




## *Eviota bacata*, a new dwarfgoby (Teleostei: Gobiidae) from New Caledonia

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### Abstract

A new species of dwarfgoby, *Eviota bacata* n. sp., is described from New Caledonia in the South Pacific Ocean. The new species is characterized by a cephalic sensory-canal pore system lacking only the IT pore (pattern 2); a dorsal/anal-fin formula of 7/7; pectoral-fin rays unbranched; the fifth pelvic-fin ray 20% of length of the fourth ray; the abdomen with black peritoneum clearly visible externally and with a yellow-white stripe along the dorsal portion and a row of distinctive round white spots on the ventral portion; and a vertically elongated black mark at the top of the pectoral-fin base. The species is most similar to *Eviota atriventris*.

**Key words:** taxonomy, ichthyology, coral-reef fishes, gobies, south Pacific Ocean, pelvic fins, *E. atriventris*

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## Introduction

The genus *Eviota*, known as dwarfgobies, comprises one of the most diverse genera of coral-reef fishes with 132 valid species at present, including the new species described herein. The number of described species has grown rapidly partly as a result of advances in underwater photography, allowing workers to recognize and document species that had previously not been recognized as distinct. As discussed by Greenfield (2017) and Greenfield & Winterbottom (2016a), early studies of the genus were based on preserved specimens where, except for melanophores, all color had been lost.

The species described here was discovered as a result of targeted in situ underwater photography of dwarfgobies, wherein photographer Richard Bajol initially sent a photograph of the new species he had found in New Caledonia to the first author DWG in 2016. DWG suggested the fish looked similar to widespread *Eviota atriventris* (Greenfield & Suzuki 2012), but had a different color pattern, perhaps indicating that it might be a new local species of the complex: to confirm the new species would require the collection of specimens. Two years later, the second author MVE, whilst conducting a project based on satellite-tagging manta rays in the Touho region of New Caledonia, photographed the new goby species in the Touho Lagoon. Subsequently, DWG and MVE came to the conclusion that the goby represented an undescribed species and was the same species as that depicted in R. Bajol's original photograph. MVE then contacted the third author AT, a local-based, aquarium-fish collector and exporter with extensive experience and expertise on the New Caledonia fish fauna. Eventually, two specimens of the new species were collected on the main island Grande Terre of New Caledonia.

Fricke & Kulbicki (2007) recorded 23 species of *Eviota* in their checklist of fishes known from New Caledonia. Subsequently, Greenfield & Winterbottom (2016b) described an additional species, *Eviota lateritea*, from the southern point of Grande Terre. The description of *Eviota bacata* brings the total to 25 *Eviota* species known from New Caledonia.

## Materials and Methods

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 (e.g. 9/8) only include segmented rays. Measurements were made to the nearest 0.1 mm using an ocular micrometer or dial calipers, 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); length to 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; 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 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.

We follow the terminology developed by Sanzo (1911) as applied by Winterbottom et al. (2015, Fig. 2) to the pygmygobies, genus *Trimma*, for the cephalic cutaneous-sensory papillae (free neuromasts). Cyanine Blue 5R (acid blue 113) stain and an airjet were used to make the cephalic sensory-canal pores, fin rays, and scales more obvious (Akihito et al. 1993, 2002, Saruwatari et al. 1997).



**Figure 1.** *Eviota bacata*, underwater photograph of holotype, Touho Lagoon, New Caledonia (M.V. Erdmann).

***Eviota bacata*, n. sp.**

Pearl Dwarfgoby

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Figures 1–8

**Holotype.** CAS 248413, 14.9 mm SL immature, New Caledonia, Touho Lagoon, -20.600, 165.2661, 30 m, M.V. Erdmann & H. Lassauce, 15 November 2020.

