



Redescription of *Eviota thamani*, an endemic dwarfgoby from Fiji (Teleostei: Gobiidae)

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Abstract

The collection of two additional specimens of *Eviota thamani* from the islands of the Southern Lau Group, Fiji, allowed us to obtain meristic and morphometric information missing in the original description, and describe fresh coloration for this species. The earlier type material was old and in poor condition and fresh coloration not known. The species lacks all cephalic sensory-canal pores, has a dorsal/anal-fin formula of 8/8, both the male and female urogenital papillae are fimbriate, it has branched pectoral-fin rays, and the fifth pelvic-fin ray is absent or a rudiment. Its fresh coloration is golden yellow with red-orange markings.

Key words: taxonomy, systematics, ichthyology, coral-reef fishes, gobies, Indo-Pacific Ocean, miniaturization, redescription

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Introduction

Greenfield and Randall (2016) described *Eviota thamani* from Ono-i-Lau, in the Southern Lau Island Group, Fiji, based on 14 specimens collected by V.G. Springer et al. in 1982. The species is very small (all specimens are 10.1 mm SL or less) and the specimens were taken in a general rotenone collection with larger fishes and sorted and shipped 34 years before description; as a result these small specimens were in poor condition and a number of characters could not be adequately determined at the time of description. In addition, field photographs were not taken, so fresh coloration was not known. In 2017, the second author made collections in the Southern Lau Islands during a joint Auckland Museum and Conservation International biodiversity survey and collected one specimen of *E. thamani* at Ogea Island and another at Yagasa Island. These specimens were collected using clove oil and a hand net and photographs were taken. The new material now enables us to address the missing characters and describe the fresh coloration.

Materials and Methods

Type specimens are deposited at the California Academy of Sciences, San Francisco, CA, USA (CAS) and the Smithsonian National Museum of Natural History, Washington, DC, USA (USNM). The additional non-type material is also deposited at the California Academy of Sciences, San Francisco, CA, USA (CAS).

Counts and measurements and descriptions of fin morphology follow Lachner & Karnella (1980) and Jewett & Lachner (1983). Postanal ventral midline spots, along the posterior ventral midline of the body, begin at the anal-fin origin and extend to a vertical drawn 2 or 3 scale rows anterior to the ends of the hypurals; the additional smaller spot posterior to this, if present, is not counted. We follow Lachner & Karnella (1980: 4) in describing the membranes joining the first 4 pelvic-fin rays, which "...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". Dorsal/anal fin-ray formula counts (eg. 8/8) only include segmented rays.

Measurements were made to the nearest 0.1 mm using an ocular micrometer or dial calipers (the latter only for standard length, body depth, and caudal-peduncle depth), and are presented as percentage of standard length (SL). Lengths are given as standard length (SL), measured from the median anterior point of the upper lip to the base of the caudal fin (posterior end of the hypural plate); origin of the first dorsal fin is measured from the median anterior point of the upper lip to the anterior base of the first dorsal-fin spine; origin of the second dorsal-fin is measured from the median anterior point of the upper lip to the anterior base of its spine; origin of the anal fin is measured from the median anterior point of the upper lip to the anterior base of its spine; body depth is measured at the center of the first dorsal fin; head length is taken from the upper lip to the posterior end of the opercular membrane; orbit diameter is the greatest fleshy diameter; snout length is measured from the median anterior point of the upper lip to the nearest fleshy edge of the orbit; upper jaw length is the straight-line distance from the anterior tip of the premaxilla to the end of the upper margin of the dentary where the maxilla joins behind it; caudal-peduncle depth is the least depth, and caudal-peduncle length is the horizontal distance between the verticals at the rear base of the anal fin and the caudal-fin base; pelvic-fin length is measured from the base of the pelvic-fin spine to the tip of the longest pelvic-fin soft ray.

Cyanine Blue 5R (acid blue 113) stain and an airjet were used to highlight the cephalic sensory-canal pores or lack thereof in this case, and to make the fin-ray branching and scales obvious (Akihito et al. 1993, 2002, Saruwatari et al. 1997).

Eviota thamani Greenfield & Randall, 2016

Thaman's Dwarfgoby

Figures 1 & 2.

Holotype. USNM 235816, 10.1 mm SL, male, Fiji, Ono-i-Lau, outside barrier reef, NW side of island, -21.63°, -178.75°, 13.5–16.5 m, field number VGS 82-15, V.G. Springer, et al., 1 May 1982.

Paratypes. USNM 436601, 4 males 8.7–9.3 mm SL, 8 females 7.5–9.7 mm SL, 1 immature 7.3 mm SL; CAS 238206, 9.5 mm SL male, 10.1 mm SL female, collected with holotype.

