



Three new dwarfgobies from the western Pacific Ocean (Teleostei: Gobiidae: *Eviota*)

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Abstract

Three species of dwarfgobies new to science are described from the western Pacific Ocean: *Eviota lateritea* from New Caledonia, *Eviota maculibotella* from Vietnam, and *Eviota singula* from Palau. *Eviota lateritea* usually lacks all cephalic sensory-canal pores, although individual specimens may have PITO, AITO, and SOT. *Eviota maculibotella* lacks the POP and IT pores, and *E. singula* lacks all pores. Some pectoral-fin rays are branched in all three species, and all have distinctive color patterns.

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

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Introduction

Eviota is a very large genus of small (usually <2 cm SL), often colorful, marine gobiid fishes that are primarily inhabitants of the coral reefs of the Indo-Pacific (excluding the eastern Pacific bordering the Americas). In 2004,

the second author developed an unpublished key containing 47 species of *Eviota*, including apparently undescribed species, which he named using the country of first collection and a number (e.g. *E. Thailand* sp. 2) based on his collections. Later, he was joined by the first author in updating the key as more and more species were described or discovered. As of this date, there are 106 valid described species in the genus, with many additional ones awaiting description. In this paper, we describe three species designated by country/number in the previous key, so that they may appear as formally named species in the publication of the forthcoming key, which is in preparation.

Materials and Methods

Counts and measurements, descriptions of fin morphology and the cephalic sensory-canal pore patterns follow Lachner & Karnella (1980) and Jewett & Lachner (1983). Postanal midline spots, along the posterior ventral midline of the body, begin at the anal-fin origin and extend to a vertical drawn 2–3 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 dorsal/anal fin-ray formula 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, 2002, Saruwatari *et al.* 1997) 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, if appropriate.

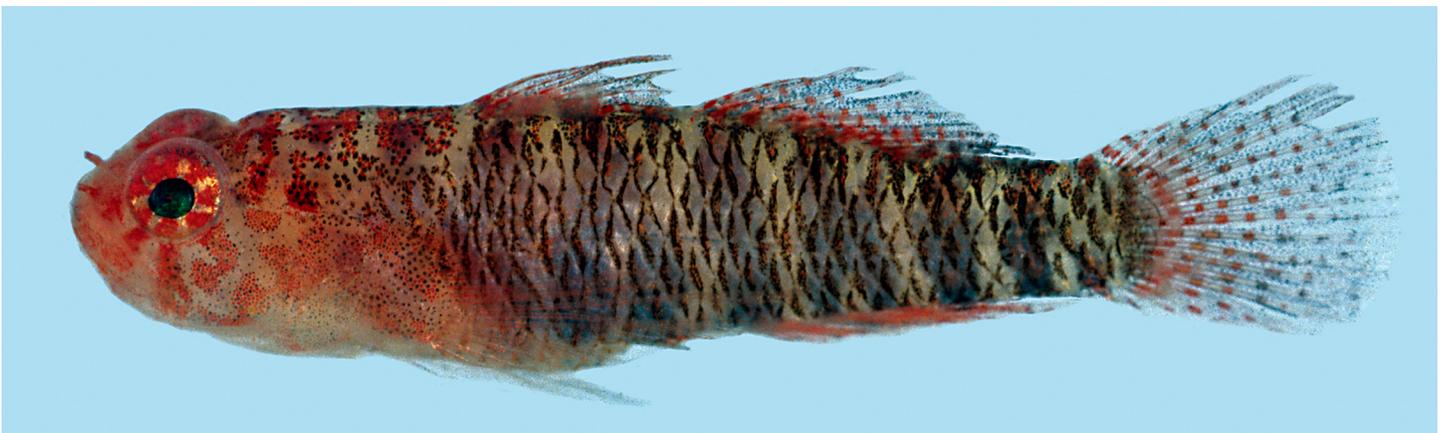


Figure 1. *Eviota lateritea*, fresh holotype, ROM 64446, 15.0 mm SL, female, Port De Goro, New Caledonia (R. Winterbottom).

Eviota lateritea, n. sp.

Laterite Dwarfgoby

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Figures 1–3.

Holotype. ROM 64446, 15.0 mm SL, female, New Caledonia, Port De Goro, fringing reef off road, 22°20'00" S, 167°00'20" E, silty coral rubble bottom, 18.3–24.4 m, Sept. 15, 1991, RW91–27, R. Winterbottom & G. Klassen.

Paratypes. (all from New Caledonia) ROM 101520, 15.1 mm SL, female, taken with holotype; ROM 64450, 14.4 mm SL, female, about 20 km S.W. of Noumea, 0.8 km inside barrier reef in quiet water, 22°23'00" S, 166°18'40" E, bommie surrounded by sand & rubble, 10.7–12.2 m, Sept. 16, 1991, RW 91–28, G. Klassen &

P. Tirard; ROM 64471, 16.0 mm SL, male & 16.4 mm SL, female, east side of Isle Ua, just S. of fringing reef, 22°42'40" S, 166°48'50" E, coral rock, rubble, & sand, 9.1–12.2 m, Sept. 13, 1991, RW 91–24, R. Winterbottom & P. Tirard; ROM 64462, 12.8 mm SL & 12.9 mm SL, females, Port De Goro, west of concrete lighthouse, 22°20'00" S, 167°00'20" E, steep slope of fringing reef, silty, 18.3–27.4 m, Sept. 14, 1991, RW 91–25, R. Winterbottom, D. Itano, & G. Klassen; CAS 238872, 12.7 mm SL, female & 14.4 mm SL, male, taken with ROM 64462.

Diagnosis. A species of *Eviota* often without any cephalic pores, but always lacking the POP, IT, AOT, and NA pores, the PITO, AITO, and/or SOT pores may be present; a dorsal/anal fin-ray formula of 9/8, some pectoral-fin rays branched, 5th pelvic-fin ray long, 50–74% of 4th pelvic-fin ray; no dark spot at preural centrum, no occipital spot, first dorsal fin not dark.