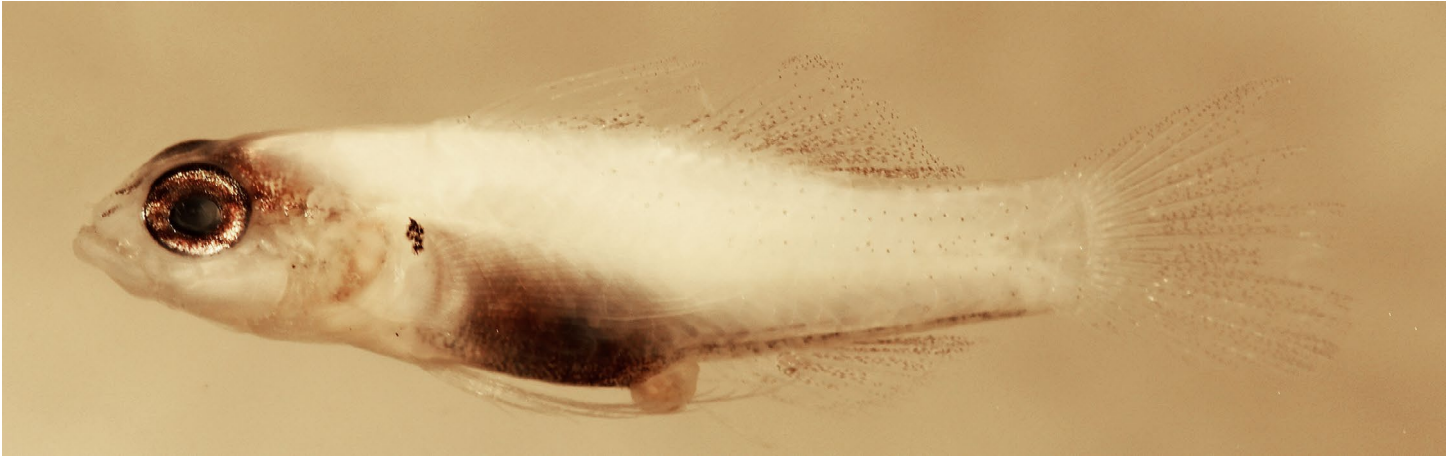
**Paratype.** CAS 248414, 25.0 mm SL male, New Caledonia, Basse Caledonienne, near Mont Dore launching area, -22.2902, 166.5602, 8–9 m, A. Teitelbaum, 18 September 2020.

**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); a dorsal/anal fin-ray formula usually 7/7; unbranched pectoral-fin rays, fifth pelvic-fin ray about 20–50% of length of fourth ray; a black peritoneum clearly visible and crossed by a yellow-white line on dorsal portion and a row of round white spots on ventral portion; and a vertically elongated black mark at top of pectoral-fin base.

**Description.** Dorsal-fin elements VI+I,7, first dorsal fin triangular, all second dorsal-fin soft rays branched, last ray branched to base; anal-fin elements I,7, all soft rays branched, last ray branched to base; pectoral-fin rays 15 (16), unbranched, fin pointed, reaching beyond center of second dorsal fin; fifth pelvic-fin ray 20% (49%) of length of fourth ray; pelvic-fin membranes between branches well developed, basal membrane reduced; 11 branched and 17 segmented caudal-fin rays; lateral scale rows 23 (24); transverse scale rows 7; urogenital papilla in male paratype male elongate, tapering with short papillae on end (Fig. 3); front of head sloped with an angle of about 60° from horizontal axis; mouth slanted obliquely downwards, forming an angle of about 55° to horizontal axis of body, lower jaw projecting; maxilla extending posteriorly to front 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 pore (pattern 2) and papillae in a reduced transverse pattern, as discussed by Winterbottom & Greenfield (2020) (Fig.4).

