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A NEW SPECIES OF *DORIOPSILLA* (MOLLUSCA,
NUDIBRANCHIA, DENDRODORIDIDAE) FROM THE PACIFIC
COAST OF NORTH AMERICA

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A new species of the genus *Doriopsilla*, *D. spaldingi*, is described on the basis of four specimens collected from La Jolla, California. This new species is characterized externally by an iridescent blue band around the mantle margin. Internally, *D. spaldingi* differs from other eastern Pacific yellow species in lacking a pyloric gland, having a very long vagina, an elongate, almost tubular, prostate and in the penial hooks morphology. Additional information on the distribution and natural history of this species is provided. Thus far *D. spaldingi* is only known from southern California and the northwestern extreme of Mexico.

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Until recently, seven nominal species from the family Dendrodorididae were known along the eastern Pacific coast (Behrens 1991). However, Gosliner, Schaefer, and Millen (in press) have recently reviewed the systematic status of the yellow species of *Doriopsilla* from this area, and they concluded that only two species are valid.

The present paper describes a third yellow species of the genus based on material recently collected from the California coast, and deposited in the Department of Invertebrate Zoology of the California Academy of Sciences (CASIZ).

SPECIES DESCRIPTION

***Doriopsilla spaldingi* sp. nov.**
(Figs. 1–5)

TYPE MATERIAL. — Holotype: CASIZ 112492, La Jolla Submarine Canyon, San Diego County, Califor-

nia, April 1996, one specimen 48 mm preserved length, collected by Michael D. Miller. Paratypes: CASIZ 112493, La Jolla Submarine Canyon, San Diego County, California, 10 August 1997, 56 m depth, three specimens 23–31 mm preserved length, two of them dissected, collected by George E. Spalding.

EXTERNAL MORPHOLOGY. — Living animals reach up to 85 mm in length. The general color of the living animals is creamy white to yellow-orange (Fig. 1), the hyponotum being nearly translucent cream. The mantle margin is edged by an iridescent blue band. The rhinophores and gill are yellow, paler in the cream specimens.

The body is oval (Figs. 1, 2), high, stiffened by a subepidermal network of strong spicules over the entire body surface. The dorsum is covered by a number of low, simple conical tubercles, stiffened with spicules. Tubercles medial on the

dorsum are larger, decreasing in size toward the borders of the mantle. The mantle margin is wide and slightly undulate compared to species of *Dendrodoris*. The rhinophores are perfoliate with 20 lamellae. The gill is composed of 4–5 bipinnate leaves. The anus is eccentric to the left.

Ventrally (Fig. 3), the border of the mantle is edged by an iridescent blue band. In some specimens similar pigmentation exists on the edge of the foot, as well. The oral tentacles are small, separate and grooved laterally. The anterior border of the foot is notched.

INTERNAL ANATOMY. — The buccal bulb is oval (Figs. 4A; 5A, B), covered by minute, rather undifferentiated oral glands on its proximal portion (Fig. 4B). The tubular esophagus leads from the buccal bulb. At this point two retractor muscles insert onto the posterior of the bulb. The esophagus is very long and convoluted (Fig. 5B). Posteriorly, it broadens into a short muscular portion, which has two retractor muscles attached (Figs 4C, 5B). The intestine runs posteriorly in the usual position and lacks any pyloric gland (Fig. 5C).

The ampulla is large and elongate (Figs. 5D, E). It divides into a short oviduct, which enters the female gland, and the prostate. The prostate is elongated, almost tubular, but slightly flattened. From its distal end, the prostate leads into an elongated and convoluted deferent duct which is almost as wide as the prostate. The penis, when everted, is very long and contains 16 rows of penial hooks. The penial hooks are approximately 70–80 μm wide at the base and up to 40–45 μm in length (Fig. 4D). The vagina is very long and convoluted. At its proximal end is a large, thin-walled, spherical bursa copulatrix. The seminal receptacle is small, having a short duct which joins the vagina at the point where it connects the bursa copulatrix. The uterine duct also emerges from this point.