Description. Dorsal-fin elements VI+I,9 (all); anal-fin elements I,8 (all); pectoral-fin rays 16 (15–16), some branched; fifth pelvic-fin ray long, 74% (50–74%) length of 4th pelvic-fin ray; 3 (2–4) branches on 4th ray; 2–3 segments between consecutive branches of 4th pelvic-fin ray; pelvic-fin membrane between rays reduced; 14 (12–14) branched and 17 segmented caudal-fin rays; 23–24 lateral scale rows; 7 transverse scale rows; scales present on ventral surface of abdomen; first dorsal fin triangular in shape, 1st spine filamentous in male paratype, extending back to base of 5th ray of second dorsal fin, non-filamentous in females; urogenital papilla in male smooth, not fimbriate, long and tapering, extending to anal-fin spine; urogenital papilla of female smooth, bulbous, with several short finger-like projections on end; front of head rounded with an angle of about 60° from horizontal axis; mouth slanted obliquely upwards, forming an angle of about 55° to horizontal axis of body, lower jaw not projecting; maxilla extending posteriorly to below first half of pupil; anterior nares tubular, extending to posterior edge of upper lip; gill opening extending forward to below posteroventral edge of preoperculum; membranous roof of cephalic sensory canal very fragile, often torn, leaving open canals; POP, IT, AOT, and NA cephalic sensory-pores are absent in all specimens. Of nine type specimens, four have no pores; one has an interorbital canal lacking a membrane where pores normally occur, so pores cannot be determined; two appear to have an AITO pore but membranes are damaged; one with a torn membrane and possibly a PITO; and one with both PITO and SOT pores.

Measurements (based on holotype and 8 paratypes, 12.7–16.4 mm SL): head length 31.3 (29.0–33.8, 30.7); origin of first dorsal fin 39.0 (35.4–39.4, 37.8), lying behind posterior margin of pectoral-fin base; origin of second dorsal fin 60.0 (57.3–62.5, 59.3), slightly in advance of anal-fin origin; origin of anal fin 62.7 (61.2–65.3, 62.9); caudal-peduncle length 23.3 (20.6–24.4, 23.4); caudal peduncle slender, 13.3 (10.9–13.3, 12.2); body slender, its depth 21.3 (18.7–23.8, 21.7); eye diameter 10.7 (9.43–11.6, 10.6); snout length 6.0 (4.3–6.0, 5.2); pectoral-fin length 34.7 (30.1–34.7, 32.7); pelvic-fin length 27.3 (25.7–34.1, 30.1).

Color when fresh. (Fig. 1). Background color of body cream with greenish tinge, head light cream; edges of scales dark, forming a diamond pattern, those on dorsum wider and darker and with a reddish tinge. Body crossed by six subcutaneous bars with a dark purplish tinge: first bar originates at front of first dorsal fin, second at end of first dorsal fin, third at front of second dorsal fin, fourth at center of second dorsal fin and bifurcated ventrally, fifth on caudal peduncle just at end of second dorsal fin, and sixth on caudal peduncle, resulting in five postanal spots. Dark area at end of caudal peduncle at caudal-fin base extending onto caudal-fin rays, bottom of dark area not counted as a postanal spot. Nape and head crossed by three red bars containing large black chromatophores: first bar in front of dorsal fin widest, second and third narrower, but extend further down ventrally in line with center of eye. Jaws and narial tubes red. Iris of eye gold, with eight red bars radiating out from black pupil. Side of head with large red bars or blotches overlaid with black chromatophores. Four red bars under eye: anteriormost at eight o'clock position and shortest, extending to upper jaw; second at seven o'clock position and also extending to upper jaw; third at six o'clock position extending down to behind end of lower jaw; fourth at four o'clock position extending half-way down cheek with a break, then extending down across preoperculum to its ventral edge. A small rounded blotch between third and fourth bars, near break in fourth bar. Several more roundish blotches on preoperculum and operculum. Pectoral-fin base with two reddish blotches, one dorsal and one ventral, overlaid with small black chromatophores. Pectoral and anal fins with a reddish tinge; first dorsal fin dusky with scattered red spots and a red base that extends onto dorsum; second dorsal fin dusky with distinct small red spots along rays, caudal fin with rows of distinct round red spots on rays.



Figure 2. *Eviota lateritea*, preserved holotype, ROM 64446, 15.0 mm SL, female, New Caledonia (D.W. Greenfield).

Color in preservative. (Figs. 2 & 3). Background color of head and body light tan, dark markings on body dark brown; edges of scales dark, forming a diamond pattern, those on dorsum wider and darker. Body crossed by six subcutaneous bars, some bifurcated ventrally, more visible ventrally from anal-fin origin posteriorly: first bar originates at front of first dorsal fin, second at end of first dorsal fin, third at front of second dorsal fin, fourth at center of second dorsal fin, fifth on caudal peduncle just at end of second dorsal fin, and sixth on caudal peduncle; bars and their bifurcations result in five postanal spots. Pectoral-fin base covered with small brown chromatophores, more concentrated dorsally and ventrally, with fewer in center. Nape and top of head crossed by three dark bars; center bar extending ventrally in line with center of eye. Side of head and jaws peppered with small brown chromatophores, similar to chromatophores on pectoral-fin base. Iris and pupil of eye black. Dorsal, anal, and caudal fins with scattered small dark chromatophores; pectoral fin immaculate; basal region of caudal fin with scattered small rounded dark spots on rays.

Etymology. The specific epithet, *lateritea*, is a noun in apposition derived from laterite, a mineral producing the red dust that is all-pervasive in southern New Caledonia, referring to the red coloration of the species.

Distribution. Known only from New Caledonia.

Comparisons. Only five other described species of *Eviota* lack all cephalic sensory pores: *E. diminuta*, *E. jewettae*, *E. occasa*, *E. singula*, and *E. thamani*. *Eviota diminuta* and *E. occasa* both have a dark internal bar or spot over the preural centrum that is lacking in *E. lateritea*. *Eviota singula* has a dark occipital spot not present in *E. lateritea*. The 5th pelvic-fin ray is long in *E. lateritea* (50–74% of 4th ray), whereas it is 20% or less in *E. thamani* and *E. jewettae* and their dorsal/anal fin-ray formula is 8/8 (vs. 9/8 in *E. lateritea*). The only *Eviota* species with the cephalic sensory-pore system consisting only of the PITO and either SOT or AOT are *E. lateritea* and *E. singula* (see above for comparison). The only other species that bears a similar color pattern to *E. lateritea* is *E. herrei*, but that species has a dorsal/anal formula of 8/8 (vs. 9/8 in *E. lateritea*), and further differs in having a complete cephalic sensory-pore system.

