Journal of the
Ocean Science Foundation

2020, Volume 35

Eviota marteynae, a new dwarfgoby from the Maldive Islands (Teleostei: Gobiidae)

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Abstract

A new species of dwarfgoby, *Eviota marteynae* n. sp., is described from Kaafa-haa, Laamu Atoll, Maldive Islands. The new species is characterized by having a cephalic sensory-canal pore system lacking only the IT pore (Pattern 2), a dorsal/anal fin-ray formula of 8/8, one or more branched pectoral-fin rays, the fifth pelvic-fin ray present, a deep body (>23% SL), a deep caudal peduncle (>14 % SL), a rounded internal dark spot over the preural centrum, 6 postanal bars, the pectoral-fin base with scattered melanophores, and the distal two-thirds of the first dorsal fin yellow with a black margin.

Key words: taxonomy, ichthyology, coral-reef fishes, gobies, Indian Ocean, *E. shibukawai*

Citation: Greenfield D.W. & Erdmann, M.V. (2020) *Eviota marteynae*, a new dwarfgoby from the Maldive Islands (Teleostei: Gobiidae). *Journal of the Ocean Science Foundation*, 35, 94 –101.

doi: https://doi.org/10.5281/zenodo.3966504
urn:lsid:zoobank.org:pub:40AC062A-642E-404C-81D4-EBFBFFE547A4

Date of publication of this version of record: 30 July 2020

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 120 described species (excluding the new species described herein), with many having been described in the last 10 years. This increase is mainly due to selective searching, underwater photography, and collection by diving researchers. This approach was centered in the Pacific Ocean (Greenfield 2017) until recently, when Greenfield & Gordon (2019) described *Eviota dalyi* that was photographed and collected by Ryan Daly at the Amirante Islands, Seychelles.

The species described in this paper was photographed and collected by the second author at Kaafa-haa, Laamu Atoll, Maldive Islands. Few of the species previously described from the Indian Ocean had information on live coloration (e.g. Lachner & Karnella [1980] and Jewett & Lachner [1983]), making it difficult to separate them from similar species in the Pacific Ocean. In 2018 and 2019, the general manager of the Six Senses Resort at Laamu Atoll in the Maldives, Ms. Marteyne van Well (herself an accomplished underwater photographer) and her dive-center managers Lauren Siba and Sascha Janson, invited the second author and colleague Gerald R. Allen to conduct reef-fish biodiversity surveys around Laamu Atoll, affording an outstanding opportunity to photograph and collect the dwarfgoby assemblage found there. The new species described herein was collected as part of that survey effort.

Materials and Methods

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

Counts and measurements and descriptions of fin morphology follow 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. 8/8) 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 b ase 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, papillae, and scale outlines more obvious (Akihito et al. 1993, 2002, Saruwatari et al. 1997).

Eviota marteynae, n. sp.

Red Star-eye Dwarfgoby

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Figures 1–4, 7A

Holotype. CAS 247235, 10.3 mm SL, male, Maldive Islands, Laamu Atoll, Kaafa-haa, 1.80873°, 73.35158°, 12 m, field number MVE-18-010, M.V. Erdmann, 23 February 2018.

Paratypes. CAS 247236, 4 males (7.7–9.6 mm SL), 3 females (8.6–9.6 mm SL), 3 immature (5.7–6.9 mm SL), Maldive Islands, Laamu Atoll, Kaafa-haa, 1.80873°, 73.35158°, 12–15 m, field number MVE-19-078, M.V. Erdmann, 19 October 2019.

Diagnosis. A species of *Eviota* distinguished from all congeners by a combination of cephalic sensory-canal pore system lacking only an IT pore (Pattern 2), a dorsal/anal fin-ray formula of 8/8, one or more pectoral-fin rays branched, fifth pelvic-fin ray present and 7–12% of fourth, body deep (23–32% SL), caudal peduncle deep (14–17% SL), a rounded internal dark spot over the preural centrum, 6 postanal bars, pectoral-fin base with scattered melanophores,and distal two thirds of first dorsal fin yellow with a black margin.

