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A review of the dwarfgobies of Fiji, including descriptions of five new species (Teleostei: Gobiidae: *Eviota*)

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Abstract

Twenty-eight species in the gobiid genus *Eviota*, five of which are new to science, are recorded from Fijian waters. An illustrated key to the species is provided, and each species is represented by a diagnosis or a description, range, habitat descriptions, and photographs. The five new species are *Eviota eyraeae*, *E. mimica*, *E. richardi*, *E. teresae*, and *E. thamani*. Four species of uncertain taxonomic status are discussed, i.e. *E. cf. flebilis*, *E. cf. indica*, *E. cf. sigillata*, and *E. cf. specca*. *Eviota hinanoae* is recorded from Fiji for the first time, and two deepwater species, Fiji sp. 1 (from 42–49 m) and Fiji sp. 2 (from 73–79 m), are reported.

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

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Introduction

The dwarfgobies in the genus *Eviota* occur throughout the Indo-Pacific Ocean and are represented by 102 valid species, including those described here. The greatest diversity of species in this genus appears to be in the Coral Triangle, with at least 51 described species and many more awaiting description. We have recorded 28 species from Fiji.

These small fishes are important because of their role in coral-reef ecology. Boehlert & Mundy (1996) found larval *Eviota* the most abundant fish in the plankton of the Hawaiian Islands. Longenecker (2001, 2007) found *Eviota epiphanes* to be the most abundant cryptic fish species in the spur-and-groove habitat in Kaneohe Bay, O‘ahu, Hawai‘i, feeding mainly on harpacticoid copepods, tanaids, and amphipods, as well as a large variety of other small invertebrates. Species of *Eviota* serve as food for larger fishes such as snappers (Wen *et al.* 2012) and even sea snakes (Voris 1972). Because of their abundance, rapid growth, and high turnover, *Eviota* species may be an important link between the small invertebrates and larger piscivorous fishes in the coral-reef ecosystem (Depczynski & Bellwood 2003).

Fiji consists of 333 islands plus many more islets, the two most important islands being Viti Levu and Vanua Levu. With the exception of Rotuma, these islands are located between 15° S and 21° S and 175° E and 177° W. Rotuma is part of Fiji, but it is distant from the remainder of the islands and is not included in this review.

The genus *Eviota* was described by Jenkins (1903), based on *Eviota epiphanes* from Hawai‘i. Two species of *Eviota* were named before Jenkins (1903) described the genus. The first was described as *Eleotris prasina* (Klunzinger, 1871) from the Red Sea, and the second as *Asterropteryx abax* (Jordan & Snyder, 1901) from Japan. At the time Jenkins described the genus, he stated that it was the “smallest vertebrate that has up to this time been described”. The species are indeed tiny (< 31 mm SL, but most < 20 mm SL), some gravid as small as 8.9 mm SL (Lachner & Karnella 1980: 99). One species, *E. sigillata*, has the shortest lifespan of any known vertebrate, living for eight weeks, the first three of which are in the larval stage (Depczynski & Bellwood 2005).

To our knowledge, the first *Eviota* specimens from Fiji were collected by Sixten Bock and his co-workers, from Uppsala University, Sweden, in 1917. Bock’s collections were distributed to various museums, including the Natural History Museum of Göteborg, Sweden; however, the specimens of *Eviota* were not identified until 2007–2009, by Leif Jonsson. These specimens, all from the Suva area, were reported as *Eviota afelei*, *E. smaragdus*, *E. zebrina*, and *Eviota* sp. In his checklist of fishes from Fijian waters, Whitley (1927) did not list any species of *Eviota*, being unaware of the Bock collections. The first species of *Eviota* from Fiji recorded in the literature were taken in 1929 during the Crane Pacific Expedition (Herre 1936): *Eviota afelei*, *E. distigma*, and *E. viridis* (= *E. zonura*), all from the Suva area. Fowler (1959) reported only the same three species in his book on the fishes of Fiji.

It was not until the advent of SCUBA and the use of rotenone that most of the smaller, cryptic fishes of Fiji were collected. The first such collections were made in the early 1960s, in the vicinity of Suva and at the Great Astrolabe Reef, by the *Te Vega* expedition from Stanford University. In the mid 1970s, Bruce A. Carlson, then a Peace Corps volunteer, collected fishes at Viti Levu, Beqa, the Great Astrolabe Reef, and Moala Island between Viti Levu and the Southern Lau Group. In 1982, Victor G. Springer of the U.S. National Museum collected fishes at more sites than any previous workers, including around the main island of Viti Levu and adjacent small islands, Matuku and Totoya between Viti Levu and the Southern Lau Group, and at the Yasawa Group. In 1983, Richard Winterbottom of the Royal Ontario Museum collected at the Great Astrolabe Reef at Kadavu Island. In 1985, Springer returned and collected at Vatoa and Ono-i-Lau, far to the south of the Southern Lau Group.

Between 1999 and 2003, we surveyed the fishes of Fiji, supported by grants from the University of Hawai‘i Sea Grant Program, the National Geographic Society, and the National Science Foundation. We made seven separate collecting trips, resulting in a total of 322 rotenone collections. The majority of our collections were made using SCUBA from vessels offshore; only a few shallow shore habitats were sampled. In addition to our collections, a group of deepwater divers in our project, led by Richard L. Pyle of the Bishop Museum, made collections off the Suva barrier reef in the “Twilight Zone”, capturing a species of *Eviota* at a depth of 73–79 meters. Two species of *Eviota* from shore habitats were not taken by us, but were collected by others. In 2012, we were contacted by Janet V. Eyre, who was taking underwater photographs of species of *Eviota*, and asked us

for identifications. That original contact developed into a collaboration, with Ms. Eyre sending us specimens she had photographed. *Eviota eyreae* n. sp., described in this paper, was one of the important species she collected; it is named in her honor.

Our fish collections are deposited at the California Academy of Sciences, San Francisco. Figure 1 shows the locality of our collections, as well as those previously made by others. Here we report on our collections of species of *Eviota*.

The genus *Eviota* is distinguished by the following characteristics: the pelvic fins are separate and the 5th pelvic-fin ray, if present, is unbranched; the membrane joining the 5th pelvic-fin rays is weakly developed; pelvic-

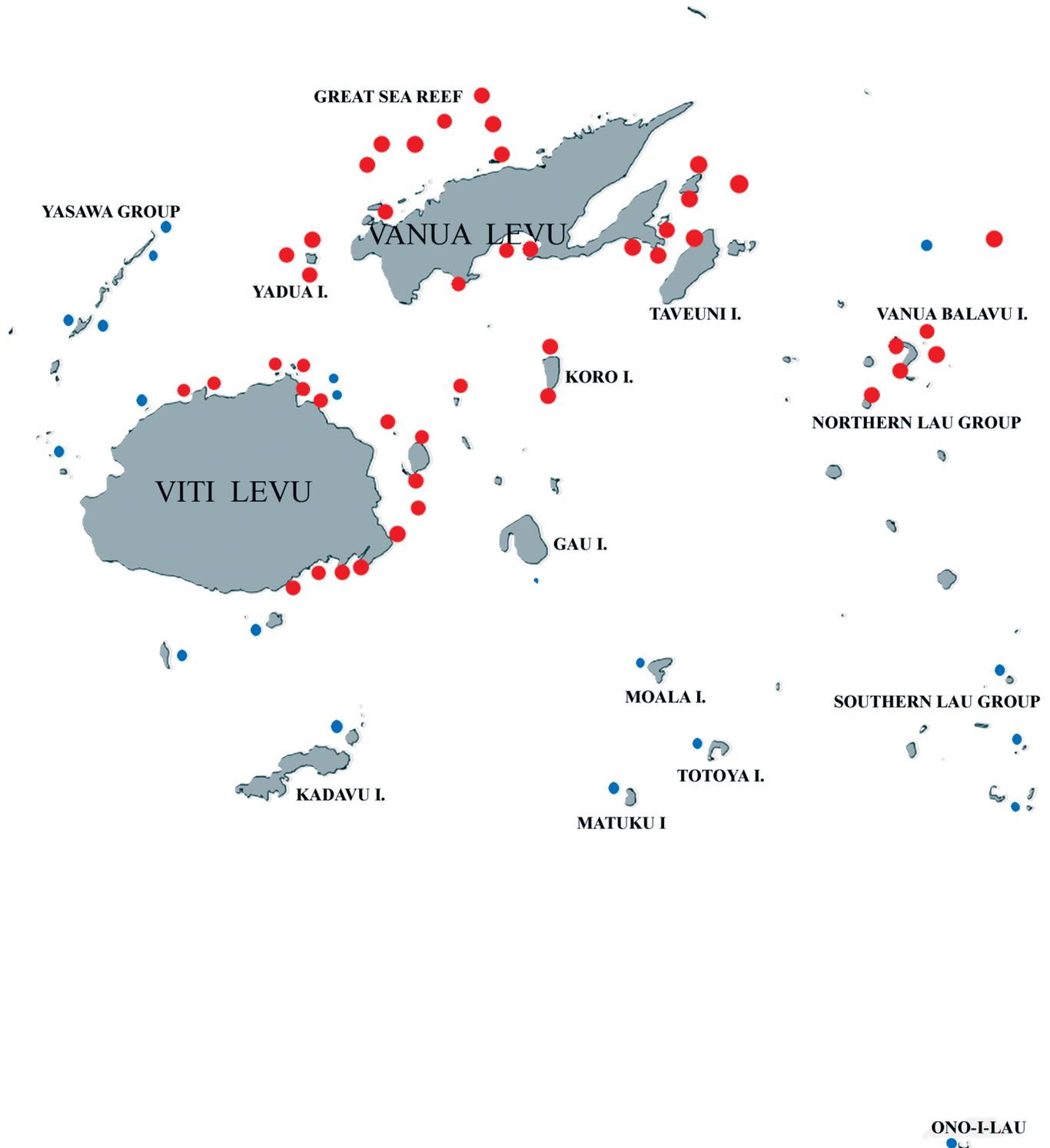


Figure 1. Map of collection sites in the Fiji Islands, those in red are our collections, those in blue made by others.

fin rays many-branched, often fringe-like; 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. As described in an earlier paper (Greenfield & Jewett 2014), the most similar genus to *Eviota* is *Sueviota*, described by Winterbottom & Hoese (1988), which differs in having the 5th pelvic-fin ray branched, whereas it is unbranched, if present, in *Eviota*, and the membrane joining the 5th pelvic-fin rays may be well-developed in some species of *Sueviota*, but never in *Eviota*. In recent DNA studies, *Eviota* was found to form a clade with *Gobiodon*, *Paragobiodon*, and *Pleurosicya* (Tornabene, Chen & Pezold 2013). Thacker & Roje (2011) also determined this relationship in their phylogenetic analysis, as did Agorreta *et al.* (2013), but including *Bryaninops* instead of *Pleurosicya*.

The major earlier work on this genus was published by Ernest A. Lachner and Susan L. Jewett (she sometimes uses the name Karnella), i.e. Lachner & Karnella (1978, 1980), Karnella & Lachner (1981), and Jewett & Lachner (1983). They described 18 species new to science, bringing the total number of valid species to 34. They determined new morphological characters to separate the species: cephalic sensory-canal head pore patterns, pectoral-fin branching, presence or absence and length of the 5th pelvic-fin ray, and the structure of the urogenital papilla, in addition to the counts of pectoral-fin rays, dorsal and anal soft-fin rays (D/A formula), and dark color patterns in preserved specimens.

Although the cephalic sensory-canal pore patterns, as shown in Figure 2, taken from Lachner & Karnella (1980), are useful in recognizing species, they appear to be phenetic groupings (Tornabene *et al.* 2013), not reflecting genetic relationships. The structure of the urogenital papilla is also a useful diagnostic feature with most

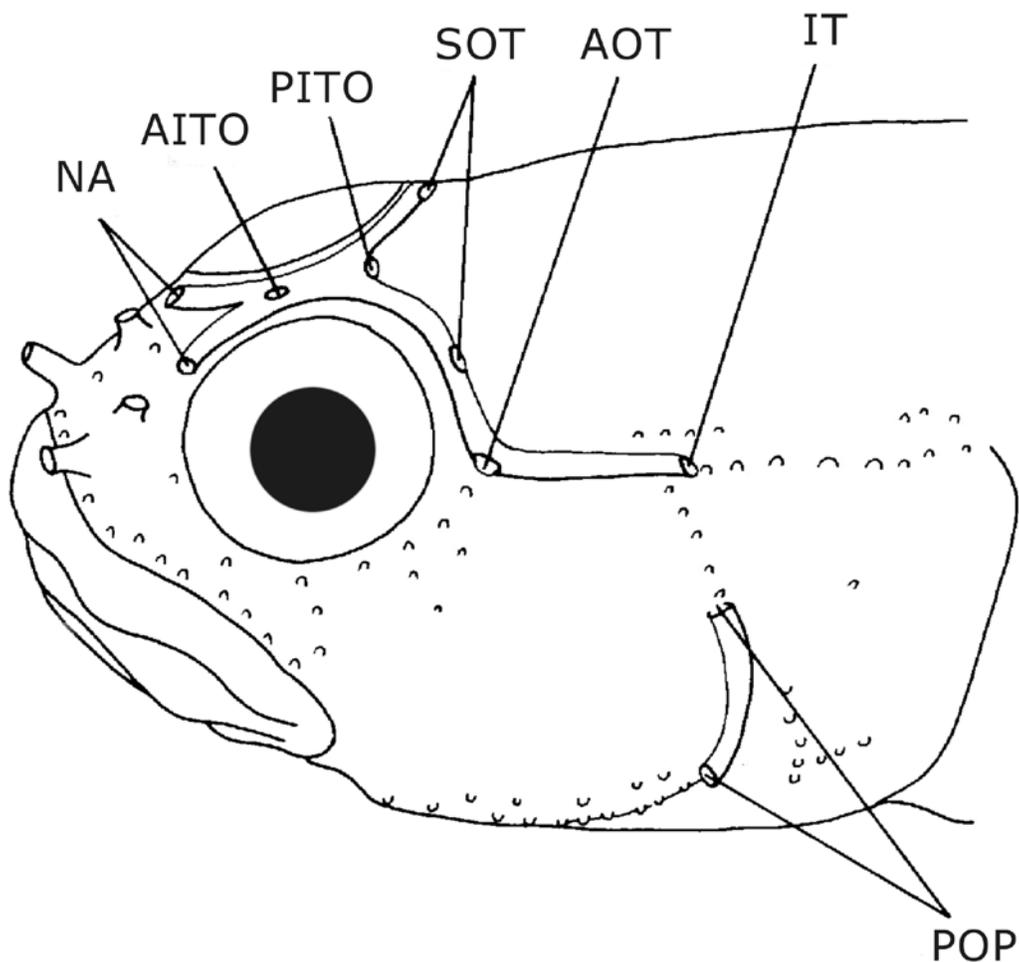


Figure 2. Cephalic sensory-canal pore system, complete pattern (1) (from Lachner & Karnella 1980, Fig. 4a); paired nares (NA); anterior interorbital (AITO); posterior interorbital (PITO); paired supraotics (SOT); paired anterior otics (AOT); paired intertemporals (IT); paired upper and lower preoperculars (POP).

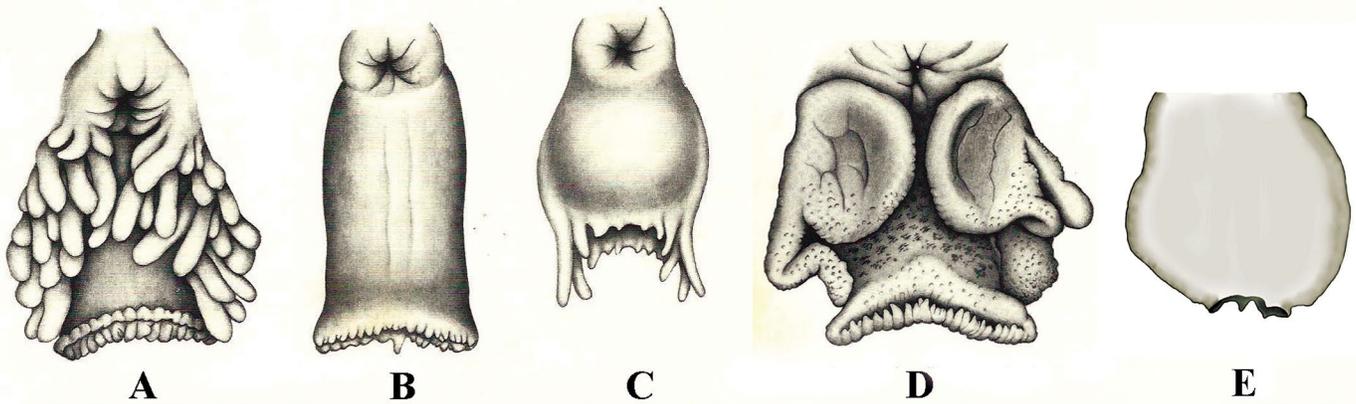


Figure 3. Examples of five types of urogenital papillae in mature *Eviota*. A: fimbriate condition in male; B: nonfimbriate condition in male; C: bulbous papilla of female; D: cup-shaped of male (A–D after Lachner & Karnella 1980, Figs. 2 & 3); E: flat rounded plate of male.

species having the normal elongate smooth pattern (as in Fig. 3B), whereas others have fimbriate or cup-shaped papilla (Figs. 3C & D), or a flat rounded plate (Fig. 3E).

At the time of their studies, very little information on fresh or live coloration of the species was available. By the end of their research with preserved specimens, photography of fresh specimens and underwater photography had become more common. As discussed by Greenfield, Winterbottom & Suzuki (2014): “The knowledge of live or fresh coloration has led to the realization that many species described earlier based on preserved material in fact were comprised of more than one species. Some examples are: *Eviota randalli* and *E. pseudostigma* (Greenfield 2009); *E. guttata* and *E. albolineata* (Greenfield & Randall 2010a); *E. karaspila* and *E. melasma* (Greenfield & Randall 2010b); and *E. santanai* and *E. latifasciata* (Greenfield & Erdmann 2013).”

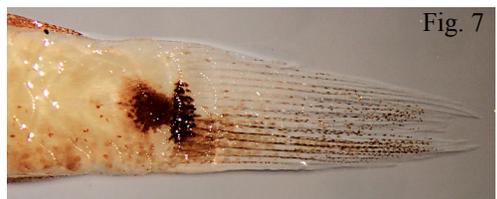
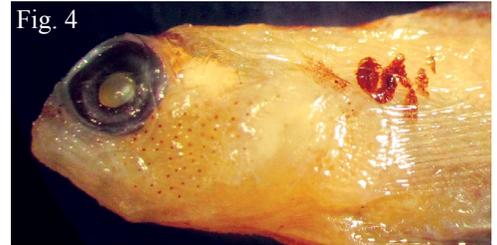
Because the earlier major works used only preserved material, it has been difficult to identify the species of *Eviota* from underwater photographs. Adding to this difficulty, color can be different between species while alive and as specimens, fresh and preserved (Greenfield & Randall 2010a). A prime example of this is *E. nigrispina*, where the distinctive, golden yellow line that curves across the black stripe over the abdomen in living fish is not visible in fresh specimens (Greenfield & Suzuki 2010). Examination of figures of live and fresh individuals of *E. cometa*, *E. prasites*, and *E. sebreei* in this paper will show that these are also examples.

