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Eviota melanosphena, a new dwarfgoby from Australia (Teleostei: Gobiidae)

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Abstract

A new species of dwarfgoby, *Eviota melanosphena*, with cephalic sensory-canal pore pattern 2 (lacking only the IT pore), some branched pectoral-fin rays, a dorsal/anal fin-ray formula of 9/8, the 4th pelvic-fin ray with numerous branches, and a diagnostic dark, wedge-shaped mark at the caudal-fin base is described from the Great Barrier Reef, Australia.

Key words: taxonomy, ichthyology, systematics, new species, coral-reef fishes, gobies, Indo-Pacific Ocean.

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Introduction

In previous papers, Greenfield & Jewett (2011, 2012, 2014a, 2014b, 2016) described species that were in preparation at the time of Ernest Lachner's death, when the second author (sometimes under the name Karnella) was actively studying the species in the genus *Eviota* with him (Lachner & Karnella 1978, Lachner & Karnella 1980, Karnella & Lachner 1981, Jewett & Lachner 1983). In this paper, we describe another of these species, *Eviota melanosphena* n. sp., a small species only known from the Great Barrier Reef, Australia.

The new species fits the description typical of all species of *Eviota*: the pelvic fins are separate, lack a frenum, and the 5th pelvic-fin ray, if present, is unbranched; the membrane joining the 5th pelvic-fin rays is weakly developed;

there are ctenoid scales on the body but no scales on the head, nape or pectoral-fin base; the breast either lacks scales or may have a few embedded cycloid scales; the teeth in the upper jaw are in two or more rows and there are 1–3 enlarged curved canine-like teeth in the innermost row of the lower jaw just behind the jaw symphysis.

Materials and Methods

Counts and measurements, descriptions of fin morphology and the cephalic sensory-canal pore patterns follow Lachner & Karnella (1980) and Jewett & Lachner (1983). Postanal midline spots, along the posterior ventral midline of the body, begin at the anal-fin origin and extend to a vertical drawn 2 to 3 scale rows anterior to the ends of the hypurals where they articulate with the caudal-fin ray bases, the additional smaller spot posterior to this, if present, is not counted. We also follow this method: "The membranes joining the first four [pelvic] fin rays are considered to be well developed when the membranes extend beyond the bases of the first branches; they are considered to be reduced when they are slightly developed, not extending to the bases of the first branches" (Lachner & Karnella 1980, p. 4). Dorsal/anal fin-ray counts include only segmented rays. Male urogenital definitions follow those of Lachner & Karnella (1980, Fig. 2).

Measurements were made to the nearest 0.1 mm using an ocular micrometer or dial calipers, and are presented as percentage of standard length (SL). All specimen lengths are SL in mm. Cyanine Blue 5R (acid blue 113) stain was used to make pores more obvious (Akihito *et al*. 1993, 2002, Saruwatari *et al*. 1997) and an air jet used to observe them. For measurements, values for the holotype are given first, followed by the range for all types and the mean in parentheses.

Type specimens have been deposited in the following museums: American Museum of Natural History, New York City (AMNH); Australian Museum, Sydney, Australia (AMS); Academy of Natural Sciences of Philadelphia (ANSP); California Academy of Sciences, San Francisco (CAS); and the United States National Museum (Smithsonian), Washington D.C. (USNM).

Eviota melanosphena, n. sp.

Wedge Dwarfgoby

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Figures 1–5.

Holotype. AMS I.19483-092, 13.3 mm SL, male, Sand Cay, on top of reef, Lizard Island, Great Barrier Reef, Australia, 0–3 m, Nov. 27, 1975, Australian Museum staff, LZ 75-71.

Figure 1. *Eviota melanosphena*, preserved holotype, AMS I.19483-092, 13.3 mm SL, male (photograph taken in 1980s by Kjell Sandved, prior to fading).

