



***Eviota bilunula*, a new dwarfgoby species from Fiji, with a redescription of *Eviota flebilis* (Teleostei: Gobiidae)**

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Abstract

A new species of dwarfgoby, *Eviota bilunula*, is described from Fiji. The new species is distinguished by having the cephalic sensory-canal pore system lacking only the IT pore (pattern 2), a dorsal/anal fin-ray formula of 7/7 or 8/7; all pectoral-fin rays unbranched, a 5th pelvic-fin ray of moderate length, a narrow dark bar at the caudal-fin base, a red line extending down from under the eye to the jaws, five postanal ventral-midline spots, and two distinctive black crescent-shaped marks underneath the pectoral fin. The description is based on two specimens and a photograph of a third. The species is most similar to *E. flebilis* from Japan, which does not share the crescent-shaped marks. *Eviota flebilis*, previously known only from the holotype, is redescribed based on two additional specimens.

Key words: taxonomy, systematics, ichthyology, coral-reef fishes, gobies, dwarfgoby, Pacific Ocean.

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Introduction

In a review of the dwarfgobies of Fiji, Greenfield & Randall (2016) presented information on a species they called *Eviota cf. flebilis*. The species differed from *E. flebilis* Greenfield, Suzuki & Shibukawa, 2014, described from Japan, in having two distinctive black crescent-shaped marks underneath the pectoral fin that are absent in *E. flebilis*. They considered it prudent not to describe the specimens from Fiji as a new species, because *E. flebilis*

was known only from the holotype at that point. Recently, the second author obtained two additional specimens of *E. flebilis* from Japan, both lacking the distinctive crescent-shaped marks present in the specimens from Fiji. In this paper, we describe the species from Fiji as new and redescribe *E. flebilis* based on the new specimens.

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 ventral-midline spots begin at the anal-fin origin and extend to a vertical about 2–3 scale rows anterior to the end 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 four 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. 9/8) only include segmented rays. 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 and an airjet were used to make the cephalic sensory-canal pores more obvious (Akihito *et al.* 1993, 2002, Saruwatari *et al.* 1997). For measurements, values for the holotype are given first, followed by the paratype, or by the range for all specimens in parentheses.

Eviota bilunula, n. sp.

Crescent Dwarfgoby

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Figures 1–3.

Eviota cf. flebilis (non Greenfield, Suzuki & Shibukawa) Greenfield & Randall 2016: 42–44, figs. 44 & 45 (Viti Levu, Fiji).

Holotype. CAS 238065, 10.9 mm SL, male, Fiji, off NE coast of Viti Levu, Charlie’s Garden, 17°16.88’ S, 178°28.3’ W, rubble bottom, 13.5 m, clove oil, J.V. Eyre, 11 February 2015.

Paratype. CAS 238207, 9.9 mm SL, female, taken with holotype.



Figure 1. *Eviota bilunula*, underwater photograph, Fiji, from Greenfield & Randall (2016) Fig. 45 (R. Whitworth).



Figure 2. *Eviota bilunula*, preserved holotype, CAS 238065, 10.9 mm SL, male, Fiji (D.W. Greenfield).

Diagnosis. A species of *Eviota* with cephalic sensory-canal pore system lacking only IT pore (pattern 2); dorsal/anal fin-ray formula 7/7 or 8/7; pectoral-fin rays unbranched; 5th pelvic-fin ray 15.9–16.4% of 4th ray; a narrow dark bar at caudal-fin base; a red line extending down from under eye to jaws; five postanal ventral-midline spots associated with subcutaneous bars; two distinctive black crescent-shaped marks underneath pectoral fin.

