



Eviota amphipora, a new dwarfgoby from Papua New Guinea (Teleostei: Gobiidae)

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Abstract

A new species of dwarfgoby, *Eviota amphipora* n. sp., is described from Milne Bay, Papua New Guinea. The new species has a cephalic sensory-canal pattern having only the supraotic (SOT) and paired posterior interorbital (PITO) pores, only the second described *Eviota* species with this distinctive pattern. It has a dorsal/anal fin-ray formula of 9/8, one or more branched pectoral-fin rays, the fifth pelvic-fin ray a rudiment, and six postanal spots. The color pattern is also diagnostic: a translucent gray body with iridescent blue on the dorsal and anal fins and two diagonal dark-brown bars across the pectoral-fin base, the first dorsal fin crossed by two wide black bars, the second dorsal fin with three fully black vertical bars extending up from the base of the fin, and a smaller fourth bar at the end of the posterior fin rays.

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

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Introduction

The dwarfgobies (genus *Eviota*) are a diverse group of tiny coral-reef fishes (usually <18 mm SL) found throughout most of the Indo-Pacific Ocean. Currently, there are 122 described species (including the new species described herein), with many having been described in the last 10 years. This increase in discoveries is mainly due to selective searching, underwater photography, and collection by diving researchers. Greenfield & Winterbottom (2016) summarized the genus and presented a key, with photographs, to the 107 species described between 1871 and 2016. Greenfield (2017) reviewed the taxonomic history, systematics, reproduction, ecology, geographic distribution, genetic studies, and speciation of the dwarfgobies.

The pattern of the cephalic sensory-canal pores has been an important character in describing various species (reviewed in Greenfield [2017]), and this new species has a distinctive pattern, with only the supraotic (SOT) and paired posterior interorbital (PITO) pores present. Interestingly, that pattern has only been documented once before, in *Eviota pseudaprica* Winterbottom & Greenfield, 2020, from Palau and Raja Ampat, Indonesia.

Recently, while conducting a biodiversity survey at Milne Bay, Papua New Guinea in 2019, the second author observed a tiny species of *Eviota* with distinct black bars crossing its fins and iridescent blue on the membranes between the prominent bars that he had never before encountered. He collected the two specimens and photographed them fresh before preserving them as type specimens of a new species. The new species is currently known only from Milne Bay, Papua New Guinea, although it is presumably more widespread.

Materials and Methods

The holotype and paratype are deposited at the California Academy of Sciences, San Francisco, CA, USA (CAS).

Descriptions of pelvic-fin morphology and cephalic sensory-canal pores follow Greenfield & Winterbottom (2016), as originally formulated by Lachner & Karnella (1980) and Jewett & Lachner (1983). Postanal ventral midline spots, along the posterior ventral midline of the body, begin at the anal-fin origin and extend to a vertical drawn 2 or 3 scale rows anterior to the ends of the hypurals; the additional smaller spot posterior to this, if present, is not counted. We follow Lachner & Karnella (1980: 4) in describing the membranes joining the first 4 pelvic-fin rays, which "...are considered to be well developed when the membranes extend beyond the bases of the first branches; they are considered to be reduced when they are slightly developed, not extending to the bases of the first branches". Dorsal/anal fin-ray formula counts (eg. 9/8) only include segmented rays.

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

Cyanine Blue 5R (acid blue 113) stain was used to make pores and scale outlines more obvious (Akihito et al. 1993, 2002, Saruwatari et al. 1997). The paratype of *E. amphipora* is very small and badly damaged, but the head is intact so that the distinctive cephalic sensory-canal pore pattern can be seen.

Eviota amphipora, n. sp.

Twinpore Dwarfgoby

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Figures 1 & 2

Holotype. CAS 247238, 9.8 mm SL, male, Papua New Guinea, Milne Bay, Sideia patch reef, -10.607°, 150.841°, 12 m, field number MVE-18-010, M.V. Erdmann, 2 October 2019.

Paratype. CAS 247239, about 8 mm SL, damaged, taken with holotype.

Diagnosis. A species of *Eviota* distinguished from all congeners by a combination of cephalic sensory-canal pore system with only SOT and paired PITO pores, a dorsal/anal fin-ray formula of 9/8, one or more pectoral-fin rays branched, fifth pelvic-fin ray a rudiment; two diagonal dark-brown bars across pectoral-fin base, first dorsal fin crossed by two wide black bars, second dorsal fin with three fully black vertical bars extending up from base of fin, and a smaller fourth bar at end of posterior fin rays.

Description. Dorsal-fin elements VI + I,9, first dorsal fin triangular, spines not filamentous, last ray branched to base; anal-fin elements I,8, last ray branched to base; pectoral-fin rays 15, some branched, pointed, reaching to below second dorsal fin; pelvic-fin rays I,5, fifth ray a rudiment, fourth with two branches, pelvic-fin membrane well developed, basal membrane reduced; caudal fin with 11 branched and 17 segmented rays; lateral-line scales 23; transverse scale rows 7; urogenital papilla of male smooth, narrow, pointed (papilla of female unknown); front of head rounded with an angle of about 60° from horizontal axis; mouth slanted obliquely upwards, forming an angle of about 60° to horizontal axis of body, lower jaw not projecting; maxilla extending posteriorly to center of pupil; anterior tubular nares moderate, extending to center of upper lip; gill opening extending forward to below posteroventral edge of preoperculum. Cephalic sensory-canal pore system with only supraotic (SOT) and paired posterior interorbital (PITO) pores.