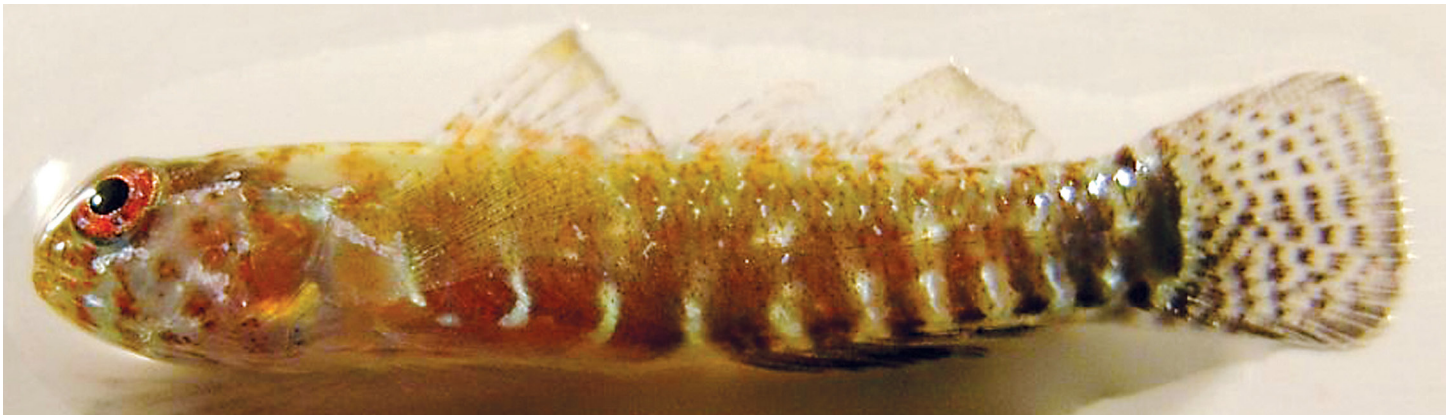

Figure 2. *Eviota melanosphena*, fresh specimen, Great Barrier Reef, Australia (Alonso Gonzalez Cabello).

Paratypes. Lizard Island, Great Barrier Reef, Australia: AMS I.19473-219 (33) 6.9–12.2 mm SL, Coconut Beach, 3–6 m, LZ 75-60; USNM 235375 (5) 9.6–12.9 mm SL; CAS 52738 (4) 9.4–12.1 mm SL; AMNH 58019 (4) 9.6–10.8 mm SL; ANSP 150921 (4) 9.0–12.1 mm SL (all same collection data as previous entry); AMS I.18755-144 (2) 11.0–11.6 mm SL, SE of Palfrey Island, 4–8 m, LZ 75-4; AMS I.19108-133 (6) 8.3–13.0 mm SL, near Bird Island, 0.9–10.7 m, LZ 75-42; AMS I.19456-112 (3) 8.8–11.8 mm SL, Yonge Reef, 3–12.2 m, LZ 75-28; AMS I.19482-171 (4) 6.8–9.9 mm SL, Sand Cay, 3.0–24.4 m, LZ 75-50; AMS I.21540-020 (1) 11.8, Eagle Cay, 4.6 m, DFH 75-133; USNM 235373 (6) 8.0–11.0 mm SL, back of Yonge Reef, 9.1–12.2 m, LZ 75-17; USNM 235374 (3) 10.2–11.3 mm SL, E. edge of Palfrey Island, 3 m, DFH 75-5; USNM 235376 (7) 8.3–11.4 mm SL, E. side Lizard Island, 0.9–7.6 m, DFH 75-14; USNM 235377 (8) 9.7–12.0 mm SL, North Pt., 4.6–6.1 m, DFH 75-28; USNM 235379 (3) 10.0–10.8 mm SL, bay S. of rocky point, 1.5–4.6 m, DFH 75-38; USNM 247332 (2) 10.3–12.9 mm SL, N. Direction Island, 3–5 m, LZ 75-11; AMNH 55063 (4) 9.3–10.6 mm SL, Coconut Beach, S. end, 75-LZ 60. The following 3 lots from Endeavour Reef, collected by C.L. Smith & J. Tyler: USNM 235378 (2) 11.0–11.8 mm SL, 0–6.1m, S 69-5; AMNH 58020 (3) 9.8–11.7 mm SL, 0–1.5 m, S 69-5; ANSP 159292 (1) 11.3 mm SL, 1.2–2.4 m, TS A-13. The following 2 lots from One Tree Island: AMS I.20211-045 (3) 11.4–12.3 mm SL, 1.8 m, FT 601; AMS I.20213-036 (5) 11.0–13.0 mm SL, 0.9–1.5 m.

Diagnosis. A small species of *Eviota*, almost always less than 13 mm SL (smallest gravid female 9.5 mm SL), with cephalic sensory-pore pattern 2 (lacking only the IT pore), some pectoral-fin rays branched, a dorsal/anal fin-ray formula of 9/8, 4th pelvic-fin ray with numerous branches (average 9.6), six dark subcutaneous body bars beginning at origin of anal fin, and caudal-fin base with a dark, wedge-shaped mark and dark spots bordering upper and lower procurrent caudal-fin rays.