Description. Dorsal-fin rays VI-I,8 (VI-I,7); anal-fin rays I,7; all dorsal- and anal-fin soft rays branched except first, last ray branched to base; first dorsal-fin spine filamentous, extending back to base of third soft ray of second dorsal fin of male holotype, not filamentous in female paratype; pectoral-fin rays 15, all unbranched, fin reaching to second anal-fin ray base; pelvic fins joined by membrane only at extreme base, pelvic-fin membranes between rays absent, pelvic-fin rays I,5; 4 (3) branches on 4th pelvic-fin ray; 2 (1) segments between consecutive branches of 4th pelvic-fin ray, 5th pelvic-fin ray 15.9 (16.4%) of 4th ray, pelvic fin reaching to base of first anal-fin ray; 11 branched and 17 segmented caudal-fin rays; lateral scale rows 23, transverse scale rows 6, no scales on head, nape, breast, pectoral-fin base, midline of abdomen, and wide areas along bases of dorsal fins; cephalic sensory-canal pore system lacking only the IT pore (pattern 2); anterior oculoscapular canal with pores B', single C, single D, E, and F', two preopercular-canal pores, N' and O'; male urogenital papilla smooth with a blunt tip, reaching to anal-fin spine; female urogenital papilla bulbous with short fingers distally; lower jaw slightly projecting, maxilla extending beyond a vertical at posterior margin of pupil; body slender, front of head rounded with an angle of about 70° from horizontal axis; mouth oblique, forming an angle of about 55° to horizontal axis of body; anterior naris tube extending forward just past posterior edge of upper jaw; gill opening extending forward to a vertical just behind back of eye. General body shape shown in Fig. 2.

Measurements (percentage of SL): (based on holotype and paratype 9.9–10.9 mm SL) head length 32.9 (33.3); origin of first dorsal fin 37.9 (40.4); origin of second dorsal fin 57.0 (57.5); origin of anal fin 60.3 (60.6); caudal-peduncle length 21.9 (22.2); caudal-peduncle depth 12.1 (13.7); body depth 20.1 (20.2); eye diameter 10.1 (10.5); snout length 4.0 (4.1); upper-jaw length 11.4 (12.1); pectoral-fin length 27.3 (32.9); pelvic-fin length 28.3 (35.6).

Color in life. (Fig. 1) Body translucent with red and silver-white markings. Internal red band running from behind eye and cheek along vertebral column, widest over abdomen and narrowing posteriorly; band broken dorsally by seven white patches. Five faint internal red bars from anal-fin origin back to caudal fin extending down from vertebral column. Series of small red dots running along dorsum back to caudal-fin base; lower body with row of eight roundish, progressively smaller, white spots from pectoral-fin base to caudal peduncle. Pectoral-fin base with a large white spot on lower half, narrow red area above, two white spots near top of base on body. In photograph, tops of characteristic dark crescent-shaped marks visible behind pectoral fin. Caudal-fin base with a distinctive vertical dark-red bar, preceded by a small dark irregular spot. White patches and spots with fine black speckling overlying red area on head above and behind eye. Lower half of head translucent with two large white spots and a distinctive narrow red line extending below eye at 6 o'clock position to posterior end of maxilla. Snout

with red line from eye to naris tube. Pupil of eye black, iris white with bold red reticulations on upper half of orbit and some red areas on lower half. First dorsal-fin spine with five dark, elongate spots spaced along distal two-thirds. Fins mostly translucent with some dark peppering and small red spots.

Color of holotype in preservative. (Figs. 2 & 3) Background color of head and body light yellow. Body with a brownish area across ventral half of abdomen, from under pectoral-fin base to just before anus, followed by five narrow black subcutaneous bars: first from first three rays of second dorsal fin, extending down to third anal-fin ray; second under fifth ray of second dorsal fin, down to fifth anal-fin ray; third from eighth dorsal-fin ray down to last anal-fin ray; fourth across caudal peduncle and darkest, with a posterior extension for a short distance along vertebral column. An intense narrow black bar crossing caudal-fin base where hypurals articulate with caudal-fin-ray bases. Two distinctive black crescent-shaped marks under pectoral fin, convex side anterior, top of upper mark extending above fin level, lower below and slightly behind first mark (Fig. 3). Dark brown over cranium and a small black spot at anterior edge of preoperculum in line with bottom of eye and another under eye just above end of upper jaw where red line is in life. Dark chromatophores on center of isthmus in line with center of eye. Remainder of head and body without marks. First dorsal-fin spine with five dark, elongate spots spaced along distal two-thirds. Remainder of first dorsal fin without pigment except for a few small melanophores at its base. Second dorsal and anal fins peppered with small dark chromatophores. Caudal fin crossed by three bands of melanophores, distalmost widest. Pectoral and pelvic fins immaculate.

