




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

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Abstract

A new species of dwarfgoby, *Eviota bikiniensis*, is described from Bikini Atoll, Marshall Islands, an archipelago in the northwestern tropical Pacific Ocean. The new species is distinguished by lacking all cephalic sensory-canal pores and having thickened unbranched pectoral-fin rays, no fifth pelvic-fin ray, a dorsal/anal-fin formula of 8/7, and a distinctive, blue-white, elongated first dorsal-fin spine on the male unique holotype.

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

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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 first 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 136 valid species (Greenfield et al. 2025b). The description of this species brings the total to 137. 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. The present species was only encountered on a single one of 21 dives conducted around Bikini Atoll, this one being on the USS *Saratoga* wreck in the eastern section of the lagoon.

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 bikiniensis*, fresh holotype, CAS 249373, 12.7 mm SL male, Bikini Atoll, Marshall Islands (M.V. Erdmann).

Eviota bikiniensis, n. sp.

Bikini Dwarfgoby

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Figures 1 & 2

Holotype. CAS 249373, 12.7 mm SL male, Marshall Islands, Bikini Atoll, USS *Saratoga* Wreck, 11.5868°, 165.5087°, 32 m, M.V. Erdmann & N.K. Ichida, 3 July 2025.

Diagnosis. A species of *Eviota* distinguished from all congeners by a combination of an absence of cephalic sensory-canal pores, a dorsal/anal fin-ray formula 8/7, pectoral-fin rays 16, unbranched and thickened, fifth pelvic-fin ray absent, and first dorsal-fin spine blue-white, sharply contrasting with orange and brown body color, and elongated, reaching to center of second dorsal fin when adpressed.

Description. Dorsal-fin elements VI+I,8, first dorsal fin triangular; first spine elongated, extending back to center of second dorsal fin when adpressed; all second dorsal-fin soft rays branched, last to base; anal-fin elements I,7, all soft rays branched, last to base; pectoral-fin rays 16, all unbranched and thickened, fin pointed, reaching to anal-fin origin; 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 short and wide, not tapering, with short papillae 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 all pores.

Measurements of holotype as percentage of SL: head length 29.7; length to origin of first dorsal fin 37.5; length to origin of second dorsal fin 57.9; length to origin of anal fin 59.5; caudal-peduncle length 28.5; caudal-peduncle depth 11.4; body depth 18.1; eye diameter 11.0; snout length 4.1; upper-jaw length 7.3; pectoral-fin length 29.1; pelvic-fin length 26.8.

Color in life. (Fig. 1) Background color of body golden yellow, body peppered with small orange melanophores, dark-brown body bars showing through surface melanophores, first bar positioned over abdomen and below first dorsal fin, second at anal-fin origin, third at end of anal fin, fourth at middle of caudal peduncle and fifth at end of caudal peduncle just anterior to hypurals, their ventral margins forming 6 post-anal spots, a central translucent gray area on pectoral-fin base with a cluster of brown melanophores overlaid with golden yellow at top and bottom. Nape and top of head similar to body but lighter with some translucent gray areas, side of head and cheek similar to nape but with scattered larger brown melanophores, a distinctive dark-brown bar between eye and upper jaw and two more shorter similar bars at end of jaws, isthmus under head golden orange, lower jaw translucent gray, upper jaw golden orange; pupil of eye surrounded by a golden ring, iris red with narrow spokes of translucent gray radiating out from pupil. Filamentous spine of first dorsal fin black on basal fifth with remaining portion fluorescent blue-white continuing down in a narrow band across lower portion of next three spines to base of fourth, membranes of first dorsal fin golden-yellow, peppered with black melanophores, brighter golden at base; second dorsal-fin elements and membranes similar to first dorsal fin except first spine dark; anal fin similar to second dorsal fin except distal margin blue; pectoral-fin rays translucent gray; basal two-thirds of rays and membranes of caudal fin golden-orange, distal third blue.



Figure 2. *Eviota bikiniensis*, preserved holotype, CAS 249373, 12.7 mm SL male, Bikini Atoll, Marshall Islands (D.W. Greenfield).

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 an adjective derived from the name of the atoll Bikini plus the Latin suffix *ensis* (denoting locality of occurrence), alluding to the place of capture of the only known specimen. It is an honor to name this unique species in recognition of Bikini and the People of Bikini, who have suffered tremendously as a result of the nuclear testing that required their displacement from their ancestral home – which nonetheless remains to this day a stunningly beautiful part of the planet and a testament to the resilience of nature.

Distribution and habitat. The single specimen was collected at 32 m depth from the wreck of the USS *Saratoga* in the Bikini Atoll lagoon; the individual was spotted on a vertical rusted bulkhead of the wreck. It is likely this species is found on deep coral bommies within the lagoon, and may well be more widespread in the Marshall Islands; further sampling is required to determine its full distribution.

Comparisons. *Eviota bikiniensis* lacks all cephalic sensory-canal pores, a character shared with only 8 other described *Eviota* species: *E. amamiko* Fujiwara, Suzuki & Motomura, 2019; *E. angustifascia* Greenfield & Erdmann, 2020; *E. deminuta* Tornabene, Ahmadi & Williams, 2013; *E. jewettae* Greenfield & Winterbottom, 2012; *E. lateritea* Greenfield & Winterbottom, 2016; *E. occasa* Greenfield, Winterbottom & Suzuki, 2014; *E. singula* Greenfield & Winterbottom, 2016; and *E. thamani* Greenfield & Randall, 2016. Unlike the new species,

all of these, except *E. angustifascia*, have branched pectoral-fin rays; *E. angustifascia* has a dorsal/anal formula of 9/8 vs. 8/7 in *E. bikiniensis*. The 8/7 is shared only with *E. deminuta* and *E. singula*, otherwise, *E. lateritea* has 9/8, and the remainder 8/8. *Eviota bikiniensis* differs from all of these by having the distinctive elongated blue-white first dorsal-fin spine.

Eviota bikiniensis keys to couplet 6b in the 2016 key by Greenfield & Winterbottom, being a third alternative with *E. jewettae* and *E. angustifascia* (not in key) differing from *E. jewettae* by having unbranched pectoral-fin rays vs. branched, and from *E. angustifascia* having a dorsal/anal formula of 8/7 rather than 9/8.

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ERRATUM

Greenfield D.W., Erdmann, M.V. & Ichida, N.K. (2025) *Eviota vader*, a new western Pacific dwarfgoby from Papua New Guinea (Teleostei: Gobiidae). *Journal of the Ocean Science Foundation*, 43, 39-44. <https://doi.org/10.5281/zenodo.15786577>

Note in this article, measurements were inadvertently omitted and are presented here:

Measurements of holotype as percentage of SL, holotype listed first: head length 32.2 (32.0); origin of first dorsal fin 37.6 (32.6); origin of second dorsal fin 53.7 (56.3); origin of anal fin 61.7 (60.0); caudal-peduncle length 26.2 (24.0); caudal-peduncle depth 15.4 (15.1); body depth 26.8 (28.3); eye diameter 10.7 (9.0); snout length 6.7 (5.9); upper-jaw length 11.1 (9.2); pectoral-fin length 30.2 (26.4); pelvic-fin length 36.9 (29.0).

Also NOTE- The third author's surname was mistakenly misspelled Ishida; it is Ichida, N.K.

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