Remarks. The membranous roof of the cephalic sensory canal is very fragile in this species, often torn and leaving open canals without pores. In some cases, what look like pores (PITO, SOT, & AOT) are at the edge of the torn membrane, so the presence of the pores is questionable, considering that some individuals lack all pores. Field data indicates that all specimens were taken from habitat listed as rubble, coral rock, sand, or silty.

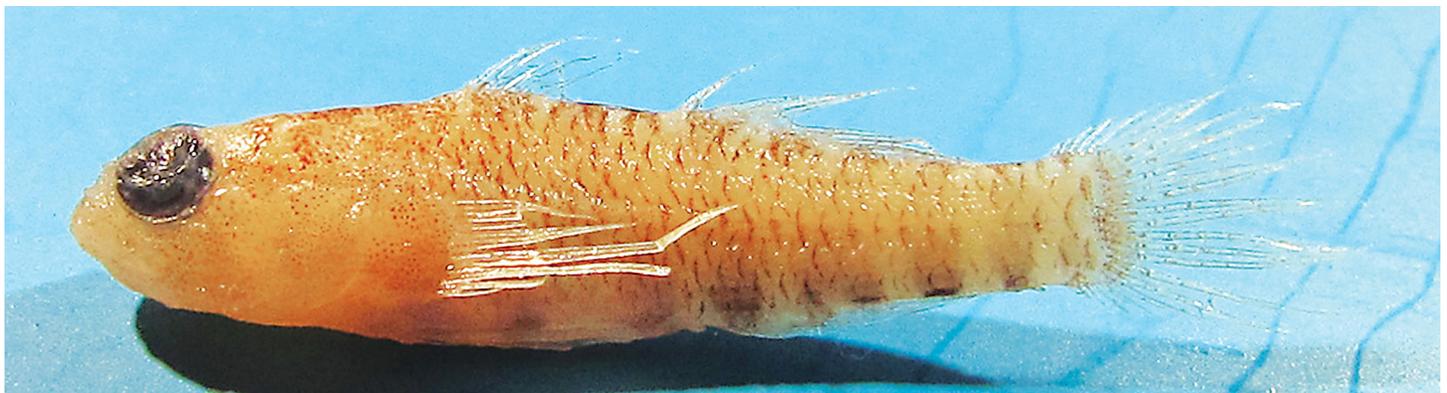


Figure 3. *Eviota lateritea*, preserved paratype, ROM 64462, female, New Caledonia (D.W. Greenfield).



Figure 4. *Eviota maculibotella*, fresh holotype, 73333, 13.7 mm SL, female, Nha Trang Bay, Vietnam (R. Winterbottom).

***Eviota maculibotella*, n. sp.**

Spotted Dick Dwarfgoby

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Figures 4–8.

Holotype. ROM 73333, 13.7 mm SL, female, Vietnam, Nha Trang Bay, Hon Lon, Bai Lan, 12°10'56" N, 109°17'37" E, patch reef on sand, 4.6–7.9 m, May 13, 2002, RW02–05, R. Winterbottom *et al.*

Paratypes. ROM 74564, 15.5 mm SL, male, Vietnam, Nha Trang Bay, Hon Rua, S. side, E. margin of island, 12°17'16" N, 109°14'42" E, fringing reef, gullies with sand, encrusting corals, and algae, 0–6 m, May 15, 2002, RW02–07, R. Winterbottom *et al.*; ROM 73346, 13.9 mm SL, male, 12.5 & 13.1 mm SL, females, Vietnam, Nha Trang Bay, Hon Mot, S.E. side, 12°10'37" N, 109°16'44" E, large bommie surrounded by coarse sand, coral rock, and algae, 0–6 m, May 24, 2002, RW02–21, R. Winterbottom *et al.*; CAS 238873, 15.8 mm SL, male, 15.1 mm SL, female, taken with ROM 74564.

Diagnosis. A species of *Eviota* lacking the POP and IT cephalic sensory-canal pores, dorsal/anal fin-ray formula usually 8/8, some pectoral-fin rays branched, 5th pelvic-fin ray present, 20% or less of 4th pelvic-fin ray; three dark bars under eye; first dorsal fin of male filamentous, male urogenital papilla smooth and tapered, peppered with small black spots.

Description. Dorsal-fin elements VI+I,8 (6), I,9 (1); anal-fin elements I,8 (all); pectoral-fin rays 16 (15 [2]–16 [5]), some branched; fifth pelvic-fin ray 20.6% (11.3–20.6%) of 4th pelvic-fin ray; 3 (2–4) branches on 4th ray; 0 (a single fork) to 5 segments between consecutive branches of 4th pelvic-fin ray; pelvic-fin membranes reduced, branches long (more than twice eye diameter in one paratype); 11–13 branched and 17–18 segmented caudal-fin rays; 24 (23–25) lateral scale rows; 7 transverse scale rows, scales absent along first third of base of first dorsal fin; scales present on ventral surface of abdomen; first dorsal fin triangular in shape, filamentous in males, reaching to base of 5th ray of second dorsal fin in paratype; urogenital papilla of male smooth and tapered, peppered with small black spots; urogenital papilla of female smooth, bulbous, with several short finger-like projections on distal margin; front of head rounded with an angle of about 60° from horizontal axis; mouth slanted obliquely upwards, forming an angle of about 55° to horizontal axis of body; maxilla extending posteriorly to below front of pupil; anterior narial tube short, not quite reaching posterior edge of upper lip; gill opening extending forward to below posteroventral edge of preoperculum; only cephalic sensory-canal pores IT and POP absent in holotype and three paratypes, canal below SOT damaged in other three paratypes so presence of AOT cannot be determined.

