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***Eviota occasa*, a new species of dwarfgoby from Palau and the Ryukyu Islands, Japan (Teleostei: Gobiidae)**

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Abstract

A new species of dwarfgoby, *Eviota occasa*, lacking all head pores, is described from Palau and Japan. It has a dorsal/anal-fin formula of 8/8, some of the pectoral-fin rays are branched, the 5th pelvic-fin ray is absent or rudimentary, the 4th pelvic-fin ray has 5 branches, the first dorsal fin is crossed by two dark bands separated by a diagonal light band, and there is a distinct dark spot on the caudal peduncle anterior to the caudal fin, followed by a pale bar and then a yellow-orange broad wedge-shaped bar at the caudal-fin base.

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

Introduction

The gobiid genus *Eviota* is a very diverse group of tiny (< 31 mm SL, but most < 20 mm SL) Indo-Pacific fishes now numbering 86 species (Eschmeyer 2014; plus two additional by Greenfield *et al.* (in press)), 28 of which have been described in the last five years. This increase in descriptions is mostly the result of collectors photographing the species underwater and then capturing them, or photographing them shortly after capture. 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). Suzuki *et al.* (2004), in their book on the gobioid fishes of Japan, illustrated 19 undescribed species in the genus *Eviota*, many from the Ryukyu Islands, identifying them by numbers (1–15) or letters (A–D). Six of these have now been described (Greenfield & Suzuki 2010, 2011, 2013, Greenfield *et al.* in press). In this paper we describe another species from the Ryukyu Islands collected by the third author, but not included in Suzuki *et al.* (2004). The second author made three trips to Palau (2004, 2006, 2008) collecting and photographing many fish species from this diverse area. Greenfield and Winterbottom (2012, 2014) have described three new species of *Eviota* from these collections, and are aware of several more. In comparing one of these undescribed species from Palau (Palau *Eviota* sp. 1) with the specimens from the Ryukyu Islands, DWG realized that they were very similar, lacking all head pores. In this paper we describe the species from Palau and include the specimens from Japan as non-types.

The new species fits the description typical of all species of *Eviota*: the pelvic fins are separate and lack a frenum, and the 5th pelvic-fin ray, if present, is unbranched; the membrane joining the 5th pelvic-fin rays is rudimentary or absent; there are ctenoid scales on the body but no scales on the head, nape or pectoral-fin base; the breast either lacks scales or may have a few embedded cycloid scales; the teeth in the upper jaw are in two or more rows and there are 1–3 enlarged curved canine-like teeth in the innermost row of the lower jaw just behind the jaw symphysis.

Materials and Methods

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

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

Specimens have been deposited in the following museums: CAS – California Academy of Sciences, San Francisco, USA; OMNH – Osaka Museum of Natural History, Osaka, Japan; ROM – Royal Ontario Museum, Toronto, Canada; USNM – United States National Museum of Natural History, Washington D.C., USA.



Figure 1. *Eviota occasa*, holotype preserved, 10.2 mm, Palau, ROM 74885. Photograph by D.W. Greenfield.

***Eviota occasa* Greenfield, Winterbottom & Suzuki, n. sp.**

Sunset Dwarfgoby

Japanese-name: Kijimunaa-Isohaze

Figures 1–8.

Holotype. ROM 74885, 10.2 mm male, Palau, Aimeliik, west coast of Babeldaob, 07°28'53.9"N, 134°27'23.8"E, reef slope 45°, mixed sand, coral, beach rock to soft and ooze bottom, brown algae and *Padina* present, 13.7–19.8 m, rotenone, field number RW04-02, R. Winterbottom, B. Hubley, A. Bauman, D. Winterbottom, A. Hilman-Kitalong and L. Pendleton, 19 May 2004.

Paratypes. All from Palau: ROM 94906, 3 (10.2 mm male, 9.4 and 9.6 mm female), collected with the holotype; ROM 84539, 108 (7–10.6 mm), Hatohobei State, Helen Reef, 02°53'56"N, 131°44'47"E, bommie and patch reef surrounded by sand, *Acropora*, *Pocillopora*, brain corals, lettuce corals, some filamentous algae, 2–8 m, rotenone, field number RW08-14, R. Winterbottom, M. Westneat, J. Williams, W. Holleman, B. Hubley, M. Winterbottom, C. McCord, and H. Rall, 16 September 2008; ROM 77503, 2 (8.6 mm immature, 10.5 mm male), Aimeliik, west coast of Babeldaob, 07°21'20.3"N, 134°26'03.0"E, reef slope, fine sand/silt, *Padina*, 9.1–15.2 m, rotenone, field number RW04-03, R. Winterbottom, B. Hubley, A. Bauman and D. Winterbottom, 19 May 2004; CAS 236709, 2 (10 mm male and 9.2 mm female), collected with ROM 77503; USNM 410946, 2 (8.9 and 10.9 mm males), collected with ROM 77503.

