




## *Eviota niedenthali*, a new dwarfgoby from Bikini Atoll, Marshall Islands (Teleostei: Gobiidae)

DAVID W. GREENFIELD

Research Associate, Department of Ichthyology, California Academy of Sciences,  
55 Music Concourse Dr., Golden Gate Park, San Francisco, California 94118-4503, USA

Professor Emeritus, University of Hawai'i

Mailing address: 944 Egan Ave., Pacific Grove, CA 93950, USA


 <https://orcid.org/0000-0001-9122-4023> E-mail: [greenfie@hawaii.edu](mailto:greenfie@hawaii.edu)

MARK V. ERDMANN

Re:wild, PO Box 129, Austin, Texas 78767, USA

Research Associate, Department of Ichthyology,

California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118-4503, USA

 <https://orcid.org/0000-0002-3644-8347> E-mail: [mverdmann@gmail.com](mailto:mverdmann@gmail.com)

NESHA K. ICHIDA

Thrive Conservation, Jl. Subak Sari 13, Tibubeneng, Bali 80361 Indonesia

E-mail: [nesha@thriveconservation.org](mailto:nesha@thriveconservation.org)

### Abstract

A new species of dwarfgoby, *Eviota niedenthali*, is described from Bikini Atoll, Marshall Islands, an archipelago in the northwestern tropical Pacific Ocean. The new species is distinguished by having a dorsal/anal-fin formula of 8/8; some branched pectoral-fin rays; no fifth pelvic-fin ray; the cephalic sensory-canal pore system lacking only the IT and POP pores; a large black spot centered on the caudal peduncle; two oval, colon-like, black spots centered on the pectoral-fin base; 6 ventral postanal spots; and a smooth, not tapering, male urogenital papilla.

**Key words:** taxonomy, ichthyology, coral-reef fishes, gobies, new species, cryptobenthic fishes, species complexes

**Citation:** Greenfield D.W., Erdmann, M.V. & Ichida, N.K. (2026) *Eviota niedenthali*, a new dwarfgoby from Bikini Atoll, Marshall Islands (Teleostei: Gobiidae). *Journal of the Ocean Science Foundation*, 46, 9–14.

**doi:** <https://doi.org/10.5281/zenodo.20299414>

**urn:lsid:zoobank.org:pub:F49B4A5C-05F3-429C-89D4-4DF3FEA8B651**

**Date of publication of this version of record:** 20 May 2026

## Introduction

The Bikini Atoll in the Marshall Islands is well known as the site of early testing of atmospheric and underwater nuclear weapons. Two detonations were conducted for “Operation Crossroads”, one atmospheric on 1 July and then the first ever underwater test, at 27 m depth in the lagoon, on 25 July 1946. The following year, from April to May, the Smithsonian Institution conducted biological surveys of the atoll, including the fishes (Schultz 1948). In that report, the only mention of fishes in the genus *Eviota* was that they were the smallest specimens sampled, at 15 mm SL. Subsequently, in the three-volume work “Fishes of the Marshall and Marianas Islands” (Schultz et al. 1953, 1960, 1966), *Eviota* is not mentioned. The collections made by the Smithsonian were all large rotenone stations in shallow waters, 0–6 m deep, where fishes killed by the chemical were then picked up off the bottom or in the water column with nets as they reacted to the rotenone. The specimens of *Eviota* were returned to the Smithsonian, but were not identified, apparently due to their poor condition.

In July 2025, the second and third authors visited Bikini Atoll as part of a filming and scientific team led by Deep Sea Productions and guided by Jack Niedenthal, consultant to the People of Bikini. While a primary objective of the trip was to document the state of the recovery of the reefs of Bikini after the extensive series of nuclear tests conducted in the atoll (detonating 23 nuclear devices, including a hydrogen bomb, over the span from 1946 to 1958), MVE and NKI also took the opportunity to document the dwarfgoby biodiversity of Bikini Atoll. Using a targeted, underwater, visual-census approach to search for individuals of *Eviota* across a depth range of 2–40 m (described in Greenfield et al. 2025a), we recorded 12 different dwarfgoby species, including the new species described here. Myers (1999) reviewed Micronesian reef fishes and listed 10 known species of *Eviota* in his checklist for Marshall Islands; he included J.E. Randall’s extensive collections of gobies at Enewetak, 384 km west of Bikini, with 30 lots comprising 12 *Eviota* species at BPBM.