Etymology. The specific epithet is a nominative singular feminine adjective combining the Latin *bi* (two) and *lunula* (little moon), in reference to the two distinctive black crescent-shaped marks underneath the pectoral fin.

Distribution. Known only from Fiji. Specimens were collected at 13.5 m depth.

Comparisons. *Eviota bilunula* belongs to the cephalic sensory-pore pattern 2 group of Lachner and Karnella (1980), lacking only the IT pore. The group now contains 39 described species, including *E. bilunula*. The new species differs from the others by having unbranched pectoral-fin rays vs. branched in *E. afelei*, *E. bimaculata*, *E. dorsimaculata*, *E. erdmanni*, *E. hinanoae*, *E. hoesei*, *E. indica*, *E. japonica*, *E. latifasciata*, *E. lacrimosa*, *E. melanosphena*, *E. pellucida*, *E. piperata*, *E. prasina*, *E. punctulata*, *E. queenslandica*, *E. rubra*, *E. saipanensis*, *E. tigrina*, *E. variola*, and *E. zonura*. *Eviota bilunula* differs from the remaining species that share unbranched pectoral-fin rays by having a dorsal/anal fin-ray formula of 8/7 or 7/7 vs. usually 9/8 or 9/7 in *E. sigillata*, *E. spilota*, and *E. zebrina*. The new species differs from *E. cometa* (which can have 9/8 or 8/7) by lacking the obvious black spot before the caudal fin on the latter. Six more species within the cephalic sensory-pore pattern 2 group also share unbranched pectoral-fin rays as well as the dorsal/anal fin-ray formula of 8/7 of the new species: *E. ancora*, *E. flebilis*, *E. pellucida*, *E. prasites*, *E. springeri*, and *E. storthynx*. Two of these, *E. pellucida* and *E. prasites*, can be differentiated from *E. bilunula* by having a longer 5th pelvic-fin ray, modally 40% vs. 15.9–16.4% of the 4th ray; *E. storthynx* can be distinguished by a dark occipital spot (vs. absent); *E. springeri* by a large dark spot medially at the end of the caudal peduncle (vs. absent); *E. ancora* by a hook-shaped orange coloration on the side of the head (vs. absent) as well as by lacking the red line under the eye and the dark bar at the caudal-fin base of *E. bilunula*. *Eviota bilunula* is most similar to *E. flebilis*, but can be distinguished by a slightly longer 5th pelvic-fin ray (15.9–16.4% vs. 9.7–12.9% of the 4th ray) and the two distinctive black crescent-shaped marks underneath the pectoral fin.



Figure 3. *Eviota bilunula*, diagnostic markings underneath pectoral fin, preserved holotype, CAS 238065, 10.9 mm SL, male, Fiji (D.W. Greenfield).

Eviota flebilis, Greenfield, Suzuki & Shibukawa, 2014

Tearful Dwarfgoby

Figures 4–8.

Holotype. NSMT-P 114944, 10.1 mm SL, male, Nakano, Iriomote-jima, Ryukyu Islands, Japan, 24°20'49.2" N, 123°42'40" E, 5–8 m, field number S-18758, T. Suzuki, K. Shibukawa, M. Suzuki & A. Kawai, 14 August 2010.

Non-type specimens. OMNH-P 43339, 10.3 mm SL, female, (S-23525), Funauki Inlet, Iriomote-jima, Ryukyu Islands, Japan, 24°20'49.2" N, 123°42'40" E, 5 m, K. Yano, 20 May 2016; OMNH-P 43340, 11.6 mm SL, male, (S-23526), same data as OMNH-P 43339.

Diagnosis. A species of *Eviota* with cephalic sensory-canal pore system lacking only IT pore (pattern 2); dorsal/anal fin-ray formula 8/7; pectoral-fin rays unbranched; 5th pelvic-fin ray 9.7–12.9% of 4th ray; a narrow dark bar at caudal-fin base; a red line extending down from under eye to jaws; five postanal ventral-midline spots associated with subcutaneous bars; no black crescent-shaped marks underneath pectoral fin.

