



## ***Eviota dalyi*, a new dwarfgoby from the Amirante Islands, Seychelles (Teleostei: Gobiidae)**

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### **Abstract**

A new species of dwarfgoby, *Eviota dalyi*, is described from three specimens collected in the Amirante Islands, Seychelles, in the western Indian Ocean. It is characterized by a cephalic sensory-canal pore pattern lacking only the IT pore (Pattern 2); a dorsal/anal-fin-ray formula of 8/7; 15 branched pectoral-fin rays; a fifth pelvic-fin ray; and long, white anterior narial tubes. The live color pattern is distinctive, not similar to any of the 116 other species of the genus, comprising bright red-and-white markings on the head and orange and yellow bars crossing the translucent body.

**Key words:** taxonomy, systematics, ichthyology, Indian Ocean, coral-reef fishes, gobies, biogeography

**Citation:** Greenfield, D.W. & Gordon, L. (2019) *Eviota dalyi*, a new dwarfgoby from the Amirante Islands, Seychelles (Teleostei: Gobiidae). *Journal of the Ocean Science Foundation*, 33, 9–15.

**doi:** <https://doi.org/10.5281/zenodo.3066358>

**urn:lsid:zoobank.org:pub:7F87B4AE-E91F-4C93-A947-7F279EB9F32A**

**Date of publication of this version of record:** 21 May 2019

## Introduction

Dwarf gobies (genus *Eviota*) are among the most diverse and rapidly evolving lineages of vertebrates, with 116 valid species prior to this description (Greenfield 2017), and more coming to light regularly. A dichotomous key to the 107 valid species of the genus described between 1871 and April 2016 was presented in Greenfield & Winterbottom (2016), and subsequently a number of additional species have been described from widespread locations in the Indo-Pacific Ocean, including several from Indonesia (Tornabene & Greenfield 2016; Greenfield & Erdmann 2017; Greenfield, Tornabene & Erdmann 2017; Greenfield, Tornabene, Gómez-Buckley & Erdmann 2018; Greenfield, Tornabene, Erdmann & Pada 2019); Fiji (Greenfield & Randall 2016, Greenfield & Suzuki 2016); Norfolk Island, Australia (Greenfield & Randall 2017); and one representative from the Indian Ocean, *E. sodwanaensis* from South Africa (Greenfield & Winterbottom 2016).

Another species from the Indian Ocean was discovered while conducting surveys for manta rays at a cleaning station on a reef north of D'Arros Island, Amirante Islands in the Seychelles in 2017. Ryan Daly and the second author observed a dwarf goby that they did not recognize. They photographed and collected two specimens from that locality, preserving them in ethanol. Those specimens and the photographs were sent to the first author who determined that they represented an undescribed species. However, because of the poor preservation condition of the specimens, they could not be adequately described at the time. Ryan Daly returned in 2019 to the same reef, at the same specific location as he collected the prior specimens, and photographed, collected, and preserved the single specimen that is the holotype of the new species. This description constitutes the 117<sup>th</sup> valid *Eviota* species described to date.

## Materials and Methods

Type specimens are deposited in the fish collection at the California Academy of Sciences, San Francisco, CA, USA (CAS).

Counts and measurements, descriptions of fin morphology, and the cephalic sensory-canal pore patterns follow Lachner & Karnella (1980) and Jewett & Lachner (1983). 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. 8/7) only include segmented rays. Measurements were made to the nearest 0.1 mm using an ocular micrometer or dial calipers (latter only for SL, 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 the horizontal distance between verticals at the rear base of the anal fin and the caudal-fin base; pelvic-fin length is the length of the longest ray; 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 and an airjet were used to make the cephalic sensory-canal pores more obvious (Akihito et al. 1993, 2002, Saruwatari et al. 1997).

*Eviota dalyi*, n. sp.

Amirante Dwarfgoby

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Figures 1–6

**Holotype.** CAS 246480, 6.9 mm SL female, Republic of Seychelles, Amirante Islands, north of D'Arros Island, -5.4094°, 53.2984°, 16.5 m, clove oil & hand net, R. Daly, 1 March 2019.

