




Eviota stella, a new dwarfgoby from West Papua, Indonesia (Teleostei: Gobiidae)

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Abstract

A new species of dwarfgoby, *Eviota stella*, is described from Cenderawasih Bay, West Papua, Indonesia. The new species is distinguished by having the cephalic sensory-canal pore system lacking only the IT pore (Pattern II); the dorsal/anal fin-ray formula 9/8, some pectoral-fin rays branched; and the fifth pelvic-fin ray rudimentary or less than 10% of the fourth pelvic-fin ray. The color pattern is characterized by two colon-like, prominent, dark round spots on the pectoral-fin base; 5 postanal dark body bars; and rounded postocular dark spots. These features of the new species are shared with sister species *E. queenslandica* and *E. perspicilla*, but it can be distinguished from both by having a single dark band along the base of the first dorsal fin vs. three oblique dark bands in the other species. *Eviota queenslandica* is further distinguished from its two close relatives by having a diagnostic dark round spot below the pectoral-fin base. In life, the new species is characterized by having close-set fine white spots over the upper iris and the fins are peppered with small blue spots.

Key words: taxonomy, ichthyology, coral-reef fishes, gobies, new species, Indonesia, Cenderawasih Bay, species complexes

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Introduction

Eviota viridis queenslandica was described briefly by Whitley (1932) from Batt Reef, part of the Great Barrier Reef off Port Douglas, Queensland, Australia. However, Lachner & Karnella (1980) placed *E. viridis* in the synonymy of *Eviota prasina* (Klunzinger, 1871) and recognized *E. queenslandica* as a valid species. The latter species was redescribed in detail on the basis of 320 specimens from wide-ranging locations including northern Australia, Thailand, Indonesia, Philippines, Papua New Guinea, Solomon Islands, and Vanuatu.

Since then, many specimens bearing a resemblance to *E. queenslandica* have been treated as that species in various publications. While conducting surveys of coral-reef fishes from various sites throughout the western Pacific, author MVE and G.R. Allen photographed and collected a number of specimens resembling *E. queenslandica*. We have been referring to these individuals as *E. cf. queenslandica* in anticipation of eventually teasing apart what is almost certainly a cryptic-species complex, in the same way we resolved the *Eviota zebrina* complex in Tornabene et al. (2021). Another recently described member of the *E. queenslandica* complex is *Eviota perspicilla* Fujiwara et al., 2019 from Japan; the authors compared it to *E. japonica*, *E. prasina*, and *E. queenslandica*, and concluded it was most similar to *E. queenslandica*.

The genus *Eviota* is currently represented by 139 valid species (Greenfield et al. 2026). The description of this species brings the total to 140. These tiny dwarfgobies (usually <18 mm SL) are relatively abundant on coral reefs, although their small size makes them especially difficult to observe (Greenfield 2017); nevertheless, tiny cryptobenthic fishes such as the dwarfgobies can have a major effect on ecosystem functioning, serving as an important link in the food chain between small invertebrates and larger fishes and providing for much of the biomass flux in the trophodynamics of the coral reef. These gobies are found throughout the Indo-Pacific Ocean, with the greatest diversity in the Coral Triangle in the western Pacific Ocean.

Earlier studies of *Eviota* did not have the advantage of documentation of fresh or live coloration, nor genetic information. This was the case for Lachner & Karnella (1980) who were working only with preserved specimens in their study of *E. queenslandica*. Considering that they found no meristic differences or significant marking differences persisting in preservative among the populations they surveyed, their conclusion that there was a single widespread species was not surprising. However, as discussed by Greenfield (2017, Fig. 4), live eye-color in *Eviota* species is an important taxonomic character distinguishing many species, and that feature is used here to separate a new species collected in at West Papua Province, Indonesia (western New Guinea) from other populations of *E. queenslandica*. Eye color also played an important role in distinguishing species in resolving the aforementioned *Eviota zebrina* complex (Tornabene et al. 2021), as well as the *Eviota guttata* complex (Erdmann et al. 2023), and the *Eviota nigriventris* complex (Greenfield et al. 2025).

Materials and Methods

The holotype is deposited at the Museum Zoologicum Bogoriense, Cibinong, Java (MZB) and the paratypes at the California Academy of Sciences, San Francisco, CA, USA (CAS).

Measurement methods follow Greenfield et al. (2025). Lengths are given as standard length (SL). Counts are presented as the value for the holotype followed by the range for the paratypes in parentheses, if different.

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). Internal postanal ventral midline spots, running along the posterior ventral midline of the body, begin at the anal-fin origin and extend to a vertical line two or three 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". The dorsal/anal fin-ray formula count (eg. 8/8) only includes segmented rays.