Description. Dorsal-fin elements VI-I,9 (IV-I,8 [2], VI-I,9 [18]), no spines elongate, first dorsal fin triangular in shape; anal-fin elements I,8 (I,7 [3], I, 8 [16], I,9 [1]); pectoral-fin rays 15 (15 [14], 16 [6]), some rays branched, reaching to third soft ray of second dorsal fin; pelvic fin I,5, 5th segmented ray 16% (10% [18], I,4 20% [2]) of 4th ray; branches on 4th pelvic-fin ray 11 (8–12, average 9.6); segments between consecutive branches of 4th pelvic-fin

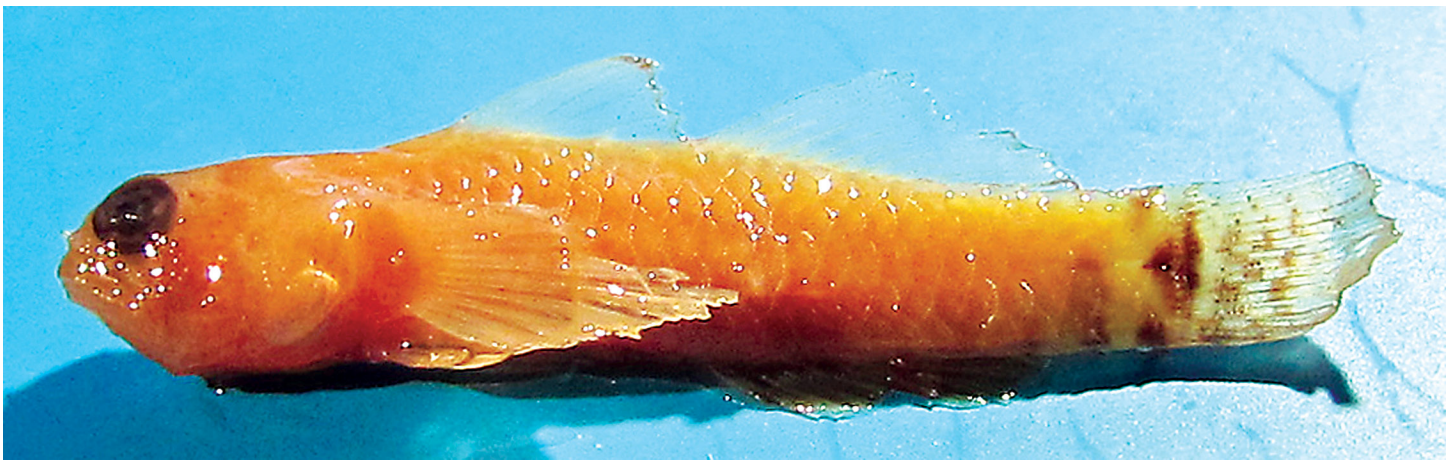

Figure 3. *Eviota melanosphena*, preserved holotype, AMS I.19483-092, 13.3 mm SL, male, recent photo (D.W. Greenfield).

ray 2 (0–2, average 1.0); pelvic-fin membrane reduced; branched caudal-fin rays 12 (10 [1], 11 [5], 12 [7], 14 [1]); segmented caudal-fin rays 17 (16 [1], 17 [19]); lateral scale rows 24 (23 [3], 24 [6]); transverse scale rows 6 (6 [7], 7 [2]); breast scaleless; pelvic fin usually extending beyond anal-fin origin. Front of head rounded with an angle of about 55° from horizontal axis; mouth slanted obliquely upwards, forming an angle of about 45° to horizontal axis of body, lower jaw not projecting; maxilla extending posteriorly to rear of pupil; anterior tubular nares short, just reaching posterior margin of upper lip; gill opening extending forward just anterior to edge of operculum; cephalic sensory-pore pattern 2 (lacking only IT pore); cutaneous papillae system weak, resembling pattern B; male urogenital papilla smooth with straight sides, end straight with several short finger-like projections; female urogenital papilla bulbous, with several short finger-like projections on end. General body shape as shown in Fig. 1.