The buccal ganglia lay just behind the central nervous system.

The circulatory system consists of a large heart (Fig. 5A), joined by the aorta with a flattened blood gland, placed behind the central nervous system.

ETYMOLOGY. — The name *spaldingi* was chosen to recognize George E. Spalding III of Solana Beach, California, who originally discovered this species.

DISTRIBUTION. — Thus far this species is known only from La Jolla Submarine Canyon (present study) and Point Loma (photographs by Mike Miller, Herb Gruenhagen and Bob Bayer) in San Diego County. This species is also present in San Miguel Island, the Santa Barbara Channel Islands and South Coronado Island, Baja California, Mexico (photographs by Marc Chamberlain).

NATURAL HISTORY. — This species has always been found on sandy to rocky substrate, at depths from 27 to over 60 m. Careful temperature records kept with numerous specimens collected indicate that in most instances this species prefers water of 15°C or lower (G. Spalding, pers. comm.), explaining its deep water occurrence. Several specimens have been observed under warmer conditions of surface downwelling (G. Spalding, pers. comm.).

The egg mass is a typical, flat ribbon coil attached to the substrate on its side (J. Lance, pers. comm.), rather than on one edge, as reported by Gosliner et al. (in press) for *Doriopsilla albopunctata*. The egg mass of *D. spaldingi* is similar to that of the new species these authors describe, which is also classified as type B (Todd 1983). The larvae exhibit direct or lecithotrophic development (J. Lance, pers. comm.).

DISCUSSION

According to the recent diagnosis of the genus *Doriopsilla* published by Valdés and Ortea (1997), *Doriopsilla spaldingi* clearly belongs to this genus. The main generic diagnostic features of this species are the mantle stiffened by spicules, dorsum covered by tubercles, anus eccentric to the left, oral tentacles reduced, digestive system lacking ptyaline glands and penis eversible with numerous internal hooks. Valdés and Ortea (1997) indicated that Eliot (1906) was likely incorrect stating that in *Doriopsilla* the buccal ganglia lie immediately behind the rest of the central nervous system. However, the present description, as well as that by Gosliner et al. (in press) for the species they have studied, contradicts Valdés and Ortea (1997) and supports Eliot's observations.

The two other yellow species of *Doriopsilla* recognized by Gosliner et al. (in press) from the Pacific coast of North America are clearly distin-