Cyanine Blue 5R (acid blue 113) stain and an airjet were used to make the cephalic sensory-canal pores, papillae, fin rays, and scales more obvious (Akihito et al. 1993 2002, Saruwatari et al. 1997).



Figure 1. *Eviota stella*, n. sp., freshly anaesthetized holotype, MZB 24598, Cenderawasih Bay, Indonesia (M.V. Erdmann).

***Eviota stella*, n. sp.**

Starburst Dwarfgoby

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Figures 1–4

Holotype. MZB 24598, 15.8 mm SL female, Indonesia, West Papua Province, Cenderawasih Bay, Pulau Papaya, -3.2085°, 135.0837°, field number MVE-17-020, 5 m, 3 August 2017, clove oil & hand net, A. Sianipar.

Paratypes. CAS 251269, 13.8 mm SL female, taken with holotype; CAS 251270, 14.3 mm SL male, 14.0 mm female & 11.7 mm immature, same location as holotype, field number MVE-16-002, 5 m, 21 February 2016, clove oil & hand net, A. Sianipar & M.V. Erdmann; CAS 251271, 2 males, 13.9 & 16.6 mm, 2 immature 13.5 mm SL, same location as holotype, field number MVE-16-071, 5 m, 25 October 2016, clove oil & hand net, A. Sianipar.

Diagnosis. A species of *Eviota* distinguished from all congeners by a combination of a cephalic sensory-canal pore system lacking only IT pore (Pattern 2 of Lachner & Karnella); a dorsal/anal fin-ray formula of 9/8, pectoral-fin rays 15–17, some rays branched, fifth pelvic-fin ray rudimentary or less than 10% of fourth; two colon-like prominent dark round spots on pectoral-fin base; 5 postanal dark body bars; postocular dark spots rounded; first dorsal fin with a single dark bar crossing lower part of fin; in life, top of iris is covered with close-set fine white spots and fins are peppered with small blue spots.

Description. Dorsal-fin elements VI+I,8 (1) or I,9 (9), first dorsal fin semi-triangular; third spine reaching to second dorsal-fin origin when adpressed, none filamentous, all second dorsal-fin soft rays branched except first, last ray branched to base; anal-fin elements I,7 (1), I,8 (9), all soft rays branched, last ray branched to base; pectoral-fin rays 16 (15–17, usually 16), branched, pointed, reaching to posterior third of second dorsal fin; fifth pelvic-fin ray rudimentary or less than 10% of fourth, fourth ray with 7 (5–8) branches and two segments between consecutive branches, pelvic-fin membrane not well developed, no basal membrane; 12 branched and 17 segmented caudal-fin rays; 24 lateral-line scales (21–24), 7 transverse scale rows; urogenital papilla of male with straight smooth sides and many small papillae at end, female urogenital papilla smooth, bulbous, with short finger-like projections at end; front of head rounded with an angle of about 65° from horizontal axis; mouth slanted obliquely upwards, forming an angle of about 50° to horizontal axis, lower jaw slightly projecting; maxilla