Description. Dorsal-fin elements VI + I,8, first dorsal fin triangular, first two spines filamentous in males and females, second spine reaching to second ray of second dorsal fin when adpressed; all second-dorsal-fin soft rays branched except first and penultimate branched, last ray branched to base; anal-fin elements I,8, all soft rays branched, last ray branched to base; pectoral-fin rays 15 (13–15, usually 15), some branched, pointed, reaching to below second dorsal fin when unbroken; pelvic-fin rays I,5, fifth ray 10% (7–12%) of length of fourth; 3 (0–5) branches, 3 (2–3) segments between consecutive branches of fourth pelvic-fin ray, pelvic-fin membrane well developed, basal membrane reduced; caudal fin with 12 (11–13) branched and 17 segmented rays; lateral-line scales 25 (24–25, usually 25); transverse scale rows 7; urogenital papilla of male smooth, wide, with several short finger-like projections at tip; female papilla also smooth but somewhat more bulbous and with slightly longer projections, making sex determination subjective; front of head rounded with an angle of about 60° from

Figure 1. *Eviota marteynae*, fresh female paratype, CAS 247236, Laamu Atoll, Maldive Islands (Mark V. Erdmann).

Figure 2. *Eviota marteynae*, fresh male holotype, CAS 247235, Laamu Atoll, Maldive Islands (Mark V. Erdmann).

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 front of pupil; anterior tubular nares long, extending to center of upper lip; gill opening extending forward to below posteroventral edge of preoperculum. Cephalic sensory-canal pore system lacking only an IT pore (Pattern 2); cheek papillae in a very reduced transverse pattern, and, as discussed by Winterbottom & Greenfield (2020), papilla row *b* is comprised of two sections.

Measurements (percentage of SL; based on holotype and 6 paratypes, 77.7–10.3 mm SL) head length 29.6 (29.6–33.7, 32.3); origin of first dorsal fin 35.9 (35.9–39.6, 37.9); origin of second dorsal fin 58.7 (56.2–63.7, 58.7); origin of anal fin 60.2 (57.9–65.9, 60.8); caudal–peduncle length 23.3 (19.2–22.3, 21.0); caudal-peduncle depth 15.5 (14.4–16.9, 15.6); body depth 24.7 (23.4–31.9, 26.0); eye diameter 9.7 (9.7–12.6, 11.5); snout length 3.9 (3.8–5.7, 4.7); upper-jaw length 8.2 (8.1–10.4, 8.7); pectoral-fin length 33.0 (20.1–46.6, 29.8); pelvic-fin length 25.2 (25.2–36.3, 29.2).

Color of fresh specimens. (Figs. 1, 2 & 7A) Background color of head and body translucent bluish gray; scales on body burnt orange, scale pockets lined with black; a round dark internal spot centered over preural centrum; a series of white spots extend along dorsal surface from top of head, under dorsal fins, and onto caudal peduncle, a similar line of white spots extend along ventral surface from anal-fin origin to caudal fin. Head covered with irregular-shaped burnt-orange blotches; snout and jaws burnt orange; iris red orange with 7 narrow,

Figure 3. *Eviota marteynae*, preserved male holotype, CAS 247235, Laamu Atoll, Maldive Islands (David W. Greenfield).