Diagnosis. A species of *Eviota* lacking all cephalic sensory-canal pores, a dorsal/anal fin-ray formula of 8/8, some pectoral-fin rays branched, 5th pelvic-fin ray absent or rudimentary, 4th pelvic-fin ray with 5 branches, a first dorsal fin crossed by two dark bands separated by a diagonal light band, and a distinct dark spot on caudal peduncle anterior to caudal fin, followed by a pale bar and a yellow-orange broad wedge-shaped bar at caudal-fin base.

Description. Dorsal-fin elements VI+I,8 (all); anal-fin elements I,8 (all); pectoral-fin rays 14 (14[19], 15[11], 16[1]), 7–13th ray branched in holotype; 5th pelvic-fin ray absent or rudimentary; 5 branches on 4th ray; 2 segments between consecutive branches of 4th pelvic-fin ray; pelvic-fin membrane between the rays very reduced; 11–12 branched and 17 segmented caudal-fin rays; scales very deciduous, about 23 lateral scale rows; transverse scale rows about 6; scales on ventral surface of abdomen, no scales on breast; first dorsal fin triangular in shape, not filamentous; genital papilla in male smooth, not fimbriate, wide and tapering only slightly, fringed at tip, not reaching to anal-fin spine; genital papilla of female smooth, bulbous, with several short finger-like projections on end; front of head sloping with an angle of about 55° 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

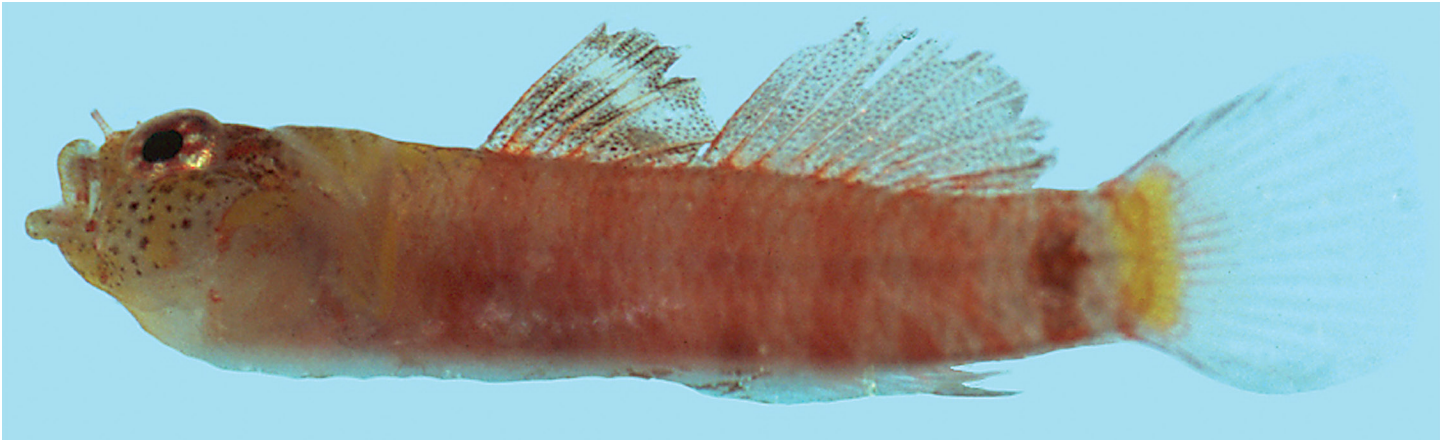


Figure 2. *Eviota occasa*, holotype fresh, 10.2 mm, Palau, ROM 74885. Photograph by R. Winterbottom.

just past anterior edge of pupil; anterior tubular nares short, just reaching to edge of upper lip; gill opening extending forward to below posteroventral edge of preoperculum; all cephalic sensory-pores absent.