The genus *Eviota* is currently represented by 138 valid species (Greenfield et al. 2026). The description of this species brings the total to 139. These tiny fishes (usually <18 mm SL) are relatively abundant on coral reefs, serving as an important link in the food chain between small invertebrates and larger fishes (Greenfield 2017), but because of their small size are often not counted in surveys. Targeted searches for *Eviota* species have resulted in the discovery of a number of undescribed species in recent years.

## Materials and Methods

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

Descriptions of pelvic-fin morphology and cephalic sensory-canal pores follow Greenfield et al. (2025b). Postanal ventral midline spots, along the posterior ventral midline of the body, begin at the anal-fin origin and extend to a vertical drawn two to three scale rows anterior to the ends of the hypurals; the additional smaller spot posterior to this, if present, is not counted. Dorsal/anal-fin-ray formula counts (e.g., 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). Lengths are given as standard length (SL), measured from the median anterior point of the upper lip to the base of the caudal fin (i.e. the posterior end of the hypural plate); the 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; the origin of the second dorsal fin is measured from the median anterior point of the upper lip to the anterior base of its spine; the 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 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 niedenthali*, fresh from type series, anesthetized and underwater, Bikini Atoll, Bikini Lagoon (M.V. Erdmann).

***Eviota niedenthali*, n. sp.**

**Bikini Colon Dwarfgoby**

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Figures 1 & 2

**Holotype.** CAS 249898, 13.6 mm SL female Marshall Islands, Bikini Atoll, Bikini Lagoon, 11.63057°, 165.5288°, 10 m, M.V. Erdmann & N.K. Ichida, 7 July 2025.

**Paratypes.** CAS 249899, 12.5 mm & 12.9 mm SL males & 14.0 mm SL female, taken with holotype.

**Non-type specimens.** CAS 249900, 13.6 mm SL male & 8.3 mm SL immature, taken with holotype, preserved in ethanol.

**Diagnosis.** A species of *Eviota* distinguished from all congeners by a combination of a cephalic sensory-canal pore system lacking only IT and POP pores; a dorsal/anal fin-ray formula of 8/8, lower 7 or 8 pectoral-fin rays branched, no fifth pelvic-fin ray; two oval, colon-like, black spots centered on pectoral-fin base; a black spot centered on caudal peduncle; 6 ventral post-anal spots; and male urogenital papilla wide, not tapering, smooth, with several short papilla at end.

**Description.** Dorsal-fin elements VI+I,8, first dorsal fin triangular; first spine elongated but not filamentous; all second dorsal-fin soft rays branched, last to base; anal-fin elements I,8, all soft rays branched, last to base; pectoral-fin rays 15, lower 7 or 8 branched, reaching to mid-anal-fin; pelvic-fin elements I,4, fifth ray absent, pelvic-fin membranes between branches well developed, basal membrane reduced; 11 branched and 17 segmented caudal-fin rays; 24 lateral scales, 7 transverse scales; urogenital papilla of male holotype wide, not tapering, with several short papilla at end; front of head sloped with an angle of about 60° from horizontal axis; mouth slanted obliquely upwards, forming an angle of about 55° to horizontal axis, lower jaw not projecting; maxilla extending posteriorly to center of pupil; anterior naris tube short, extending just to posterior margin of upper lip; gill opening extending forward just past posteroventral edge of preoperculum. Cephalic sensory-canal pore system lacking only IT and POP pores.

Measurements of holotype followed by range for all specimens and mean as percentage of SL: head length 30.1 (29.3–30.4, 30.0); origin of first dorsal fin 36.8 (36.8–38.4, 37.3); origin of second dorsal fin 55.4 (55.4–60.7, 58.3); origin of anal fin 60.2 (60.0–63.3, 61.3); caudal-peduncle length 23.5 (20.1–23.5, 21.8); caudal-peduncle depth 12.5 (12.4–14.7, 13.3); body depth 22.0 (22.0–25.0, 23.7); eye diameter 10.3 (9.2–10.1, 9.5); snout length 4.4 (3.6–4.8, 4.3); upper-jaw length 10.3 (8.5–12.4, 10.5); pectoral-fin length 36.8 (35.7–47.2, 40.0); pelvic-fin length 40.4 (33.6–40.4, 37.2).