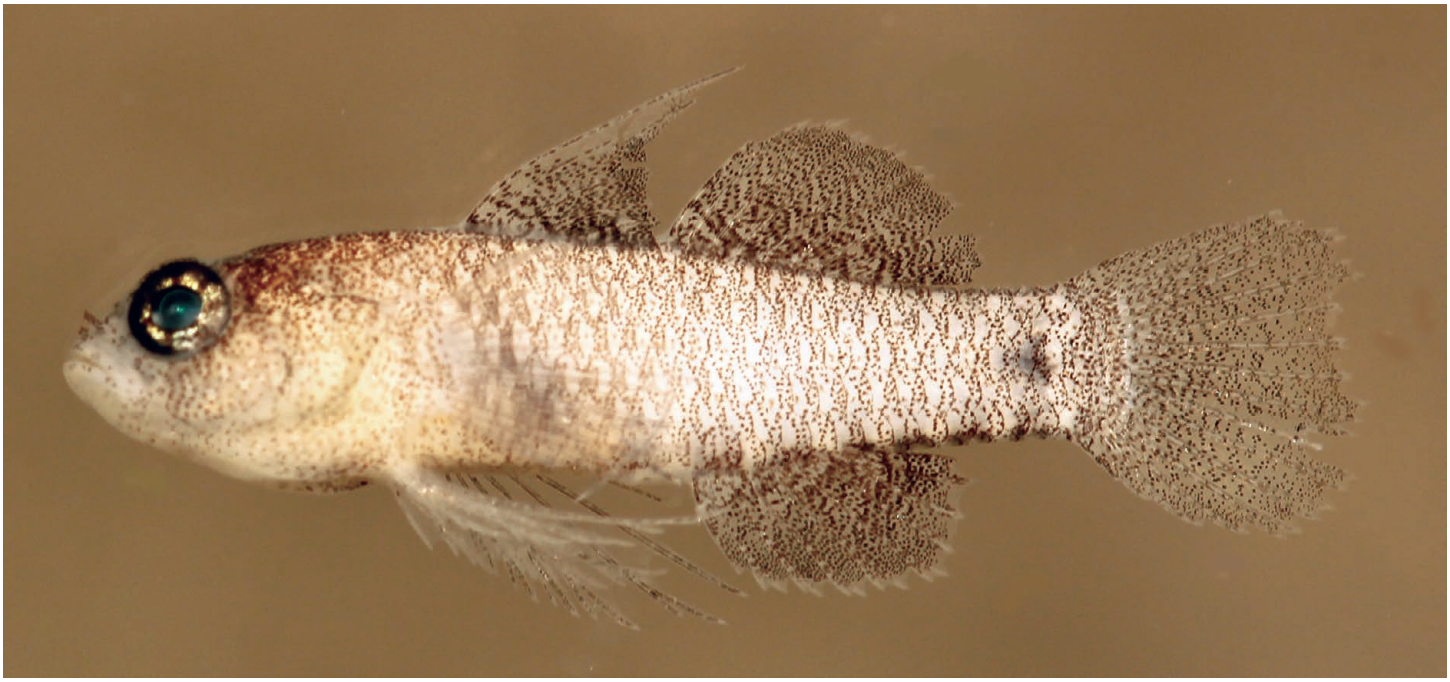

Figure 4. *Eviota marteynae*, preserved female paratype, CAS 247236, Laamu Atoll, Maldive Islands (David W. Greenfield).

bluish gray bands radiating from pupil-like spokes. First dorsal fin red orange along basal third, remainder of fin lemon yellow with a black margin, crossed by two curved rows of white dots on orange area; second dorsal and anal fins red orange along basal half, distal portion black, entire fin covered with electric-blue spots and blotches; caudal fin red orange on basal three-fourths and black on distal portion with electric blue spots covering entire fin; pectoral and pelvic fins clear.

Color of holotype in preservative. (Fig. 3; female paratype in Fig. 4) Background color of head and body light yellow. Body with spindle-shaped pattern of brown lines from pigment in scale-pocket tissue, overlaid by a peppering of brown melanophores; a brown spot centered over the preural centrum; ventral side of body posterior to anal-fin origin with 6 dark-brown marks from internal body bars, three over anal fin; pectoral-fin base with a peppering of melanophores, lighter on abdomen. Top of head and nape with a heavy peppering of brown