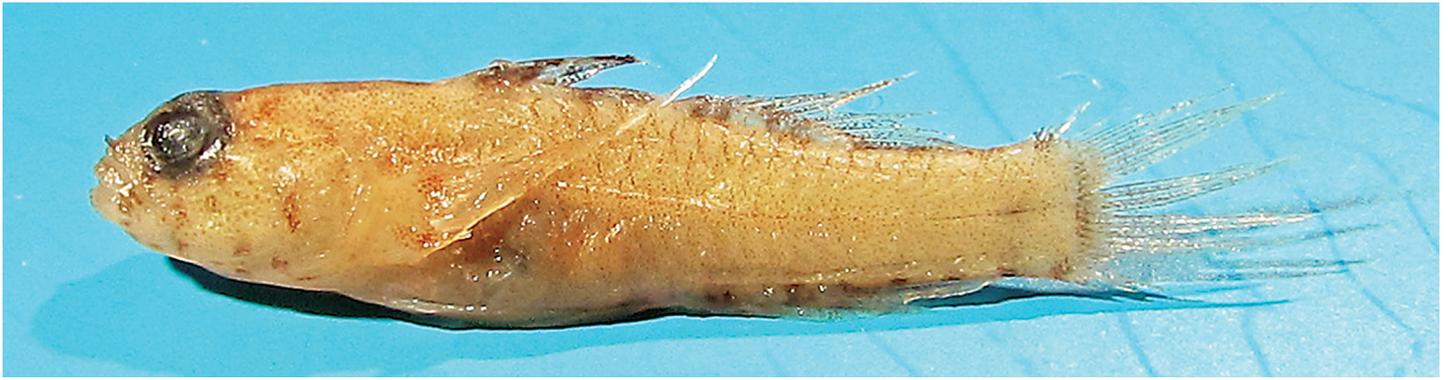


Figure 5. *Eviota maculibotella*, preserved holotype, ROM 73333, 13.7 mm SL, female, Vietnam (D.W. Greenfield).

Measurements (based on holotype and 6 paratypes, 12.6–15.8 mm SL): head length 33.6 (27.8–33.6, 31.3); origin of first dorsal fin 38.7 (34.5–39.2, 36.9), lying behind posterior margin of pectoral-fin base; origin of second dorsal fin 62.0 (55.1–62.0, 57.5), ahead of anal-fin origin; origin of anal fin 63.1 (58.9–63.3, 61.0); caudal-peduncle length 26.3 (23.0–26.3, 24.5); caudal peduncle slender, its depth 13.1 (11.3–15.8, 13.2); body slender, its depth 23.0 (19.8–23.0, 21.6); eye diameter 10.9 (10.3–11.4, 10.9); snout length 5.1 (4.7–5.9, 5.3); pectoral-fin length 24.4 (22.8–38.1, 30.0); pelvic-fin length 26.3 (26.3–40.0, 33.7).

Color when fresh. (Fig. 4). Background color of head and body light tan; head and body heavily peppered with black chromatophores, edges of scales on body dark brown, more intense dorsally. Body crossed by six subcutaneous black bars as described for preserved specimen. Six black postanal spots, followed by two dark brown spots at caudal-fin base, one dorsal and one ventral, not counted as postanal spots. A lighter area with tinge of pink following last body bar, before brown band of pigment along base of caudal-fin rays. Pectoral-fin base lighter than rest of body, with two dark brown to black blotches, one dorsal and one ventral. Markings on head as described for preserved specimen with dark marks dark brown to black. Pupil of eye black, iris golden, with brown spokes radiating out from pupil, those on ventral side of eye in line with bars under eye. First dorsal-fin spine white at its base, then black followed by two more white spots separated by black, distal margin pinkish-red; center of first dorsal fin with white area connecting to third white spot on first spine; posterior half of first dorsal fin pinkish red with peppering of black chromatophores, and dark blotch underlying pinkish red that is extension of body bar; second dorsal fin with three pinkish-red sections in line with black body bars extending onto fin base, entire fin peppered with black chromatophores. Anal fin similar to second dorsal fin; caudal fin with dark line across area where hypurals articulate with caudal-fin ray bases, followed by narrow clear area and then another dark line across fin rays parallel to first dark line; remaining two-thirds of fin pinkish-red, distal third clear with peppering of small dark spots.

Color in preservative. (Figs. 5 & 6) Background color of head and body light yellow; head and body peppered with small brown chromatophores, edges of scales dark on upper half of body. Body crossed by six subcutaneous bars: first bar faintest, under pectoral fin to front of first dorsal fin; second from center of first dorsal fin and



Figure 6. *Eviota maculibotella*, preserved paratype, ROM 74564, 15.5 mm SL, male, Vietnam (D.W. Greenfield).

bifurcating down to abdomen; third at anal-fin origin to front of second dorsal fin; fourth under center of second dorsal fin, X-shaped, bifurcating dorsally to center and end of second dorsal fin, and ventrally to center and rear of anal fin, less obvious dorsally; fifth at center of caudal peduncle bifurcating like fourth; sixth a single bar 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. Dark band of pigment along base of caudal-fin rays. Pectoral-fin base with two dark clusters of brown chromatophores, one dorsal and one ventral. Three bars under the 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; and dark bar along lower half of preoperculum. Dark area behind upper half of eye extending to top of head. Narial tubes dark brown. Cheek with many small dark chromatophores. Several dark blotches behind eye above operculum. Underside of head with several dark areas: one at tip of lower jaw; four dark spots on 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. First dorsal fin with two dark spots at base, formed as extensions of subcutaneous bars, and dark sections on first spine; second dorsal fin with three dark spots, also extensions of subcutaneous bars, and membranes with scattered dark chromatophores. Caudal and anal fins with scattered dark chromatophores; pectoral and pelvic fins immaculate. Male urogenital papilla entirely peppered with small black spots (Fig. 7); female urogenital papilla peppered with small black spots only on basal half (Fig. 8).

Etymology. The specific epithet, *maculibotella*, is a compound adjective derived from the Latin *maculos* (spotted) and *botellus* (a small sausage, and apparently the origin of the English word pudding) in reference to the spots on the male urogenital papilla that is reminiscent of the British pudding, known as spotted dick, which is light brown with dark spots.