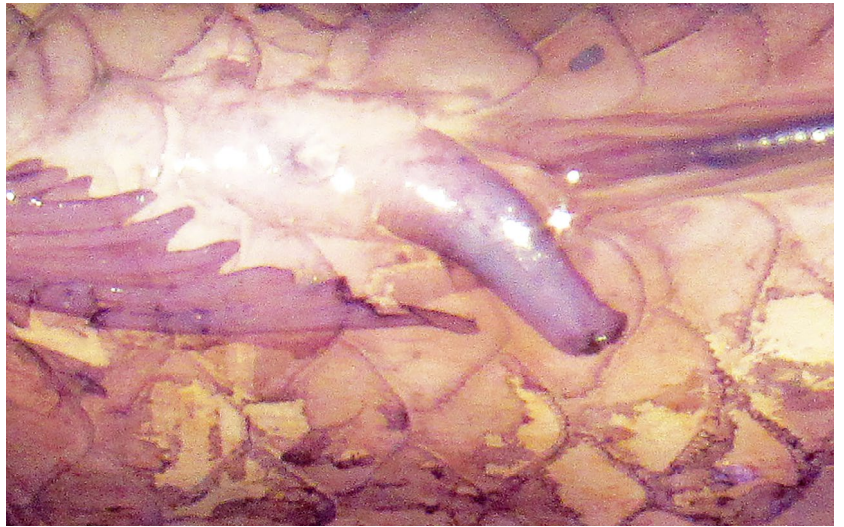
Measurements of holotype and paratype as percentage of SL, holotype (paratype): head length 32.2 (32.0); origin of first dorsal fin 37.6 (32.6); origin of second dorsal fin 53.7 (56.3); origin of anal fin 61.7 (60.0);



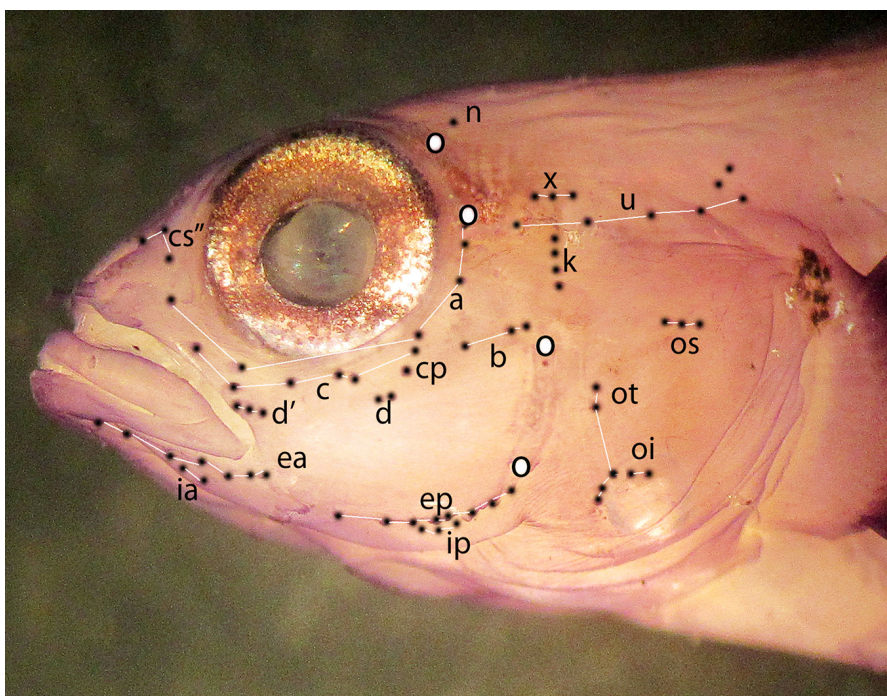
**Figure 2.** *Eviota bacata*, CAS 248413, 14.9 mm SL, preserved holotype, Touho Lagoon, New Caledonia (D.W. Greenfield).

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).

**Color in preservative of holotype.** (Fig. 2) Background color of head and body pale yellowish; top of pectoral-fin base with a distinctive, vertically elongated black mark; abdomen with black peritoneum clearly visible externally (not in paratype), followed by a dark ventral midline row of melanophores from anal-fin origin to caudal-fin base; upper body and rear part of body to caudal peduncle with a scattering



**Figure 3.** *Eviota bacata*, CAS 248414, 25.0 mm SL male, paratype, urogenital papilla (D.W. Greenfield).



of small dark spots. Head with area over interorbital and behind eye ending over preoperculum; snout with a dark spot at upper-jaw midline, followed by a short midline black bar from point midway between anterior and posterior nares up to interorbital area, flanked on each side by a short dark line extending from posterior to anterior nares. Dorsal, anal, and caudal fins with light scattering of melanophores; pectoral and pelvic fins immaculate.