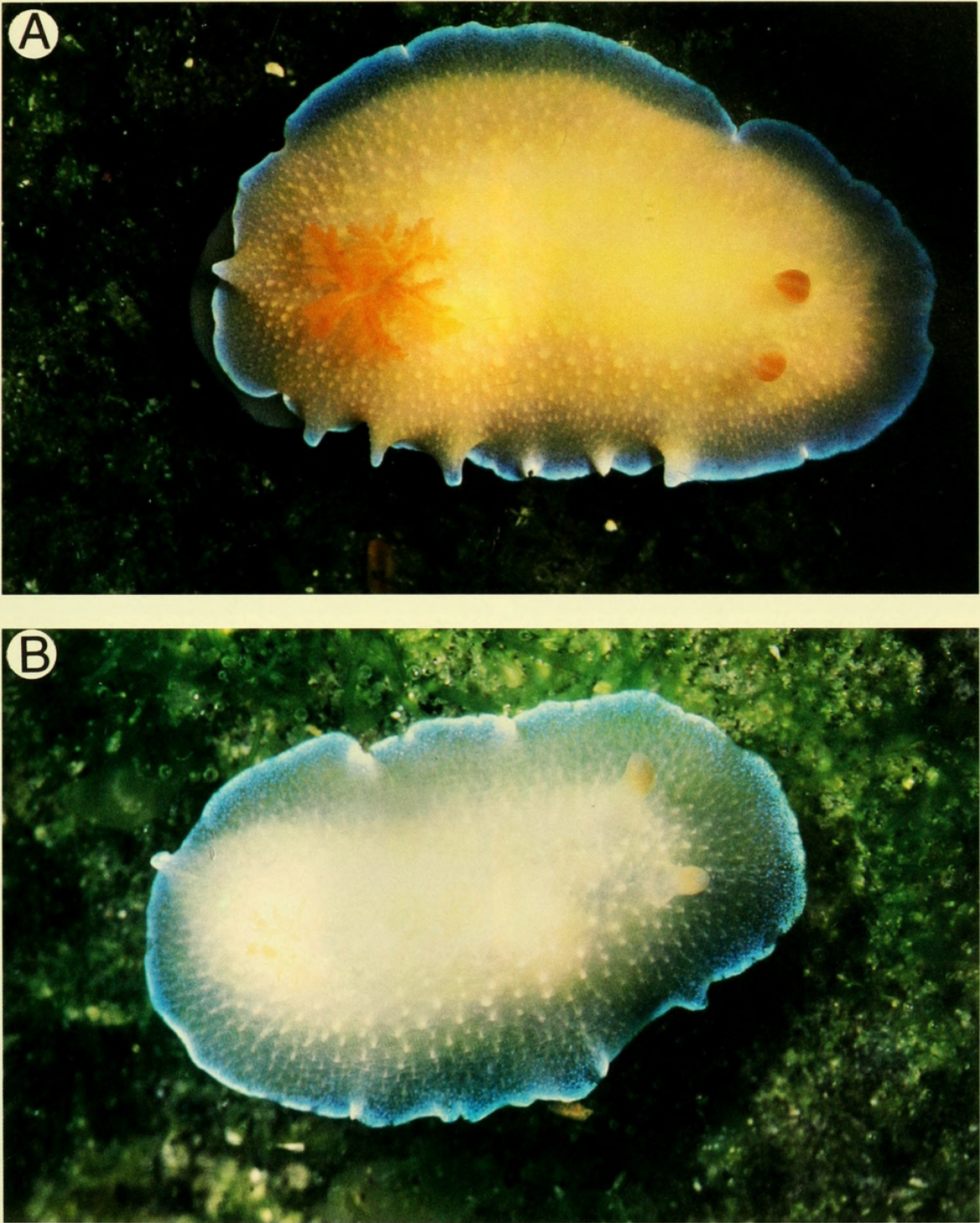


FIGURE 1. Living animals of *Doriopsilla spaldingi* sp. nov. A. Yellow-orange color phase specimen from La Jolla Canyon, California, 50 m depth. B. Creamy white color phase specimen from La Jolla Canyon, 50 m depth. Photographs by Mike Miller.