Distribution. Known only from Vietnam.

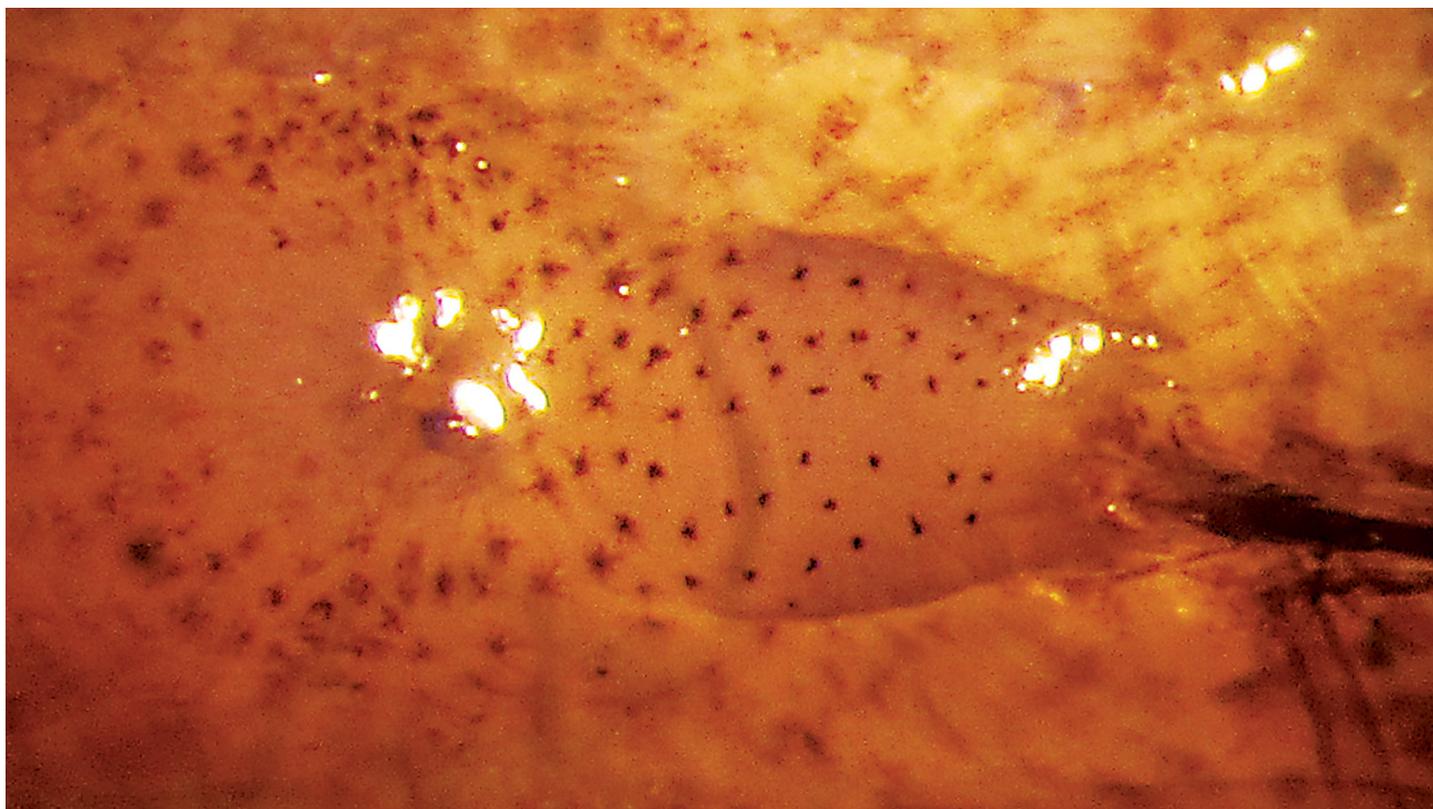


Figure 7. *Eviota maculibotella*, urogenital papilla, male paratype, ROM 74564, 15.5 mm SL, Nha Trang Bay, Vietnam, (D.W. Greenfield).