Materials and Methods

Counts and measurements, descriptions of fin morphology and the cephalic sensory-canal pore patterns follow Lachner & Karnella (1980), Jewett & Lachner (1983), and Akihito *et al.* (1993, 2002). Postanal midline spots along the posteroventral midline of the body begin at the anal-fin origin and extend to a vertical line 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 is not counted. 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 (following Lachner & Karnella 1980, p. 4). Dorsal/anal fin-ray counts (D/A) only include segmented rays, and were taken from radiographs for *E. thamani* because of their small size and poor condition. Measurements were made to the nearest 0.1 mm using an ocular micrometer, and are presented as percentage of standard length (SL). 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 airjet was used to observe them. Two of the species described in this paper are very small, and their delicate fins have been damaged; therefore some information is missing from their descriptions. Counts and measurements are presented for the holotype first, followed by the range and mean for all types. Distributions are from Randall (2005) and supplemented by Allen & Erdmann (2012) and more recent information. Specific locations of CAS and USNM collections may be found by entering the listed catalogue number into the CAS or USNM collection databases. Unless otherwise noted, all figures and photographs are from Fiji specimens and by the first author. Specimens have been deposited at the California Academy of Sciences, San Francisco (CAS), Royal Ontario Museum, Toronto (ROM), and the United States National Museum (Smithsonian), Washington D.C. (USNM).

Key to the Species of *Eviota* known from Fiji

- 1a. Pectoral-fin rays unbranched 2
- 1b. Some pectoral-fin rays branched 9
- 2a. An irregular to W-shaped dark mark on upper, anterior body, above and just posterior to pectoral-fin base (see Fig. 4 at right); cephalic sensory-canal pore system lacking NA and IT pores and AITO pore far forward and opening anteriorly *E. infulata* (p. 45)
- 2b. No dark mark on upper anterior body (there may be some dark marks behind top of pectoral fin, but not above); cephalic sensory-canal pore system not as in 2a 3
- 3a. Caudal-fin base with one or two distinct dark marks (these marks are different from dark marks over the preural centrum, which are farther anterior, such as in *E. zonura*, see fig. on p. 70) 4
- 3b. Caudal-fin base lacking distinct dark marks 7
- 4a. Three to four prominent, dark, wavy vertical bands on caudal fin; caudal spot followed by an elongate vertical mark (see Fig. 5 at right) *E. zebrina* (p. 69)
- 4b. No wavy vertical bands in caudal fin 5
- 5a. Caudal-fin base with a single vertical line; two small black spots on body just behind top of pectoral-fin base (see Fig. 6 at right); distinctive narrow red-orange vertical line under eye *E. cf. flebilis* (p. 42)
- 5b. One or two rounded spots at caudal-fin base, not a vertical line; no narrow line under eye; no black spots behind top of pectoral-fin base 6
- 6a. Cephalic sensory-canal pore system lacking only IT pore; vertical caudal spot preceded by a more rounded second mark (see Fig. 7 at right); body with a red stripe in life *E. cometa* (p. 36)
- 6b. Cephalic sensory-canal pore system lacking NA, PITO, and IT pores; a single dark caudal spot, preceded by a yellow spot in life (see Fig. 8 at right); body with a black stripe in life *E. sebreei* (p. 56)



7a. Ventral portion of body with a broad dark band, wider than eye diameter at middle of anal fin (see Fig. 9 at right)*E. dorsogilva* (p. 38)



Fig. 9

7b. No dark band on ventral portion of body 8

8a. Dorsal/anal-fin formula 8/7; pectoral-fin base with an obvious dark to dusky spot on uppermost portion (see Fig. 10 at right)*E. prasites* (p. 51)



Fig. 10

8b. Dorsal/anal-fin formula 9/8; no dark spot on uppermost pectoral-fin base*E. cf. sigillata* (p. 57)

9a. Seven or eight rays in second dorsal fin 10

9b. Nine rays in second dorsal fin 17

10a. A single prominent dark spot on lower half of pectoral-fin base, but none dorsally; a single broad bar at anteroventral margin of eye (see Fig. 11 at right)*E. randalli* (p.53)



Fig. 11

10b. No single dark spot on lower half of pectoral-fin base, but there may be spots both dorsally and ventrally 11

11a. No cephalic sensory-canal pores*E. thamani, n. sp.* (p. 67)

11b. Cephalic sensory-canal pore system present 12

12a. Cephalic sensory-canal pore system lacking only the IT or IT and PITO pores 13

12b. Cephalic sensory-canal pore system complete 14

13a. Dark spot centered on preural centrum (see Fig. 12 at right); anal fin dark; D/A 8/8*E. cf. indica* (p. 45)

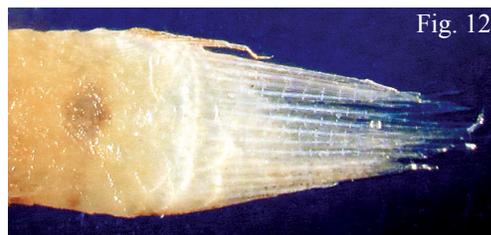


Fig. 12

13b. No dark spot on caudal peduncle; anal fin not dark; D/A 7/7*E. eyraeae, n. sp.* (p. 39)

14a. Distinct dark spot on preural centrum; male urogenital papilla not a flat rounded plate, more elongate 15

14b. No distinct dark spot on preural centrum (subcutaneous bar may be present); male urogenital papilla a flat rounded plate (as in *E. mimica*, Fig. 13 at right) 16

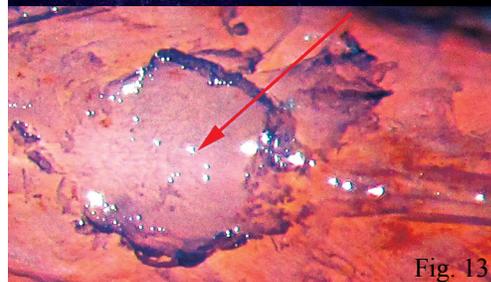


Fig. 13

15a. Fifth pelvic-fin ray 10–20% of 4th ray; two dark spots on base of pectoral fin in males (see Fig. 14 at right); dark spot centered on preural centrum*E. distigma* (p. 37)



Fig. 14

15b. Fifth pelvic-fin ray absent or rudimentary; no paired dark spots on pectoral-fin base in males; dark spot on preural centrum centered above midline (see Fig. 15 at right)*E. nebulosa* (p. 50)

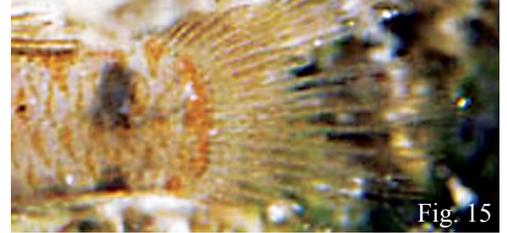


Fig. 15

16a. Pectoral-fin base with two dark marks one dorsally and one ventrally (see Fig. 16 below left); dark spots under head (see Fig. 17 below right)*E. mimica*, n. sp. (p. 47)



Fig. 16

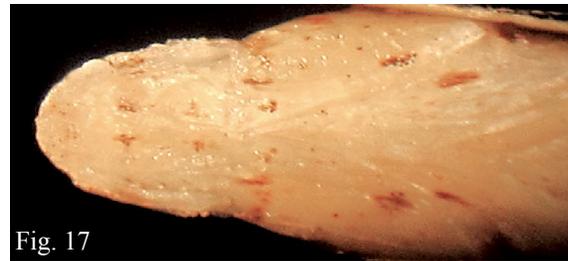


Fig. 17

16b. Pectoral-fin base with only a single mark dorsally (see Fig. 18 below left); no dark spots under head as in Fig. 17, but a small cluster of small chromatophores near front of jaw (see Fig. 19 below right)*E. cf. specca* (p. 62)



Fig. 18



Fig. 19

62
17a. All cephalic sensory-canal pores absent*Eviota Fiji sp. 2* (see deepwater species, p. 73)

17b. At least one cephalic sensory-canal pore present 18

18a. Cephalic sensory-canal pore system complete 19

18b. Cephalic sensory-canal pore system lacking both IT and POP pores or lacking only the IT pore 23

19a. A single dark vertical bar on pectoral-fin base (see Fig. 20 at right); body light, with numerous dark bands almost full depth of body*E. fasciola* (p. 41)



Fig. 20

19b. No single dark vertical bar on pectoral-fin base 20

- 20a. No dark occipital spot21
- 20b. Dark central occipital spot present just behind eye (as in *E. smaragdus*, Fig. 21 right)22
- 21a. A broad dark bar crossing caudal peduncle, followed by a light area (see Fig. 22 at right); cheek and pectoral-fin base with a heavy peppering of dark chromatophores; 5th pelvic-fin ray absent; no dark spots on ventral side of head as shown in Fig. 23*E. richardi*, n. sp. (p. 53)
- 21b. No dark band on caudal peduncle; cheek and pectoral-fin base lacking peppering of dark chromatophores; 5th pelvic-fin ray 5% of 4th ray; a distinct dark spot on ventral side of head on isthmus, about in line with posterior portion of maxilla (see Fig. 23 at right).....*E. teresae*, n. sp. (p. 63)
- 22a. Dorsal midline of body with a series of small dark spots along dorsal-fin bases (see Fig. 24 at right); dark bars crossing nape in advance of dorsal fin (see Fig. 21 above); caudal-peduncle depth 13.4–14.9% SL*E. smaragdus* (p. 60)
- 22b. Dorsal midline of body without dark spots along dorsal-fin bases or bars on nape; caudal-peduncle depth 10.3–12.9% SL; body very light and occipital spot very obvious (see Fig. 25 at right)*E. karaspila* (p. 46)
- 23a. Cephalic sensory-canal pore system lacking both POP and IT pores24
- 23b. Cephalic sensory-canal pore system lacking only the IT pore25
- 24a. Fifth pelvic-fin ray 50–90% of 4th ray; five dark postanal spots; naris tube short, not extending past posterior edge of upper lip, sprinkled with some dark chromatophores but not solid black*E. sparsa* (p. 61)
- 24b. Fifth pelvic-fin ray absent; six dark postanal spots; naris tube long, extending past posterior edge of upper lip, and solid black*Eviota Fiji sp. 1* (see deepwater species, p. 72)



Fig. 21

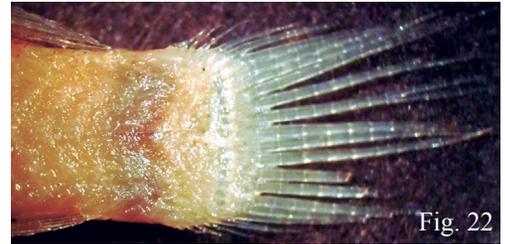


Fig. 22

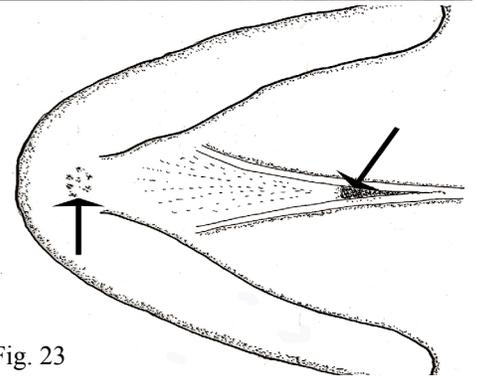


Fig. 23

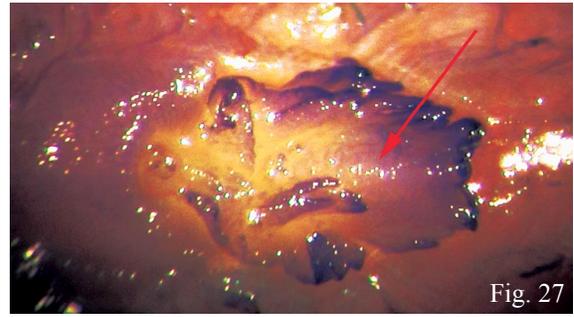
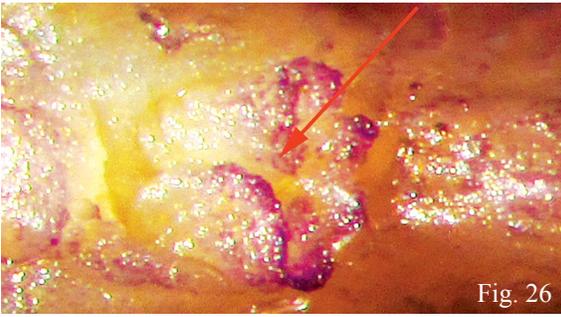


Fig. 24



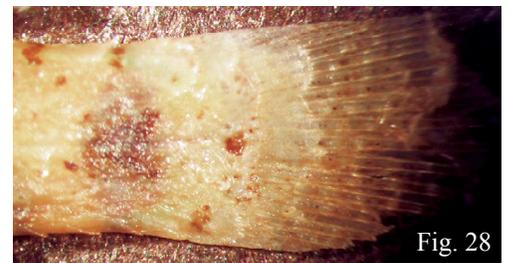
Fig. 25

- 25a. Male urogenital papilla either cup-shaped (as in *E. hinanoae*, Fig. 26 at lower left) or fimbriate (as in *E. zonura*, Fig. 27 at lower right); strong dark spot over preural centrum on caudal-peduncle the size of the pupil or larger26



- 25b. Male urogenital papilla not fimbriate or cup-shaped; no strong dark spot over preural centrum, but may have a small spot associated with last subcutaneous bar27

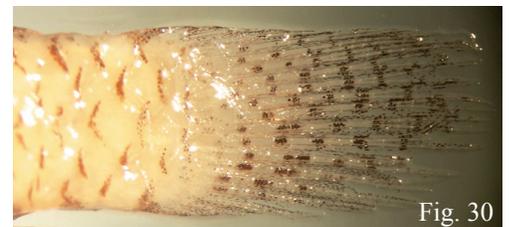
- 26a. Caudal-peduncle spot centered on midline of caudal peduncle (see Fig. 28 at right); male urogenital papilla cup-shaped (see Fig. 26 top of page, at left)*E. hinanoae* (p. 44)



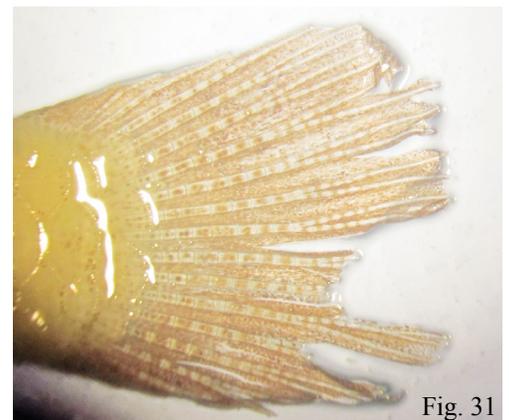
- 26b. Caudal-peduncle spot centered above midline of caudal peduncle (see Fig. 29 at right); male urogenital papilla fimbriate (see Fig. 27 top of page, at right)*E. zonura* (p. 70)



- 27a. Caudal fin with scattered well-spaced strong dark spots on rays, membranes clear or with a few scattered melanophores, not dark (see Fig. 30 at right); scale edges dark; no obvious dark spot over preural centrum or caudal-fin base.....*E. punctulata* (p. 52)



- 27b. Caudal fin with rows of small dark spots set close together on rays, membranes dark (see Fig. 31 at right); scale edges not dark; a small dark spot may be present over preural centrum associated with last subcutaneous bar*E. afelei* (p. 35)



Eviota afelei Jordan & Seale, 1906

Afele's Dwarfgoby

Figures 31–33.



Figure 32. *Eviota afelei*, USNM 259379, preserved specimen, 17.1 mm SL, Fiji.

Eviota afelei Jordan & Seale 1906: 387–388, fig. 77 (type locality: Pago Pago, American Samoa).

Lectotype. CAS-SU 8715.

Paralectotypes. CAS 43542 (6); USNM 51763 (3).

Diagnosis. The cephalic sensory-canal pore system lacking only the IT pore (pattern 2); pectoral-fin rays branched; dorsal/anal-fin formula 9/8; 5th pelvic-fin ray small or rudimentary (about 10% of 4th pelvic ray); caudal fin with rows of small dark spots set close together on rays, membranes dark; a small dark spot over preural centrum associated with last subcutaneous bar may be present; scale edges not dark.

Distribution. Recorded from the Tuamotu Archipelago westward to the islands of Oceania and the Timor Sea, Great Barrier Reef, and New Caledonia to the south, and Ryukyu Islands, Japan to the north. Specific distribution within Fiji unknown, see Remarks.

Depth. Usually less than 3 m.

CAS Fiji collections. None.

Other Fiji collections. USNM 235830 (5), 242014 (64), 259379 (141).

Remarks. *Eviota afelei* was described from American Samoa by Jordan and Seale in 1906. Herre (1936) reported that three specimens were taken at Suva, but did not provide any museum numbers; however, there is a specimen (FMNH 24375) at the Field Museum collected by Herre in Fiji that we have not examined. Fowler (1959) reported *E. afelei* from Fiji based on Herre's record. The first persons to review the species were Lachner & Karnella (1980), but they did not cite any specimens from Fiji, including Herre's; however, they did choose a lectotype and paralectotypes from the 10 specimens referred to by Jordan and Seale and wrote a description of the species. Randall (2005) published a photograph of *E. punctulata* from Fiji as *E. afelei* and others have followed in this misidentification, with photographs of "*E. afelei*" from Fiji being *E. punctulata*. Because we had not identified any of the specimens we collected as *E. afelei*, we assumed it did not occur in Fiji; however, we borrowed three lots from the USNM that were identified as *E. afelei* from Fiji and determined that they were *E. afelei* (see collection above). All of these collections were from very shallow areas described as "tidal flat", "along



Figure 33. *Eviota afelei*, live aquarium photograph, Moorea, French Polynesia (G. Ahmadi).

shoreline”, and “shore-rock, rubble, sand, depth to two feet.” Our collections were mostly SCUBA collections from boats in deeper water, and as a result we made very few shore collections, explaining why we did not collect this species. Based on the large number of individuals in the USNM collections, it appears to be common in very shallow habitat. The same situation was true for *E. smaragdus*. Tornabene & Ahmadi (pers. com.) found a similar distribution at Moorea, where *E. afelei* was by far the most common *Eviota* species at depth of less than 3 m.

Both *E. afelei* and *E. punctulata* have dark spots on the caudal fin, a black anal fin, and an oblique row of dark chromatophores through the mid-lateral portion of the pectoral-fin base; however, as illustrated in the key, the spot pattern on the caudal fin is different (Figs. 30 & 31), and *E. afelei* may have a small dark spot over the preural centrum (lacking in *E. punctulata*), and lateral scales are darker in *E. punctulata*. A photograph of a live individual of *E. afelei*, from Moorea (Fig. 33), differs in general coloration from *E. punctulata* in Fiji.

One of the paralectotypes from CAS 43542, all in poor condition, appears to have a torn IT pore on one side. We consider this to be an anomaly.

***Eviota cometa* Jewett & Lachner, 1983**

Comet Dwarfgoby

Figures 7, 34 & 35.



Figure 34. *Eviota cometa*, CAS 222731, fresh specimen, Fiji.

Eviota cometa Jewett & Lachner 1983: 796–799, figs. 8 & 9 (type locality: Totoya Island, Fiji).

Holotype. USNM 235817.

Paratypes. AMS I.24027-001 (1); ANSP 151996 (2); CAS 52831 (2); USNM 235832 (8), 235863 (1), 260328 (1).

Diagnosis. The cephalic sensory-canal pore system lacking only the IT pore (pattern 2); the dorsal/anal fin-ray formula 8–9/7–8; pectoral-fin rays unbranched; 5th pelvic-fin ray 10% of 4th ray; vertical dark spot at caudal-fin base preceded by a more rounded spot; an elongate dark streak on the lower caudal-fin rays; no wavy vertical lines crossing caudal fin. In life, there is a narrow red line running down the lateral midline of the body.