Measurements (based on holotype and 9 paratypes, 9.7–13.1 mm SL): head length 29.4 (28.3–31.7, 30.1); origin of first dorsal fin 35.5 (32.4–38.6, 36.5), lying behind posterior margin of pectoral-fin base; origin of second dorsal fin 55.0 (54.1–58.0, 56.2), slightly in advance of anal-fin origin; origin of anal fin 57.2 (57.2–62.4, 59.6); caudal-peduncle length 24.4 (23.1–27.8, 25.1); caudal-peduncle depth moderate, 14.9 (11.9–14.9, 13.0); body slender, its depth 19.1 (17.5–23.2, 19.8); eye diameter 9.2 (8.8–13.9, 10.1); snout length 3.8 (3.8–5.5, 4.7); pectoral-fin length 33.6 (29.6–36.4, 32.1); pelvic-fin length 32.1 (25.5–34.0, 29.4).

Color in preservative. (Figs. 1, 3 & 4) Generally pale bodied, with six dark subcutaneous body bars plus a pronounced dark wedge-shaped mark on caudal-fin base. Head laterally with four to six clusters of large dark chromatophores; clusters occur ventrally on head from chin to branchiostegal membranes, and, to lesser extent, dorsally on head and nape, where sometimes arranged transversely; chromatophores on head faint or obscure on some specimens. Anterior naris tubes light dusky. Fleshy base of pectoral fin pale or with oblique band of faint chromatophores centrally and a few scattered chromatophores on dorsal portion; ventral portion of base usually pale. Belly with three broad dusky brownish subcutaneous patches, sharply separated by narrow vertical pale bands that extend to lateral midline of body or slightly above. Six dark subcutaneous postanal body bars, about equal in width to pale interspaces; bars faintly extend above midline; sixth bar most intense. Small dark seventh spot occurs ventrally at procurrent caudal-fin rays, matched by similar spot at dorsal procurrent rays. Anteriorly pointed, dark, triangular to wedge-shaped mark centrally at base of caudal fin and overlapping end of hypural plate, variable in size (large, black, and wedge-shaped when well developed, but sometimes reduced in size in various stages, smallest of which is triangular-shaped mark approximately same size as procurrent ray spots, see Fig. 4). Body otherwise pale or uniformly sprinkled with weak brownish chromatophores. Spinous and second