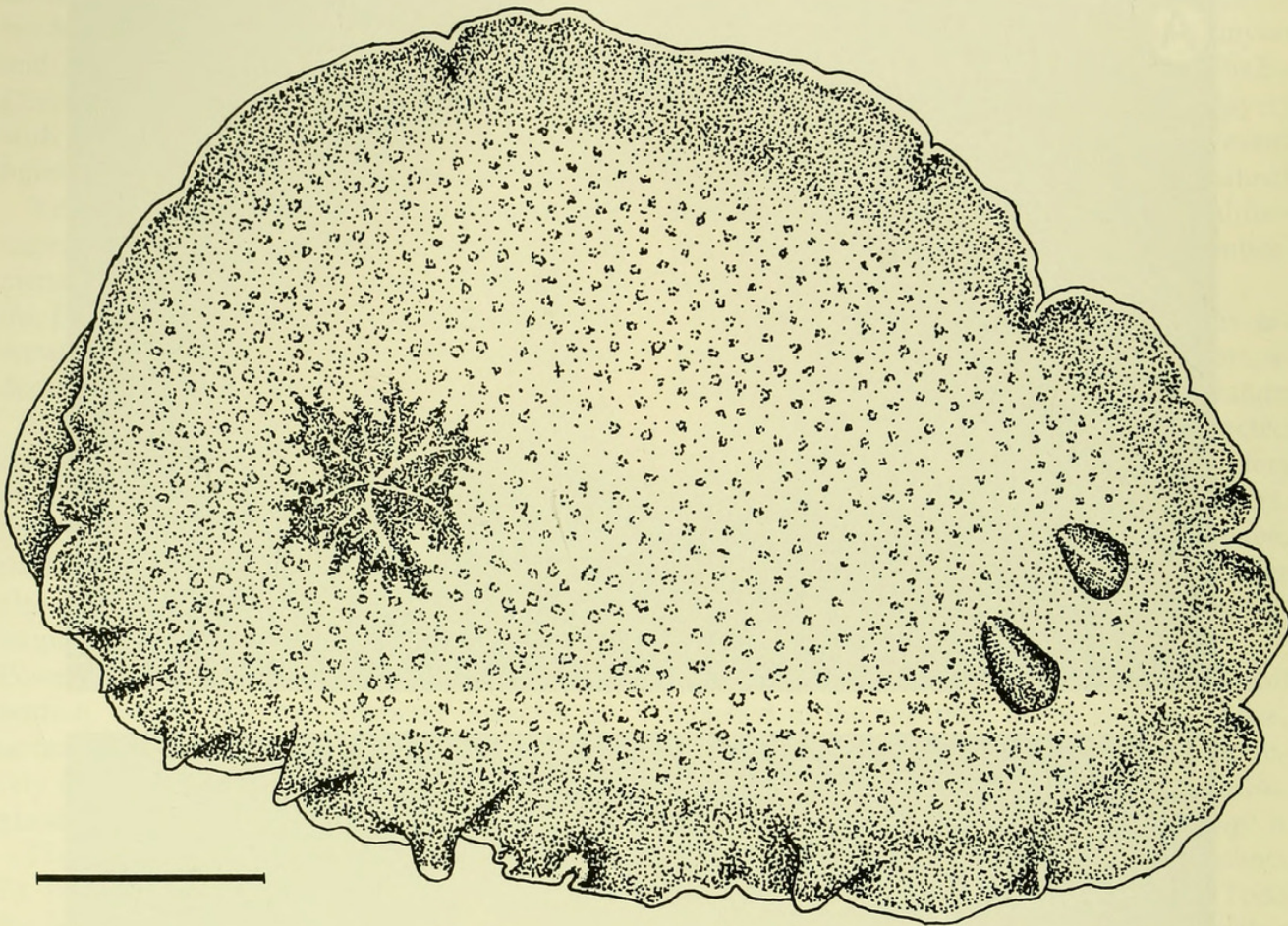


FIGURE 2. *Doriopsilla spaldingi* sp. nov., dorsal view of a living animal from Point Loma, scale bar = 8 mm.

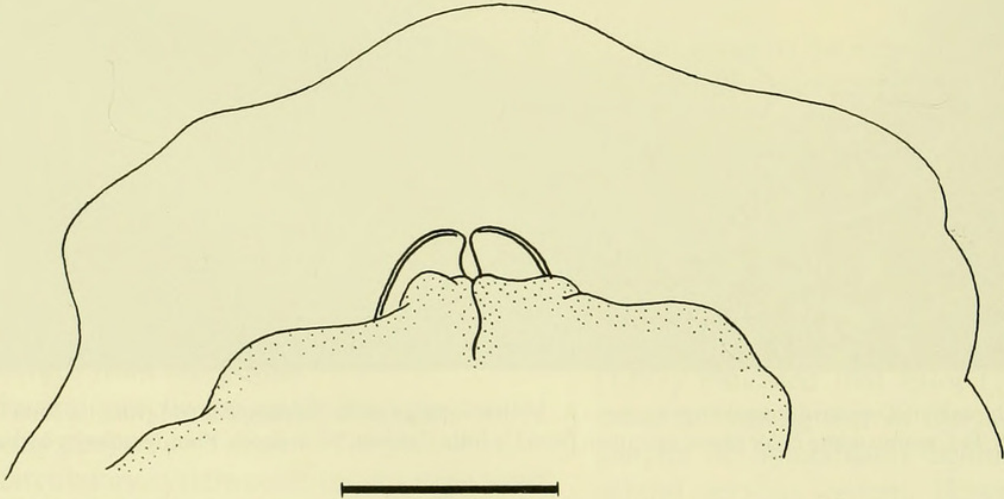


FIGURE 3. Ventral view of the anterior border of the foot of *Doriopsilla spaldingi* sp. nov. (CASIZ 112493).

