N. (ed.). Further zoological results of the Swedish Antarctic Expedition 1901-1903. Volume 2. Stockholm (Norstedt and Söner).

O'Donoghue, C. H. 1926. A list of the nudibranchiate Mollusca recorded from the Pacific coast of North America, with notes on their distribution. Transactions of the Royal Canadian Institute 34: 199-247.

– – 1929. 38. Report on the Opisthobranchiata. In: Zoological results of the Cambridge Expedition to the Suez Canal, 1924. Transactions of the Zoological Society of London 22(6): 713-841.

Ortea, J. & Llera, E. M. 1981. Un nuevo dórido (Mollusca: Nudibranchiata) de la Isla Isabel, Nayarit, México. Iberus 1: 47-51.

Perrone, A. 1992. Restituzione nottale ed aspetti teratologici in *Peltodoris atromaculata* Bergh, 1880 (Opisthobranchia, Nudibranchia). Pubicações Ocasionais da Sociedade Portuguesa de Malacologia 16: 81-84.

Schmekel, L. & Portmann, A. 1982. Opisthobranchia des Mittelmeeres. Nudibranchia und Sacoglossa. 410 pp., 36 pls, Berlin (Springer-Verlag).

Schrödl, M. 1996. Nudibranchia y Sacoglossa de Chile: morfología externa y distribución. Gayana Zoologica 60: 17-62.

– – 1997. On the Magellanic nudibranch *Gargamella immaculata* Bergh, 1894, and its synonymy to *G. latior* Odhner, 1926. Spixiana 20: 81-92.

– – 2000. On the morphology of the Magellanic nudibranch *Anisodoris fontaini* (d'Orbigny, 1837) and its synonymy with *A. tessellata* Bergh, 1898. The Veliger 40: 228-233.

– – 2003. Sea slugs of southern South America. 165 pp., Hackenheim (ConchBooks).

Thompson, T. E. 1975. Dorid nudibranchs from eastern Australia (Gastropoda, Opisthobranchia). Journal of Zoology, London, 176: 477-517.

Valdés, A. 2002. A phylogenetic analysis and systematic revision of the cryptobranch dorids (Mollusca, Nudibranchia, Anthobranchia). Zoological Journal of the Linnean Society 136: 535-636.

– – & Gosliner, T. M. 2001. Systematics and phylogeny of the caryophillidia-bearing dorids (Mollusca, Nudibranchia), with descriptions of a new genus and four new species from Indo-Pacific deep waters. Zoological Journal of the Linnean Society 133: 103-198.

– – & Muniain, C. 2002. Revision and taxonomic reassessment of Magellanic species assigned to *Anisodoris* Bergh, 1898 (Nudibranchia: Doridoidea). Journal of Molluscan Studies 68: 345-351.

Buchbesprechungen

1. Leschen, R. A. B., Beutel, R. G. & Lawrence, J. F. (Hrsg.) 2010. Handbook of Zoology, Teilband/Part 39: Volume 2: Coleoptera, Morphology and Systematics (Elateroidea, Bostrichiformia, Cucujiformia partim). – W. De Gruyter, Berlin, 786 pp., ISBN 978-3-11-019075-5.

Der zweite Band des Handbook of Zoology / Käfer führt in 116 Kapiteln die Polyphaga fort, und beinhaltet Elateroidea, Bostrichiformia, Cucujiformia partim; für die Adephaga sind außerdem als Nachträge die erst jüngst beschriebenen Meruidae und Aspidytidae abgehandelt. Insgesamt haben 52 namhafte Coleopterologen aus aller Welt an diesem Buch mitgearbeitet. Das erste Kapitel fasst Änderungen in der Klassifikation der höheren Taxa zusammen und präsentiert eine Liste der im 2. Band behandelten Familien und Unterfamilien. Im 2. Kapitel wird ein 12-seitiges "Glossary of morphological terms" vorgelegt, welches sehr hilfreich ist, um die Beschreibungen morphologischer Strukturen zu verstehen. Im Folgenden wird dann Familie nach Familie behandelt, und zwar deren Verbreitung, Biologie, Morphologie von Adulten und Larven, Phylogenie und Taxonomie sowie Schlüsselliteratur. Großgruppen werden jeweils in einer Einleitung kurz vorgestellt und wiederum Schlüsselzitate vorgelegt. Das Buch ist gut mit Abbildungen versehen, allerdings wäre es sehr zu begrüßen gewesen, wenn gerade die Übersichtszeichnungen detaillierter beschriftet worden wären. Es wäre sicherlich auch sachdienlich gewesen, mehr schematische Zeichnungen, z. B. von den Käfer-Ventralseiten oder von Genitalstrukturen mit entsprechender Beschriftung der Strukturen einzufügen. So wird es etwas schwierig bleiben, beim Studium der verschiedenen Familien entsprechende Strukturen zu homologisieren.