Distribution. Recorded from Indonesia, Philippines, Japan (Ryukyu Islands), through Micronesia (Palau, Federated States of Micronesia [Pohnpei], Marshall Islands, Caroline Islands, and Phoenix and Line Islands), into Melanesia (Papua New Guinea, Solomon Islands, Vanuatu, Fiji, and New Caledonia) and south to Australia (the Great Barrier Reef). In Fiji, more common around Viti Levu and Vanua Levu, not taken in the S.E. Lau Group. Taken over a wide range of habitats from well-developed coral reefs to rock, sand and silt, and dead coral with algae. Widely distributed throughout the islands.

Depth. 0–22 m.

CAS Fiji collections. CAS 219806 (1), 222731 (7), 228684 (2), 228685 (13), 228692 (30), 228703 (19), 228729 (1), 228730 (1), 228767 (18), 229055 (3), 229059 (1), 229060 (5), 229061 (1), 229062 (5), 229085 (1), 229086 (5), 229118 (1), 229143 (7), 229590 (3), 229600 (1), 229603 (1), 229607 (1); and type material listed above.

Other Fiji collections. USNM 241747 (7), 241781 (1), 241789 (1); and type material listed above.



Figure 35. *Eviota cometa*, underwater photograph, Fiji (R. Whitworth).

Eviota distigma Jordan & Seale, 1906

Twospot Dwarfgoby

Figures 14, 36 & 37.

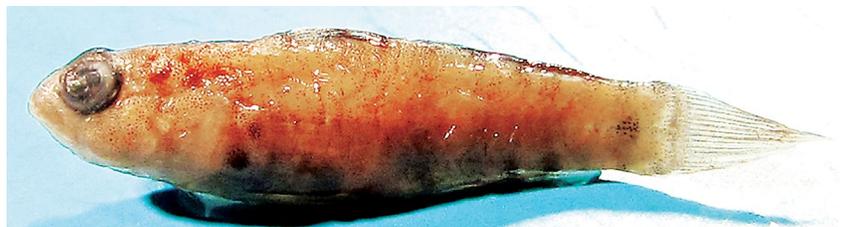


Figure 36. *Eviota distigma*, CAS 219781, 13.3 mm SL, Fiji.

Eviota distigma Jordan & Seale 1906: 389, fig. 79 (type locality: Pago Pago, American Samoa).

Lectotype. CAS-SU 8710.

Paralectotypes. USNM 51767 (4).

Diagnosis. The cephalic sensory-canal pore system complete (pattern 1); the dorsal/anal fin-ray formula 8/8; pectoral-fin rays branched; 5th pelvic-fin ray 10% of 4th ray; caudal-peduncle spot present; prominent dark spots on head and 2 dark spots on pectoral-fin base of males.

Distribution. Recorded from the Red Sea, the Maldives, and from eastern Indonesia (Nusa Penida and west Papua), north to Japan (Ryukyu and Ogasawara Islands), east through Micronesia to the Line Islands and across Polynesia (eastward to Pitcairn Islands), and south to Australia (west coast and southern Great Barrier Reef). In Fiji, this species was rarely taken at scattered locations mostly around Viti Levu, Vanua Levu, Great Astrolabe Reef, and the Yasawa Group, usually from protected waters such as patch reefs behind a barrier reef.

Depth. 0.9–4.6 m.

CAS Fiji collections. CAS 216726 (13), CAS 217175 (5), CAS 219781 (3), CAS 228611 (1), CAS 229575 (1).

Other collections. ROM 45188 (1), 45189 (8), 45190 (3), 45191 (1), 45704 (5); USNM 235797 (28), 356380 (1).



Figure 37. *Eviota distigma*, 13.9 mm SL, JTW-2006-13, Mururoa, Tuamotu Archipelago, French Polynesia (J.T. Williams).

***Eviota dorsogilva* Greenfield & Randall, 2011**

Creamback Dwarfgoby

Figures 9, 38 & 39.



Figure 38. *Eviota dorsogilva*, CAS 232705, preserved holotype, Fiji.

Eviota dorsogilva Greenfield & Randall 2011: 56–59, figs. 6, 11 & 12 [other figures listed as this species cannot be confirmed as the same species](type locality: North shore, Viti Levu, Fiji).

Holotype. CAS 232705.

Paratypes. (from Fiji) BPBM 38981 (2); CAS 232706 (1). (Paratypes from non-Fiji locations cannot be confirmed as *E. dorsogilva*.)

Diagnosis. The cephalic sensory-canal pore system lacking the PITO and IT pores and the AITO pore enlarged; the dorsal/anal fin-ray formula usually 9/8; pectoral-fin rays unbranched; 5th pelvic-fin ray greater than 50% of 4th ray; spinous dorsal fin elongate or filamentous in both sexes; urogenital papilla not fimbriate or cup-shaped; ventral black band (reddish brown in life) wider than eye diameter at middle of anal fin; upper half of body cream.

Distribution. Known positively only from Fiji from north shore of Viti Levu, reef east of Nananui-i-Cake reef and from the south shore of Viti Levu, Beqa Island (CAS 237982). As discussed by Greenfield & Tornabene (2014), specimens recognized as *E. dorsogilva* are restricted to Fiji, with similar-colored specimens from other locations likely a different species.

Depth. 5–21 m.

CAS Fiji collections. CAS 237982 (8); and type material listed above.

Other Fiji collections. Type material listed above.



Figure 39. *Eviota dorsogilva*, underwater photograph, Fiji (J.V. Eyre).

Eviota eyrae, n. sp.

Eyre's Dwarfgoby

Figures 40–42.

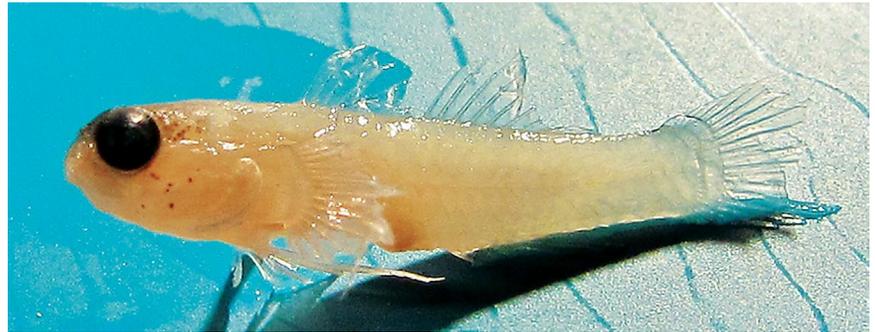


Figure 40. *Eviota eyrae*, CAS 238067, preserved holotype, Fiji

Holotype. CAS 238067 (1), 10.8 mm female, Vatu-i-ra Island, Fiji, 17°18.82' S, 178°28.21' W, 3 m, J.V. Eyre, May 4, 2015.

Diagnosis. A species of *Eviota* with the cephalic sensory-canal pore system lacking the IT and PITO pores, the AITO pore not enlarged or double; no dark spot over preural centrum area; the dorsal/anal-fin formula 7/7; pectoral-fin rays 16, some branched; body with many brick-red markings in life.

Description. Dorsal-fin rays VI+I,7; anal-fin rays I,7; pectoral-fin rays 16, some lower rays branched (ends of most broken); 5th pelvic-fin ray about 10% of 4th ray; 8 branches on 4th ray; 3 segments between consecutive branches of 4th pelvic-fin ray; pelvic-fin membranes well-developed; lateral scale rows 24; transverse scale rows 7; scales present on middle of ventral surface of abdomen, no scales on breast; first dorsal fin triangular in shape, 1st spine not filamentous in female holotype; urogenital papilla of female smooth, bulbous, with six short finger-like projections on end; front of head rounded with an angle of about 70° from horizontal axis; mouth slanted



Figure 41. *Eviota eyrae*, CAS 238067, aquarium photograph (horizontally reversed), holotype, 10.8 mm female, Vatu-i-ra Island, Fiji (J.V. Eyre).

obliquely, forming an angle of about 55° to horizontal axis of body, lower jaw not projecting; maxilla extending posteriorly to front half of pupil; anterior naris tube extending just to anterior margin of upper lip; gill opening extending forward just anterior to edge of operculum; cephalic sensory-canal pore system lacking IT and PITO pores. General body shape is shown in Fig. 40.

Measurements from 10.8 mm SL holotype: head length 29.5; origin of first dorsal fin 36.8, lying behind posterior margin of pectoral-fin base; origin of second dorsal fin 59.4, slightly in advance of anal-fin origin; origin of anal fin 63.1; caudal-peduncle length 25.3; caudal peduncle medium depth 14.7; body slender, its depth 21.6; eye diameter 10.1; snout length 3.2; pectoral-fin length 29.0; pelvic-fin length 29.5.

Color of holotype in preservative. (Fig. 40) Background color of head and body light cream, no distinctive bold dark markings; a few scattered dark chromatophores on cheek; a cluster of dark chromatophores behind upper half of eye and across top of head; rim of dark pigment around distal margin of naris tube; all fins immaculate.

Color of holotype in life. (Figs. 41 & 42) Background color of head and body translucent greenish yellow, all other markings brick red. Pupil of eye black, iris yellow with five red spokes radiating out from pupil. Naris tube red. Both jaws red. Four red spots on gular area under lower jaw. Five red bars radiating out from eye: first, short, from 8 o'clock position extending down to upper jaw; second at 7 o'clock extending down to upper jaw; third, longest, at 6 o'clock position extending down to end of jaws; fourth bar widest and short, at 4 o'clock; fifth bar just above fourth, extending back at an angle towards nape and covered with relatively large black chromatophores connecting with dark chromatophores on top of head. Posterior half of preoperculum and operculum with large red blotches. Pectoral-fin base with two red blotches, one dorsal and one ventral, separated by a light bar. Nape

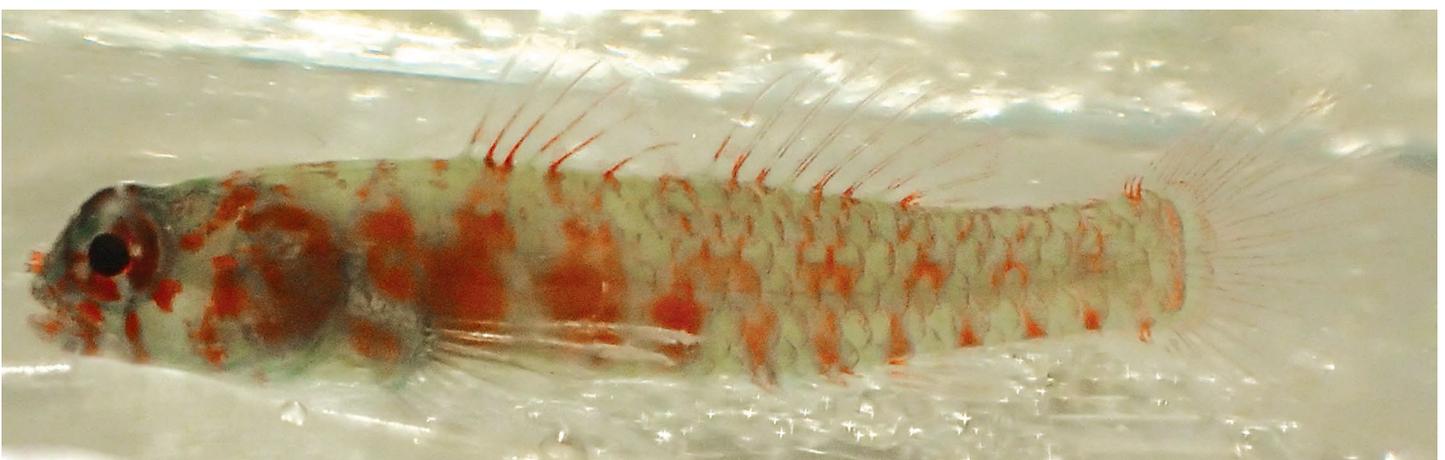


Figure 42. *Eviota eyrae*, CAS 238067, aquarium photograph (horizontally reversed), holotype, 10.8 mm female, Vatu-i-ra Island, Fiji (J.V. Eyre).

with scattered small red spots. Three large red blotches on side of abdomen: first just behind pectoral-fin base and under origin of first dorsal fin; second below last two spines of first dorsal fin; third at origin of second dorsal fin. Five more smaller red blotches centered along vertebral column, extending to caudal-fin base, each with a red triangle-shaped bar extending down to ventral surface. A narrow red line across caudal-fin base. Dorsum above vertebral column with red edges on scales. Bases of dorsal-fin spines and rays red, extending out various distances onto some spines and rays. Other fins clear.

Distribution. Known only from Vatu-i-ra Island, Fiji. Collected over low-relief reef of dead coral and coral rock rubble.

Etymology. The specific epithet is a patronym, a noun in the Latin genitive case, named for Janet V. Eyre who collected and photographed the species in Fiji and who also has been of great assistance in our studies of the dwarfgobies.

Comparisons. Only one other species of *Eviota* has a cephalic sensory-canal pore pattern lacking both the IT and PITO pores and the AITO not enlarged or paired, i.e. *E. santanai* known from Timor-Leste (Greenfield & Erdmann 2013). *Eviota eyreae* differs from *E. santanai* in a number of characters: *E. eyreae* has a dorsal/anal-fin formula of 7/7 (vs. 8/8 in *E. santanai*), 5th pelvic-fin ray about 10% of 4th pelvic ray (vs. absent), no dark spot over preural centrum area (vs. present), live color quite different, with *E. santanai* lacking the many brick-red bars radiating out from the eye that are present in *E. eyreae*, and having pinkish-mauve triangular-shaped body bars that are absent in *E. eyreae*. *Eviota eyreae* also differs in live coloration from any other known species of *Eviota*.

Eviota fasciola Karnella & Lachner, 1981

Barred Dwarfgoby

Figures 20 & 43.



Figure 43. *Eviota fasciola*, CAS 228678, fresh specimen, Fiji.

Eviota fasciola Karnella & Lachner 1981: 268–272, figs. 2 & 3 (type locality: One Tree Island, GBR, Australia).

Holotype. USNM 220560.

Paratypes. AMNH 39132 (1); AMS I.15641-049 (1), 19473-177 (103), 19483-071 (76), 21422-001 (15); ANSP 143048 (11), 143057 (1); 143059 (4); USNM 220559 (11), 220563 (31), 220564 (25), 220955 (3); CAS 45396 (5); LACM 32820-8 (2); WAM P.26843-001 (5).

Diagnosis. The cephalic sensory-canal pore system complete; the dorsal/anal fin-ray formula 9/8; pectoral-fin rays branched; 5th pelvic-fin ray absent; urogenital papilla nonfimbriate; a single dark vertical bar on pectoral-fin base; body light with numerous dark bands almost full depth of body.

Distribution. Known from Japan (Ryukyu Islands), Papua New Guinea (Trobriand Islands), New Caledonia, Fiji, Tonga, Australia (Great Barrier Reef), and throughout Micronesia to Kiribati. In Fiji, widely distributed throughout the islands, but absent from the S.E. Lau Group. This species was taken most often over areas of coral or coral pavement with strong currents. Our largest collection, consisting of 122 specimens (CAS 225078), was taken outside of the barrier reef off Suva in a spur-and-groove habitat with no sand in the groove, but coral pavement and live coral at a depth of 3–6 m with a strong current.

Depth. 1–15 m.

CAS Fiji collections. CAS 219782 (49), 219807 (29), 225076 (1), 225077 (7), 225078 (122), 225079 (10), 225080 (1), 225081 (1), 228678 (5), 228704 (4), 228705 (4), 228719 (13), 228720 (1), 228721 (2), 228748 (1), 229049 (2), 229058 (9), 229119 (1), 229123 (4), 229127 (2), 229582 (2), 229595 (1).

Other Fiji collections. USNM 235868 (5), 236672 (10); ROM 45138 (1), 45139 (5), 45140 (28), 45141 (5), 45142 (14), 45143 (1), 45144 (12).

Eviota cf. flebilis Greenfield, Suzuki & Shibukawa, 2014

Tearful Dwarfgoby

Figures 6, 44 & 45.



Figure 44. *Eviota cf. flebilis*, CAS 238065, Viti Levu, Fiji.

This species is most similar to *Eviota flebilis* Greenfield, Suzuki & Shibukawa, 2014 (type locality: Iriomote-jima Island, Ryukyu Islands, Japan).

Diagnosis. The cephalic sensory-canal pore system lacking only IT pore (pattern 2); dorsal/anal fin-ray formula 7–8/7; pectoral-fin rays unbranched; 5th pelvic-fin ray about 15% of 4th ray; a dark vertical line at caudal-fin base; red line extending down from under eye to jaws; five postanal midline spots from subcutaneous bars; two distinctive black crescent-shaped marks under pectoral fin.

Description. Dorsal-fin rays VI-I,8, (VI-I,7); anal-fin rays I,7; pectoral-fin rays 15, unbranched; 5th pelvic-fin ray about 15% of 4th ray; 4 (3) branches on 4th pelvic-fin ray; 2 (1) segments between consecutive branches of 4th pelvic-fin ray; pelvic-fin membrane absent; 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 belly and wide areas along bases of dorsal fins; 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; cephalic sensory-canal pore system lacking only the IT pore (pattern 2); male urogenital papilla smooth with a blunt tip, reaching to anal-fin spine; female 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 edge of upper jaw; gill opening extending forward to a vertical just behind the back of the eye. General body shape as in Fig. 44.

Measurements from specimens of 10.9 (9.9) 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 preservative. (Fig. 44) Background color of head and body light yellow. Body with a brownish area across center of abdomen, from under pectoral-fin base to just before anus. Sides with 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, extending down to fifth anal-fin ray; third from eighth dorsal-fin ray to last anal-fin ray; fourth across caudal peduncle and darkest, with a posterior extension for a short distance along



Figure 45. *Eviota cf. flebilis*, underwater photograph, Fiji (R. Whitworth).

vertebral column. An intense, narrow black bar crossing caudal-fin base where the hypurals articulate with the caudal-fin ray bases. Two distinctive black crescent-shaped marks under pectoral fin, convex side facing anteriorly, dorsal most at top of fin with top visible above fin, ventral most below and slightly behind first mark (Fig. 6). Dark brown area from behind center of eye crossing top of head to other side and down interorbital area. Side of head with a small black spot at edge of preoperculum in line with bottom of eye. Another small black spot under eye just above end of upper jaw. Dark chromatophores on center of isthmus in line with center of eye. Remainder of head and body without marks. First dorsal spine with five dark sections spaced along its length. 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 and melanophores. Caudal fin crossed by three bands of melanophores, distal most the widest. Pectoral and pelvic fins immaculate.

Color in life. (Fig. 45) Body translucent with red and silver-white markings. Red running from back of eye and cheek down vertebral column, widest over abdomen and narrowing posteriorly. Red along vertebral column separated by seven white marks on dorsal part of column. Five faint 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. Series of eight roundish progressively smaller white spots running from pectoral-fin base along ventral surface to caudal peduncle. Pectoral-fin base with large white spot on lower half, narrow red area above, two white spots at top of base on body. Tops of dark marks behind pectoral fin, described for preserved specimen, visible. Caudal-fin base with distinctive vertical dark red mark, smaller dark spot anterior to it. Top of head and behind eye with white lines and spots over red area. Lower half of head translucent with two large white spots on this area and distinctive



Figure 46. *Eviota flebilis*, NSMT-P 114944, holotype, Iriomote-jima Island, Ryukyu Islands, Japan (K. Yano).

narrow red line extending ventrally from under eye at 6 o'clock position to posterior end of jaws. Snout with red line from eye to naris tube. Pupil of eye black, iris white with bold red marking in reticulated pattern on top of eye and some red areas on lower half of iris. First dorsal-fin spine with spaced dark marks. Fins mostly clear with some dark peppering and small red spots.