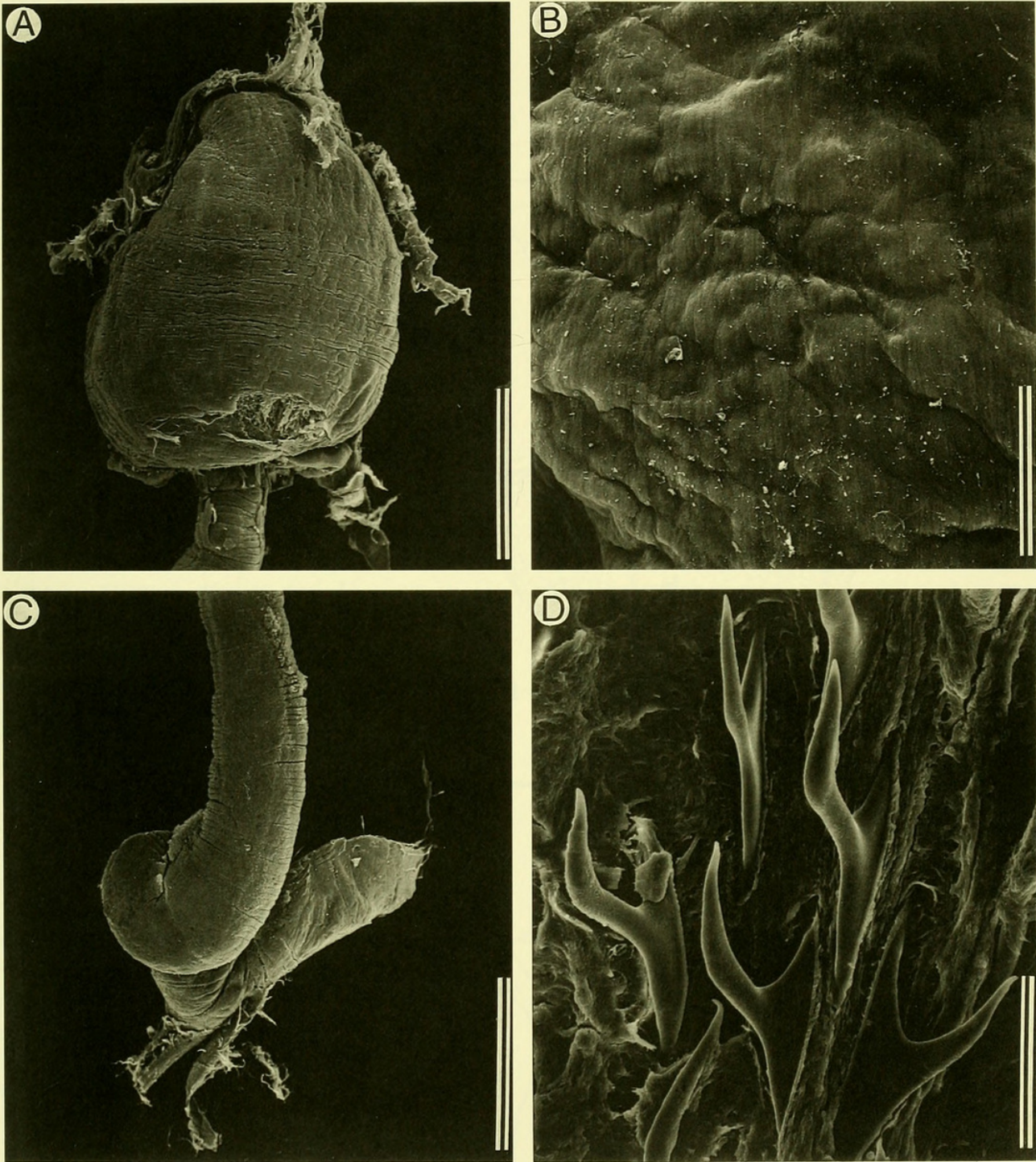


FIGURE 4. Scanning electron micrographs of *Doriopsilla spaldingi* sp. nov. (CASIZ 112493). A. Buccal bulb, scale bar = 1.5 mm. B. Detail of the oral glands, scale bar = 100 μ m. C. Muscular esophageal region, scale bar = 1.5 mm. D. Penial hooks, scale bar = 60 μ m.