**Color in life.** (Fig. 1) Background color of head and body translucent light yellow; scale edges lined with red-orange making scales obvious; body crossed by 6 red-orange bars, first bar at front of first dorsal fin, second under rear of first dorsal fin, third at front of second dorsal fin extending down to anterior anal fin, fourth bar X-shaped below center of second dorsal fin with lower arms reaching to center and rear of anal-fin base, fifth bar X-shaped on anterior portion of caudal peduncle, sixth bar on caudal peduncle passing through a large, rectangular, black spot, then a curved red bar at caudal-fin base; two oval, black, colon-like spots on pectoral-fin base; body beneath and below pectoral-fin base golden yellow; top of head and nape with a row of oblong black spots, two behind eye, two on nape, and the fifth below those on the nape and above the operculum; side of head with several scrawled red-orange vertical lines with melanophores on them, three under the eye extending down over jaws; jaws and snout with scattered red-orange areas; pupil surrounded by narrow golden ring, iris red with silver-black spokes radiating out from pupil; first dorsal fin with two red spots at base above body bars, lower half clear, lower half yellow, entire fin peppered with melanophores; second dorsal and anal fins similar, heavily peppered with melanophores some red spots on rays and red spots along base where body bars meet fin base; caudal fin with red dots along rays, heavily peppered with melanophores and a curved red bar at base over hypural plate..

**Color in preservative.** (Fig. 2) Background color of head and body light cream, body peppered with small melanophores, 6 black, ventral, post-anal spots, an indistinct dark bar over caudal peduncle; pectoral-fin base with a scattering of larger melanophores forming a spot above and bar below; side of head with scattered larger melanophores, some forming a thin bar on preoperculum, dense melanophores over cranium, a bar of melanophores under eye; snout, jaws and underside of head peppered with small melanophores; nasal tubes black; dorsal, anal, and caudal fins evenly peppered, except denser on anterior part of first dorsal fin.

**Etymology.** The specific epithet is a patronym in the genitive singular for Jack Niedenthal, a long-term champion for the people of Bikini, former Minister of Health for the Marshall Islands, and guide for our recent expedition to Bikini. It is a pleasure to name this distinctive species in his honor.

**Distribution and habitat.** The new species was encountered at only one of 14 sites sampled at Bikini Atoll, reflecting the unique nature of this lagoonal site, which was exposed to minimal wave energy and only minimal currents. Specimens were observed resting on the tops of large patches of calcareous *Halimeda* algae, into which they would quickly dive when approached. These *Halimeda* patches were found in 10–12m depth along a generally



**Figure 2.** *Eviota niedenthalii*, preserved holotype, CAS 249898, 13.6 mm SL female, Bikini Atoll, Bikini Lagoon (D.W. Greenfield).



**Figure 3.** *Eviota maculibotella*, fresh holotype, ROM 73333, 13.7 mm SL female, Nha Trang Bay, Vietnam (R. Winterbottom).

flat sandy lagoon floor, approximately 300 m offshore of the island of Bikini. The species is presently known only from the Bikini Atoll lagoon, but it likely occurs in similar habitats in the lagoons of other atolls in the Marshall Islands and perhaps farther afield.

**Comparisons.** *Eviota niedenthalii* shares the combination of a dorsal/anal fin-ray formula of 8/8 and lacking only the IT and POP pores only with *Eviota susanae* Greenfield & Randall, 1999 and *Eviota maculibotella* Greenfield & Winterbottom, 2016. *Eviota susanae*, native to Hawaii, can be separated from the new species by having a fifth pelvic-fin ray vs. absent; a fimbriate male urogenital papilla vs. non-fimbriate; and 4 postanal spots vs. 6. *Eviota maculibotella* was described from Vietnam and is also known from the Solomon Islands (see CAS 243570). It is most similar to *E. niedenthalii* but has a fifth pelvic-fin ray (vs. absent) and a different color pattern (Fig. 3), i.e. without a black spot centered on the caudal peduncle, with a dark band on the lower pectoral-fin base and a roundish dark spot at the top vs. a colon-like pair of oval dark spots, and a row of 5 large dark spots at the base of the first and second dorsal fins, not present in *E. niedenthalii*.

### Acknowledgments

The authors would like to thank Jack Niedenthal for guiding us on our visit to Bikini, and especially the People of Bikini for allowing our visit to the area. We moreover thank Carl Douglas, Johan Candert, and Carl Gustaf Lundin of Deep Sea Productions for sponsoring the expedition, and the hard-working and able crew of the *Pacific Master* liveaboard for serving as a fantastic dive survey platform during our visit. We thank Jon Fong and Mysi Hoang of the California Academy of Sciences for providing valuable curatorial and logistic support. Finally, MVE and NKI sincerely thank Julie Munro for funding our participation in the Bikini Expedition as part of a capacity-building exercise for NKI. The manuscript was reviewed by Gerald R. Allen.

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