**Paratypes.** CAS 246482, 10.3 mm SL female & 11.2 mm SL male, same locality as holotype (within 2 m), clove oil & hand net, R. Daly & L. Gordon, 27 November 2017 (preserved in ethanol).

**Diagnosis.** A species of *Eviota* with cephalic sensory-canal pore system lacking only an IT pore (Pattern 2); dorsal/anal fin-ray formula 8/7; pectoral-fin pointed when depressed, 15 branched rays; fifth pelvic-fin ray present and about 20% of fourth; no dark markings on head; long, white anterior narial tubes; and bright red-and-white markings on head and orange and yellow bars crossing translucent body.

**Description.** Dorsal-fin elements VI+I,8; first dorsal fin triangular, spines not filamentous, rays 2, 6, 7 & 8 branched; anal-fin elements I,7, first two unbranched, last ray split to base; pectoral-fin pointed when depressed, 15 branched rays, reaching to below fourth soft ray of second dorsal fin; fifth pelvic-fin ray length about 20% of fourth ray, 7 branches on fourth ray, two segments between consecutive branches of fourth pelvic-fin ray, pelvic-fin membrane reduced, no basal membrane, fin reaching past anal-fin origin; caudal fin with 11 branched and 16 segmented rays; lateral-line scales 25; transverse scale rows 7; urogenital papilla of male a flat rounded plate; female urogenital papilla smooth, bulbous, with long finger-like projections on end.

Front of head sloped, profile an angle of about 70° from horizontal axis; mouth slanted obliquely upwards, forming an angle of about 40° to horizontal axis of body, lower jaw not projecting; maxilla extending posteriorly to below posterior margin of pupil; anterior narial tube long and white, extending anteriorly beyond posterior margin of lip; gill opening extending forward to posteroventral edge of preoperculum; cephalic sensory-canal pore system lacking only IT pore (Pattern 2); cutaneous sensory papillae obscure; teeth not examined.



**Figure 1.** *Eviota dalyi*, underwater photograph of holotype, Amirante Islands, Seychelles (R. Daly).



**Figure 2.** *Eviota dalyi*, fresh holotype, Amirante Islands, Seychelles (R. Daly).

Measurements (% SL of holotype): head length 29.3; origin of first dorsal fin 34.3; origin of second dorsal fin 58.6; origin of anal fin 62.6; caudal-peduncle length 25.2; caudal-peduncle depth 14.6; body depth 20.2; eye diameter 8.1; snout length 4.0; upper-jaw length 10.6; pectoral-fin length 32.3; greatest pelvic-fin length 35.3.

**Color in life.** (Figs. 1–5) Background color of head translucent gray and body translucent and colorless. Head with red and white markings. Elongate anterior narial tubes stark white, jaws red, and snout white. Iris white with irregular red markings, not bars. Two red bars under eye, one at 6 o'clock, the other at 5 o'clock position. Area behind eye stark white crossed by three red bars from top of head. Red area on preoperculum with a white spot on ventral portion. Operculum red with white area dorsally, joining white area behind eye. Pectoral-fin base yellow, crossed by a stark white bar extending posteroventrally down from white area behind eye. Area above pectoral-fin base and white bar with red blotch, grey nape above it crossed by two yellow bars. Top of head with a red triangle enclosing a white spot between eyes just posterior to bifurcation of interorbital canal, a crescent-shaped red bar on each side behind triangle, followed by a large crescent-shaped red area crossing top of head; a few large melanophores scattered over cranium on one paratype. White line extending down vertebral column, interrupted by red, orange, and yellow segments. First body bar behind pectoral-fin base, extending from first dorsal-fin base to ventral surface, portion above vertebral level orange, grading to yellow at lower abdomen. Second body bar under the end of first dorsal fin similar in color pattern and separated from first by a stark white area; similar white



**Figure 3.** *Eviota dalyi*, underwater photograph of paratype, Amirante Islands, Seychelles (L. Gordon).



**Figure 4.** *Eviota dalyi*, fresh paratype, Amirante Islands, Seychelles (R. Daly).

area behind second bar. Remaining body bars yellow, with narrow white bars in between, extending to ventral surface. Fin membranes clear with a few scattered melanophores on distal margin of first dorsal fin and distal margin of second dorsal fin edged with yellow. One fresh paratype with dark markings over preural centrum (Fig. 4).