Description. Dorsal-fin rays VI-I,8; anal-fin rays I,7; all dorsal- and anal-fin soft rays branched except first, last ray branched to base; first dorsal-fin spine filamentous, extending back to middle of second dorsal fin of male specimens, not filamentous in female specimen; pectoral-fin rays 15, all unbranched, fin reaching to third anal-fin-ray base; pelvic fins joined by membrane only at extreme base, pelvic-fin membranes between rays reduced or absent, pelvic-fin rays I,5; 4th pelvic-fin ray with 5 branches, one segment between branches, 5th segmented pelvic-fin ray 9.7–12.9% of 4th ray, pelvic fins reaching to second to fourth anal-fin-ray base; 11 branched caudal-fin rays, segmented caudal-fin rays 15–17; lateral scale rows 22–23, transverse scale rows 5, no scales on head, nape, breast, pectoral-fin base, midline of abdomen and wide areas along bases of dorsal fins, scales on body finely ctenoid; vertebrae 10+15=25; first dorsal-fin spine filamentous, extending back to base of second to sixth soft ray of second dorsal fin; cephalic sensory-pore system lacking only the IT pore (pattern 2); anterior oculoscapular canal with pores B', single C, single D, E, and F', two preopercular-canal pores, N' and O'; male urogenital papilla non-fimbriate, straight with fringed end, reaching beyond anal-fin origin; female urogenital papilla bulbous with four fingers distally; mouth oblique, lower jaw slightly projecting, maxilla extending beyond a vertical at posterior



Figure 4. *Eviota flebilis*, fresh holotype, NSMT-P 114944, 10.1 mm SL, male, from Greenfield et al. (2014), Fig. 4 (T. Suzuki).



Figure 5. *Eviota flebilis*, underwater photograph, male, Ryukyu Islands, Japan (K. Yano).

part of pupil; anterior naris tube extending to posterior edge of upper jaw and light in color; gill opening extending forward to a vertical at midway between edge of preoperculum and posterior end of opercular membrane, gill membranes attached anteriorly to isthmus, without a free fold. General body shape shown in Fig. 4.

Measurements (percentage of SL): (based on 3 specimens, 10.1–11.6 mm SL) head length 33.5 (32.4–33.5); origin of first dorsal fin 38.7 (38.7–40.2), above and behind posterior end of pectoral-fin base; origin of second dorsal fin 58.1 (57.4–58.3); origin of anal fin 61.3 (60.2–61.5), at a vertical through first soft ray of second dorsal fin; caudal-peduncle length 25.5 (22.2–25.5); caudal-peduncle of moderate depth 12.3 (10.2–12.3); body slender, its depth 17.0 (13.9–17.0); eye diameter 9.4 (9.0–9.4); snout length 6.1 (4.5–6.1); upper-jaw length 14.2 (10.2–14.2); pectoral-fin length 32.1 (28.7–32.1); pelvic-fin length 34.0 (37.0).

Color of fresh holotype. (Fig. 4) Body translucent with a series of alternating white and red-orange blotches spread along vertebral column: first just posterior to pectoral-fin base in advance of first dorsal fin; second under center of first dorsal fin; third at end of first dorsal fin; fourth under elements two, three, and four of second dorsal fin; fifth under last three elements of second dorsal fin; sixth and seventh spaced along caudal peduncle. Abdomen dusky with three red-orange blotches, each behind three smaller blotches above vertebral column; fourth through seventh blotches each with narrow red-orange lines extending down to ventral midline; fourth with single line; fifth with two lines; sixth with two lines but posteriormost line joining anteriormost line of the two extending down from seventh blotch. Spaces between these narrow lines appearing as six distinct light spots. Single narrow, vertical red-orange bar with a few melanophores across caudal-fin base. Narrow yellow line extending up from vertebral blotches to dorsal surface, similar to those below blotches. Upper half of side of head and pectoral-fin base red-orange, lower half of head, jaws, and nares yellow overlaid with small red-orange spots. Distinctive narrow red-orange line extending down from under eye to posterior end of jaws. Eye with black pupil surrounded by yellow iris with scattered red-orange markings. Interorbital area and top of head behind eyes translucent with scattered chromatophores behind eye. Red-orange area extending up from side of head to top of head behind translucent area. Nape with a few red-orange spots and faint yellow bars. Bases of first and second dorsal fins with yellow on membranes. First dorsal-fin spine with five red-orange spots spaced out along about distal two-thirds, the distal end bluish. Remaining spines of first dorsal fin with slight reddish tinge. Second dorsal fin with a row of red-orange spots across center of fin. Distal third of second dorsal fin with yellow on membranes overlaid with small bluish dots concentrated on distal margin. Anal fin heavily peppered with yellow and bluish dots. Caudal fin translucent, crossed by three rows of red dots, distal margin with some yellow and peppering of bluish dots. Pelvic