Non-type specimens. CAS 244086, 10.0 mm SL, male, Fiji, Southern Lau Group, Ogea, inner lagoon, -19.1957°, -178.4579°, 5 m, field number MVE-17-031, M.V. Erdmann & S. Meo, 19 August 2017; CAS 244098, 9.9 mm SL male, Fiji, Southern Lau Group, Yagasa Lagoon, -18.9196°, -178.4743°, 20 m, field number MVE-17-033, M.V. Erdmann & S. Meo, 21 August 2017.

Diagnosis. A species of *Eviota* distinguished from all congeners by a combination of all cephalic sensory-canal pores absent; dorsal/anal-fin formula 8/8; male and female urogenital papillae fimbriate; all pectoral-fin rays branched; fifth pelvic-fin ray absent or a rudiment; pectoral-fin base with a long, oblique, dark band ventrally and a separate small dark spot dorsally at insertion of rays, not crossing midline; lower portion of preoperculum with a distinct dark, thin, short bar; no dark occipital spot; no dark spot at preural centrum; and no narrow dark lines under eye.

Description. Dorsal-fin elements VI + I,8, first dorsal fin triangular, no spines elongated; all second-dorsal-fin soft rays branched except first, last ray branched to base; anal-fin rays I,8, all soft rays branched, last ray branched to base; pectoral-fin rays 15–17, all branched, reaching to below third soft ray of second dorsal fin; pelvic-fin rays I,4, fifth ray absent or a rudiment, 4 branches on fourth ray, three segments between consecutive branches of fourth pelvic-fin ray, pelvic-fin membrane reduced, no basal membrane; caudal fin with 11–13 branched and 17 segmented rays; lateral-line scales 24; transverse scale rows 5; urogenital papilla of males and females fimbriate; front of head sloping with an angle of about 65° from horizontal axis; mouth slanted obliquely upwards, forming an angle of about 55° to horizontal axis of body; maxilla extending to center of pupil of eye; anterior naris tube moderate length, just reaching anterior margin of upper lip; gill opening extending forward to posterior edge of preoperculum; cephalic sensory-canal pore system lacking all pores; and papilla pattern obscure. General body shape is shown in Fig. 1.

Measurements [based on holotype, 8 paratypes, and 2 non-types; holotype (range and mean of all)]: Standard length 10.1 (8.5–10.1); head length 32.7 (32.5–35.5; 33.7); origin of first dorsal fin 41.1 (37.4–42.9; 40.0); origin



Figure 1. *Eviota thamani*, fresh specimen, CAS 244086, 10.0 mm SL, male, Southern Lau Group, Fiji (M.V. Erdmann).

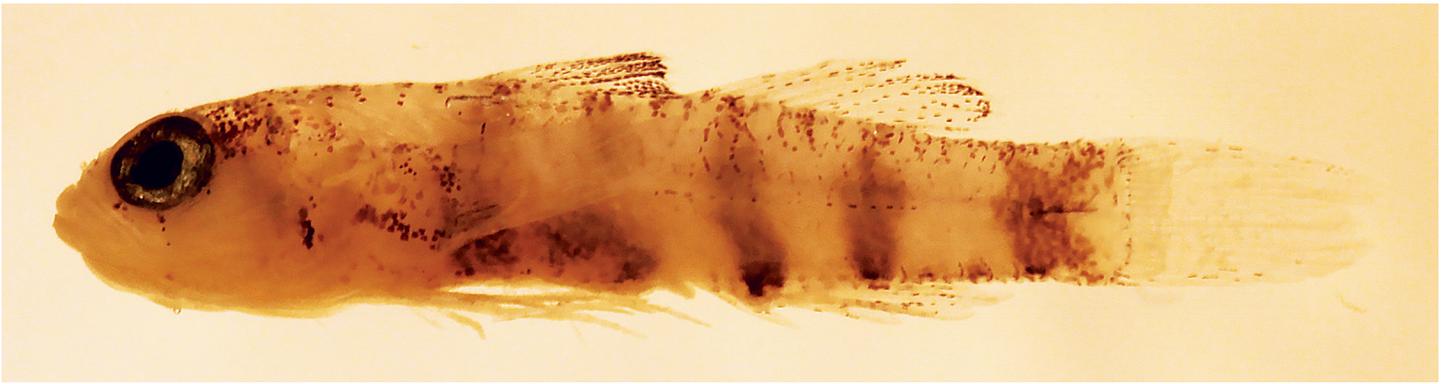


Figure 2. *Eviota thamani*, preserved specimen, CAS 244086, 10.0 mm SL, male, Southern Lau Group, Fiji (D.W. Greenfield).

of second dorsal fin 61.9 (57.1–62.1; 59.4); origin of anal fin 62.4 (58.9–65.6; 60.9); caudal-peduncle length 21.8 (20.8–25.3; 22.6); caudal-peduncle depth 11.4 (10.4–13.0; 11.7); body depth 19.3 (18.5–20.3; 19.4); eye diameter 11.4 (9.4–13.1; 11.3); snout length 4.9 (4.0–6.3; 5.1).