Generell stellt der 2. Band, wie auch schon sein Vorgänger, eine hochkonzentrierte Zusammenfassung des Wissens um die jeweiligen Käferfamilien dar und einen guten Startpunkt für weitere Recherche.

Alarmierend ist vor allem der von den Herausgebern festgestellte Mangel an jüngeren Käferforschern in der Welt, die diesen Startpunkt nutzen könnten. Ich persönlich hoffe, dass das Handbook of Zoology / Käfer helfen wird, interessante Fragen rund um die Käfer an jüngere Interessierte zu tragen, und auch zu zeigen, wo nach wie vor Kenntnislücken klaffen. Ich empfehle das Werk sehr für Bibliotheken und ganz besonders für den praktischen Unterricht an den Universitäten.

M. Balke

2. Klausnitzer, B. 2009. Süßwasserfauna von Mitteleuropa 20/17 – Insecta: Coleoptera: Scirtidae. – Spektrum Akademischer Verlag, Heidelberg, 326 Seiten, 1093 Abb., 52 in Farbe., ISBN 978-3-8274-1074-0.

Die unscheinbaren Sumpfkäfer, die in der Vergangenheit mit unterschiedlichen Familiennamen belegt wurden, werden vom namhaften Autor in einem Band der Reihe der Süßwasserfauna Mitteleuropas vorgestellt. Dabei geht die zoogeographische Zuordnung weit über Mitteleuropa hinaus, da die Arten der Westpalaearktis und somit auch Nordafrikas erfasst und auch die Arten der Türkei aufgeführt sind. Aus Mitteleuropa sind 27 Arten bekannt, in Deutschland kommen 24 Arten vor, insgesamt werden140 Arten aus 8 Gattungen im vorliegenden Band behandelt. Dem besonders umfangreichen und durch zahllose Abbildungen sehr aufwändig gestalteten Bestimmungsteil sind Kapitel zur Erforschungsgeschichte, Sammelmethoden, Phylogenie, Biogeographie und Fossilbelege vorangestellt. Die Verbreitung mit Diversitätszentren wird besonders eingehend behandelt, dabei haben sich allerdings bei der Aufzählung der Arten in den Tabellen und der Auflistung häufig Wiederholungen eingeschlichen. Umfassend wird auf die bisher allerdings nur dürftigen Daten zur Biologie dieser Käfergruppe eingegangen. Bei den Larven wurde eine Bestimmungstabelle zu den Gattungen und den Arten der beiden Gattungen *Odeles* und *Elodes* zusammengestellt. Der jeweiligen Artenübersicht mit zahlreichen Abbildungen vor allem der Genitalarmaturen vorangestellt sind wiederum eine Gattungsbeschreibung, eine zoogeographische Zuordnung, die bei den Artdokumentationen präzisiert wird, Angaben zur Ökologie und Biologie, die Phylogenie, wobei bei Artengruppen besonderer Wert auf die Begründung durch Synapomorphien gelegt wird und der Bestimmungsschlüssel. Bei den Beschreibernamen wird deutlich, dass sich hier der Spezialist einer Gruppe angenommen hat, die bisher wenig Beachtung fand und doch gerade auf Grund ihrer limnischen, semiaquatischen und auch terrestrischen Lebensweise, was die Imagines betrifft, von herausragender Bedeutung ist. Die Kenntnis zu diesen meist sehr kleinen Käfern zeigt auch besondere Strategien bei der Besiedlung von Lebensräumen (z. B. Phytotelmen) oder bei der Paarung, bei der sich sogar die Weibchen einiger Arten mit einer Art Löffel (Prehensor) beim Männchen die Spermatophore "abholen".

Ernst-Gerhard Burmeister