Measurements of holotype: head length 30.6; origin of first dorsal fin 39.3; origin of second dorsal fin 59.2; origin of anal fin 60.2; caudal-peduncle length 27.0; caudal-peduncle depth 11.7; body depth 22.4; eye diameter 10.7; snout length 4.1; upper-jaw length 8.7; pectoral-fin length 32.6; pelvic-fin length 42.8.

Color in life. (Fig. 1) Background color of head and body translucent bluish gray. Body crossed by 6 dark-brown body bars: first bar under first dorsal fin extending from black band on first dorsal fin down to abdomen; second bar from second black band on first dorsal fin extending down to abdomen; third bar under front of second dorsal fin extending down to first postanal spot; fourth bar X-shaped with upper limbs connecting to



Figure 1. *Eviota amphipora*, fresh holotype, anesthetized and underwater, Milne Bay, Papua New Guinea (Mark V. Erdmann).

second and third black bars on second dorsal fin, and lower limbs connecting to second and third postanal spots; fifth bar X-shaped with upper limbs extending to end of second dorsal fin and caudal peduncle, and lower limbs connecting to fourth and fifth postanal spots; last body bar centered on caudal peduncle and Y-shaped with lower portion connecting to last postanal spot with the caudal-fin base spot behind it, and anterior limb of Y connecting to upper limb of fifth bar and posterior limb connecting to spot at caudal-fin base; a dark-brown vertical line along boundary where caudal-fin rays join hypural plate. Pectoral-fin base crossed by two dark-brown diagonal bars, one dorsal and one ventral, the dorsal darker, separated by a wide white area extending onto base of fin. Nape crossed by three brown bars, anteriormost merging with dark area on top of head and behind eye. Side of head white with three dark-brown bars under eye at 4, 6, and 8 o'clock: 6 o'clock longest extending down to lower part of head, 8 o'clock extending onto upper jaw, 4 o'clock wider and V-shaped extending a short distance onto side of head; a few scattered blotches on side of head, with a vertical bar at center of preopercular edge, and a peppering of melanophores on operculum; three rounded brown spots on branchiostegal membranes and a narrow brown line extending from lower jaw to lower side of head. Tubular nares black. Iris of eye orange with white spokes radiating out from pupil. Basal portion of first dorsal-fin spine and membrane iridescent blue, remainder of fin black except for an iridescent bar at center of fin, curving anteriorly to upper third of first spine; second dorsal fin with three vertical, fully black bars, one at front, one at center and one at end, extending up from fin base, with smaller fourth bar at end of posterior fin rays; membranes between bars iridescent blue. Anal fin with black bars extending down onto fin from postanal spots, membranes between them iridescent blue.

Color in preservative. (Fig. 2) Background color of head and body light yellow. Body with spindle-shaped pattern of brown lines from pigment in scale-pocket tissue. Body crossed by 6 internal dark bars and 6 dark-brown postanal spots, three over anal-fin base. Pectoral-fin base crossed by two diagonal dark-brown bars, one dorsal and one ventral. Top of head and behind eyes with heavy peppering of melanophores, two dark-brown bars crossing nape. Snout and jaws peppered with melanophores, tubular nares black. Three dark brown bars under eye at 4, 6, and 8 o'clock. Side of head with scattered clusters of melanophores. First spine of first dorsal fin clear, followed by a triangle of black extending from base up to spine, followed by a clear area in center before another wider black triangle covering most of posterior half of fin, then with a narrow clear distal margin. Second dorsal fin with three vertical fully black bars, one at front, one at center and one at end, extending up from fin base, with a smaller fourth bar at end of posterior fin rays. Anal fin all dark brown with a narrow, clear, distal margin. Caudal-fin base just anterior to hypural plate with a dark-brown angled bar at dorsal and ventral surface; line of melanophores extending along boundary where caudal-fin rays join hypural plate; and a heavy peppering of melanophores on dorsal, ventral, and distal margins of caudal fin.

Etymology. The specific epithet is from the Greek *amphi*, meaning on both sides or double, and the Greek *poros*, meaning hole, referring to the pair of PITO pores, one on each side of the interorbital area. The name is treated as a feminine nominative singular adjective.



Figure 2. *Eviota amphipora*, preserved male holotype, CAS 247238, Milne Bay, Papua New Guinea (David W. Greenfield).

Distribution. The new species is currently known only from Milne Bay, Papua New Guinea, though presumably is more widespread. Specimens were collected on a sheltered patch reef in Sideia Bay, in 12 m depth, living in small holes in dead-coral pavement between live massive coral colonies.

Comparisons. Only one other described species of *Eviota*, *E. pseudaprica*, has the pore pattern of only SOT and paired PITO pores. *Eviota pseudaprica* can be distinguished by having a long fifth pelvic-fin ray (65–83 % of the fourth ray), whereas it is only a rudiment in *E. amphipora*. They also differ greatly in both fresh and preserved coloration. *Eviota amphipora* has two bold black bars crossing the first dorsal fin and three prominent, fully black, vertical black bars on the second dorsal fin, extending up from the fin base, and a smaller fourth bar at the end of the posterior fin rays, none of which is shared with *E. pseudaprica*. *Eviota amphipora* has a translucent gray body crossed by 6 black bars and with iridescent blue on the dorsal and anal fins, while *E. pseudaprica* is lemon yellow with three red-orange bars crossing the nape. The color pattern of three vertical full black bars on the second dorsal fin extending up from the fin base followed by a smaller fourth bar is not found on other congeners.

When Winterbottom & Greenfield (2020) described *E. pseudaprica*, they stated that the SOT and paired PITO pore pattern was unique within the genus. The new species is now the second species with this pattern, and we are, moreover, aware of an additional undescribed species with this unusual cephalic sensory-canal pore pattern.

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