Distribution. Known only from Fiji, however *E. flebilis* is known only from Japan. The specimens from Fiji were taken over a reef composed mostly of coral rubble.

Depth. 13.5 m.

CAS Fiji collections. CAS 238065, 10.9 mm SL, male, Fiji, off N.E. coast of Viti Levu, Charlie's Garden, 17°16.88' S, 178°28.3' W, rubble reef, 13.5 m, clove oil, J.V. Eyre, Feb. 11, 2015; CAS 238207, 9.9 mm SL, female, taken with CAS 238065.

Comparisons. *Eviota cf. flebilis* is very similar to *E. flebilis* (Fig. 46), known only from the holotype taken at the Ryukyu Islands, Japan. The major difference between the two Fiji specimens and the holotype of *E. flebilis* is the presence of two distinctive black crescent-shaped marks under pectoral fin (Fig. 6) in the Fiji specimens that are absent in the holotype. Gento Shinohara kindly reexamined the holotype of *E. flebilis* and confirmed that there is no evidence of these distinctive marks. Until more specimens of *E. flebilis* from Japan are obtained, we feel it is prudent to consider the Fiji specimens as *E. cf. flebilis*.

Eviota hinanoae Tornabene, Ahmadi & Williams, 2013

Hinano's Dwarfgoby

Figures 26, 28 & 47.



Figure 47. *Eviota hinanoae*, USNM 236674, Ono-i-Lau, Fiji.

Eviota hinanoae Tornabene, Ahmadi & Williams 2013: 216, figs. 2–5 (type locality: Cook's Bay, Moorea, French Polynesia).

Holotype. USNM 407541.

Paratypes. USNM 407000 (4), 407001 (1), 407128 (1), 407138 (1), 407147 (1), 407159 (1), 407246 (1), 407247 (1), 407285 (1), 407303 (2), 407329 (1), 407330 (1); CAS 234535 (1).

Diagnosis. The cephalic sensory-canal pore system lacking only IT pore (pattern 2); dorsal/anal fin-ray formula 9/8; some pectoral-fin rays branched; 5th pelvic-fin ray absent or rudimentary; body with 8 distinct subcutaneous bars, two over the anal-fin base; prominent spot centered over preural centrum; pectoral-fin base lacking prominent pair of dark spots; male urogenital papilla cup-like.

Distribution. Known from French Polynesia (Moorea, Austral and Gambier Islands), Niue, Tonga, and Fiji (Ono-i-Lau). This species was only taken at the isolated Ono-i-Lau island, far south of the Southern Lau Group. *Eviota thamani*, described here, also was only taken at that location. *Eviota hinanoae* was described from French Polynesia, but occurs at Niue (CAS 238208, 238209, 238210), and Tonga (USNM 346295, Eua Island), which is physically closest to Ono-i-Lau in Fiji.

Depth. 0–1 m.

Fiji collections. USNM 236674 (1).

Eviota cf. indica Lachner & Karnella, 1980

Figures 12 & 48.

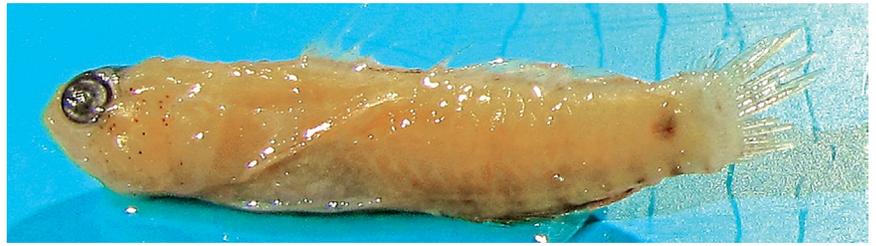


Figure 48. *Eviota cf. indica*, CAS 219783, 14.1 mm SL, Fiji.

This species is most similar to *Eviota indica* Lachner & Karnella, 1980 (type locality: Cargados Carajos Shoals, Mauritius, Mascarene Islands).

Diagnosis. The cephalic sensory-canal pore system lacking only the IT pore (pattern 2); dorsal/anal fin-ray formula 8/8; pectoral-fin rays branched; 5th pelvic-fin ray a rudiment to 10% of 4th ray; caudal spot higher than wide; scattered dark chromatophores on the cheek; pectoral-fin base lacking distinct dark spots.

Distribution. *Eviota indica* is restricted to the Seychelles and the Mascarene Islands in the Indian Ocean. *Eviota cf. indica* in Fiji has only been taken by us behind the barrier reef at Suva, at Great Astrolabe Reef south of Suva by R. Winterbottom, and at Gau Island by A. Emery *et al.*

Depth. 0–1.9 m.

CAS Fiji collections. CAS 219783 (15).

Other Fiji collections. ROM 45176 (1), 45210 (4), 45211 (9), 45212 (1), 45213 (8), 45214 (2), 45215 (2), 45216 (1).

Remarks. Although *E. indica* was only described from islands in the Indian Ocean, and there are no records of it in the East Indies (Allen & Erdmann 2012), or any other islands close to Fiji, both we and R. Winterbottom have identified specimens from Fiji as *E. indica*. Morphological characters appear to be identical between these specimens and ones from the Indian Ocean, but there are no color photographs of *E. indica* from the type locality for comparison. Until information on coloration and or genetics is available, we will refer to the Fiji specimens as *E. cf. indica* because this disjunct distribution seems improbable.

Eviota infulata (Smith, 1956)

Epaulet Dwarfgoby

Figures 4, 49 & 50.



Figure 49. *Eviota infulata*, CAS 219749, 11.4 mm SL, Fiji.

Eviotops infulatus Smith 1956: 826, fig. 4 (type locality: Mahé, Seychelles).

Holotype. RUSI 223.

Paratypes. USNM 181858 (3), USNM 209244 (1).

Diagnosis. The cephalic sensory-canal pore system lacking NA and IT pores and AITO pore far forward and



Figure 50. *Eviota infulata*, underwater photograph, approx. 14 mm SL, Moorea, French Polynesia (J.E. Randall).

opening anteriorly; dorsal/anal fin-ray formula 8/7; pectoral-fin rays unbranched; 5th pelvic-fin ray 30% of 4th ray; irregular to W-shaped mark on upper, anterior trunk above and just posterior to pectoral-fin base.

Distribution. Known from Seychelles and Mauritius (Cargados Carajos), western Australia and the Great Barrier Reef, Japan (Ryukyu Islands), Palau, across Micronesia (including Kapingamarangi in Federated States of Micronesia), through Polynesia to French Polynesia and Pitcairn Islands. Widely scattered throughout Fiji, occurring as far south as Ono-i-Lau. All specimens were taken from protected areas mostly with fine sand and silt and/or dead coral and algae. The largest collection, at Muaivuso of 41 specimens, was in the lagoon behind the barrier reef in a large depression in very fine white sand. We do not have a color photograph of this species from Fiji and so include an underwater photograph from Moorea (Fig. 50).

Depth. 3.4–15.5 m.

CAS Fiji collections. CAS 217179 (4), 219749 (41), 228687 (1), 228718 (1), 228747 (2), 228771 (1), 229128 (1).

Other Fiji collections. ROM 45174 (1), 45175 (1), 45176 (1), 45795 (1); USNM 235804 (1), 266692 (1), 235869 (2), 235815 (2), 356437 (1).

***Eviota karaspila* Greenfield & Randall, 2010**

Eastern Headspot Dwarfgoby

Figures 25 & 51.

Eviota karaspila Greenfield & Randall 2010b: 61–68, figs. 1, 2 & 6 (type locality: Nananu-i-ra Island, Viti Levu, Fiji).

Holotype. CAS 229856.

Paratypes. CAS 229857 (1), 229858 (2), 229859 (21), 229860 (27), 229861 (6); BPBM 38987 (1), 41030 (8); FMNH 119164 (2); USNM 398647 (5).



Figure 51. *Eviota karaspila*, underwater photograph, Fiji (R. Whitworth).

Diagnosis. The cephalic sensory-canal pore system complete (pattern 1); dark prominent occipital spot; nape and dorsal midline of body without dark spots; dorsal/anal fin-ray formula 9/8; some pectoral-fin rays branched; 5th pelvic-fin ray about 10–15% of 4th ray; eye 33.7–39.3% HL; caudal-peduncle depth 10.3–12.9% SL.

Distribution. Known only from Fiji, mainly near Viti Levu and Vanua Levu, absent from the S.E. Lau Group.

Depth. 12–22.5 m.

CAS Fiji collections. CAS 217050 (1), 217123 (1), 217126 (1), 217203 (1), 217204 (3), 217206 (3), 217208 (1), 219784 (2), 229862 (15), 229864 (8), 229865 (6), 229866 (5), 229867 (4), 229868 (6), 229869 (5), 229870 (4), 229871 (6), 229872 (3), 229873 (3), 229874 (4), 229875 (3), 229876 (3), 229877 (2), 229878 (2), 229879 (2), 229880 (2), 229881 (2), 229882 (3), 229883 (1), 229884 (1), 229885 (1), 229886 (1), 229887 (1), 229888 (1), 229889 (1), 229890 (1), 229891 (1), 229892 (1), 229893 (1), 229894 (1), 229895 (4); and type material listed above.

Other Fiji collections. (listed as “*E. melasma*”) ROM 45240 (7), 45241 (9), 45242 (6), 45243 (10), 45244 (12), 45245 (13), 45246 (1), 45247 (2), 45248 (1), 45249 (1), 45250 (12), 45492 (5), 45696 (18), 45697 (8); USNM 216294 (2), 235872 (1), 235873 (4), 235874 (1), 235875 (14), 235876 (2), 235877 (2), 235878 (3), 236675 (1); and type material listed above.

Remarks. Prior to its description, this species in Fiji was identified as *E. melasma*, a species now known not to occur in Fiji. We have not examined Fijian specimens from the USNM or ROM identified as *E. melasma*, but assume that they are *E. karaspila* and listed them above.

Eviota mimica, n. sp.

Mimic Dwarfgoby

Figures 13, 16, 17, 52 & 53.



Figure 52. *Eviota mimica*, CAS 238095, preserved holotype, Rabi Island, Fiji.

Holotype. CAS 238095, 11.3 mm SL, male, Fiji, Rabi Island, N.W. shore, 16°26.701' S, 179°56.261' W, spur-and-groove habitat outside barrier reef, 16.5–20.0 m, field number G03-45, D.W. & T.A. Greenfield, May 20, 2003.

Paratypes. (all from Fiji) CAS 238185, 10.4 mm SL, female, Yadua Island, Talai Harbor, 16°49.799' S, 178°16.807' E, 1.5–3.0 m, field number G02-84, D.W. Greenfield *et al.*, March 17, 2002; CAS 238186, 11.0 mm SL, female, 10.4 mm SL, male, Charybdis Reef, N.W. of Rakiraki, 17°13.072' S, 178°02.533' E, 1–4.4 m, field number G02-64, D.W. Greenfield *et al.*, March 12, 2002; CAS 238187, 11.1 mm SL, male, Yadua Island, Talai Harbor, 16°49.799' S, 178°16.807' E, 3.1–4.2 m, field number G02-88, D.W. Greenfield *et al.*, March 18, 2002; CAS 238188, 11.1 mm SL, female, Koro Basin, Makogai Island, 17°26.553' S, 178°57.162' E, 3.6–6.0 m, field number G02-184, D.W. Greenfield *et al.*, Nov. 14, 2002; CAS 238190, 11.1 mm SL, male, N. Lau Group, Kanacea Island, 17°14.890' S, 179°08.475' W, 7.0–9.4 m, field number G03-15, D.W. Greenfield *et al.*, Jan. 5, 2003; CAS 238189, 11.6 mm SL, female, Great Sea Reef, west of Kia Island, 16°13.730' S, 179°01.733' E, 4.2–10.6 m, field number G02-125, D.W. Greenfield *et al.*, March 31, 2002; CAS 238191, 13.3 mm SL, male, Great Sea Reef, S.W. of Kia Id, off Nukubati, 16°18.795' S, 178°57.631' E, 11.5 m, field number G02-132, D.W. Greenfield *et al.*, April 2, 2002; CAS 238192, 10.2 mm SL, female, barrier reef off Suva, 18°11.170' S, 178°26.819' E, 15.2–16.7 m, field number G02-48, D.W. Greenfield *et al.*, Feb. 9, 2002; USNM 436603, 11.3 mm SL, female, Great Sea Reef, west of Kia Island, 16°13.730' S, 179°01.733' E, 15.2–17.0 m, field number G02-124, D.W. Greenfield *et al.*, March 31, 2002; USNM 436605, 10.3 mm SL, immature, barrier reef off Suva, 18°08.947' S, 178°23.932' E, 9.8–15.4 m, field number G02-37, D.W. Greenfield *et al.*, Feb. 5, 2002.

Non-type material. CAS 238193 (1), CAS 238194 (2), CAS 238195 (1), CAS 238196 (3), CAS 238204 (1).

Diagnosis. A species of *Eviota* with the cephalic sensory-canal pore system complete (pattern 1); dorsal/anal fin-ray formula 8/8; first dorsal spine in males filamentous; some pectoral-fin rays branched; 5th pelvic-fin ray absent or rudimentary; male urogenital papilla a flat rounded plate; three bars extending down from lower half of eye; dark mark on lower portion of the preopercular margin; dark bars angling down posteroventrally at upper and lower portions of pectoral-fin base; a number of dark marks on underside of head.

Description. Dorsal-fin rays VI+I,8, first spine filamentous extending back to sixth soft ray of second dorsal fin; anal-fin rays I,8; all pectoral fins badly damaged, some unbroken rays branched; pectoral-fin rays 16; pelvic-fin rays I,4, a rudiment of fifth may be present, most rays broken but a count of 7 branches with two segments in one; lateral and transverse scales missing in all specimens, but 23 lateral scale pockets estimated; 17 segmented caudal-fin rays; no scales or pockets on breast; dorsal, anal, pectoral, and caudal fins broken in all specimens, extent of elongation of spines not known, but no elongation in color photo; urogenital papilla of males a flat rounded plate (Fig. 13), and females bulbous with several distal fingers; front of head rounded with an angle of about 70° from horizontal axis; mouth slanted obliquely upwards, forming an angle of about 55° to horizontal axis of body, lower jaw slightly projecting; 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 margin of eye; cephalic sensory-canal pore system complete (pattern 1), and papilla pattern obscure. General body shape is shown in Fig. 52.

Measurements from 11.3 mm SL holotype and 9 paratypes 10.2–13.3 mm SL: head length 32.7 (29.7–33.8, 31.6); origin of first dorsal fin 37.2 (32.7–40.9, 37.9); origin of second dorsal fin 59.3 (55.6–61.7, 58.4); origin of anal fin 61.9 (59.6–63.4, 62.0); caudal-peduncle length 27.0 (22.4–27.0, 24.3); caudal-peduncle depth 10.6 (10.3–13.4, 12.0); body depth 19.5 (18.3–22.5, 19.8); eye diameter 11.1 (10.8–13.4, 11.5); snout length 5.3 (3.8–5.4, 4.7); jaw length 10.2 (8.8–12.5, 10.6).

Color in preservative. (Fig. 52) Background color of head and body light cream, all dark marks brown. Most distinctive markings are three bars under eye: first at 8 o'clock position, widest, extending down across jaws; second at 6 o'clock extending down behind and below end of jaws; third at 4 o'clock and shortest. A dark bar along lower half of preoperculum. Dark area behind upper half of eye extending to top of head. Naris tube black, snout and jaws heavily peppered with small black chromatophores. Cheek with many dark chromatophores. Three dark blotches behind eye above operculum. Underside of head with a number of dark areas: one at tip of lower jaw; four dark spots on lower edges of branchiostegal membranes next to isthmus arranged in a rectangle; two more spots posterior to these on branchiostegal membrane at end of jaws; and two additional dark spots on membranes, one under center of preoperculum and second at end of preoperculum. Nape crossed by three faint bars, center of each with a dark spot, entire area heavily peppered with dark chromatophores. Pectoral-fin base with two diagonal bars, one dorsal and one ventral, sloping downward from front to back, sometimes ends of

bars darker. Body crossed by six subcutaneous bars: first bar faintest, under pectoral fin to front of first dorsal fin; second over abdomen in front of anus to back of first dorsal fin; third at anal-fin origin to front of second dorsal fin; fourth at rear of anal fin, forking ventrally with a dark spot at end of each fork, and less obviously dorsally; fifth at center of caudal peduncle and like fourth; sixth at end of caudal peduncle, with dark ventral spot, resulting in six postanal spots. Two dark spots at caudal-fin base, one dorsal and one ventral, not counted as postanal spots. First dorsal fin with two dark spots at base, extensions of subcutaneous bars. Second dorsal fin with three dark spots, also extensions of subcutaneous bars.

Color when fresh. (Fig. 53) Background color of head and body translucent white. Subcutaneous body bars and other pigment on head and body black. Area from pectoral-fin base forward to opercular membrane lighter than rest of body, almost white. Scale edges on dorsum lightly edged with dark pigment. Body with



Figure 53. *Eviota mimica*, CAS 238095, fresh holotype, Fiji (note white lines are reflections).

scattered dark chromatophores on anterior half but not on fins. Dark bars radiating out from eye as described for preserved specimen, but an additional bar at two o'clock position, curving up and back onto head and separated from dark pigment on top of head. Tip of jaws dark, as is naris tube. Pupil of eye black, iris pale yellow with red spokes radiating out from pupil. First dorsal fin with two black areas extending up from top of subcutaneous dark bars, one at front and one at back, center of fin clear except for distal dark margin. Second dorsal fin similar to first except there are three dark areas, one at front, center, and back. Anal fin similar to dorsal fins.

Distribution. Known only from Fiji, mainly near Viti Levu and Vanua Levu, taken most often from a reef face or spur-and-groove habitat.

Depth. 0.5–19.5 m.

Etymology. The specific epithet is an adjective derived from the Latin word *mimicus* (imitative) in reference to its superficial similarity to *Eviota minuta*.

Comparisons. Only 12 other species with a complete sensory-canal pore system (pattern 1) have branched pectoral-fin rays and a D/A count almost always 8/8 as does *E. mimica* (Greenfield & Erdmann 2013). Of these, only six share some dark markings on the pectoral-fin base: *E. distigma*, *E. minuta*, *E. monostigma*, *E. pseudostigma*, *E. randalli*, and *E. specca*. *Eviota mimica* has a male urogenital papilla that is a flat rounded plate, whereas it is cup-shaped in *E. minuta* and elongate and smooth in the other five species. *Eviota mimica* has two bars angling posteroventrally at upper and lower portions of the pectoral-fin base, whereas *E. monostigma* has a single dark mark covering the entire height of the base, *E. distigma* has two dark spots on the base in males, *E. pseudostigma* and *E. randalli* both have a single dark spot on the lower portion of the base, *E. specca* only has a bar on the top of the base, and the lower ventral mark on the pectoral-fin base of *E. minuta* is round, not a bar.

Remarks. Although we have only taken this species a few times, and usually only a single individual at a time, it is unlikely that it is that rare. Because of its small size, it would be less likely to be picked up from rotenone stations, and even if collected, they would have been mixed in with many other larger fishes in collecting bags, the chance of them being lost is great.