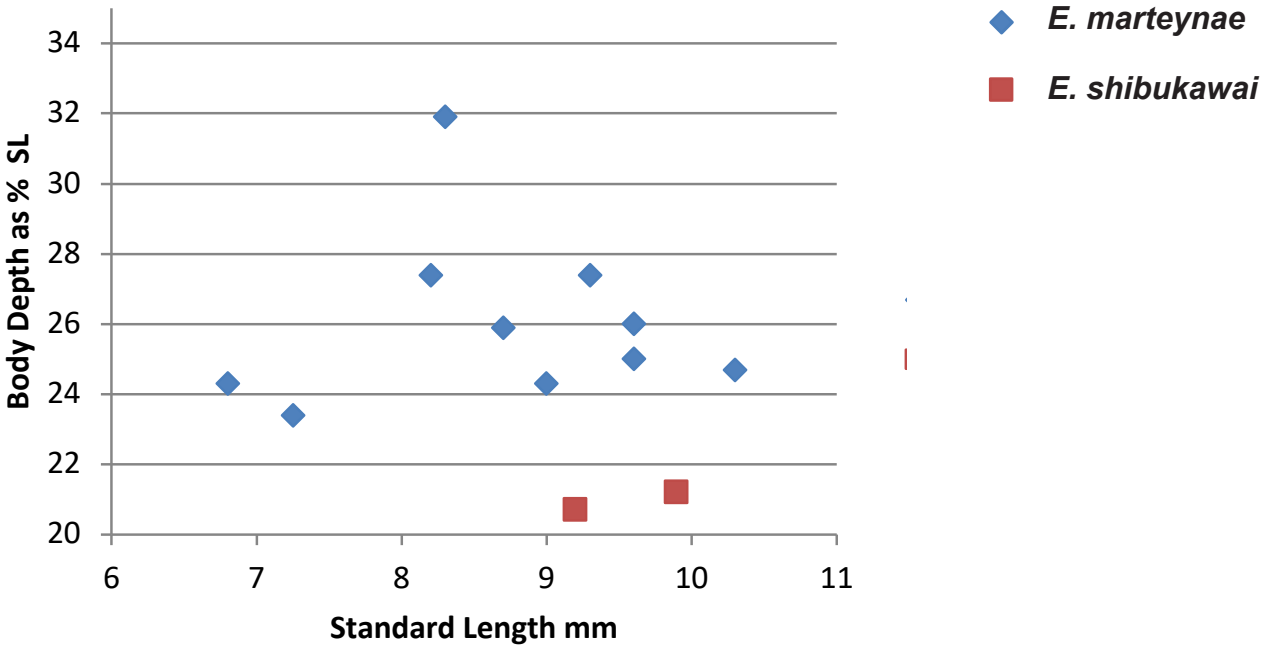

Figure 5. Greatest body depth versus SL for *Eviota marteynae* and *Eviota shibukawai.*

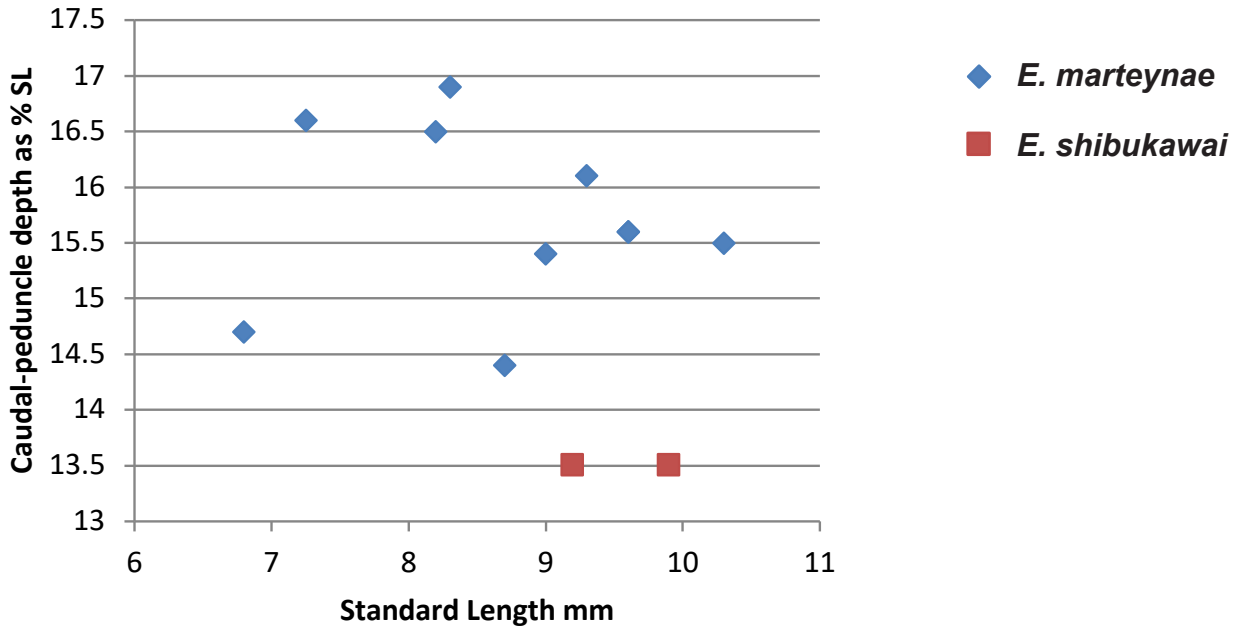

Figure 6. Caudal-peduncle depth versus SL for *Eviota marteynae* and *Eviota shibukawai.*

melanophores; side and ventral surface of head with less peppering; snout and jaws lacking pigmentation. First dorsal fin with a rounded dark-brown spot at lower third of last two spinous membranes, remainder of fin with scattered clusters of melanophores, posterior distal margin with dark band; second dorsal and anal fins with many blotches of melanophores, distal margins darker; caudal fin with scattered blotches, base of fin lighter; pectoral-fin rays with dark margins, pelvic fins mostly clear.