Measurements (based on holotype and 8 paratypes, 8.5–10.9 mm). Head length 32 (31.6–34.8, 32.9); origin of first dorsal fin 36.4 (36.2–42.1, 38.7), lying behind posterior margin of pectoral-fin base; origin of second dorsal fin 57.1 (56.9–63.2, 59.5), slightly in advance of anal-fin origin; origin of anal fin 61.1 (61.1–64.6, 62.8); caudal-peduncle length 25.1 (19.1–25.1, 22.7); caudal peduncle of moderate depth 14.8 (12.9–16, 14.4); body relatively slender, its depth 22.7 (20–23.9, 21.4); eye diameter 10.3 (10.3–12.2, 10.9); snout length 4.9 (4.2–6.2, 5); pectoral-fin length 31 (29.9–39.5, 32.4); pelvic-fin length 31 (25.3–38.9, 30).

Color in preservative of holotype (Fig. 1). Background color of head and body pale cream with only bold marking on body a broad dark bar across caudal peduncle. Lower half of body with a sprinkling of dark chromatophores that are more concentrated under pectoral fin. Caudal-fin base behind dark bar on caudal peduncle lighter than sides of body. Pectoral-fin base lighter than body, especially adjacent to fin rays. Head with a heavy sprinkling of large chromatophores behind eye and on top of head. Cheek with scattered large clusters of dark chromatophores. Snout, interorbital region and jaws lighter than rest of head, anterior tubular nares lacking pigment. Pupil of eye clear, iris black. Base of first dorsal fin light, area above it black with a clear band above it, distal margin black. Second dorsal fin heavily peppered with dark chromatophores as is anal fin. Caudal fin with scattered dark chromatophores on membranes, more concentrated on dorsal and ventral margins.

Fresh color of holotype (Fig. 2). Background color of head and body pale cream, overlaid with red-orange on scale edges. Six reddish subcutaneous bars on body, the posteriormost darker, especially at center over vertebral column. A light area posterior to dark spot, followed by a golden-yellow broad wedge-shaped bar at caudal-fin base. Vertebral column showing as a dark line. Ventral portion of abdomen white. Nape golden-yellow overlaid with scattered dark chromatophores, yellow extending down to pectoral-fin base. Anterior portion of nape with a heavy concentration of dark chromatophores. Head with three red-orange lines, overlaid with dark chromatophores, radiating out from posterior margin of eye. Snout, anterior tubular nares, and jaws orange-yellow, jaws



Figure 3. *Eviota occasa*, paratype fresh, 9 mm, Helen Reef, Palau, ROM 84539. Photograph by R. Winterbottom.



Figure 4. *Eviota occasa*, preserved specimen, 10.3 mm, Ryukyu Islands, Japan, OMNH-P 35256. Photograph by T. Suzuki.

with a sprinkling of dark chromatophores. Cheek with three orange bars extending down from eye, the entire side of head with scattered clusters of dark chromatophores. Pupil of eye black, iris red with white spokes radiating out from it. A fresh paratype (9 mm SL, ROM 84539, Fig. 3) has a more translucent body, somewhat yellowish on nape, but otherwise similar to holotype.

Color in preservative of specimen from Japan (OMNH-P 35256) (Fig. 4). Background color of head and body pale yellow. Body heavily peppered with small chromatophores. Body with six subcutaneous dark bars, posteriormost very dark, appearing as a dark spot or band. Posterior portion of pectoral-fin base adjacent to fin rays lacking pigment, but anterior portion heavily peppered with chromatophores. Head and nape with scattered larger chromatophores, with a heavy concentration on top of head and behind eyes. Two bars of scattered larger chromatophores extending posteriorly from eye, one ventrally from below eye and across cheek towards branchiostegal membrane and the second closer to middle of eye and extending posteriorly down to preopercular margin. Snout, interorbital region and jaws lighter than rest of head, anterior tubular nares lacking pigment. Pupil of eye clear, iris black. Lower two-thirds of first dorsal fin heavily spotted with chromatophores, distal third clear with a dark margin of chromatophores and melanophores. Second dorsal fin similar to first except that outer third has a light sprinkling of chromatophores. Anal fin mostly covered with chromatophores. Caudal fin with scattered chromatophores at base and at dorsal and ventral margins, remainder clear. Scattered dark pigment along pectoral-fin rays, membranes clear. Pelvic fins with a few melanophores on rays.