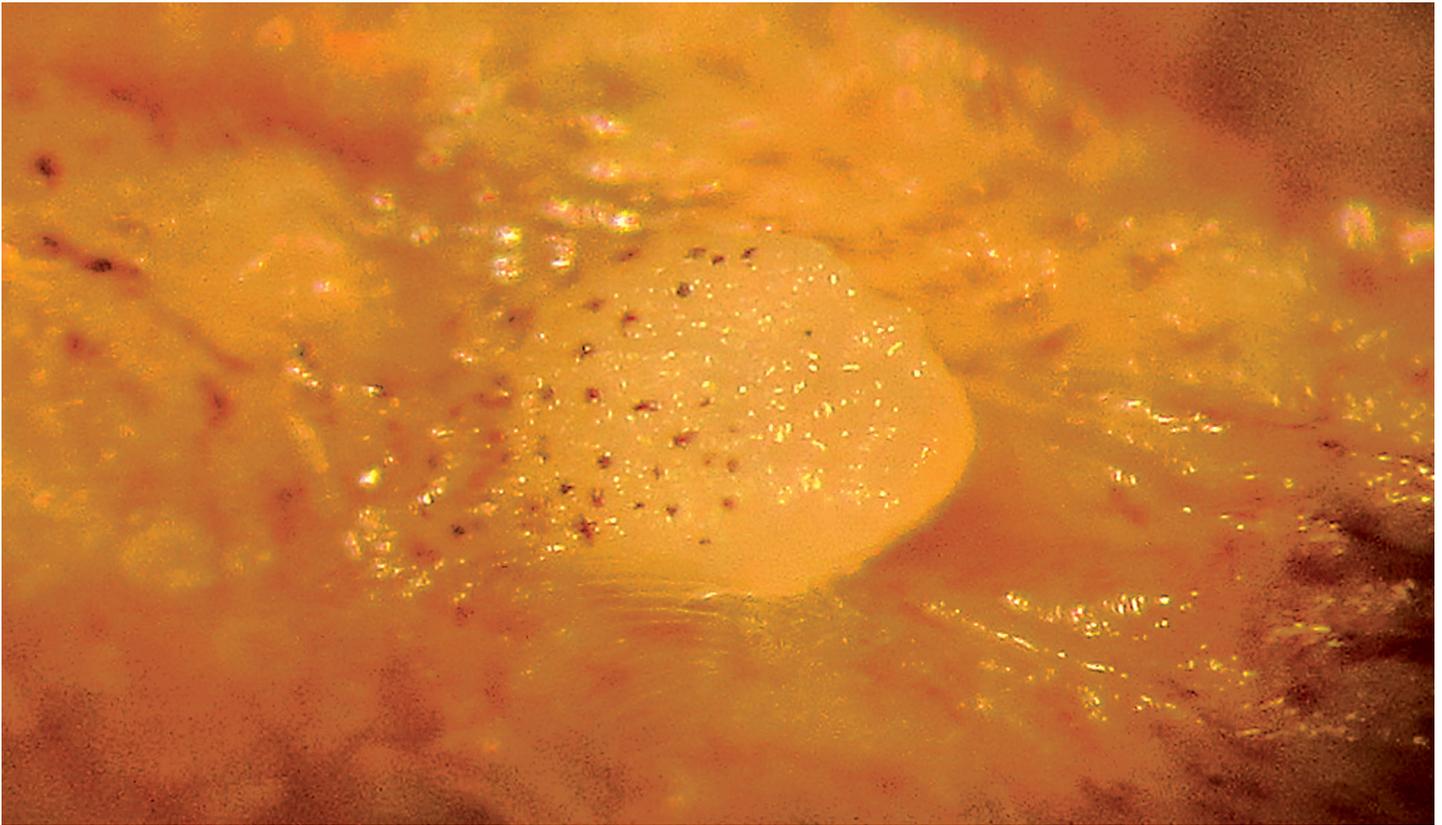


Figure 8. *Eviota maculibotella*, urogenital papilla, female holotype, ROM 73333, 13.7 mm SL, Nha Trang Bay, Vietnam (D.W. Greenfield).

Comparisons. Only five other described *Eviota* species also lack only the POP and IT cephalic sensory-canal pores: *E. lacrimae*, *E. ocellifer*, *E. pinocchioii*, *E. sparsa*, and *E. susanae*. *Eviota sparsa* has a very long 5th pelvic-fin ray, 53–90% of 4th pelvic-fin ray (vs. 20% or less in *E. maculibotella*), and a D/A formula of 9/8 (vs. usually 8/8). *Eviota susanae* has fimbriate urogenital papillae in both sexes (vs. non-fimbriate). *Eviota pinocchioii* has anterior narial tubes that are very elongate (greater than pupil diameter), reaching well anterior to the upper lip (vs. shorter, just reaching posterior margin of the lip), and also the D/A formula is usually 9/8 (vs. 8/8), and the pectoral-fin rays are simple (vs. branched). *Eviota ocellifer* has a D/A formula of 9/8 (vs. 8/8) and the first dorsal fin is black, bordered above with pale yellow. *Eviota lacrimae* has simple pectoral-fin rays (vs. branched) and the shape of the male urogenital papilla is more rounded, as in Fig. 4 in Sunobe (1988)(vs. smooth and tapered, peppered with small black spots, Fig. 7).

Eviota filamentosa looks very similar to *E. maculibotella*, sharing its spots under the head, but, in addition to lacking the IT and POP pores, it also lacks the AOT pore. It differs further from *E. maculibotella* in having simple pectoral-fin rays and no 5th pelvic-fin ray (vs. branched pectoral-fin rays and the 5th pelvic-fin ray present). Although there are some dark spots on the male urogenital papilla of *E. filamentosa*, the spots are lateral in position, and the shape is more widely expanded distally and not as pointed as the male urogenital papilla of *E. maculibotella*. *Eviota lacrimosa* also is similar to *E. maculibotella* in general coloration, but *E. lacrimosa* only has five dark ventral postanal spots, with two over the anal fin (vs. six postanal spots, with three over the anal fin). *Eviota lacrimosa* further differs in lacking only the IT pore (pattern 2), and having limited dark spots on the male urogenital papilla restricted to a lateral position.



Figure 9. *Eviota singula*, preserved holotype, ROM 84762, 9.1 mm SL, immature, Helen Reef, Palau (D.W. Greenfield).

Eviota singula, n. sp.

One-spot Dwarfgoby

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Figures 9–12.

Holotype. ROM 84762, 9.1 mm SL, immature, Palau, Helen Reef, N.W. outer reef about 0.5 km S. of northern large ship wreck, N.W. tip of island in lagoon, 2°58'38" N, 131°47'59" E, steep dropoff slope with a large variety of hard corals, 7–33 m, Sept. 27, 2008, RW08–45, R. Winterbottom *et al.*

Paratypes. ROM 84777, 10.4 mm SL & 8.1 mm SL, males, Palau, Helen Reef, S. coast, W. side, 2°48'08" N, 131°43'53" E, vertical wall dropoff, 23–36 m, Sept. 28, 2008, RW08–48, R. Winterbottom *et al.*

Non-type Material. CAS 238218, 12.2 mm SL, female, Indonesia, Raja Ampat, Ayau Besar, 00°36.306' N, 131°06.398' E, 40 m, outer, sandy, steep reef slope, Oct. 22, 2014, M.V. Erdmann; ROM 102217, 7.6 mm SL, immature, taken with ROM 84777.

Diagnosis. A species of *Eviota* lacking all cephalic sensory-canal pores, a dorsal/anal fin-ray formula of 8/7, some pectoral-fin rays branched, 5th pelvic-fin ray 14.6–18.2% of 4th pelvic-fin ray, a conspicuous dark occipital spot, no dark spot at preural centrum, first dorsal fin clear with a basal dark spot and a dark distal margin.