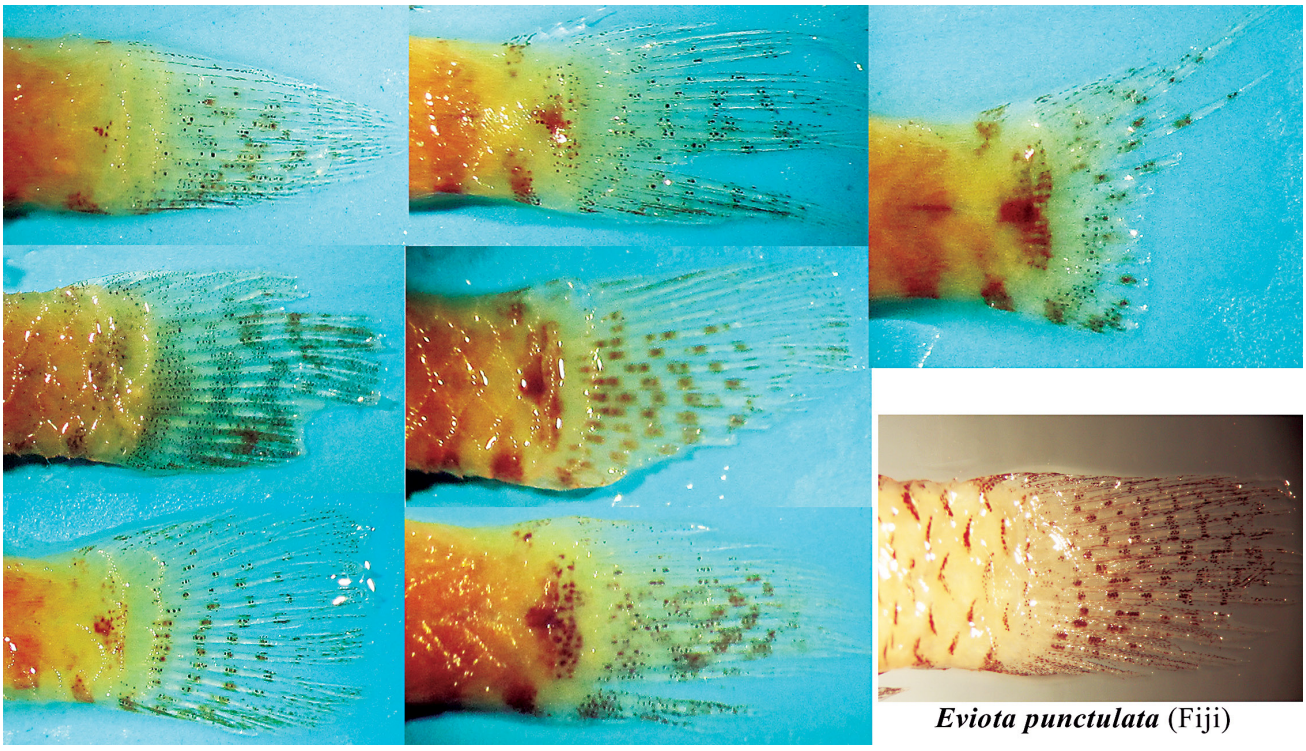

Figure 4. Caudal-fin pigment variation of *Eviota melanosphena* from a single lot of specimens, AMS I.19473-219, compared to *E. punctulata* from Fiji (D.W. Greenfield).

Figure 5. *Eviota melanosphena*, underwater photograph, Great Barrier Reef, Australia (Alonso Gonzalez Cabello).

dorsal fins mostly pale except for narrow dusky margin, some specimens with weak sprinkling of chromatophores basally or distally. Anal fin blackish, much darker than dorsal fins, basal third of fin in some specimens grayish. Caudal fin with dark reticulated pattern composed of dark spots, primarily on rays, forming wavy vertical bars. Pectoral and pelvic fins pale. Sexual dichromatism not evident in this species.

Color when live and fresh. (Figs. 2 & 5) Background color of head translucent gray, dark markings on head reddish brown; vertical line directly under eye, extending down across jaws and under head; second dark mark behind eye at 4 o'clock position; short horizontal mark at 2 o'clock position extending towards nape; two short bars at front of eye extending to upper jaw, one at 7 o'clock and one at 8 o'clock; side of head with roundish blotches, two at lower half and larger blotch at center of preopercular edge, large blotch covering most of operculum, several small blotches under head. Both jaws and naris tubes reddish brown. Pupil of eye black, iris silver with spokes of reddish brown radiating out. Several distinct silver-white marks on head: one at 6 o'clock under eye; second at end of lower jaw extending back to dark vertical bar under eye; third between two roundish blotches near preopercular edge; last under horizontal dark bar at 2 o'clock position behind eye. Pectoral-fin base reddish brown, crossed at center by narrow silver-white bar, angling dorsoventrally from top of operculum to pectoral-fin base.

Background color of body translucent yellowish, dorsal half of body lighter crossed by several red-orange bars extending from midline up to dorsum, two of these as bars crossing nape. Ventral half of body with 9 dark reddish brown rectangular bars, three over abdomen widest, narrowing posteriorly and becoming darker. Ninth bar black and extending over most of caudal peduncle, ventral margin of other postanal bars black. Ninth bar followed by triangular to wedge-shaped black mark centrally at base of caudal fin and overlapping end of hypural plate. Ventral surface under head, breast, and abdomen translucent gray. First dorsal-fin membranes clear centrally, distal margin dusky, and basal one-quarter red-orange extending up from body, spines with alternating black and white sections. Second dorsal fin similarly marked to first. Caudal fin crossed by rows of black dots, its margin dusky. Anal fin light basally, remainder black. Pectoral and pelvic fins translucent gray.

Etymology. The specific epithet is a feminine compound adjective derived from a latinized Greek combination, *melanos*, meaning black, and *sphena*, meaning wedge, in reference to the dark, wedge-shaped mark at the base of the caudal fin.

Distribution. Known only from the Great Barrier Reef, Australia between Lizard Island and Endeavour Reef. Recorded depths range from 0–24.4 m, habitat not recorded.