Figure 6. *Eviota flebilis*, fresh specimen, OMNH-P 43340, 11.6 mm SL, male, Ryukyu Islands, Japan (T. Suzuki).

and pectoral fins translucent. Fresh non-type male specimen with mostly the same markings and color (Fig. 6), fresh female non-type specimen with reduced spotting and colors, especially on fins, but retaining characteristic red line below eye, vertebral column blotches, postanal ventral-midline spots, and dark bar at base of caudal fin (Fig. 7).

Color in life. (Fig. 5; from Suzuki *et al.* (2004) p. 143; this photograph was incorrectly listed as the holotype in Greenfield & Randall (2016), Fig. 46) Body translucent with red and white markings. Red extending down the vertebral column separated by seven white marks on dorsal part of column. Narrow red lines extending down from vertebral column posterior to abdomen. Abdomen, cheek, and top of head red with white spots of various sizes. Series of eight roundish, progressively smaller white spots running from pectoral-fin base along ventral surface of side to caudal-fin base. Three or four small white spots on cheek and more on top of head. Lower half of head translucent overlaid with peppering of fine dark spots. A distinctive narrow red line extending ventrally from under eye to posterior end of jaws. Pupil of eye black surrounded by yellowish-white iris with red areas, small yellowish-white dots on red at top of iris. Caudal-fin base with distinct narrow dark bar, with a slight widening at its center. Membranes of dorsal, anal, and caudal fins appear peppered with fine dark spots. Dark spots present on filamentous first dorsal-fin spine of male.



Figure 7. *Eviota flebilis*, fresh specimen, OMNH-P 43339, 10.3 mm SL, female, Ryukyu Islands, Japan (T. Suzuki).



Figure 8. *Eviota flebilis*, preserved holotype, NSMT-P 114944, 10.1 mm SL, male, from Greenfield *et al.* (2014), Fig. 1 (T. Suzuki).

Color in preservative of holotype. (Fig. 8) Body whitish and mostly translucent with internal markings corresponding to internal red-orange markings in fresh specimens. Clusters of melanophores at ventral midline behind anal-fin origin, associated with internal bars. Abdomen with scattered melanophores over peritoneum behind pectoral-fin base to anus. Cluster of larger melanophores over brain behind eye, three large melanophores under eye at location of red line in fresh specimens. Scattered melanophores at anterior end of jaws, and cluster at isthmus. First dorsal fin translucent except for five dark marks on distal spine; second dorsal fin translucent except for scattering of melanophores on distal third; anal fin heavily peppered with dense small melanophores. Thin bar of melanophores at caudal-fin base with short midline anterior extension. Caudal fin translucent with a distal band of melanophores extending anteriorly along dorsal margin and widely scattered on lower rays. Pectoral and pelvic fins translucent.

Etymology. The specific epithet is a nominative singular feminine adjective from Latin for tearful, in reference to the characteristic tear-like red marking below the eye.

Distribution. Collected and observed underwater only from Amami-oshima Island, Kerama Islands and Iriomote-jima, in the Ryukyu Islands of Japan (Suzuki *et al.* 2004). It has been photographed or collected from lagoon, slope, and drop-off coral-reef habitats.

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