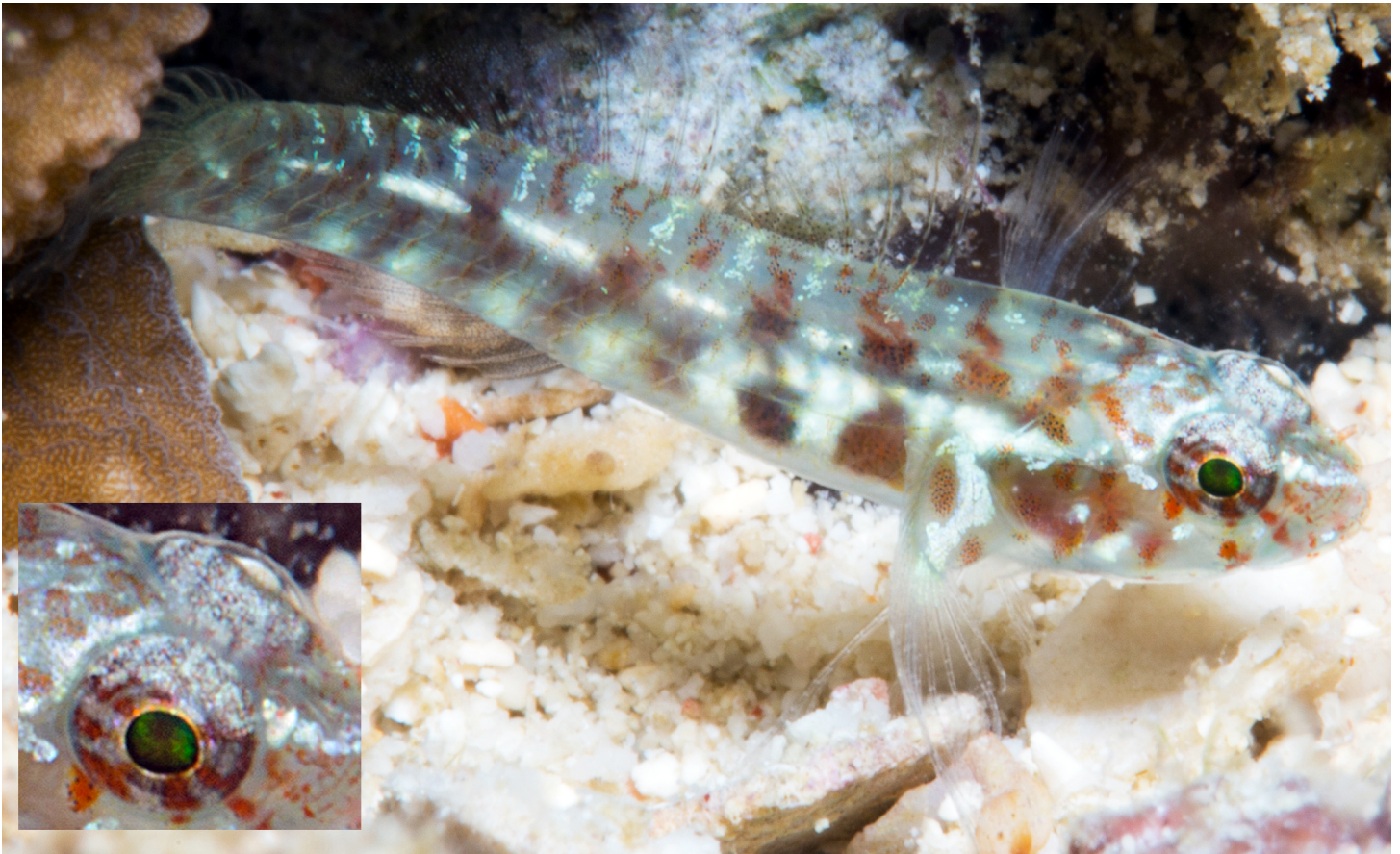


Figure 2. *Eviota stella*, n. sp., live underwater, one from the type series, CAS 251270, Cenderawasih Bay, West Papua, Indonesia: inset at lower left is detail of eye showing close-set fine white spots over upper iris (M.V. Erdmann).

extending posteriorly to center of pupil; anterior naris tube short, not reaching posterior margin of upper lip; gill opening extending forward to below posteroventral edge of vertical limb of preoperculum. Cephalic sensory-canal pore system lacking only IT pore (Pattern II of Lachner & Karnella).

Measurements. (holotype with range for all specimens and mean as percentage of SL) head length 32.9 (29.4–33.3, 31.7); distance to origin of first dorsal fin 37.0 (36.3–38.0, 37.2), first dorsal-fin origin lying behind posterior margin of pectoral-fin base; distance to origin of second dorsal fin 57.9 (55.9–60.7, 57.6), second dorsal-fin origin well in advance of anal-fin origin; distance to origin of anal fin 63.0 (58.5–63.2, 60.8); caudal-peduncle length 23.7 (18.8–25.9, 22.4); caudal-peduncle depth 13.6 (12.8–15.1, 13.8); body slender, depth 22.1 (21.0–22.2, 21.7); eye diameter 9.8 (9.0–10.2, 9.7); snout length 5.4 (3.7–5.5, 4.9); pectoral-fin length 41.1 (28.2–41.1, 35.6); pelvic-fin length 41.1 (21.0–41.1, 32.8), reaching urogenital papilla.

Color in life. (Figs. 1 & 2) Background color of head and body translucent gray, with a bluish tinge on body, body covered with an array of short brown thin bars outlining margin of each scale, internally a silvery-white line overlying vertebral column broken by 8 reddish-brown segments along full length; dorsal aspect of body with a surface series of short, narrow, reddish-brown bars alternating with silvery-white narrow bars, lower body with a series of internal dark patches alternating with whitish patches, largest irregular dark patches over whitish peritoneum. Pectoral-fin base with two colon-like oval dark-brown spots separated by a broad silver-white irregular band; entire head with a scattering of irregular reddish-brown and silvery-white short bars and spots, dark markings becoming more reddish towards snout. Iris with short reddish spokes around pupil, breaking up near top of iris with an overlay of close-set fine white spots. Pectoral and pelvic fins clear. First dorsal fin crossed by reddish-brown bands with scattered tiny bluish-white dots across basal third of fin and a band of similar spots concentrated at distal margin of membranes, second dorsal fin with similar but more irregular dark bands and tiny spots, caudal fin with similar narrow reddish-brown bands alternating with white and tiny bluish-white spots evenly scattered on membranes and a similar pattern on anal fin.