Comparisons. Of the 36 species of *Eviota* with cephalic sensory-pore pattern 2 (lacking only the IT pore) only 13 also have a dorsal/anal-fin formula of 9/8 and branched pectoral-fin rays as in *E. melanosphena*: i.e. *E. afelei, E. bimaculata, E. flavipinnata, E. hinanoae, E. hoesei, E. japonica, E. prasina, E. punctulata, E. queenslandica, E. rubrimaculata, E. saipanensis, E. shibukawai,* and *E. zonura. Eviota prasina* and *E. zonura* both have fimbriate male urogenital papilla (vs. non-fimbriate in *E. melanosphena*); *E. hinanoae* and *E. saipanensis* have cup-like male urogenital papilla (vs. non-cuplike); *E. bimaculata* and *E. japonica* have occipital spots (vs. no spots); *E. hoesei* and *E. queenslandica* have obvious dark spots on the pectoral-fin base (vs. none); *E. rubrimaculata* lacks a 5th pelvic-fin ray (vs. 10–20%); *E. afelei* has a completely dark first dorsal fin, *E. punctulata* has a first dorsal fin with distinct dark spots in rows or scattered, the fin is heavily peppered in *E. flavipinnata* and *E. shibukawai*, and *E. flavipinnata* has yellow dorsal fins and a red anal fin (vs. first dorsal fin pale with narrow dusky margin); *E. afelei* has rows of small dark spots set close together on the caudal-fin rays (vs. scattered well-spaced strong dark spots on rays); and none of the species have the distinctive wedge-shaped dark mark at the base of the caudal fin as in *E. melanosphena*.

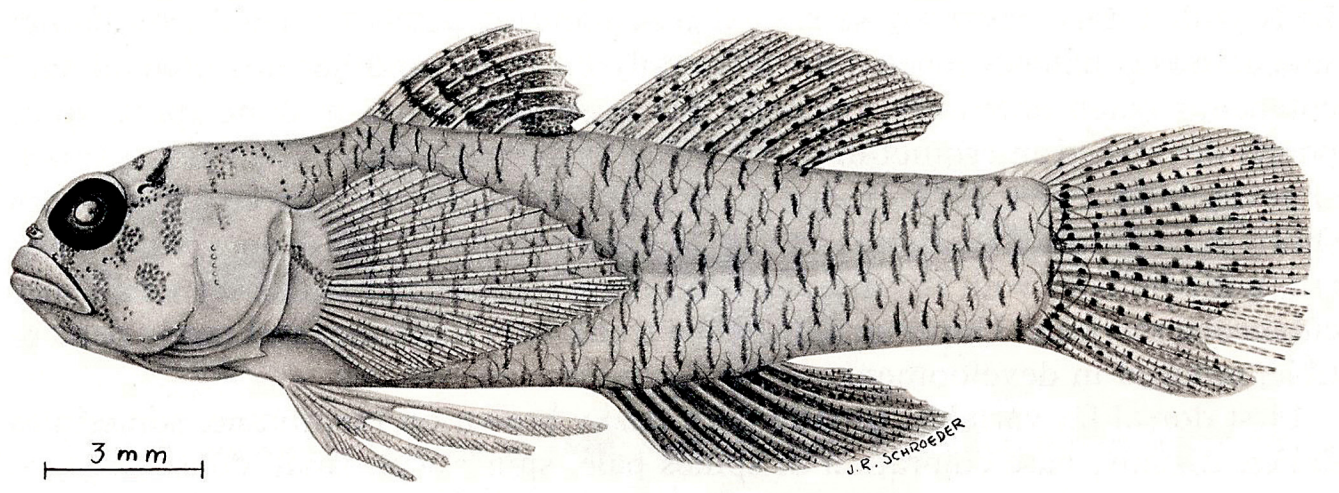

Figure 6. *Eviota punctulata*, holotype, from Fiji (Fig. 7 from Jewett & Lachner 1983).

Remarks. Because of its general similarity to what is recognized as *E. punctulata* in Australia, and because of its small size, *E. melanosphena* had been considered to be the juvenile of that species by ecologists in Australia (Alonso Gonzalez Cabello, pers. comm., September, 2010). In Fiji, the type locality of *E. punctulata*, the first dorsal fin is crossed by rows of dark spots (Fig. 6), and in Australia the species considered there to be *E. punctulata* has heavy spotting on the first dorsal fin (Fig. 7), both patterns lacking in *E. melanosphena*. Caudal-fin coloration in *E. melanosphena* differs from adult *E. punctulata* in Fiji (Fig. 4), and small specimens of *E. punctulata* in Fiji lack the distinctive caudal-fin marking found in *E. melanosphena* (pers. observation by the first author). In addition, a gravid female of *E. melanosphena* as small as 9.5 mm SL (USNM 235377) was found, and, since no other species of *Eviota* is known to have such a distinctive juvenile color phase, we reject the hypothesis that *E. melanosphena* represents the young of *E. punctulata*.

Figure 7. *Eviota punctulata*, fresh adult specimen, Great Barrier Reef, Australia (Alonso Gonzalez Cabello).

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