Fresh color of specimen from Japan (OMNH-P 35256) (Fig. 5). Head and body mostly red-orange, with



Figure 5. *Eviota occasa*, fresh specimen, 10.3 mm, Ryukyu Islands, Japan, OMNH-P 35256. Photograph by T. Suzuki.



Figure 6. *Eviota occasa*, fresh specimen, 8.3 mm, Ryukyu Islands, Japan, OMNH-P 35242. Photograph by T. Suzuki.

a peppering of dark chromatophores over body. Six dark subcutaneous bars visible through body, posteriormost black with a very obvious spot, extending from dorsal to ventral surface of caudal peduncle. A light area posterior to dark spot, followed by a red-orange broad wedge-shaped bar with yellow tinges at caudal-fin base. Ventral surface of caudal peduncle and abdomen white, as are pelvic fins. Nape and top of head red-orange with a heavier sprinkling of dark chromatophores behind eyes. Snout, anterior tubular nares, and upper jaw red-orange, lower jaw mottled white and red-orange. Side of head with a white background color overlaid by two fairly wide solid red-orange bars extending down from eye across cheek. Pupil of eye black, iris solid red-orange with dark speckles. Pectoral-fin base red-orange with a narrow diagonal white line extending from its anterior central portion posteriorly down to its ventral surface. First dorsal fin with four red-orange blotches along its base, with smaller blotches above them on lower half of fin; this lower half also covered with small dark chromatophores; upper half clear with a heavy peppering of small reddish yellow dots that are intense yellow when viewed against a dark background; dorsal margin edged with a band of melanophores. Second dorsal fin similar to first except that upper half lacks reddish yellow pigment and has a continuation of smaller red-orange blotches with scattered dark chromatophores and dark dorsal margin is less intense. Anal fin is similar to second dorsal fin but lacks dark distal margin. Caudal fin with a red-orange broad wedge-shaped bar with a yellowish tinge at its base, followed by four scales with red-orange edges extending out over rays; rays edged with red and membranes clear; scattered melanophores on anterodorsal edge of fin.

Fresh color of specimen from Japan (OMNH-P 35242) (Fig. 6). The second smaller specimen from Japan has the same basic color pattern as the larger specimen described above except that the overall red-orange pigmentation is less intense so that the six subcutaneous bars are more visible through the body. The yellowish portion of the first dorsal fin is more intense in this specimen and the distal dark margin broader.

Color in preservative of specimen from Japan (OMNH-P 35242) (Fig. 7). Basic color as in Fig. 4, but with less peppering of small chromatophores on the body.



Figure 7. *Eviota occasa*, preserved specimen, 8.3 mm, Ryukyu Islands, Japan, OMNH-P 35242. Photograph by T. Suzuki.

Color of live individual of *E. occasa* from Japan (Fig. 8). Head and body generally rust colored with scale edges darker red. Internal body bars visible on posterior half of body. An obvious dark bar on caudal peduncle before caudal fin. A light area posterior to this bar followed by a yellow-red broad wedge-shaped bar at caudal-fin base. Small white spots on body along dorsal-fin bases, a few narrow white lines across nape. A few more small white spots scattered on body and two narrow vertical white lines crossing abdomen. Pupil of eye black, iris red with radiating white spokes. Dorsal and anal-fin rays reddish, caudal-fin rays with yellow tinges.

Distribution. Known only from the main islands of Palau as well as from Merir Island and Helen Reef in the Palauan South-West Islands, and from Japan at Amami-oshima Island and Iriomote-jima Island, the Ryukyu Islands.

Etymology. The specific epithet is a noun in apposition from the Latin *occasus* (sunset) referring to the distinctive yellow-orange broad wedge-shaped bar at the caudal-fin base on a red body reminiscent of a sunset.

Comparisons. There are only two other described species of *Eviota* lacking all cephalic sensory-canal pores: *E. jewettae*, from Palau, Philippine Islands, Papua New Guinea and Raja Ampat, Indonesia (Greenfield & Winterbottom 2012), and *E. diminuta* from Marquesas Islands (Tornabene *et al.* 2013). *Eviota jewettae* lacks the distinct dark spot on the caudal peduncle and yellow-orange broad wedge-shaped bar at the caudal-fin base that is present in *E. occasa*, and has a light-colored translucent body crossed by five wide orange bars (absent in *E. occasa*). *Eviota diminuta* has a pale first dorsal fin or with a dark distal margin (fin crossed by two dark bars in *E. occasa*), and also has three distinct vertical lines under the eye (lacking in *E. occasa*).