Etymology. It is a pleasure to name this species after Marteyne van Well, the General Manager of the Six Senses Resort on Laamu Atoll, in honor of her deep commitment to sustainability in the hospitality industry and her strong support for marine conservation initiatives that protect the reefs where this species is found.

Distribution. The new species is currently known only from Laamu Atoll, Maldive Islands. The specimens were collected or observed across a depth range of 8–30 m, and were found under large pieces of coral rubble along a gentle slope on an inner patch reef. They were never observed in the open, but only found under coral rubble and living within the interstices of the reef.

Comparisons. *Eviota marteynae* belongs to the Pattern 2 group of Lachner & Karnella (1980), with the cephalic sensory-canal pore system lacking only the IT pore. Including *E. marteynae*, there are 46 valid species in this group. Of those, only 10 species also have branched pectoral-fin rays and a dorsal/anal fin-ray formula of 8/8: *E. asymbasia, E. bipunctata, E. dalyi, E. dorsimaculata, E. indica, E. lacrimosa, E. latifasciata, E. piperata, E. rubra*, and *E. shibukawai*. Four of those species (*E. asymbasia, E. bipunctata, E. lacrimosa*, and *E. piperata*) can be separated by having one or two distinct dark marks on the pectoral-fin base (vs. none). Two more (*E. dalyi* and *E. rubra*) have no dark spot over the preural centrum (vs. present). Two more (*E. dorsimaculata* and *E. latifasciata*) have 4 postanal bars (vs. 6). *Eviota indica* can be distinguished by a vertically elongated dark spot over the preural centrum (vs. rounded) and the first dorsal fin not elongated (vs. elongated). *Eviota shibukawai* appears to be most similar to *E. marteynae*; it was described based on two specimens from Japan (Suzuki & Greenfield 2014). The two species share a small size (less than 10.3 mm SL), a rounded dark spot over the preural centrum, and are heavily peppered with melanophores, most evident in preserved specimens.However, *E. shibukawai* is more slender (body depth 21%) and *E. marteynae* more deep-bodied (body depth 23–32%, mean 26%) (Fig. 5). Correspondingly, the caudal-peduncle depth is 13% SL in *E. shibukawai* vs. 14–17% (mean 15.7%) in *E. marteynae* (Fig. 6). The shape of the first dorsal fin also differs between the two species, with that of *E. shibukawai* being more rounded. The photographs of anesthetized individuals of *E. marteynae* show small electric-blue spots on the body and fins that are not apparent on photographs of freshly dead *E. shibukawai* (Fig. 7). In addition, the yellow on the first dorsal fin is present only on the distal edge in *E. shibukawai* (vs. distal two-thirds) and the internal dark spot over the preural centrum also appears to be smaller.