Two of the species described in this paper, *E. mimica* and *E. thamani*, are very similar to each other and to *E. cf. specca*, and also to *E. minuta* described from the Philippine Islands (Greenfield & Jewett 2014). All are very small species, have complete cephalic sensory-canal pore patterns, dorsal/anal fin-ray formulae of 8/8, absent or reduced 5th pelvic-fin rays, branched pectoral-fin rays, and similar preserved coloration. However, each has a different shape of the urogenital papilla: *E. minuta* has a cup-shaped papilla, *E. thamani* has a fimbriate papilla, and both *E. mimica* and *E. cf. specca* have a flat rounded-plate shape; none have the typical smooth, more elongate, urogenital papilla of most *Eviota* species. There is no information on live coloration of these species or genetic information, but the similarity of characters and unusual urogenital papillae suggest that they might form a related species complex.

***Eviota nebulosa* Smith, 1958**

Nebulous Dwarfgoby

Figures 15, 54 & 55.



Figure 54. *Eviota nebulosa*, ROM 45217, 18.3 mm SL, Fiji (R.W. Winterbottom).

Eviota nebulosa Smith 1958: 141, fig. 3 (type locality: Pinda, Mozambique).

Holotype. RUSI 259.

Paratypes. USNM 209225.

Diagnosis. The cephalic sensory-canal pore system complete (pattern 1); 5th pelvic-fin ray absent; some pectoral-fin rays branched; anal-fin base with two dark spots; pectoral-fin base pale and yellow in life; dark spot over preural centrum area above midline; no occipital spot; dorsal fin not uniform black.

Distribution. Known from the East African coast (Mozambique) and Seychelles, Aldabra, and Chagos, throughout the East Indian region; southward to Australia (Great Barrier Reef), north to Japan and Micronesia (Palau, Guam, Northern Mariana Islands, Federated States of Micronesia, Marshall Islands, and Kiribati [Line Islands]), and east to French Polynesia (Society Islands). In Fiji, found mainly near Viti Levu and Vanua Levu, but absent from the S.E Lau Group. This species was taken from a wide range of habitats from well-developed coral areas with strong currents to silty areas with dead coral.

Depth. 0.3–18 m.

CAS Fiji collections. CAS 216739 (1), 216741 (5), 216742 (3), 217053 (1), 217177 (1), 217183 (4), 217185 (1), 217186 (1), 217187 (13), 217197 (2), 217200 (1), 217260 (1), 219809 (4), 228608 (1), 228609 (3), 228686 (2), 237762 (1), 237763 (1), 237764 (4), 237765 (1), 237766 (1), 237767 (3), 237768 (3), 237769 (1), 237770 (5), 237771 (1), 237772 (5), 237773 (2), 237774 (3).

Other Fiji collections. ROM 45217 (50), 45222 (2), 45223 (2); USNM 235799 (1), 235860 (4), 236665 (1), 241766 (3).



Figure 55. *Eviota nebulosa*, underwater photograph, Fiji (J.E. Randall).

Eviota prasites Jordan & Seale, 1906

Hairfin Dwarfgoby

Figures 10, 56–58.

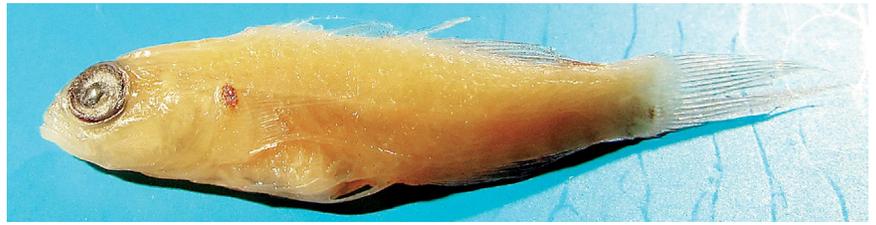


Figure 56. *Eviota prasites*, CAS 233666, 17.7 mm SL, Fiji.

Eviota prasites Jordan & Seale 1906: 387, fig. 76 (type locality: Pago Pago, American Samoa).

Holotype. USNM 51768.

Diagnosis. The cephalic sensory-canal pore system lacking only the IT pore (pattern 2); pectoral-fin rays unbranched; dorsal/anal-fin formula 8/7; 5th pelvic-fin ray 40% of 4th ray; abdomen without black peritoneum clearly visible externally; a dark spot on upper portion of pectoral-fin base when dead, lacking or less visible in life. In life there is a distinctive red line running from the tip of the lower jaw back under the eye across the cheek.

Distribution. Known from Vietnam, Indonesia (Moluccas), east and northward to Japan (Ryukyu Islands); east through Micronesia (Palau, Guam, Federated States of Micronesia [Yap], Kiribati [Gilbert Islands]); south through Melanesia to Australia (Great Barrier Reef), and across to New Caledonia, Samoa, and French Polynesia (Gambier). In Fiji, taken mainly between Viti Levu and Vanua Levu. The field notes for most of the lots listed below include a wall, steep reef face, or steep spur-and-groove habitat, indicating that this species might be more common in these habitats.

Depth. 1–22 m.

CAS Fiji collections. CAS 227468 (1), 227469 (31), 227470 (1), 227471 (1), 227472 (1), 228679 (2), 228717 (2), 228769 (3), 229091 (2), 229092 (3), 229581 (1), 229613 (33), 229651 (4), 233666 (33).

Other Fiji collections. ROM 45127 (1), 45128 (9), 45129 (1), 45130 (4), 45131 (4), 45132 (1), 45133 (9); USNM 235866 (2), 241714 (2), 241786 (1).

Figure 57. *Eviota prasites*, CAS 227472, fresh specimen, Fiji.



Figure 58. *Eviota prasites*, underwater photograph, Fiji (J.V. Eyre).

Eviota punctulata Jewett & Lachner, 1983

Dotted Dwarfgoby

Figures 30, 59 & 60.

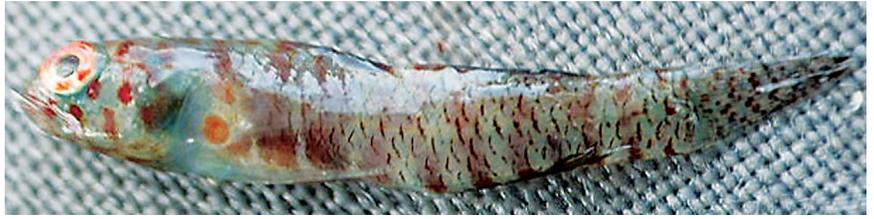


Figure 59. *Eviota punctulata*, CAS 238211, fresh specimen, Fiji.

Eviota punctulata Jewett & Lachner 1983: 793–796, figs. 6 & 7 (type locality: Great Astrolabe Reef, Fiji).

Holotype. USNM 224550.

Paratypes. (lots from Fiji) USNM 224542 (3), 224543 (18); 21 additional lots from Papua New Guinea, Australia, and the Philippine Islands.

Diagnosis. The cephalic sensory-canal pore system lacking only the IT pore (pattern 2); pectoral-fin rays branched; dorsal/anal-fin formula 9/8; 5th pelvic-fin ray 10–20% of 4th ray; no postocular spot; no dark spot on preural centrum area; no prominent dark spots on pectoral-fin base; strong scattered well-spaced dark spots on caudal fin.

Distribution. Known from Western Thailand, the East Indian region to the Caroline Islands, and Fiji. This species was described from Fiji, where there are confirmed records from numerous localities. Specimens from other localities exhibit some differences in coloration, thus records from other areas throughout the western Pacific may represent other species. In Fiji, collected mainly near Viti Levu and Vanua Levu, but absent from the S.E Lau Group. Most of the specimens of *E. punctulata* are from stations characterized as dead reef, mostly dead with silty sand, silt, and fine sand.

Depth. 1–22 m.

CAS Fiji collections. CAS 219768 (1), 225903 (11), 228682 (1), 228683 (6), 228716 (2), 228749 (1), 228755 (3), 228756 (10), 228757 (1), 228758 (6), 228759 (1), 228760 (22), 228761 (31), 228762 (2), 228763 (1), 229056 (4), 229057 (1), 229065 (4), 229066 (17), 229067 (3), 229068 (22), 229071 (4), 229087 (3), 229116 (2), 229117 (43), 229126 (2), 229137 (3), 229138 (1), 229139 (1), 229140 (32), 229542 (19), 229553 (1), 229567 (32), 229572 (1), 229577 (1), 229606 (4), 229609 (13), 229612 (1), 238211 (6).

Other Fiji collections. USNM 235808 (1), 235812 (5), 235823 (19), 235857 (34), 235858 (3), 239378 (5), and type material listed above; (listed as “*E. afelei*”) ROM 45145 (20), 45147 (23), 45148 (13), 45151 (11), 45153 (2), 50326 (3), 50327 (4), 50329 (1).

Remarks. Randall (2005) published a photograph of *E. punctulata* from Fiji as *E. afelei*, and others have followed in this misidentification (as discussed under *E. afelei*).



Figure 60. *Eviota punctulata*, underwater photograph, Fiji (J.E. Randall).

Eviota randalli Greenfield, 2009

Randall's Dwarfgoby

Figures 11 & 61.



Figure 61. *Eviota randalli*, CAS 228572, fresh holotype, Cobia Island, Fiji.

Eviota randalli Greenfield 2009: 683–687, figs. 1 & 2 (type locality: Cobia Island, Fiji).

Holotype. CAS 228572.

Paratypes. CAS 219785 (2), 228573(1), 228574 (1), 228575 (2); BPBM 41001 (1); ROM 60895 (2), 84966 (1); USNM 396995 (1).

Diagnosis. The cephalic sensory-canal pore system complete (pattern 1); pectoral-fin rays branched; dorsal/anal fin-ray formula 8/8; 5th pelvic-fin ray absent; three internal dark bars between anal-fin origin and caudal fin; a prominent dark spot on lower half of pectoral-fin base and white area anterior to pectoral-fin base.

Distribution. Known from Fiji, American Samoa, Moorea, and Tahiti. In Fiji, taken only around Viti Levu.

Depth. 3.4–12.0 m.

CAS Fiji collections. Type material listed above.

Other Fiji collections. Some type material listed above.

Eviota richardi, n. sp.

Rick's Dwarfgoby

Figures 62–65.

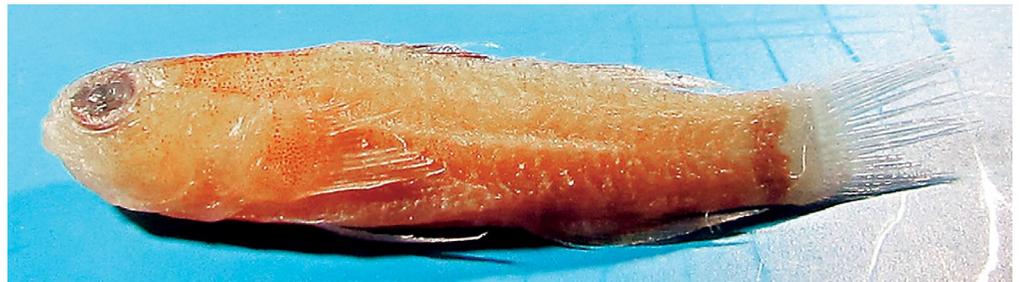


Figure 62. *Eviota richardi*, CAS 238175, preserved holotype, Fiji.

Holotype. CAS 238175, 13.6 mm SL, male, Fiji, Viti Levu, Charybdis Reef, 17°13.138' S, 178°02.851' E, 4.6–6.8 m, coral and sand, rotenone, field number G03-81, D.W. & T.A. Greenfield, May 30, 2003.

Paratypes. (all from Fiji) CAS 238176, 4 males, 9.2–11.3 mm SL, 5 females, 8.3–10.9 mm SL, 1 dried, sex undetermined, 9.7 mm SL, Viti Levu, north shore, Nananu Passage, 17°15.063' S, 178°13.445' E, 6.3–8.4 m, field number G02-80, D.W. Greenfield *et al.*, March 16, 2002; CAS 238180, 1 male, 11.5 mm SL, Vanua Levu, Great Sea Reef Lagoon, east of Kia Island, 16°14.225' S, 179°07.128' E, 10.5–12.0 m, field number G02-116, D.W. Greenfield & R. Langston, March 29, 2002; CAS 238182, 1 male, 11.4 mm SL, 3 females, 10.1–10.7 mm SL, Vanua Levu, Yadua Island, 16°49.864' S, 178°19.625' E, 3–7.6 m, field number G02-133, D.W. Greenfield *et al.*, April 3, 2002; ROM 45203, 3 males, 10.7–13.2 mm SL (see Fig. 63), 2 females, 9.7–11.5 mm SL, Great Astrolabe Reef, 18°44'51" S, 178°33'42" E, 6–10 m, field number WE83-28, R. Winterbottom *et al.*, March 30, 1983; ROM 45209, 11 males, 11.7–16.7 mm SL, 9 females, 11.5–15.0 mm SL, 2 sex undetermined, 9.0–13.1 mm SL, Yasawa Group, Nanuya Island, 16°43' S, 177°36' E, 11 m, field number WE83-67, A. Emery *et al.*, April 28, 1983; USNM 436603, 2 males, 13.2–13.8 mm SL, taken with ROM 45209.



Figure 63. *Eviota richardi*, ROM 45203, fresh paratype, 13.2 mm SL, male, Fiji (R.W. Winterbottom).

Non-type material. (all from Fiji) ROM 45201 (4), 45202 (5), 45204 (2), 45205 (2), 45206 (3), 45207 (3), 45208 (4); USNM 235809 (8); CAS 238177 (2), 238178 (4), 238179 (10), 238181 (1), 238183 (1), 238184 (2).

Diagnosis. A species of *Eviota* with the following combination of distinguishing characters: cephalic sensory-canal pore system complete (pattern 1); dorsal/anal-fin formula 9/8; pectoral-fin rays branched; no dark occipital spot; pectoral-fin base with heavy peppering of large dark chromatophores; broad dark bar across entire caudal peduncle; side of head crossed by three light undulating lines.

Description. Dorsal-fin rays VI+I,9 (all); anal-fin rays I,8 (all); pectoral-fin rays 16 (16 [8], 17 [22]), branched; 5th pelvic-fin ray absent; 7 branches on 4th ray (6–9), and 2 segments between consecutive branches of 4th pelvic-fin ray; pelvic-fin membrane reduced; lateral scale rows mostly lost, 23 or 24 estimated from scale pockets; transverse scale rows estimated to be 6; breast scaleless; first dorsal fin triangular in shape, no spinous dorsal-fin elongation observed; male urogenital papilla wide, slightly expanded posteriorly, distal end with three points, one in center and one on each side; female urogenital papilla bulbous; gill opening forward to edge of preoperculum; naris tube short, just reaching to edge of upper lip; cephalic sensory-canal pore system pattern 1 (complete); cutaneous papillae system obscure. Head rounded. General body shape shown in Fig. 62.

Measurements from 13.6 mm SL holotype and 9 paratypes, 12.1–16.4 mm SL: head length 29.8 (28.0–32.3, 30.1); origin of first dorsal fin 37.8 (33.6–37.8, 36.4), above posterior end of pectoral-fin base; origin of second dorsal fin 58.8 (54.6–59.2, 57.1); origin of anal fin 64.0 (59.7–64.0, 60.9); caudal-peduncle length 22.8 (21.9–26.9, 23.9); caudal-peduncle depth 14.3 (10.7–14.6, 13.5); body depth 23.5 (20.1–25.5, 22.4); eye diameter 10.3 (7.9–11.1, 9.9); snout length 4.8 (3.0–5.4, 4.4); upper-jaw length 11.0 (9.8–13.6, 11.9); pectoral-fin length broken in holotype (3 paratypes, 29.3–40.1, 34.5); pelvic-fin length 26.8 (26.8–36.3, 31.2).

Color of holotype in preservative. (Figs. 62 & 64) Background color of body pale yellow, distinctive color a broad dark band across entire caudal peduncle followed by a white area that extends onto basal third of caudal fin. Anterior portion of head from center of eye forward white and extending to top of head and posterior to back of eye. Nape crossed by four broad dark brown bars, anterior three darkest, entire area heavily peppered with large dark chromatophores. Side of head also heavily peppered with large dark chromatophores, area crossed by three light undulating lines: first under the eye at the 5 o'clock position; second extending from the three o'clock position behind eye down across cheek to bottom of preoperculum; third line is posterior to second, paralleling



Figure 64. *Eviota richardi*, head detail, CAS 238175, freshly preserved holotype before fading, 13.6 mm SL, male, Viti Levu, Fiji.



Figure 65. *Eviota richardi*, USNM 235809, preserved non-type specimen, 12.4 mm SL, Fiji.

it, extending down across the entire cheek. Pupil of eye dusky clear, iris black. Pectoral-fin base entirely covered with heavy peppering of large dark chromatophores. Edges of scales on body outlined with dark chromatophores forming a diamond pattern, dorsal half of body more heavily peppered with dark chromatophores. Ventral edge of body with five dark blotches on lower margin of internal bars: two along base of anal fin, and three more along caudal peduncle, last part of caudal bar. Dorsal and anal fins black. Basal third of caudal fin white, remainder black. Pectoral and pelvic fins pale yellow. A preserved specimen from Ono-i-Lau that is not type material is shown in Fig. 65.

Color of paratype when fresh. (Fig. 64) Background color of head and body white, overlaid by orange on scale edges giving it an overall orange appearance. Upper and lower jaws and snout orange. Pupil of eye black, iris red with scattered white specks. Area immediately under eye white. Top of head above and directly behind eye gray. Side of cheek white with a large orange blotch in its center, overlaid with large black chromatophores and two white undulating vertical lines in center of blotch. A large gray-black area over the operculum in advance of the pectoral-fin base. Pectoral-fin base white, overlaid with orange tinges and a heavy peppering of large black chromatophores. Nape crossed by four bars, anterior two bars black, posterior two orange, entire area peppered with large black chromatophores. Scale edges on body orange, forming a diamond pattern. Orange color is more intense on dorsal half of body, belly much lighter. Caudal peduncle crossed by a broad black bar, almost as wide as eye. Ventral edge of body from anal-fin origin to caudal-fin base dusky from subcutaneous dark bars. Two dark blotches over anal fin most intense. Caudal-fin base orange followed by a clear area extending posteriorly about one-third fin length. Remainder of fin dusky. Anal fin black with some orange on its base. First dorsal-fin spines orange, membranes at base of fin clear with some orange extending up a short distance behind the spines. Distal to clear area intense black two-thirds up fin, then a clear band followed by an intense black band on distal margin. Second dorsal fin similar to first, except that area distal to basal clear and orange area all black. Pelvic fins dusky including breast anterior to them.

Distribution. Known only from Fiji, mainly around Viti Levu and Vanua Levu, but also at Great Astrolabe Reef. *Eviota richardi* was taken from a wide range of habitats, from well-developed coral reefs to areas of dead coral and rock and algae. The largest collection was ROM 45209 (and USNM 436603) with 24 individuals, taken at Nanuya Island in the Yasawa Group, at a depth of 11 m, from habitat that was “tunicates, sponges, very small amount of living coral, coralline algae.”

Depth. 0.5–20 m.

Etymology. The specific epithet is a patronym, a noun in the Latin genitive case, in honor of Richard (Rick) Winterbottom, Royal Ontario Museum, who made important collections in Fiji, also recognized this species as undescribed, and has provided invaluable help to the first author.

Comparisons. *Eviota richardi* is most similar to *E. aquila* from Taiwan, but differs from it by having a broad dark bar across entire caudal peduncle (vs. a spot somewhat above the lateral midline), the cheek crossed by three light undulating lines (vs. almost entirely covered with dense brown pigment patches), and usually 17 pectoral-fin rays (vs. usually 16).

Remarks. The cephalic sensory-canal pore canal between AOT and IT pores is very fragile, often making it difficult to find the IT pore at the end of the canal.