Description. Dorsal-fin elements VI+I,8 (all); anal-fin elements I,7 (all); pectoral-fin rays 16 (15–16), some branched; fifth pelvic-fin ray 14.6% (18.2%) of the 4th pelvic-fin ray; 3 branches on 4th ray; 2 segments between consecutive branches of 4th pelvic-fin ray; 11–12 branched and 17 segmented caudal-fin rays; 22 lateral scale rows; 6 transverse scale rows, scales not reaching top of pectoral-fin base and absent along first half of base of first dorsal fin; scales present on ventral surface of abdomen; first dorsal fin triangular in shape, no spines filamentous; urogenital papilla in male smooth, not fimbriate, long and tapering; urogenital papilla of female smooth, bulbous, with several short finger-like projections on distal margin; front of head rounded with an angle of about 60° from horizontal axis; mouth slanted obliquely upwards, forming an angle of about 55° to horizontal axis of body, lower jaw slightly projecting; maxilla extending posteriorly to rear of pupil; anterior narial tube extending to posterior

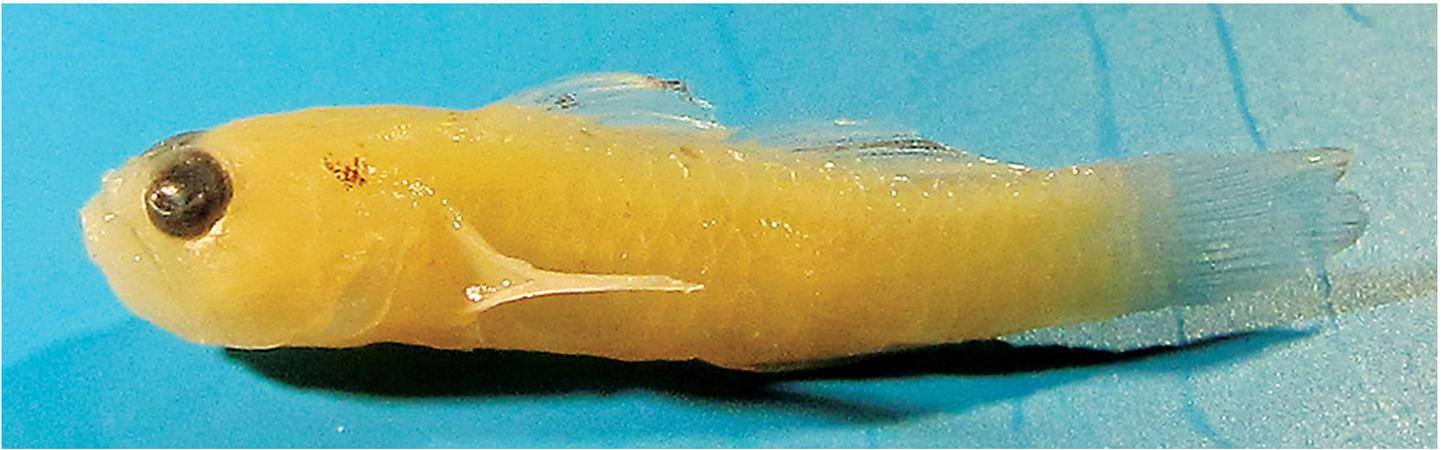


Figure 10. *Eviota singula*, preserved paratype, ROM 84777, Helen Reef, Palau (D.W. Greenfield).

edge of upper lip; gill opening extending forward to below posteroventral edge of preoperculum; all cephalic sensory-canal pores absent in all types and non-type specimens (note that there are papillae over the location of the AITO and SOT pores that could be mistaken for pores in these tiny specimens).

Measurements (based on holotype and 2 paratypes, 8.1–10.4 mm SL): head length 35.5 (34.6–35.6); origin of first dorsal fin 41.5 (37.5–42.9), lying behind posterior margin of pectoral-fin base; origin of second dorsal fin 61.7 (61.7–67.5), above or slightly behind anal-fin origin; origin of anal fin 60.0 (60.0–67.5); caudal-peduncle length 21.8 (21.1–24.5); caudal peduncle moderately deep, 16.4 (15.4–17.2); body moderately deep, its depth 24.6 (21.1–24.6); eye diameter 9.8 (9.6–10.4); snout length 6.0 (4.9–6.7); pectoral-fin length 31.1 (27.0–31.1); pelvic-fin length 30.0 (27.5–30.7).

Color in life of CAS 238218. (Fig. 11) Body from back of head to caudal-fin base red, scale edges with small white spots creating a diamond pattern. Several short, narrow white lines extending down from base of second dorsal fin onto body. Pectoral-fin base red with white bar angling dorsoventrally across its center and white spot just above its base on body. Nape dark red, with white area directly in front of first dorsal fin. Distinct black occipital spot present above operculum. Top of head with longitudinal white line at center, above margin of preoperculum, surrounded by yellow, area in front of this red-orange down to upper jaw. Iris of eye red with black spokes radiating out from black pupil. Upper jaw red, lower jaw red anteriorly with yellow tinge at posterior end. Area under head and branchiostegals yellow. Short white line at six-thirty o'clock position under eye extending to upper jaw, area immediately anterior to it with yellowish tinge; posterior to short white line a narrow red line extending from below eye to under head. Cheek over preopercular area gray with yellow tinges ventrally and yellow-orange tinges towards operculum. Area above operculum red with scattered white spots, located below black occipital spot. Dorsal fins with red bases, spines and rays red with evenly spaced white areas. Pectoral, anal and caudal fins red with scattered small white dots.



Figure 11. *Eviota cf. singula*, fresh in water, CAS 238218, 12.2 mm SL, female, Raja Ampat, Indonesia (M.V. Erdmann).



Figure 12. *Eviota* cf. *singula*, preserved, CAS 238218, 12.2 mm SL, female, Raja Ampat, Indonesia (D.W. Greenfield).

Color in preservative of holotype. (Fig. 9) Head and body white. Dark round occipital spot present. Body with peppering of small dark spots present from dorsal fins down to ventral surface, spots darker and larger along base of dorsal fins. Pectoral-fin base with a scattering of brown chromatophores angling dorsoventrally across its center. First dorsal fin with a dark distal margin and dark spots on lower half, the largest between spines five and six. Second dorsal fin peppered with small dark spots and distal margin dark. Anal fin with a few dark spots distally. Paratype similar (see Fig. 10), but lacking dark basal spots at posterior end of first dorsal fin.