**Color in preservative.** (Fig. 6) Background color of head, body and fins light cream with no distinctive dark marks. The dark marks near the preural centrum of fresh specimens not visible.

**Etymology.** The species is named after Ryan Daly, who photographed and collected the holotype and who has played a major role in surveying the fishes of the Seychelles Islands (Daly et al. 2018).

**Distribution.** Currently known only from a small coral patch north of D'Arros Island, Amirante Islands, Seychelles Republic. The fish were associated either with a large massive *Porites* coral colony or a marginal algal-covered section of the reef with a mix of rubble and hard corals (primarily *Acropora* spp.).

**Comparisons.** There are no described species of *Eviota* having the combination of a dorsal/anal-fin-ray formula of 8/7, branched pectoral-fin rays, and the cephalic sensory-canal pore system lacking only the IT pore, as occurs in *E. dalyi*. There is a typographical error in Table 3 of Greenfield (2017) showing *E. pellucida* having branched pectoral-fin rays— they are in fact unbranched in that species and thus not similar to *E. dalyi*. As discussed by Greenfield & Winterbottom (2016), the membranous roof of the IT pore may easily be destroyed in small specimens. Thus, although we found no indication of an IT pore, we believe it is prudent to compare the new species with species



**Figure 5.** *Eviota dalyi*, head of fresh paratype, Amirante Islands, Seychelles (R. Daly).



**Figure 6.** *Eviota dalyi*, preserved holotype, CAS 246480, 6.9 mm SL female, Amirante Islands, Seychelles (D.W. Greenfield).

having a complete pore pattern and a dorsal/anal-fin-ray formula of 8/7: i.e. *E. pardalota*, *E. rubriguttata*, and *E. sodwanaensis* (Greenfield 2017: Table 2). Those three species can be distinguished from *E. dalyi* as follows: *E. pardalota* has two dark, vertically aligned spots on the pectoral-fin base and a series of more than 8 dark spots on the body along the base of the dorsal fins onto the caudal peduncle (not in *E. dalyi*); *E. rubriguttata* lacks the fifth pelvic-fin ray (vs. present), has red body bars (vs. yellow) that are dark in preservative (vs. absent), and red spots on the dorsal and anal fins (vs. none); and *E. sodwanaensis* has a dark occipital spot, black first dorsal and anal fins, and a dark second dorsal fin (vs. no spot or dark fins). Furthermore, the live color pattern of *E. dalyi* is distinctive, not similar to any of the 116 other species of the genus, comprising bright red-and-white markings on the head and orange and yellow bars crossing the translucent body.

**Remarks.** Most collections of fishes from the Republic of Seychelles in the past have been made using ichthyocides, resulting in a mixture of fishes from an area and not targeting a specific group of fishes. Smaller fishes, such as the dwarfgobies, are often overlooked and photographs of fresh specimens are usually not taken. Ichthyocide collections from the Seychelles have yielded a total of 12 confirmed species of *Eviota*, with 4 species described specifically from the islands: *E. infulata*, *E. notata*, *E. pseudostigma*, and *E. zebrina*. This example of the discovery of a new tiny species of goby by directed searching, photographing, and collecting illustrates how the diversity of dwarfgobies has likely been greatly underestimated and intensive efforts need to be made to resolve their taxonomy.

## Acknowledgments

We thank the Ministry of Environment, Energy and Climate Change of the Republic of Seychelles for permission to describe the *Eviota* specimens. We also thank the staff of the California Academy of Sciences (David Catania, Jon Fong, Mysi Hoang, and Luiz Rocha) who provided valuable curatorial and logistic support. We would also like to acknowledge the founders of Save Our Seas Foundation: Guy Stevens, Clare Keating Daly and Hannah Vaughn-Jones; and those on D'Arros Island who provided support and assistance to the D'Arros Research Centre. The manuscript was reviewed by Gerald R. Allen and Richard Winterbottom.

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Erratum for:

Greenfield, D.W. & Gordon, L. (2019) *Eviota dalyi*, a new dwarfgoby from the Amirante Islands, Seychelles (Teleostei: Gobiidae). *Journal of the Ocean Science Foundation*, 33, 9–15.

Acknowledgments should read as:

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24 May 2019