**Figure 4.** *Eviota bacata*, CAS 248413, 14.9 mm SL, head of preserved holotype, Touho Lagoon, New Caledonia. White ovals are cephalic sensory canal pores; black dots are papillae, labels following Winterbottom & Greenfield (2020); thin white lines represent inferred nerve pathways (D.W. Greenfield).



**Figure 5.** *Eviota bacata*, underwater photograph of 25.0 mm SL male, paratype, New Caledonia (A. Teitelbaum).

**Color in life.** (Figs. 1, 5–7) Background color of body translucent gray, overlaid by spindle-shaped pattern from red pigment in scale-pocket tissue producing a spotted pattern; a midline yellow-white stripe extends along dorsal vertebral column anteriorly, breaking into spots after abdomen level; lateral abdominal wall black overlain with a dorsal yellow-white stripe continuing from upper iris to rear end of abdomen and a lower series of 6 small evenly spaced round white spots from pectoral-fin base to end of abdomen; ventral abdomen whitish from anus across ventral thorax and head to tip of jaws; upper head and snout reddish orange with golden-yellow stripes, one along midline from interorbital to level of naris followed by a short segment before upper lip, flanked on each side by a short nasal segment. Iris of eye reddish orange, upper portion crossed by a stripe above pupil, bright yellow anteriorly in line with lateral snout segments and becoming white across iris and continuous with upper abdominal white stripe, lower iris with a parallel short white stripe only on iris, dorsal sclera with bands of golden yellow. Rays and spines of fins pinkish with clear membranes. Against a dark background, red becomes purplish and orange gets darker (Fig. 3).



**Figure 6.** *Eviota bacata*, underwater photograph, New Caledonia (R. Bajol).

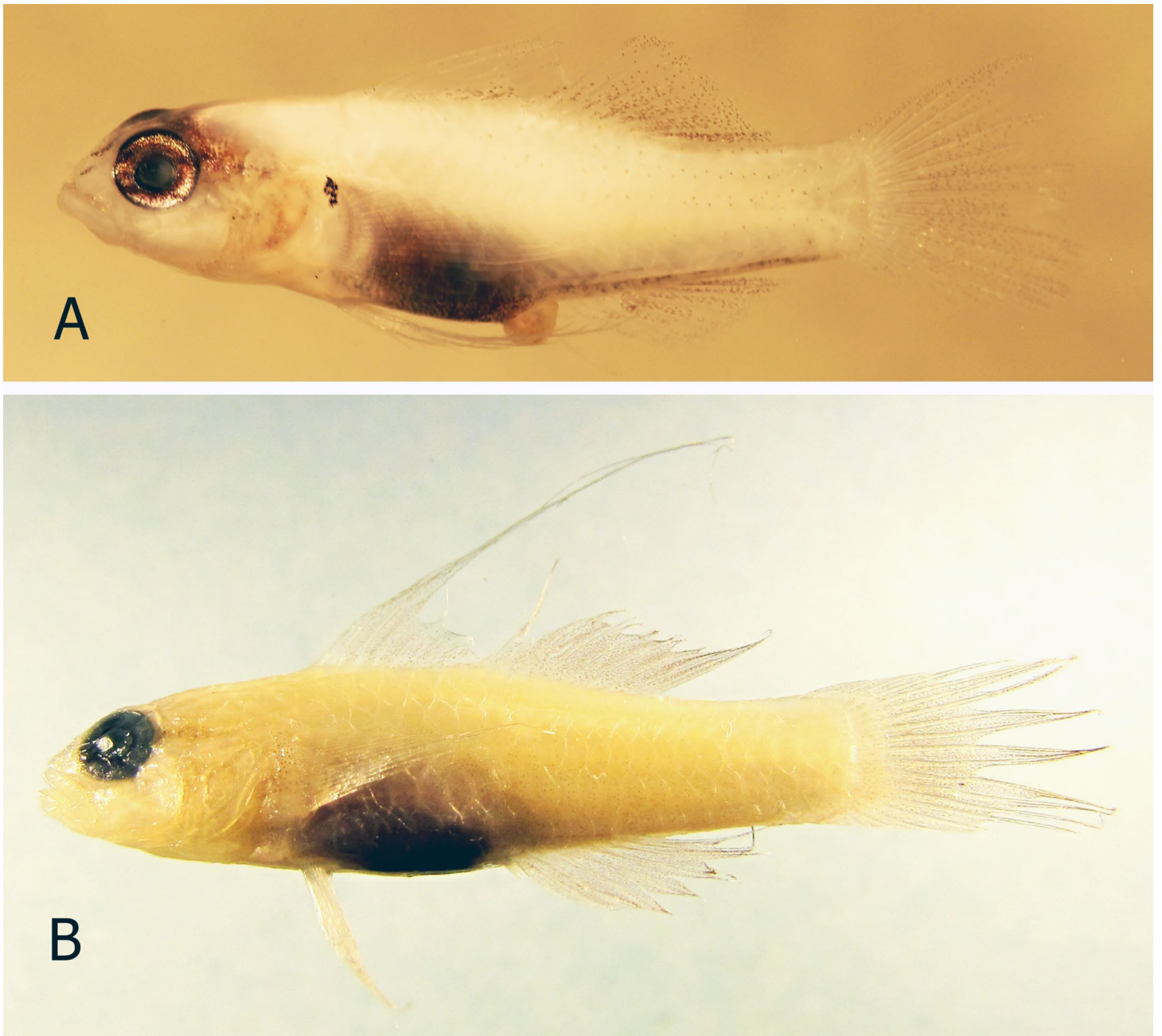
**Etymology.** The specific epithet is from the Latin *bacatus*, meaning adorned with pearls, in reference to the string of round white spots across the dark abdomen.