Figure 66. *Eviota sebreei*, underwater photograph, Fiji (J.E. Randall).

Eviota sebreei Jordan & Seale, 1906

Striped Dwarfgoby

Figures 8, 66 & 67.

Eviota sebreei Jordan & Seale 1906: 390, fig. 80 (type locality: Apia, Samoa Islands).

Holotype. USNM 51765.

Diagnosis. The cephalic sensory-canal pore system lacking the NA, PITO & IT pores; pectoral-fin rays not branched; dorsal/anal-fin formula 9/8; 5th pelvic-fin ray 50–80% of 4th ray; large dark spot at midbase of caudal fin.

Distribution. Known from the Seychelles eastward throughout Oceania and the Coral Triangle to Tonga. In Fiji, taken at a few scattered locations at Vanua Levu and Viti Levu.

Depth. 1.5–24.5 m.

CAS Fiji collections. CAS 219748 (1), 228770 (1), 229072 (2), 229141 (1), 229571 (1), 229576 (1), 229579 (2).

Other collections. USNM 235795 (1), 235867 (1).

Remarks. The stripe along the side of *E. sebreei* is black. There is another similar species, *E. punyit*, with a red lateral stripe, found throughout the Coral Triangle and west to the Red Sea (Tornabene *et al.* 2016).



Figure 67. *Eviota sebreei*, underwater photograph, Fiji (J.V. Eyre).

***Eviota cf. sigillata* Jewett & Lachner, 1980**

“Silverline” Adorned Dwarfgoby

Figures 68–73 & 75.



Figure 68. *Eviota cf. sigillata*, CAS 229583, fresh specimen, Fiji.

This species is most similar to *Eviota sigillata* Jewett & Lachner, 1983 (type locality: Cargados Carajos Shoals, Mauritius, Mascarene Islands).

Diagnosis. The cephalic sensory-canal pore system lacking only the IT pore (pattern 2); dorsal/anal-fin formula 8–9/7–8 (usually 9/8); pectoral-fin rays unbranched; 5th pelvic-fin ray about 10–15% of 4th ray; no dark or dusky spot on pectoral-fin base; no dark spot at midbase of caudal fin; male urogenital papilla non-fimbriate, cup-like, or plate-like; a solid silver-white, narrow stripe extending horizontally from under center of eye back to posterior edge of preoperculum.

Color in preservative. (Fig. 69) Head and body light cream, no distinctive bold dark markings. A few scattered melanophores behind upper half of eye. Some scattered small, dark, chromatophores on jaws and cheek. A line of small, dark subcutaneous chromatophores running along the vertebral column. No pigment on any fins.

Color when fresh and live. (Figs. 68, 70–72) Background color of head and body translucent gray, overlaid by reddish and white pigment patterns. Top and side of head down to ventral surface of eye red-orange, extending to pectoral-fin base. Red-orange area directly under eye and behind eye overlaid with concentration of dark chromatophores. A solid silver-white, narrow stripe extending horizontally from under center of eye back to posterior edge of preoperculum. Area ventral to stripe translucent gray. Jaws and naris tube translucent gray with orangish tinge and sprinkled with dark chromatophores. A short white stripe extending posteriorly from upper half of eye, red-orange area above it with several larger dark chromatophores. Three white spots ventral to stripe behind center of eye across top of operculum. A short white line extends from interorbital area onto base of naris. Pupil of eye black, iris dark orange with wide stripe across upper portion above pupil. Narrow white edge below pupil, remainder of iris under eye dark, almost black. Pectoral-fin base with wide white bar crossing its center. Dorsal area above vertebral column translucent gray with a yellowish tinge. A series of 14 small orange blotches extending from nape posteriorly along bases of dorsal fins to caudal-fin base. A series of nine larger orange-red blotches just above vertebral column from above operculum to caudal peduncle, with white areas between them. Anterior half of body with white over abdomen below vertebral column, overlaid by reddish areas extending down from orange blotches above vertebral column, with a sprinkling of dark chromatophores over this area. Body from anal-fin origin posteriorly to caudal-fin base with subcutaneous dusky wash below vertebral column. Five larger orange-red blotches above vertebral column are located here with triangular extensions down to



Figure 69. *Eviota cf. sigillata*, CAS 238214, Fiji.



Figure 70. *Eviota* cf. *sigillata*, CAS 238214 underwater photograph, Fiji (J.E. Randall).

ventral body surface. Ventral portion of last blotch with cluster of large black chromatophores. Dorsal-fin rays light orange, membranes peppered with small white and yellow dots. Lower portion of pectoral fin with slight yellow tinge. Anal-fin rays orange, membranes with orange tinge. Caudal fin dusky on lower half, concentration of dark chromatophores on lower base, upper half with a few orange blotches similar to those along back.

Distribution. *Eviota* cf. *sigillata* has only been taken at Viti Levu and Vanua Levu in Fiji. Field notes often mention dead coral, sand, silt as well as rubble and coral.

Depth. 0.9–22.0 m.

CAS Fiji collections. CAS 229546 (1), 229562 (1), 229566 (1), 229569 (2), 229570 (2), 229574 (1), 229583 (32), 229589 (6), 238057 (2), 238058 (4), 238064 (1), 238066 (2), 238068 (1), 238214 (5), 238220 (84).

Comparisons. *Eviota* cf. *sigillata* is most similar to *E. sigillata* from the Indian Ocean (type locality Cargados Carajos Shoals, Mascarene Islands, Mauritius) when only looking at preserved material, because it shares the same morphological characters; however, because the second author had seen, photographed, and collected *E. sigillata* at the Seychelles Islands (Fig. 73; e.g. BPBM 35727), he realized that the corresponding species in Fiji has a long silver-white line under the eye, extending from in front of the pupil back across the cheek to the posterior edge of the preoperculum, whereas type-location *E. sigillata* from the Indian Ocean lacks this line. The photograph from the Seychelles Islands (Fig. 73), considerably closer to the type locality of Mauritius, shows two small white markings under the eye, a smaller dot anteriorly, and a shorter white line under the back of the eye. However, it is possible that the silver-white spots or lines on the head are under neurological control and can be turned on and off and may not be taxonomically relevant. Janet Eyre photographed *E. cf. sigillata* underwater



Figure 71. (above) *Eviota* cf. *sigillata*, CAS 238214, underwater photograph, Fiji (J.E. Randall).



Figure 72. (right) *Eviota* cf. *sigillata*, underwater photograph, Fiji (J.V. Eyre).



Figure 73. *Eviota sigillata*, underwater photograph, Mahé, Seychelles (J.E. Randall).

in Fiji (Fig. 74), and then captured one specimen (CAS 238068) and placed it in a small aquarium, where she took a photograph (Fig. 75), and the silver-white line was no longer obvious. Nonetheless, the only location where we have seen this long line in undisturbed fish underwater is in Fiji. Additional documentation of live appearance, along with morphological comparisons and comprehensive DNA surveys should clarify the degree to which various populations of these fishes diverge taxonomically.

A Japanese species, *E. shimadai*, is very similar in coloration, but differs from *E. cf. sigillata* in cephalic sensory-canal pore pattern, lacking both the IT and PITO pores (only lacking IT in *E. cf. sigillata*). A search of a Japanese fish photographic website (fishpix.kahaku.go.jp/fishimage-e/search.html) failed to show a long white line under the eye in any of the many available photographs of *E. shimadai*. There are several forms in the Coral Triangle and Oceania that have very similar morphology and coloration, but differ in genetics (L. Tornabene & M.V. Erdmann, pers. comm.). The taxonomic and geographic limits of the nominal species *E. shimadai* and *E. sigillata* require a more detailed investigation.



Figure 74. *Eviota cf. sigillata*, underwater photograph, Fiji (J.V. Eyre).



Figure 75. *Eviota cf. sigillata*, CAS 238068, in aquarium, Fiji (J.V. Eyre).

Eviota smaragdus Jordan & Seale, 1906

Emerald Dwarfgoby

Figures 21, 24, 76 & 77.



Figure 76. *Eviota smaragdus*, CAS 238215, preserved specimen, American Samoa.

Eviota smaragdus Jordan & Seale 1906: 388–389, fig. 78 (type locality: Pago Pago, American Samoa).

Holotype. USNM 51764.

Paratypes. USNM 213872 (6); CAS-SU 8712 (7).

Diagnosis. The cephalic sensory-canal pore system complete (pattern 1); 5th pelvic-fin ray 10–40% (usually 20%) of 4th ray; some pectoral-fin rays branched; dorsal/anal-fin formula 9/8; a prominent occipital spot; dorsal midline of body with a series of small dark spots along dorsal-fin bases; dark bars crossing nape in advance of dorsal fin; caudal-peduncle depth 13.4–14.9% SL.

Distribution. Known from the western Pacific from Taiwan, Japan (Ogasawara Islands and Ryukyu Islands), Philippines, Micronesia (Palau, Guam, and Marshall Islands), east to Vanuatu, Fiji, Wallis and Futuna, Tonga and Samoa, and south to Australia (Scott Reef, Great Barrier Reef, Middleton Reef, Elizabeth Reef) and Norfolk Island.

Depth. Recorded from 0.1–40 m, although it is most commonly found from shallow depths and tidepools. From examining the Fiji collection data from the USNM and ROM, the listed depths were: 0–0.5, 0.3, 0–1, 0.1, 0.5–2.5, 0.5–3, 2.0, and 4–6 m. In 1990, the first author collected 10 individuals of *E. smaragdus* from the type locality in American Samoa from a tidepool that was 1.2 meters above the waterline, being in a high-tide splash zone.

Other Fiji collections. USNM 235827 (3), 235864 (4); ROM 45134 (7), 45135 (3), 45136 (1), 45137 (2), 45591 (3).

Comparisons. *Eviota smaragdus* is very similar in coloration to *E. melasma* (Lachner & Karnella 1980: figs. 8 & 9) and we suspect that many of the literature records from deeper water may be based on *E. melasma*. *Eviota smaragdus* has a series of small dark spots along the dorsal-fin bases, dark bars crossing the nape in advance of the dorsal fin, and the caudal-peduncle depth is 13.4–14.9% SL, whereas *E. melasma* lacks the dorsal-fin base spots and the bars on the nape, and has a caudal-peduncle depth of 10.3–12.9% SL.

Remarks. We did not collect this species, but it was collected by others in Fiji. Our collections were mostly SCUBA collections from boats in deeper water, and, as a result, we made very few shallow shore collections.



Figure 77. *Eviota smaragdus*, underwater photograph (image horizontally reversed), American Samoa (J. Kuwabara).

Eviota sparsa Jewett & Lachner, 1983

Speckled Dwarfgoby

Figures 78 & 79.



Figure 78. *Eviota sparsa*, CAS 229133, fresh specimen, Fiji.

Eviota sparsa Jewett & Lachner 1983: 802–805, figs. 11–13 (type locality: Tutuila Island, Samoa Islands).

Holotype. USNM 227483.

Paratypes. USNM 260327 (7); CAS 52832 (2); ANSP 151998 (2) (all taken with holotype). Philippine Islands: USNM 227485 (1), 227481 (4); AMS I.23987-001 (1); AMNH 55055 (1). Indonesia: USNM 210070 (3).

Diagnosis. The cephalic sensory-canal pore system lacking IT and POP pores; pectoral-fin rays branched; dorsal/anal-fin formula 9/8; 5th pelvic-fin ray 70% of 4th ray.

Distribution. Known from Indonesia, Philippines, and Palau; south to Australia (Great Barrier Reef and NSW); east to Fiji, Solomon Islands, New Caledonia, Tonga, and the Samoan Islands. Widely distributed throughout Fiji. Examination of those stations where the greatest number of individuals was taken did not show any habitat specificity.

Depth. 0.75–21.5 m.

CAS Fiji collections. CAS 219767 (1), 228670 (1), 228671 (2), 228690 (29), 228728 (2), 228734 (1), 228735 (26), 228736 (2), 228746 (2), 229069 (1), 229070 (15), 229133 (10), 229134 (8), 229135 (5), 229136 (5), 229543 (1), 229547 (3), 229548 (1), 229549 (2), 229550 (5), 229554 (4), 229556 (2), 229557 (2), 22559 (4), 229560 (2), 229565 (1), 229573 (1), 229578 (1), 229584 (14), 229585 (2), 229586 (1), 229587 (1), 229588 (2), 229591 (4), 229594 (13), 229598 (5), 229604 (2), 229611 (8).

Other Fiji collections. USNM 235796 (6), 235801 (2), 235811(1), 235837 (2), 235838 (1), 235855 (2), 235870 (1), 236673 (25), 266691 (2), 371850 (1).



Figure 79. *Eviota sparsa*, underwater photograph, Fiji (J.E. Randall).

***Eviota cf. specca* Greenfield, Suzuki & Shibukawa, 2014**

Figures 18, 19, 80 & 81.

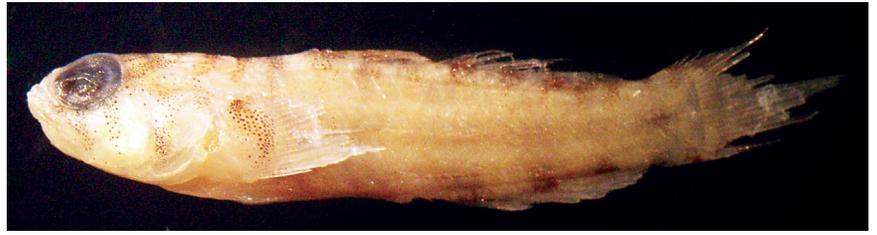


Figure 80. *Eviota cf. specca*, CAS 238197, preserved specimen, Fiji.

This species is most similar to *Eviota specca* Greenfield, Suzuki & Shibukawa, 2014 (type locality: Hatoma-jima Island, Ryukyu Islands, Japan).

Diagnosis. The cephalic sensory-canal pore system complete (pattern 1); pectoral-fin rays branched; dorsal/anal fin-ray formula 8/8; 5th pelvic-fin ray absent; male urogenital papilla a flat rounded plate; three bars extending down from lower half of eye; dark mark on upper portion of the preopercular margin; single dark bar angling down posteroventrally at the upper pectoral-fin base; only dark marks on underside of head a scattering of small chromatophores at front of lower jaw.

Distribution. Known from Fiji only from a few collections near Suva and at the west end of Viti Vanua. Most field notes mention dead coral, boulders, or pavement as habitat. *Eviota specca* is known only from the Ryukyu Islands, Japan.

Depth. 0.6–10.4 m.

CAS Fiji collections. CAS 238197 (5), 238198 (3), 238199 (1), 238200 (1), 238201 (1), 238202 (1), 238203 (1).

Remarks. Seven lots with a total of 13 individuals were collected in Fiji that are very similar to *E. specca*, described from the Ryukyu Islands, Japan. The characters and general coloration of the head and body for the two populations are similar, but the structure of the male urogenital papilla of *E. specca* is unknown (the holotype is sexually immature), and thus cannot be compared to the distinctive flat and rounded urogenital papilla found in *E. cf. specca* (Fig. 81).

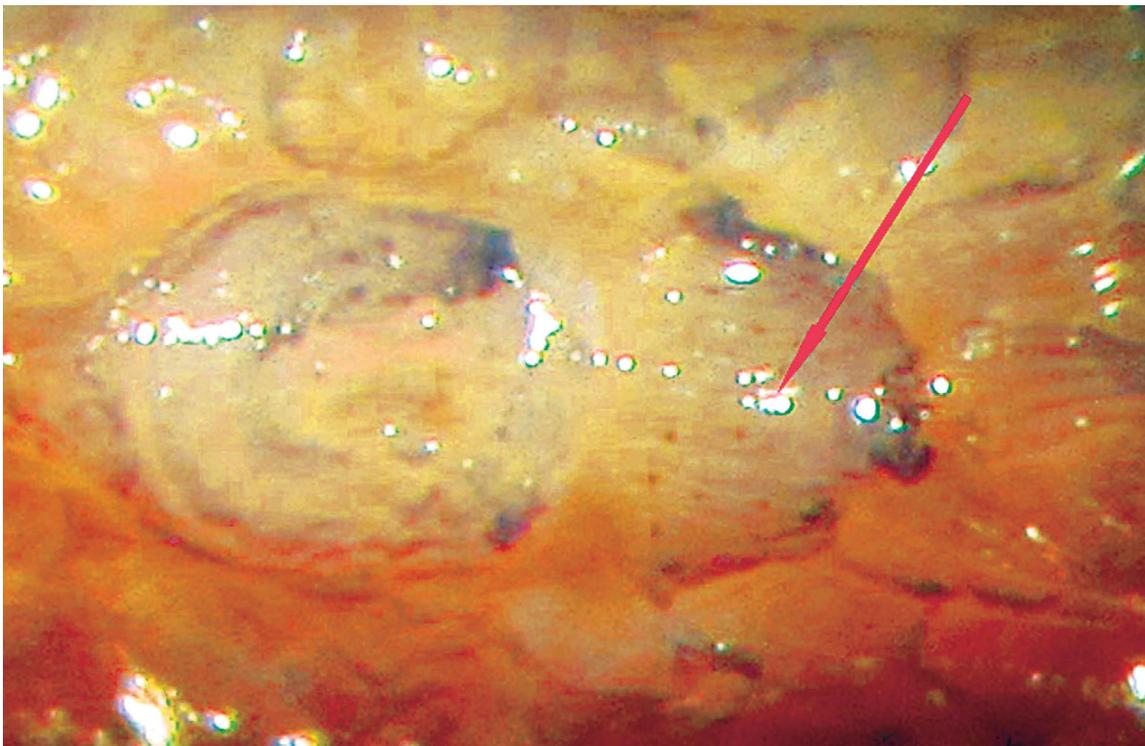


Figure 81. *Eviota cf. specca*, flat rounded male urogenital papilla (red arrow), CAS 238197, preserved specimen, Fiji.

Eviota teresae, n. sp.

Terry's Dwarfgoby

Figures 23, 82–86.

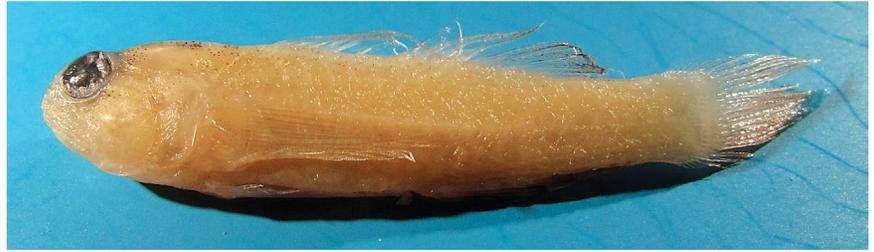


Figure 82. *Eviota teresae*, CAS 229088, preserved holotype, Fiji.

Eviota guttata [non Lachner & Karnella] Greenfield & Randall 2010a: 282, fig. 29 (Fiji).

Holotype. CAS 229088, 19.6 mm SL, male, Fiji, Rabi Island, N.W. shore, 16°26.701' S, 179°56.261' W, fringing reef about 23 m off rocky shore, 0.5–1.8 m, field number G03-47, D.W. & T.A. Greenfield, R. Langston & J. Philippoff, May 20, 2003.

Paratypes. (all from Fiji) CAS 238205, 8 males, 12.9–21.1 mm SL, 3 females, 15.5–16.5 mm SL, 1 immature, 11.3 mm SL, taken with holotype; CAS 219808, 6 females, 13.3–15.8 mm SL, 13 males, 12.5–16.8 mm SL, Viti Levu, 18°08.90' S, 178°23.91' E, barrier reef off Suva, 9–12 m, field number G02-12, D.W. Greenfield, K. Cole, N. Holcroft, R. Langston & K. Longenecker, Jan. 26, 2002; USNM 436602, 3 males, 14.4–18.0 mm SL, 2 females, 13.1–13.9 mm SL, Duff Reef, 16°50.390' S, 179°56.743' W, west side of barrier reef in spur and groove, 4.8–9.0 m, field number G03-34, D.W. Greenfield, R. Langston & K. Longenecker, Jan. 10, 2003.