Figure 3. *Eviota stella*, n. sp., preserved holotype, MZB 24598, Cenderawasih Bay, West Papua, Indonesia (D.W. Greenfield).

Color in preservative. (Figs. 3 & 4) Background color of head and body light yellow; scale edges on body prominently edged with brown, 5 distinct, internal, dark spots extending up as short bars run along base of anal fin and caudal peduncle with an internal spot over preural centrum; pectoral-fin base with two prominent, dark, colon-like, rounded spots. Head with scattered spots and short bars reflecting pattern of reddish-brown spots on live fish. Dorsal fins with bands of melanophores along lower portions of membranes and concentrated fine melanophores as dark margins, anal fin uniformly dark spotted, caudal fin with central array of rounded spots and periphery with dense fine melanophores, pectoral fins with clear membranes and small melanophores along rays, pelvic fins clear.

Etymology. The specific epithet is from the Latin noun *stella* (star), in reference to the starburst appearance of the many fine white spots at the top of the iris of the eye.

Distribution and habitat. The new species is currently known only from Cenderawasih Bay, West Papua Province, Indonesian New Guinea. The species has been observed and collected exclusively from 2–5 m depth on the reef crest of several offshore islands with steep drop-offs into 200 m or more. Small aggregations up to about 6 individuals were frequently observed amongst the coral rubble and carbonate bench on the reef crest, in a habitat often exposed to moderate to strong wave surge..

Comparisons. *Eviota stella* belongs to the group of dwarfgobies with the cephalic sensory-canal pore system Pattern II (only missing the IT pore) which includes 51 valid described species to date. Of those, 31 share branched pectoral-fin rays with *E. stella*, and 20 share the 9/8 soft ray count (see Table 3 in Greenfield (2017), plus recent additions). Among these, the two distinct dark spots on the pectoral-fin base prominent on *E. stella* are shared only



Figure 4. *Eviota stella*, n. sp., preserved paratype, CAS 251269, Cenderawasih Bay, West Papua, Indonesia (D.W. Greenfield).



Figure 5. *Eviota perspicilla*, fresh holotype, KAUM-I. 124386, Kagoshima, Japan (Fig. 6; Fujiwara, et al. 2019).

with 6 species: *E. atausiensis*, *E. prasina*, *E. hoesei*, *E. japonica*, *E. perspicilla*, and *E. queenslandica*. These can be distinguished from *E. stella* by a fimbriate male urogenital papilla in *E. prasina*; a cup-shaped papilla in *E. atausiensis*; no prominent postocular dark spots plus the spot over the preural centrum especially large, more than half peduncle depth, in *E. hoesei*; 6 postanal dark bars (vs. 5) and postocular dark spots elongate (vs. relatively round) in *E. japonica*.

Two of the 6 species with the two pectoral-fin spots are very similar to *E. stella* and share counts and morphology, varying mainly in the color pattern on the first dorsal fin. Whereas *E. stella* has a single dark band across the lower fin membranes, *E. perspicilla* has three dark bands: one at the base of the first three membranes, one midway out, and a thick band along the margin, overlain with white spots. That pattern leaves two whitish patches centered on the base of the fourth and sixth membranes (Fig. 5). The other close species, *E. queenslandica*, differs from both aforementioned species in having a prominent, discrete, rounded, dark spot obliquely below the lower of the colon marks on the pectoral-fin base (arrow, Fig. 6); this spot is absent in the other species, which may have speckling



Figure 6. *Eviota queenslandica*, arrow indicates diagnostic chest spot for the species, Queensland, Australia (courtesy Alonso González-Cabello).

on the overlying branchiostegal membranes in that location, but no rounded spot under the membranes. It also has oblique dark bands on the first dorsal fin vs. a single band along the base in the new species. This diagnostic feature was noted by Lachner & Karnella (1980) who “found no consistent differences in the development of any specific color mark within major geographic areas, but the first dorsal fin pattern of several oblique bars is more commonly present in Australian specimens”.

The live eye-coloration of *E. stella* is also distinctive, the iris is silvery with a radiation of reddish spokes out from the pupil, and the upper third of the iris surface is speckled with many close-set fine white spots (Fig. 2).

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