Remarks. We have restricted the type material to specimens from Palau because there are only two specimens known from Japan and there are some differences in coloration between specimens from the two localities. Some of the fresh color differences may be the result of the length of time between capture and being photographed, those from Palau, especially the holotype, being more faded. The photographs of the specimens from Japan were taken shortly after the fishes, which were taken alive, were anesthetized, whereas those from Palau were taken with rotenone and photographed after the collection. The preserved specimens, however, also differ. The specimens from Japan have a more distinct band on the caudal peduncle and the body more heavily peppered with dark chromatophores. Although one of the two specimens from Japan has less peppering than the one illustrated (Fig. 7), none of the specimens from Palau showed this feature. One of the specimens from Japan has a second dorsal-fin count of I,9, whereas all of the specimens from Palau have a count of I,8. Because the specimens from both localities share the unusual character of lacking all head pores, are both small in size, and have the same basic color pattern, until future DNA studies determine otherwise, we consider them to be conspecific.



Figure 8. Underwater photograph of *Eviota occasa*, 7 m depth, Amami-oshima Island, Ryukyu Islands, Japan. Photograph by H. Kanehara.

Other material of *Eviota occasa* examined. Palau: ROM 77497, (10 mm), Babeldaob Island, inside barrier reef off E coast, 07°23'09.5"N, 134°37'21.7"E, 18.3–24.4 m; ROM 77500, 2 (8.2–9.5 mm), SE of Koror Island, SW corner of Uchelbeluu Reef, 07°16'28.7"N, 134°31'32.1"E, 13.7–25.9 m; ROM 77501 (9.4 mm), SE of Koror Island, SW corner of Uchelbeluu Reef, 07°16'26.9"N, 134°31'29.3"E, 12.2–21.3 m; ROM 80519, (10.1 mm), Koror, lagoon on west side about 1 km east of reef top, 07°12'35.0"N, 134°13'42.3"E, 0–6.7 m; ROM 80680, (8.7 mm), western outer reef north of tip of Babeldaob Island, 07°49'02.5"N, 134°31'42.5"E, 19.8–33.5 m; ROM 81014, 19 (8.4–10.1 mm), lagoon west of natural beach, south of Ngeruktabal Island, 07°11'46.2"N, 136°20'09.6"E, 6.1–12.2 m; ROM 84555, 6 (8.1–9.6 mm), Helen Reef, E side of lagoon opposite entry channel, just to inside of wreck on reef top, 02°51'48"N, 131°48'06"E, 7–23 m; ROM 84565, 2 (8.9–9.1 mm), Helen Reef, about middle of lagoon south of pass, 02°43'42"N, 131°45'54"E, 4–8 m; ROM 84579, 5 (8.6–9.4 mm), Helen Reef, almost due W of S tip of island, 02°57'47"N, 131°48'04"E, 0–4 m; ROM 84588, 2 (9–9.8 mm), Helen Reef, at marker bouy on W side of 'no take' zone in middle of lagoon, 02°52'47"N, 131°46'30"E, 15–28 m; ROM 84597, (8.6 mm), Helen Reef, S side of main channel at about half-way point, 02°52'17"N, 131°45'23"E, 8–20 m; ROM 84755, 4 (7.9–8.9 mm), Helen Reef, lagoon, due E of large wreck on NW side, 02°55'45"N, 131°46'25"E, 0–15 m; ROM 84795, 4 (8.6–9.1 mm), Merir Island, E coast, a little south of northern tip, 04°19'22"N, 132°19'02"E, 22–35 m. Japan: OMNH-P 35256, (10.3 mm, female), Funauki-wan Inlet, Iriomote-jima Island, the Ryukyu Islands, Japan, 24°20'28.76"N, 123°43'53.05"E, 4–15 m, field number S-17910, Toshiyuki Suzuki, Masatomi Suzuki and Akira Kawai, 6 July 2009; OMNH-P 35242, (8.3 mm, juvenile), Funauki-wan Inlet, Iriomote-jima Island, the Ryukyu Islands, Japan, 24°20'12.57"N, 123°42'49.26"E, 4–18 m, field number S-17896, Toshiyuki Suzuki, Masatomi Suzuki and Akira Kawai, 6 July 2009.

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