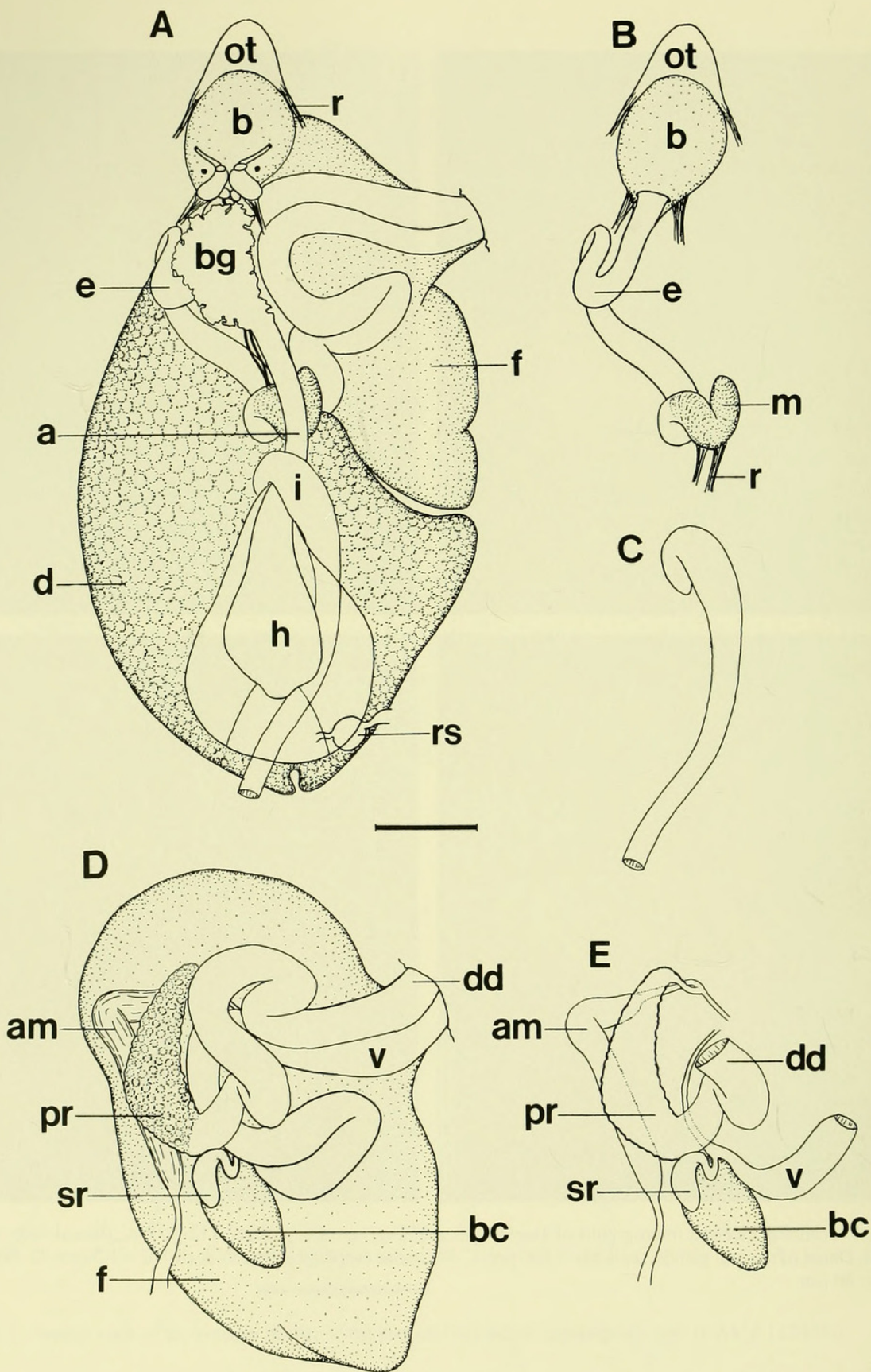


FIGURE 5. Anatomy of *Doriopsilla spaldingi* sp. nov. (CASIZ 112493), scale bar = 3 mm. A. Dorsal view of the anatomy. B. Anterior portion of the digestive system. C. Intestine. D. General view of the reproductive system. E. Dissected reproductive organs. Abbreviations: a = aorta, am = ampulla, b = buccal bulb, bc = bursa copulatrix, bg = blood gland, d = digestive gland, dd = deferent duct, e = esophagus, f = female gland, h = heart, i = intestine, m = muscular esophageal region, ot = oral tube, pr = prostate, r = retractor muscle, rs = renal sac, sr = seminal receptacle, v = vagina.

guished from *Doriopsilla spaldingi* for their external morphology and anatomy. *Doriopsilla albopunctata* and the unnamed species have the dorsum ornamented with white spots, which are absent in *D. spaldingi*, and lack the iridescent blue line around the mantle margin of this latter species. No other described species of the family Dendrodorididae has a color pattern similar to *D. spaldingi*.

Internally, *Doriopsilla spaldingi* is characterized by the presence of an elongate, almost tubular prostate, which is different from the wide and flattened prostates of other species of the genus (see Valdés and Ortea 1997; Gosliner et al., in press). In addition, *D. spaldingi* differs from *D. albopunctata* and the other Californian unnamed species in the short length of the seminal receptacle duct, in lacking a pyloric gland, in having a long vagina and in the penial hook's size and shape. According to Gosliner, Schaefer and Millen (in press), there are 6 rows of penial hooks in their unnamed species and 16 rows in *D. albopunctata*, as in *D. spaldingi*. They also report the penial hooks of both their species to be very elongated with a short base (about 25–35 μm wide and 50 μm long in *D. albopunctata*, and 10–15 μm wide and 15–20 μm long in their unnamed species), whereas in *D. spaldingi* they are elongated but the base is longer than the cusp (70–80 μm wide and 40–45 μm long).