Diagnosis. A species of *Eviota* with a complete cephalic sensory-canal pore pattern (pattern 1); dorsal/anal-fin formula usually 9/8; pectoral-fin rays usually 18; no spot lateral to pelvic-fin base; no dark occipital spot; pectoral-fin base with no obvious dark pigmentation; no dark spot on mid caudal peduncle; head and nape without transverse bars; anal fin darker than other fins; orange scale margins in life; distinct dark spots present on ventral side of head; iris of eye reddish with scattered small light spots on dorsal surface; red blotches on sides deeper than wide; some pectoral-fin rays branched; 5th pelvic-fin ray about 10–15% of length of 4th ray; membranes absent in pelvic fins and branches elongate and slender with 2 segments between branches.

Description. Dorsal-fin rays VI+I,9; anal-fin rays I,8; pectoral-fin rays 18 (16 [3], 17 [4], 18 [16]), branching beginning with ray 5 in holotype; 5th pelvic-fin ray about 10–15% of 4th ray; 8 (6–11) branches on 4th ray; 2 segments between consecutive branches of 4th pelvic-fin ray; no pelvic-fin membrane; 12 branched and 17 segmented caudal-fin rays; lateral scale rows mostly lost, 24 estimated from scale pockets in holotype; transverse scale rows estimated to be 7 in holotype; scales present on middle of ventral surface of abdomen, no scales on breast; first dorsal fin triangular in shape, first spine filamentous in male holotype, extending back to 5th ray of second dorsal fin; second spine filamentous extending back to the 4th ray; dorsal-fin spines not elongate in female; all soft rays of second dorsal and anal fin branched, the last split through its base; urogenital papilla in male smooth, not fimbriate or cup-shaped, sides straight, with three short projections at end, the center one the longest, extending past anal-fin base; urogenital papilla of female smooth, bulbous, with eight short finger-like projections on end; front of head rounded with an angle of about 75° from horizontal axis; mouth slanted obliquely upwards, forming an angle of about 65° to horizontal axis of body, lower jaw not projecting; maxilla extending posteriorly



Figure 83. *Eviota teresae*, CAS 219808, preserved paratype, Fiji.



Figure 84. *Eviota teresae*, CAS 229090, fresh specimen, Fiji.



Figure 85. *Eviota teresae*, underwater photograph, Fiji (R. Whitworth).

to back of pupil; anterior naris tube extending just to anterior margin of upper lip; gill opening extending forward just anterior to edge of operculum; cephalic sensory-canal pore system complete (pattern 1), and papilla pattern A. General body shape is shown in Fig. 82.

Measurements from 19.6 mm SL holotype and 9 paratypes, 15.5–21.1 mm SL: head length 30.3 (26.2–30.3, 28.1); origin of first dorsal fin 36.7 (33.2–36.7, 34.7), lying behind posterior margin of pectoral-fin base; origin of second dorsal fin 54.8 (52.6–56.7, 54.7), slightly in advance of anal-fin origin; origin of anal fin 58.7 (57.3–60.5, 58.1); caudal-peduncle length 21.4 (21.3–24.9, 23.3); caudal peduncle slender 12.5 (10.2–12.8, 11.5); body slender, its depth 21.9 (18.6–22.7, 21.0); eye diameter 8.9 (8.9–10.5, 9.7); snout length 4.1 (3.0–4.1, 3.5); pectoral-fin length 32.9 (21.5–33.5, 30.0); pelvic-fin length 28.1 (28.2–32.2, 27.8).

Color in preservative. (Figs. 82 & 83) Head and body light cream, no distinctive bold dark marking except for a black anal fin. A cluster of scattered small dark chromatophores behind upper half of eye extending across top of head to other side. A few more small dark chromatophores at four o'clock behind eye. Two short bands of small dark chromatophores crossing nape, and one more band at front of dorsal fin. A dark spot on ventral side of head on isthmus, about in line with posterior portion of maxilla. In addition, there are a few scattered dark chromatophores on underside of lower jaw near tip (Fig. 23). All fins clear except for black anal fin.

Color when fresh and live. (Figs. 84–86) Background color of head and body translucent gray, overlaid by red, orange, and white pigment patterns. Top of head white with a large red-orange spot behind eye and a smaller red-orange spot on top of head behind eyes. Three distinct white spots under eye: first in front of eye extending forward onto snout; second between seven and eight o'clock, almost broken into two spots; third at five o'clock. A curved sickle-shaped spot, immediately posterior to third white spot, extending posteriorly across cheek in live individuals. A second shorter red-orange bar between second and third white spots under eye, extending towards lower jaw. Another red-orange bar extending from between first and second white spots forward over both jaws. Pupil of eye black, surrounded by a yellow-white ring, iris of eye reddish with scattered small light spots on the dorsal surface. Scale edges on body yellow-orange, distinct against translucent background underneath. A series of small yellow-orange spots extending along dorsal-fin bases. Two to three broad red vertical/diagonal bars on abdomen, separated by narrower white vertical/diagonal bars with yellow centers, followed by six red postanal spots on ventral surface. A series of narrow, elongate red-orange dashes, wider than tall, spaced along vertebral column, separated by white spots: first and largest red-orange spot just behind larger spot behind eye and above pectoral-fin base; second under first four dorsal-fin spines; third at end of first dorsal fin; fourth under anterior half of second dorsal fin; fifth at end of second dorsal fin; remaining three on caudal peduncle. A broken white line extending back from behind eye under large red-orange spot to above anal-fin origin. A separate white spot behind line above center of anal fin. Pectoral-fin base white with yellow, surrounded by white lines extending down from midline, fin clear. Dorsal fins with reddish tinge, caudal fin clear with scattered red spots, anal fin black.



Figure 86. *Eviota teresae*, underwater photograph, Fiji (R. Whitworth).

Distribution. Positively known only from Fiji; similar individuals from other Pacific areas referred to as *E. cf. teresae*. Very common and widely distributed throughout Fiji in a wide variety of habitats.

Depth. 0.6–26 m.

Etymology. The specific epithet is a patronym, a noun in the Latin genitive case, in honor of Teresa Arámbula Greenfield who assisted in collecting the type material and has provided field, editorial, and moral support to the first author for many years.

CAS Fiji collections. CAS 216724 (7), 216725 (1, 216729 (3), 217018 (5), 217021 (1), 217051 (1), 217057 (6), 217061 (12), 217065 (1), 217122 (15), 217131 (11), 217133 (6), 217134 (2), 217136 (35), 217137 (12), 217139 (3), 217140 (6), 217144 (24), 217145 (6), 217146 (9), 217147 (24), 217148 (5), 217149 (31), 217151 (1), 217152 (3), 217154 (17), 217155 (5), 217166 (1), 217167 (10), 217168 (4), 217169 (8), 217170 (4), 217172 (1), 217173 (5), 217174 (6), 217176 (4), 217191 (8), 217193 (2), 217195 (110), 217196 (1), 217199 (78), 217202 (32), 217205 (13), 217207 (3), 217259 (1), 219808 (27), 228113 (6), 228605 (7), 228672 (1), 228673 (2), 228674 (2), 228675 (6), 228676 (2), 228680 (1), 228681 (11), 228693 (6), 228694 (1), 228706 (7), 228707 (6), 228708 (2), 228709 (19), 228710 (19), 228722 (9), 228723 (1), 228724 (4), 228725 (1), 228726 (2), 228727 (1), 228740 (9), 228741 (6), 228742 (4), 228753 (2), 228764 (1), 228765 (3), 228766 (1), 229047 (4), 229050 (18), 229051 (2), 229052 (1), 229053 (2), 229054 (18), 229063 (1), 229064 (1), 229073 (3), 229074 (8), 229075 (5), 229076 (12), 229077 (9), 229078 (6), 229079 (8), 229088 (12), 229089 (6), 229090 (1), 229111 (7), 229112 (1), 229113 (2), 229114 (5), 229115 (36), 229124 (32), 229125 (5), 229142 (7), 229145 (2), 229551 (1), 229552 (2), 229563 (1), 229564 (1), 229597 (1), 229601 (7), 229602 (2), 229605 (8), 238205 (12); and type material listed above.

Other Fiji collections. (listed as “*E. albolineata*”) ROM 45157 (6), 45158 (2), 45159 (17), 45160 (36), 45161 (42), 45162 (76), 45163 (14), 45164 (4), 45165 (2), 45166 (6), 45167 (13), 45168 (12), 45169 (14), 45170 (1), 90467 (16), 90473 (8), 90476 (8); USNM 227150 (3), 235794 (60), 235802 (17), 235807 (2), 235820 (8), 235824 (2), 235835 (7), 235842 (9), 235846 (50), 235849 (4), 235852 (4), 236666 (8), 236667 (6), 236669 (29), 236676 (15), 241772 (1), 243068 (1), 260028 (1); and type material listed above.

Comparisons. In 1978, Lachner & Karnella described *Eviota guttata* from the Red Sea with all of the type specimens from that location. Later, in 1983, Jewett & Lachner described *Eviota albolineata* with type specimens from French Polynesia, but they listed non-type material from many areas across the Pacific and Indian Oceans, including Fiji, and discussed their reasons for separating *E. albolineata* from *E. guttata*. In 2010, Greenfield & Randall (2010a) demonstrated that the name *E. albolineata* should be restricted to the Society Islands, Tuamotus, and Line Islands, but used the name *E. guttata* for the remainder of the non-Red Sea specimens. Recent studies



Figure 87. *Eviota guttata*, underwater photograph, Sudan, Red Sea (J.E. Randall).

of *Eviota* have demonstrated the importance of live coloration, particularly eye coloration, in separating different species, as discussed by Greenfield & Tornabene (2014) and Greenfield, Winterbottom & Suzuki (2014). Earlier studies by Jewett & Lachner were prior to the widespread use of underwater photography and thus were based on preserved material devoid of color, other than retained dark pigment. In addition to the differences discussed by Jewett & Lachner (1983) between their concept of *E. albolineata* and *E. guttata*, recent underwater photographs of *E. guttata* from the Red Sea show color differences from live photographs of *E. teresae* from Fiji (previously identified as *E. albolineata* or *E. guttata*), particularly in eye coloration (Fig. 87), and the red blotches on the sides that are wider than deep in *E. guttata* and deeper than wide in *E. teresae*. *Eviota guttata* has distinct black and white areas on the top of the iris, whereas *E. teresae* has a continuous reddish area with scattered small light spots on the dorsal surface. An examination of the pelvic fins of *E. guttata* from the Red Sea and *E. teresae* from Fiji shows that they differ in the development of the membranes (Fig. 88). Membranes are absent or weak in the pelvic fins of mature individuals of *E. teresae* and the branches are more elongate and slender, whereas the membranes are well-developed in *E. guttata* and the branches more robust. *Eviota teresae* usually has 18 pectoral-fin rays (16 [3], 17 [4], 18 [16]), whereas *E. guttata* usually has 17 (15 [2], 16 [12], 17 [23], 18 [1]) (the latter

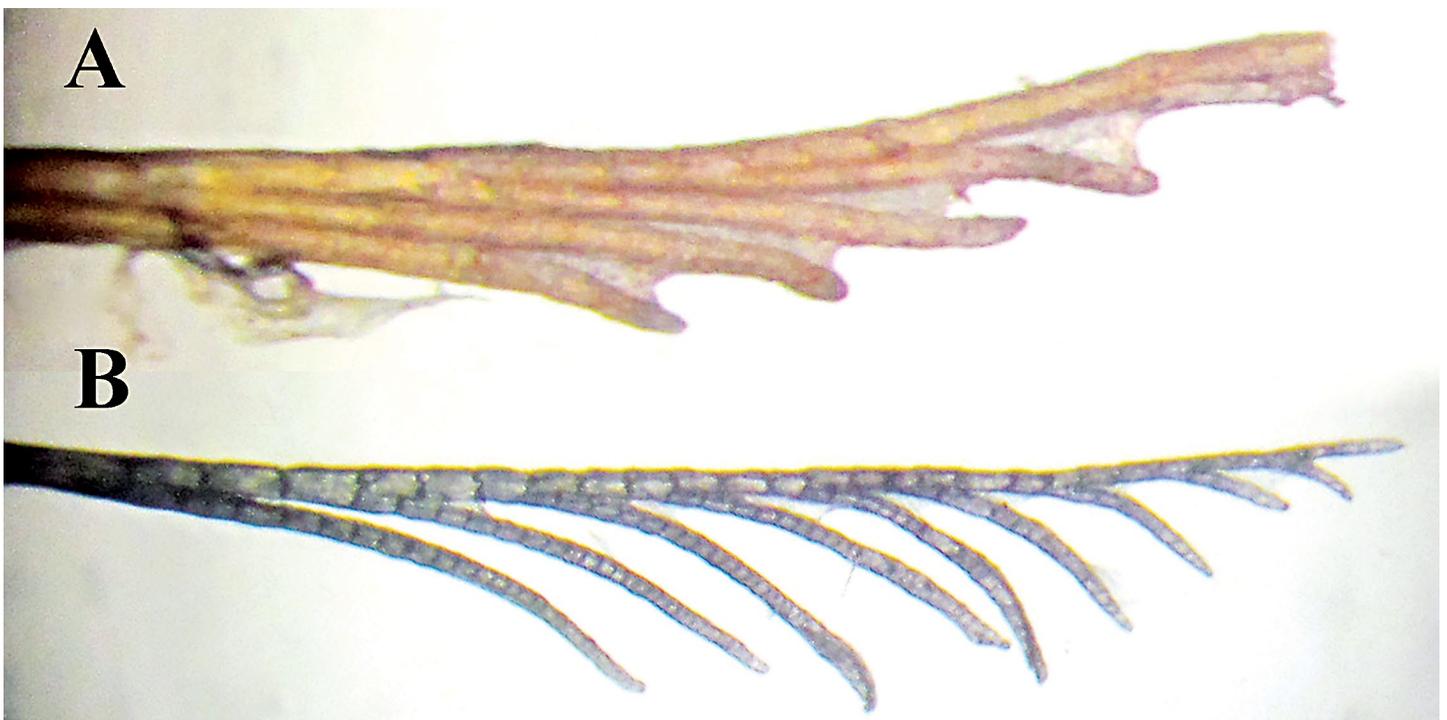


Figure 88. Pelvic-fin development in *Eviota* spp.: **A.** *Eviota guttata*, USNM 218017, paratype, Eritrea; **B.** *Eviota teresae*, CAS 229088, Fiji.



Figure 89. *Eviota cf. teresae*, CAS 238213, underwater photograph, Nuusafee, Samoa (M.V. Erdmann).

from Lachner & Karnella [1978]). In addition, Tornabene *et al.* (2015, fig. 3) have reported genetic divergences between specimens identified as *E. guttata* from the Red Sea and specimens from Fiji.

A comparison of the pelvic-fin structure of specimens from various Pacific areas outside of Fiji that are very similar to *E. teresae* in body color (including in the shape of the side blotches), found that they are more robust with membranes more similar to those of *E. guttata*. Specimens from Samoa (CAS 238212, 238213; Fig. 89) have more robust pelvic fins and an eye color different from *E. teresae* in Fiji, with red blotches separated by fine white lines on the top of the iris. An examination of the eye color of individuals from throughout the western Pacific has found considerable variation from different localities. It is quite possible that the non-*E. guttata* species in the Pacific consists of a complex of geographically isolated species, similar to that found for the *Eviota nigriventris* complex (Greenfield & Tornabene 2014), that must await additional morphological and genetic analyses. We refer to these other populations as *Eviota cf. teresae*.

Eviota thamani, n. sp.

Thaman's Dwarfgoby

Figures 90 & 91.

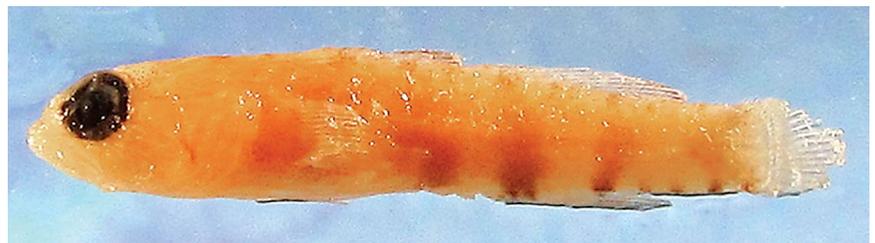


Figure 90. *Eviota thamani*, CAS 235816, preserved holotype, Fiji.

Holotype. USNM 235816, 10.1 mm SL, male, Fiji, Ono-i-Lau, outside barrier reef, N.W. side of island, 21° 38' S, 178° 45' W, 13.5–16.5 m, field number VGS 82-15, V.G. Springer, *et al.*, May 1, 1982.

Paratypes. (all taken with holotype) 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.

Diagnosis. A species of *Eviota* with all cephalic sensory-canal pores absent; no dark occipital spot; no dark spot at preural centrum; 5th pelvic-fin ray 20% or less of 4th ray; no narrow dark lines under eye; dorsal/anal-fin formula 8/8; male and female urogenital papillae fimbriate; pectoral-fin base with dark pigment spots dorsally and ventrally, but not crossing center of base.

Description. Dorsal-fin rays VI+I,8; anal-fin rays I,8; all pectoral fins badly damaged, some unbroken rays branched; pectoral-fin rays 16 or 17; pelvic-fin rays I,5, all rays broken, but short 5th ray present at base of 4th ray; lateral and transverse scales missing in all specimens; a few cycloid scales remaining on middle of ventral surface of abdomen, no scales or pockets on breast; dorsal, anal, and caudal fins broken in all specimens, extent of elongation of spines not known; urogenital papillae of males and females fimbriate (Fig. 91); 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 short, not 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. 90.

Measurements from 10.1 mm SL holotype and 8 paratypes, 8.5–10.1 mm SL: head length 32.7 (32.5–35.5, 33.9); origin of first dorsal fin 41.1 (37.4–42.9, 40.2); origin of second dorsal fin 61.9 (57.1–61.9, 59.0); origin of anal fin 62.4 (58.9–65.6, 61.1); caudal-peduncle length 21.8 (20.8–25.3, 22.8); caudal-peduncle depth 11.4 (10.4–12.8, 11.5); body depth 19.3 (18.5–20.3, 19.5); eye diameter 11.4 (9.4–13.1, 10.1); snout length 4.9 (4.2–6.3, 5.3).

Color in preservative of holotype. (Fig. 90) Head and body light cream. Four subcutaneous brown bars: first over abdomen just in advance of anal opening; second at anal-fin origin, extending dorsally to midline and becoming lighter on upper half of body; third bar at end of anal fin and similar to second; fourth on caudal peduncle, darkest centrally. Ventral body surface with six distinct dark spots: first two extensions of bars two and three; three and four on caudal peduncle, not associated with subcutaneous bars; fifth under bar four; sixth a separate dark spot at caudal-fin base. Dorsal surface of body with 9 brown spots: two on nape, two under first dorsal fin, three under second dorsal fin, two on caudal peduncle. Pectoral-fin base with four brown blotches, two dorsal and two ventral, ventral spots sometimes joined to form a bar. Distinct dark vertically aligned brown line on lower portion of preoperculum. Cluster of brown chromatophores behind upper half of eye, extending up to top of head. Naris tube brown, cluster of brown chromatophores on top of upper jaw. All fins badly damaged, two brown spots at anal-fin base appear to extend onto fin. Dorsal fins may have some scattered brown chromatophores. Male paratypes dark from over-staining with Acid base 113.