Color in preservative of CAS 238218. (Fig. 12) Background color of head and body light yellow. Body with few dark markings, those present scattered small brown chromatophores. Head with dark occipital spot and small scattered brown chromatophores behind center of eye and lower half of operculum. Some dark brown pigment at end of lower jaw and top of head and nape. Pectoral-fin base with scattering of brown chromatophores angling dorsoventrally across its center. All fins immaculate except for black distal margin in both dorsal fins.

Etymology. The specific epithet, *singula*, is derived from the Latin word *singulus* (one), referring to the single obvious dark spot on the occiput of this species, and is treated as a noun in apposition.

Distribution. Known only from Palau and Raja Ampat, Indonesia.

Comparisons. As discussed for *E. lateritea*, only five other described species of *Eviota* lack all cephalic sensory pores: *E. deminuta*, *E. jewettae*, *E. lateritea*, *E. occasa*, and *E. thamani*. *Eviota singula* has a distinctive dark occipital spot not present in any of these species. *Eviota thamani* differs by having the urogenital papilla of both the male and female fimbriate (vs. non-fimbriate in male *E. singula*). *Eviota deminuta* and *E. occasa* both have a dark internal bar or spot over the preural centrum (vs. lacking in *E. singula*). The 5th pelvic-fin ray is long in *E. lateritea*, 50–74% of 4th ray (vs. 20% or less in *E. singula*). All species except *E. deminuta* have 8 anal-fin rays (vs. 7 in *E. singula*).

There are other species, all with pores, that share the single conspicuous occipital spot with *E. singula*, but all differ in the dorsal/anal-fin formula as well as in color: *E. abex* (10/8), *E. masudai* (10/9), *E. fallax*, *E. karaspila*, *E. nigramembrana*, and *E. smaragdus* (all with 9/8), and *E. epistigmata* (8/8).

Remarks. The single specimen from Indonesia, CAS 238218, matches the types of *E. singula* in all characters except that the dorsal/anal formula is 7/7 instead of 8/7, and the basal dark spot in the first dorsal fin is not obvious, with only a couple of dark melanophores present. Because of these differences we have not included it in the type material in the event that an examination of additional specimens and genetic analyses show them to be different species.



Figure 13. *Eviota* sp., preserved, ROM 76398, 11.9 mm male, Palau (D.W. Greenfield).

***Eviota* Palau sp. 4**

We believe that a single specimen collected in Palau (ROM 76398) represents an undescribed species originally called Palau sp. 4. Because it is in poor condition we do not formally describe it here. The cephalic sensory-pore system lacks all pores; the dorsal/anal fin-ray formula is 8/8, but all of the pectoral-fin rays are broken in the specimen.

Material examined. ROM 76398, 11.9 mm male, Palau, Ngardmau, Babeldaob Island outer reef, reef top 3–7.3 m, coral rock, *Acropora*, *Pocillopora*, *Porites*, starcorals, field number RW04–24, May 31, 2004, R. Winterbottom, W. Holleman, B. Hubley, & D. Winterbottom.

Color in preservative. (Fig. 13) Background color of head and body light yellow. Most distinctive coloration consists of 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, and dark bar along lower half of preoperculum. Dark area behind upper half of eye extending to top of head. Nape with scattered dark chromatophores. Narial tubes black; snout and jaws peppered with small black chromatophores. Short dark line above operculum in line with center of eye. Underside of head with several dark areas: one at tip of lower jaw; four dark spots on isthmus arranged in 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. Pectoral-fin base with dark blotch at anterior top and then band of brown chromatophores running along fin-ray bases, remainder of base without dark pigment. 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; fifth at center of caudal peduncle forking ventrally with dark spot at end of each fork; sixth at end of caudal peduncle, with dark ventral spot, resulting in five postanal spots. Two dark spots at caudal-fin base, one dorsal and one ventral, not counted as postanal spots. First dorsal fin with three dark spots at base, formed of extensions of subcutaneous bars. Second dorsal fin with three dark spots, also extensions of subcutaneous bars. Color of other fins unknown because membranes missing.

Remarks. Although this species, Palau sp. 4, bears a superficial resemblance to *E. maculibotella*, the latter lacks only the POP and IT pores (vs. no pores), has six postanal spots with three over the anal fin (vs. only five with two over the anal fin), and has two separate dark spots on the pectoral-fin base (vs. single vertical dark area along base of fin rays).

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References

- Akihito, Sakamoto, K., Ikeda, Y. & Sugiyama, K. (2002) Gobioidae. In: Nakabo, T. (Ed.) *Fishes of Japan with pictorial keys to the species*. English edition, Vol. II. Tokai University Press, Tokyo, Japan, pp. 1139–1310.
- Akihito, Sakamoto, K., Iwata, A. & Ikeda, Y. (1993) Cephalic sensory organs of the gobioid fishes. In: Nakabo, T. (Ed.) *Fishes of Japan with pictorial keys to the species*. Tokai University Press, Tokyo, Japan, pp. 1088–1116. [In Japanese]
- Jewett, S.L. & Lachner, E.A. (1983) Seven new species of the Indo-Pacific genus *Eviota* (Pisces: Gobiidae). *Proceedings of the Biological Society of Washington*, 96 (4), 780–806.
- Karnella, S.J. & Lachner, E.A. (1981) Three new species of the *Eviota epiphanes* group having vertical trunk bars (Pisces: Gobiidae). *Proceedings of the Biological Society of Washington*, 94 (1), 264–275.
- Lachner, E.A. & Karnella, S.J. (1980) Fishes of the Indo-Pacific genus *Eviota* with descriptions of eight new species (Teleostei: Gobiidae). *Smithsonian Contributions to Zoology*, 315, 1–127. <http://dx.doi.org/10.5479/si.00810282.315>
- Saruwatari, T., Lopez, J.A. & Pietsch, T.W. (1997) Cyanine blue: a versatile and harmless stain for specimen observations. *Copeia*, 1997 (4), 840–841. <http://dx.doi.org/10.2307/1447302>