The other three nominal species of *Doriopsilla* present on the Pacific coast of North America are *Doriopsilla nigromaculata* (Cockerell in Cockerell and Eliot, 1905), *Doriopsilla rowena* Marcus and Marcus, 1967 and *Doriopsilla janaina* Marcus and Marcus, 1967. *Doriopsilla rowena* is probably a junior synonym of *D. nigromaculata* (see Behrens 1991), but anatomical comparisons between specimens from San Diego, California and Puerto Peñasco, Mexico (the type localities of both nominal species) are needed to confirm this point. These three species differ from *D. spaldingi* in coloration and anatomy. *Doriopsilla janaina* is light red, orange or yellow with white dots (Marcus and Marcus 1967a), and *D. nigromaculata* and *D. rowena* are yellowish to orange with brown and white spots (Marcus and Marcus 1967b; Behrens 1991). Both species lack any blue pigment. In addition,

the prostate of *D. rowena* and *D. janaina* is rather flattened instead of tubular, as in *D. spaldingi*.

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RESUMEN

Se describe una nueva especie del género *Doriopsilla*, *D. spaldingi*, en base a cuatro ejemplares recolectados en California. Esta nueva especie se caracteriza externamente por la presencia de una banda azul iridiscente alrededor del borde del manto. Internamente, *D. spaldingi* se diferencia de otras especies amarillas del Pacífico Este en que carece de glándula pilórica, en que posee una vagina muy larga, una prostata alargada, casi tubular, y en la morfología de las espinas peneales. Se incluye además información adicional sobre la distribución e historia natural de esta especie. Hasta el momento, *D. spaldingi* se conoce solamente en el Sur de California y del extremo noroeste de México.

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