Distribution. Known only from Ono-i-Lau in Fiji.

Depth. 13.5–16.5 m.

Etymology. The specific epithet is a patronym, 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. Over the years Dr. Thaman (Randy) has provided continuous support for our work in Fiji, and without his help this project would not have been possible. Most recently, he assisted Janet Eyre in obtaining permission to collect *Eviota* specimens.

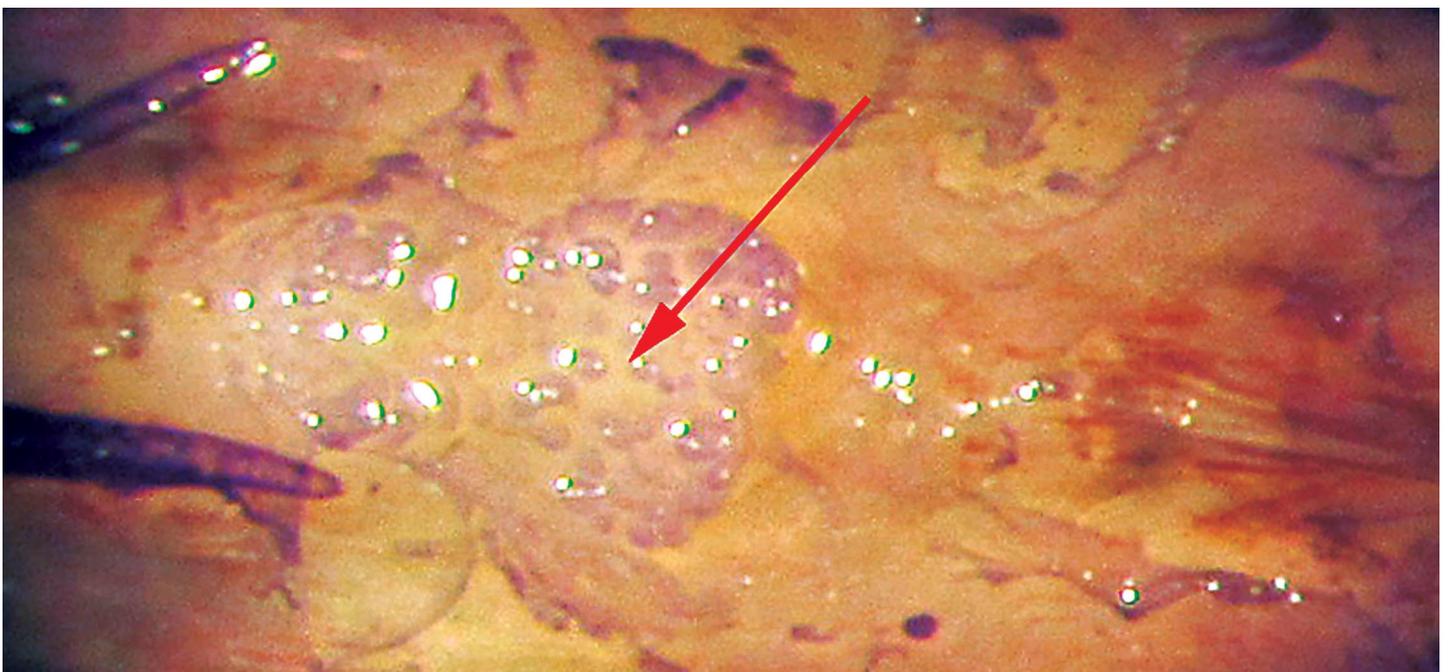


Figure 91. *Eviota thamani*, fimbriate male urogenital papilla (red arrow), USNM 235816, preserved holotype, Fiji.

Comparisons. Only five other species of *Eviota* are known to lack all pores in the cephalic sensory-canal pore system: three of these are described (*E. deminuta*, *E. jewettae*, *E. occasa*) and two are awaiting description (Palau sp. 7 and New Caledonia sp. 1). *Eviota thamani* differs from Palau sp. 7 by lacking a dark occipital spot, from both *E. occasa* and *E. deminuta* by lacking a dark bar or spot over the preural centrum, from New Caledonia sp. 1 by having a 5th pelvic-fin ray that is less than 50% of the 4th ray, and from *E. jewettae* and all of these other species by having fimbriate urogenital papilla in both the male and female. The only other described *Eviota* species with fimbriate urogenital papillae are *E. partimaculata*, *E. prasina*, *E. rubra*, *E. susanae*, *E. variola*, and *E. zonura*. *Eviota thamani* has a dorsal/anal formula of 8/8, whereas it is 9/8 in *E. prasina* and *E. zonura*, and 10/9 in *E. variola*. *Eviota partimaculata* has a D/A formula of 8/7 and unbranched pectoral-fin rays (branched in *E. thamani*). *Eviota rubra* and *E. susanae*, both from the Hawaiian Islands, have cephalic sensory-canal pores, whereas they are absent in *E. thamani*.

Remarks. *Eviota thamani* is a very small species; the largest specimen is the holotype at 10.1 mm SL. The fact that the fimbriate urogenital papillae are well-developed in these specimens suggests that they are mature (Fig. 91). Unfortunately, because of their small size and having been collected with rotenone along with larger fishes, their delicate fins have been damaged. In addition, the specimens were collected 33 years ago and have been sorted, handled, and shipped during this time. As a result, many of the counts usually included in descriptions of species in this genus are not possible, but their lack of pores and distinctive fimbriate urogenital papillae clearly distinguish them from all other known species. The small island where they were collected, Ono-i-Lau, is located far south of the Southern Lau Group of islands in Fiji, and thus is relatively isolated at 21° 38' S.

Eviota zebrina Lachner & Karnella, 1978

Zebra Dwarfgoby

Figures 5, 92 & 93.



Figure 92. *Eviota zebrina*, CAS 228731, fresh specimen, Fiji.

Eviota zebrina Lachner & Karnella 1978: 15–20 (type locality: Curieuse Island, Seychelles Islands).

Holotype. USNM 218026.

Paratypes. USNM 218027 (22); ANSP 138902 (15), 138903 (1), 138904 (18), 138905 (28), 138906 (99), 138907 (5), 138908 (33), 138909 (29), 138910 (11), 138911 (1), 138912 (1), 138913 (1); AMS I.20062-001 (13); CAS 40599 (31).

Diagnosis. The cephalic sensory-canal pore system lacking only the IT pore (pattern 2); pectoral-fin rays not branched; dorsal/anal-fin formula 8–9/7–8 (usually 9/8 in Pacific); 5th pelvic-fin ray 5–10% of 4th ray; dark spot on area of preural centrum round, not wedge-shaped; 3–4 dark wavy vertical lines on caudal fin.

Distribution. Known from the Red Sea (including the Gulf of Aqaba), across the Indian Ocean to Indonesia and Western Australia; north to Taiwan and Japan; south to the Great Barrier Reef and Lord Howe Island; localities in Oceania include the Marshall Islands, Kiribati, New Caledonia, Fiji, Wallis and Futuna, Samoa, and Tonga. In Fiji, this species appears to be more common at the Great Astrolabe Reef than other areas sampled. The largest ROM samples were from areas with dead coral, algae, hydroids and some live coral; sand and silt bottom also were mentioned. In our CAS collections, the largest samples were from habitats with rock and green algae.



Figure 93. *Eviota zebrina*, underwater photograph, Fiji (J.E. Randall).

Depth. 0–28 m.

CAS Fiji collections. CAS 219786 (3), 228614 (22), 228677 (8), 228731 (1), 228732 (2), 228733 (3), 228743 (1), 228744 (1), 229544 (1), 229568 (2), 229580 (14), 229608 (15).

Other Fiji collections. ROM 25238 (3), 44237 (108), 45234 (173), 45235 (94), 45236 (117), 45239 (1), 90493 (42); USNM 235821 (1), 235831 (5), 235861 (1), 235862 (7).

***Eviota zonura* Jordan & Seale, 1906**

Zoned Dwarfgoby

Figures 27, 29, 94 & 95.



Figure 94. *Eviota zonura*, CAS 219811, preserved specimen, Fiji.

Eviota zonura Jordan & Seale 1906: 386, fig. 75 (type locality: Pago Pago, American Samoa).

Lectotype. USNM 51766.

Paralectotypes. USNM 218352 (14); CAS-SU 8709 (20).

Diagnosis. The cephalic sensory-canal pore system lacking only the IT pore (pattern 2); pectoral-fin rays branched; urogenital papilla fimbriate; dorsal/anal-fin formula 9/8; 5th pelvic-fin ray rudimentary or absent; no dark spots on pectoral-fin base; 5 subcutaneous bars on body between anal-fin origin and caudal fin; large rectangular dark spot on mid and upper caudal peduncle.

Distribution. Known from Western Australia (Ashmore Island and Dampier Archipelago), Indonesia (Waigeo, Java, and Celebes Sea); north to Philippines, Taiwan, and Japan; and south to Great Barrier Reef and Lord Howe Island. Records for Oceania include Micronesia (Marshall Islands, Kagingamarangi, FSM), New Caledonia, Fiji,

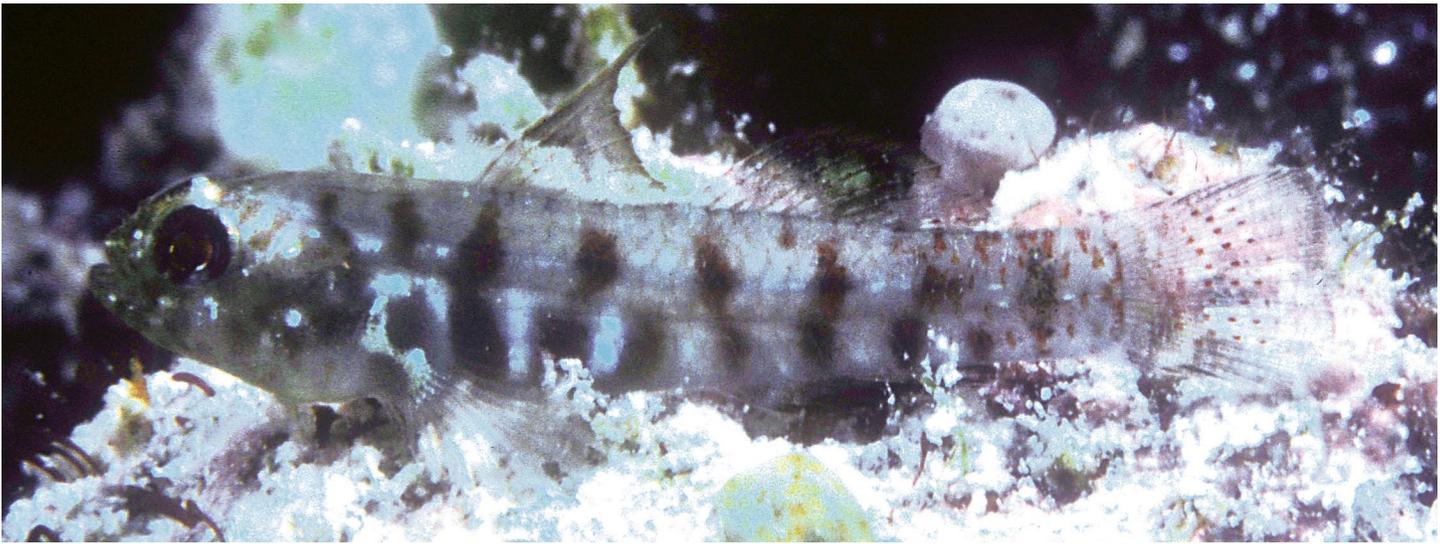


Figure 95. *Eviota zonura*, underwater photograph, Ataoru, Indonesia (J.E. Randall).

Tonga, the Samoan Islands to French Polynesia (Society Islands) and Pitcairn Islands. Most of the collections seem to be from relatively shallow water.

Depth. 1.5–7.5 m.

CAS Fiji collections. CAS 217180 (21), 217209 (1), 219811 (23), 228666 (2), 228689 (1), 229610 (1).

Other Fiji collections. ROM 45177 (9), 45178 (3), 45180 (20); USNM 235800 (24), 235805 (8), 235806 (1), 235819 (2), 241771 (1), 259380 (1), 266693 (1).

***Eviota* sp.**

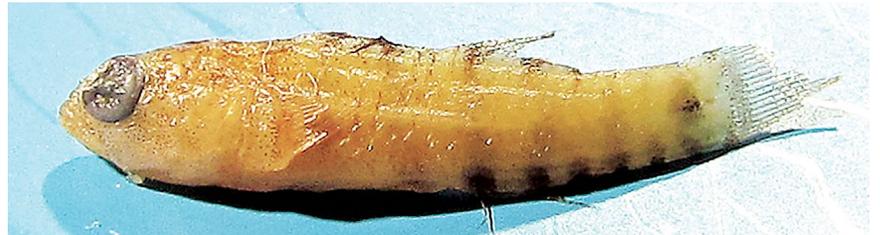


Figure 96. *Eviota* sp., USNM 243362, preserved specimen, 11.2 mm SL, Fiji.

Remarks. Neither we nor R. Winterbottom collected *E. herrei* in Fiji, but the USNM has a single specimen identified as “*E. herrei*”, taken by V.G. Springer in 1982 (field number VGS 82-24, USNM 243362) at Kandavu Island, Fiji, from a shore station of rock, rubble, and sand at a depth of 0–0.6 m (Fig. 96). The specimen had been removed from USNM 235830, one lot of *E. afelei*. As discussed under our remarks for *E. afelei* and *E. smaragdus*, we made very few such shallow collections and did not collect either species ourselves. Unfortunately, this 11.2 mm SL specimen is in poor condition and the identification cannot be confirmed, however, because it was reidentified in 1982, the identification was most likely made by S.L. Jewett. The identification as *E. herrei* remains a problem. *Eviota herrei* was described from the Samoan Islands by Jordan & Seale (1906). Neither the drawing in the description nor the lectotype (USNM 51769) provide sufficient information to resolve the identification and the photograph used by Lachner & Karnella (1980) in their treatment of the species is from the Banda Islands, Indonesia. To our knowledge, no other specimens of *E. herrei* have been collected from the Samoan Islands, and photographs purported to be that species by others vary widely in appearance.

Deepwater Species

Two specimens of *Eviota* were collected by Richard L. Pyle and his deep-diving team off the Suva barrier reef, one at 42–49 m and the other at 73–79 m. Unfortunately the specimens are in poor condition and their photographs not clear enough to allow an adequate color description. Based on their morphological characters and the limited information on coloration, both are most likely undescribed species. We report these species here as *Eviota* Fiji sp. 1 and *Eviota* Fiji sp. 2. It appears that *Eviota* Fiji sp. 2, taken at a depth of 73–79 meters, is a depth record for the genus.

Eviota Fiji species 1

Figures 97 & 98.

BPBM 39780, 12.3 mm SL, male.

Cephalic sensory-canal pore system lacking IT and POP pores; D/A formula 9/8; pectoral-fin rays unbranched; 5th pelvic-fin ray absent; naris tube long and black; six postanal spots.



Figure 97. *Eviota* Fiji sp. 1, BPBM 39780, preserved specimen, 12.3 mm SL, male, Suva barrier reef, Fiji.

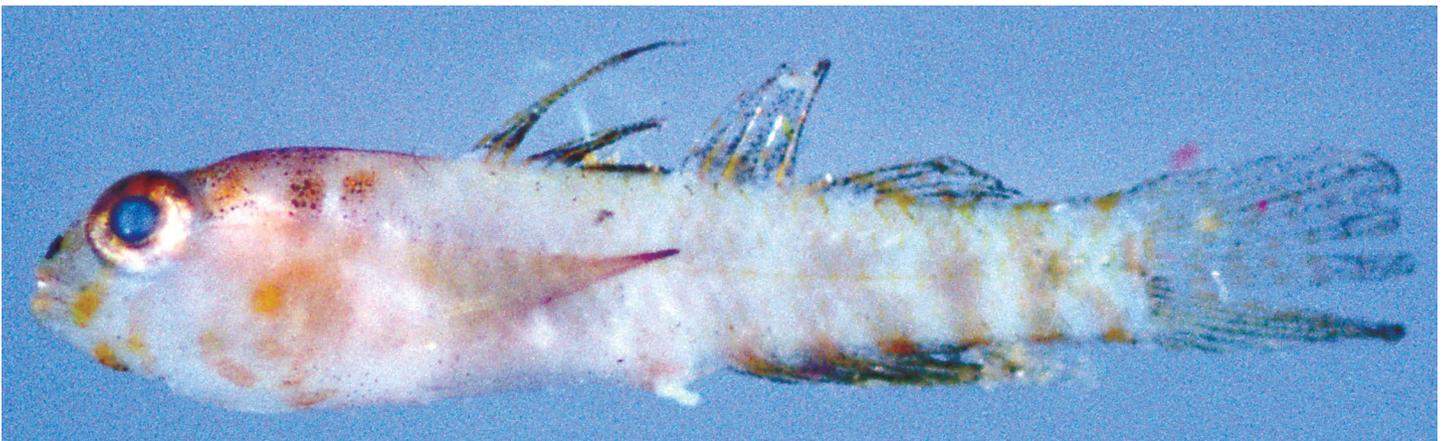


Figure 98. *Eviota* Fiji sp. 1, BPBM 39780, fresh specimen, 12.3 mm SL, male, Suva barrier reef, Fiji (R.L. Pyle).

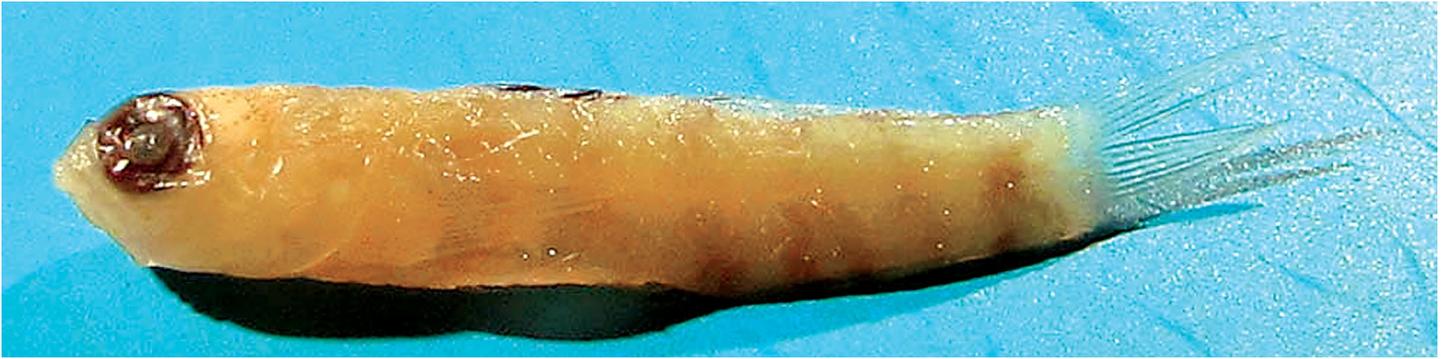


Figure 99. *Eviota* Fiji sp. 2, BPBM 39959, preserved specimen, 10.2 mm SL, Suva barrier reef, Fiji.

***Eviota* Fiji species 2**

Figure 99.

BPBM 39959, 10.2 mm SL, sex undetermined.

Cephalic sensory-canal pore system absent; D/A formula 9/8; pectoral-fin rays branched; 5th pelvic-fin ray 20% of 4th pelvic ray; five postanal spots.

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