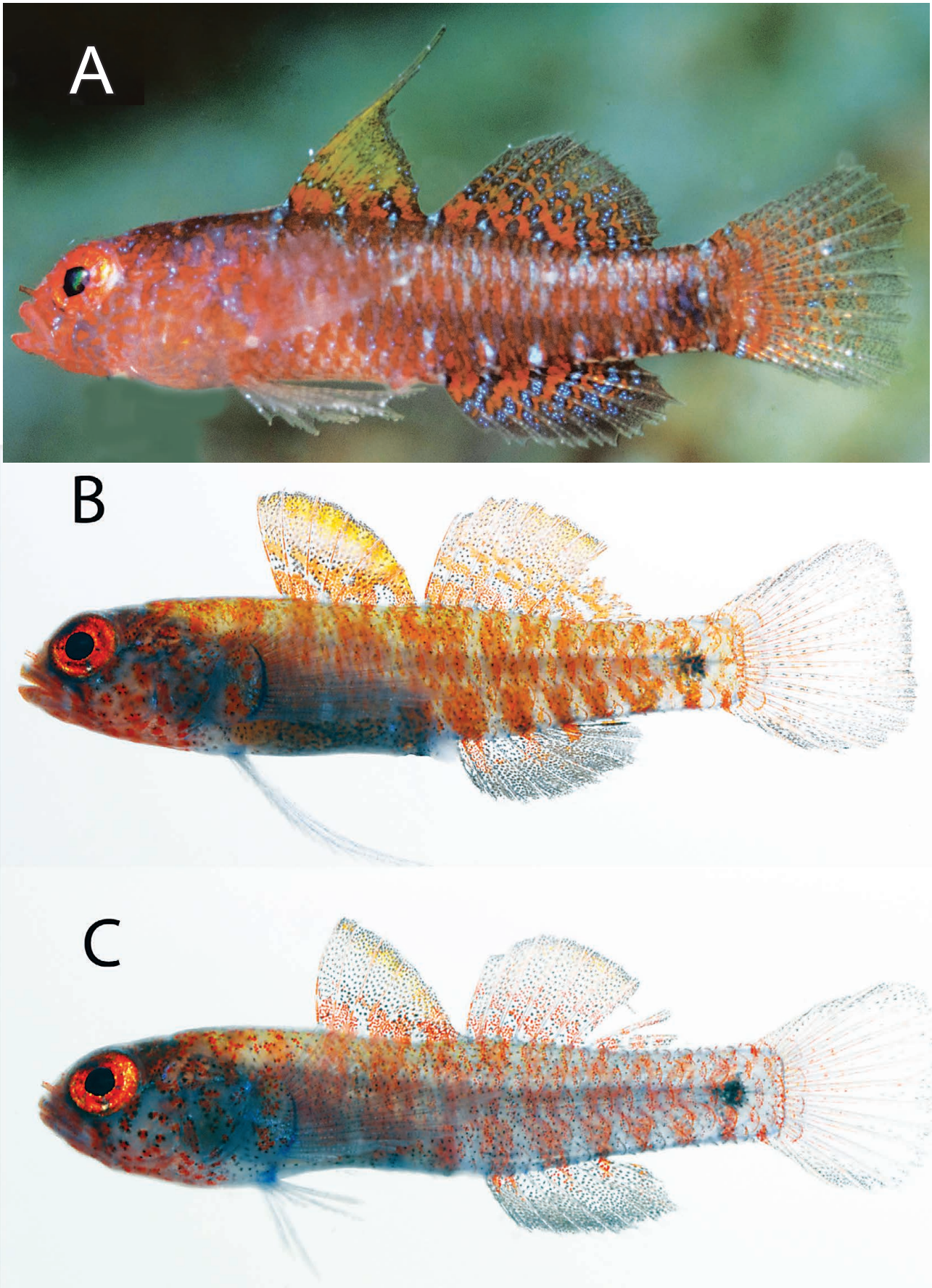

Figure 7. *Eviota marteynae*, fresh female paratype (A), CAS 247236, Laamu Atoll, Maldive Island (Mark V. Erdmann) vs. *Eviota shibukawai,* fresh female holotype (B), NSMT-P 114946, 9.9 mm SL, Iriomote-jima, Japan (Toshiyuki Suzuki) and freshly collected juvenile paratype (C), NSMT-P 114947, 9.2 mm SL, Iriomote-jima, Japan (Koichi Shibukawa) (from Figs. 2 & 3 of Suzuki & Greenfield [2014]).

Acknowledgments

We thank Lauren Siba, Sascha Janson, and Marteyne van Well of Six Senses Laamu for their generous hosting of the second author during several trips to Laamu to document the reef-fish biodiversity, and our colleague Gerald R. Allen for his companionship above and below water during those surveys. Special thanks to Shaha Hashim and Hassan Hameez for their local hospitality and excellent guiding skills underwater. We also thank the Maldives Ministry of Fisheries and Agriculture for allowing collection of the specimens under permit (OTHR)30-D/PRIV/2018/134. We thank Toshiyuki Suzuki and Koichi Shibukawa for the use of their photographs and D. Catania, J. Fong, M. Hoang, and L. Rocha of the California Academy of Sciences for valuable curatorial and logistic support. The manuscript was reviewed by Gerald R. Allen and Rick Winterbottom.

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