Color of fresh specimen. (Fig. 1) Background color of head and body golden yellow. Scale pockets on body with elongated orange marks. Body crossed by 5 internal brown-orange bars: first under front of first dorsal fin; second over abdomen just in advance of anal opening and under back of first dorsal fin; third at anal-fin origin, extending dorsally to midline and becoming lighter on upper half of body; fourth bar at end of anal fin and similar to third; fifth on caudal peduncle, widest. Ventral body surface with two brown-orange spots between bars 4 and 5. Dorsal surface of body with 8 red-orange spots along dorsal-fin bases and onto caudal peduncle. Nape crossed by 5 narrow, dark-orange bars. Area behind upper half of eye bright orange extending onto nape. Front and side of head golden yellow with a greenish tinge. Red-orange marks on upper and lower jaws, some red markings inside of mouth. Naris tube red orange. Three red-orange lines under eye: widest at 7 o'clock position extending down to upper jaw; second at 5 o'clock a narrow line; third at 4 o'clock of moderate width. Iris of eye white with red-orange bars radiating out from the pupil. Lower part of preoperculum with a red-orange short vertical bar, overlain with melanophores. Pectoral-fin base with two brown-orange marks, overlain with melanophores: a long oblique dark band ventrally and a separate small dark spot dorsally at insertion of rays, not crossing midline. First dorsal fin brown orange with distinct, small black spots on membranes. Anterior first two membranes of second dorsal fin brown orange, remainder of fin golden yellow, membranes with distinct, small black spots, more concentrated distally. Base of caudal fin golden yellow with orange tinges, rays brown orange, and membranes clear. Pectoral and pelvic fins clear.

Color in preservative. (Fig. 2) Head and body light cream. Most distinctive color pattern is 5 internal brown bars: first under front of first dorsal fin; second over abdomen just in advance of anal opening and under back of first dorsal fin; third at anal-fin origin, extending dorsally to midline and becoming lighter on upper half of body; fourth bar at end of anal fin and similar to third; fifth on caudal peduncle, widest. Ventral body surface with two dark spots between bars 4 and 5. Scattered melanophores along dorsal-fin bases, some coalesced into spots. Scattered melanophores on nape, some in rows crossing nape. Pectoral-fin base with clusters of melanophores, a prominent dark band obliquely crossing lower base and a separate smaller one dorsally at insertion of rays, no dark pigment crossing horizontal midline of base. Lower part of preoperculum with a distinct, dark, thin short bar. Cluster of melanophores behind upper half of eye, extending up to top of head. Naris tube and upper jaw cream. First dorsal fin sprinkled with melanophores, more concentrated on distal one-third. Second dorsal fin similar to the first but not as intense. Anal fin similar to second dorsal fin. Pectoral and pelvic fins clear.

Etymology. The specific epithet is an eponym, a noun in the Latin genitive case, in honor of Dr. Randolph R. Thaman, Professor of Pacific Islands Biogeography at the University of the South Pacific in Fiji.

Distribution. The new species is currently known only from the islands of the Southern Lau Group, Fiji, from depths of 5–20 m.

Comparisons. Only 5 other described species of *Eviota* lack all cephalic sensory-canal pores: *E. deminuta*, *E. lateritea*, *E. jewettae*, *E. occasa*, and *E. singula*. *Eviota thamani* differs from all of these by having fimbriate urogenital papillae in both the male and the female, and in both live and preserved markings and coloration.

Discussion. As discussed by Greenfield (2017), 5 of the 6 species of *Eviota* lacking all cephalic sensory-canal pores are very small. The two recent specimens of *E. thamani* are also small (9.9 and 10.0 mm SL), similar to the type material. They also have well-developed urogenital papillae indicating that they are mature. Rüber et al. (2007), in discussing miniaturization of fishes, suggested that miniaturized fishes often are characterized by a reduction or simplification of various structures: this appears to be the case with the loss of pores in *E. thamani* and its aforementioned congeners.

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