**Distribution and habitat.** The new species is known with certainty from the main island (Grand Terre) of New Caledonia, from the southwestern tip near Nouméa and extending up the east coast to Kouaoua and at least northwards to Touho, although it likely is found on all coastal reefs around Grand Terre, and perhaps farther to the Loyalty Islands. It is found on inshore coastal and lagoonal reefs, including those subject to significant sedimentation, from 8m down to at least 30m depth, where it frequents complex reef habitat with abundant live coral or rugose rubble areas

**Comparisons.** *Eviota bacata* is most similar to *Eviota atriventris* described from Palau (Greenfield & Suzuki (2012)), both having a black abdomen, unbranched pectoral-fin rays, and a cephalic sensory-canal pore system lacking only the IT pore (pattern 2). It differs from that species in having a dorsal/anal fin-ray formula of 7/7 vs. 8/8, 15 vs. 14 pectoral-fin rays, and in coloration (Fig. 7). *Eviota bacata* can have a distinctive vertically elongate dark spot or concentration of melanophores on the upper portion of the pectoral-fin base vs. a scattering of melanophores over the base and the lower abdominal white stripe characteristic of *E. atriventris* is replaced by a row of bright white spots. *Eviota bacata* also shows a checkered pattern of reddish orange scale pockets not found on *E. atriventris*. When present, the dark spot on the upper pectoral-fin base in *E. bacata* easily distinguishes it



**Figure 7.** Comparison of live coloration of *Eviota bacata*, New Caledonia (A) and *Eviota atriventris* from Flores, Indonesia (B) (M.V. Erdmann & J.E. Randall).



**Figure 8.** Comparison of preserved coloration of holotype of *Eviota bacata*, New Caledonia (A) and the holotype of *Eviota atriventris*, ROM 76339 (B) (D.W. Greenfield).

from from *E. atriventris* in preserved material (Fig. 8). *Eviota bilunula* shares with the new species the unbranched pectoral-fin rays, a cephalic sensory-canal pore system lacking only the IT pore (pattern 2), and a dorsal/anal-fin ray formula of 7/7, but has two distinctive, black, crescent-shaped marks underneath the pectoral fin and a clearly different color pattern.

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