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A new cleaner species of *Elacatinus* (Actinopterygii: Gobiidae) from the Southwestern Atlantic

IVAN SAZIMA[1,4], ALFREDO CARVALHO-FILHO[2] & CRISTINA SAZIMA[3]

[1]*Museu de Zoologia, Universidade Estadual de Campinas, 13083-970 Campinas, SP, Brasil (retired and associated as voluntary researcher). E-mail: isazima@gmail.com.br*
[2]*Fish Bizz Ltda. Rua Moncorvo Filho 51, São Paulo, SP, Brasil. E-mail: alfie@telnet.com.br*
[3]*Departamento de Parasitologia, Universidade Estadual de Campinas, 13083-970 Campinas, SP, Brasil. E-mail: csazima@gmail.com*
[4]*Corresponding author*

Abstract

A new species of cleaner goby, *Elacatinus phthirophagus* **sp. n.,** is described from Fernando de Noronha Archipelago, off northeastern Brazil. It differs from its congeners of the putative "*randalli-evelynae*" cleaning clade by the following combination of characters: mouth subterminal, pale (bright yellow in life) elliptical spot on dark snout, width of lateral pale (bright yellow in life) stripe almost equal as eye diameter (slightly narrower in live individuals), light purplish sheen (in life) extending laterally from below eye to tail origin, no blue line (in life) from below eye to end of opercular margin, teeth multiserial on the distal portion of both jaws, males with 3 enlarged and recurved teeth on dentary inner row. The new species was recorded at depths ranging from 3 to 18 m and is ubiquitous in the archipelago islets. It tends cleaning stations on coral heads, sponges, and rocky substrata, with up to 15 individuals present in large stations, particularly those on sponges. *Elacatinus phthirophagus* **sp. n.** was recorded to clean about 30 species of fish clients, including large carnivores such as the shark *Carcharhinus perezi* and smaller carnivores such as the grouper *Cephalopholis fulva*, besides small clients like the planktivorous damselfish *Chromis multilineata* and the zoobenthivorous butterflyfish *Chaetodon ocellatus*. The new species increases to three the number of cleaner gobies recorded for Southwestern Atlantic, one from the coast and two from oceanic islands.

Key words: *Elacatinus*, new species, Gobiidae, reef fish, oceanic islands, Southwestern Atlantic, cleaning symbiosis

Introduction

The reef-dwelling neon gobies of the genus *Elacatinus s. s.* (see Taylor & Hellberg 2005) are currently represented by 16 species in the Western Atlantic, most of them known from the Caribbean, with only three species reported south of the equator (Böhlke & Robins 1968, Colin 1975, Guimarães *et al*. 2004, Taylor & Hellberg 2005, Taylor & Akins 2007). Here we describe a new cleaning species of *Elacatinus* from Fernando de Noronha Archipelago, off northeastern Brazil, previously misidentified for *Elacatinus randalli* (Böhlke & Robins) (Sazima & Moura 2000, Guimarães *et al*. 2004, Sazima *et al*. 2004).

Material and methods

Counts and measurements follow Böhlke & Robins (1968). For counts and proportions those of the holotype are given first, followed (in brackets) by range and mean of 16 paratypes. Color description encompasses the

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range of specimens in the type series. A male and a female paratypes were cleared and stained (marked c & s). Proportions for comparison of the new species with *Elacatinus randalli* and *Elacatinus figaro* Sazima, Moura & Rosa were taken from original descriptions (Böhlke & Robins 1968, Sazima et al. 1997 respectively). Institutional abbreviations are listed in Leviton *et al*. (1985) except for (CIUFES) Coleção Ictiológica, Departamento de Ecologia e Recursos Naturais, Universidade Federal do Espírito Santo.

***Elacatinus phthirophagus* – sp. n.**
Noronha cleaner goby
(Figures 1–4)

Elacatinus randalli, (*non* Böhlke & Robins, 1968), Sazima & Moura 2000: 297–298, Figure 1; Guimarães *et al*. 2004: 2–4, Figure 3; Sazima *et al*. 2004: 484, Figure 1.
Elacatinus cf. *randalli*, Francini-Filho & Sazima 2007: 1–7.
Elacatinus aff. *randalli*, Carvalho-Filho 1999: 210.

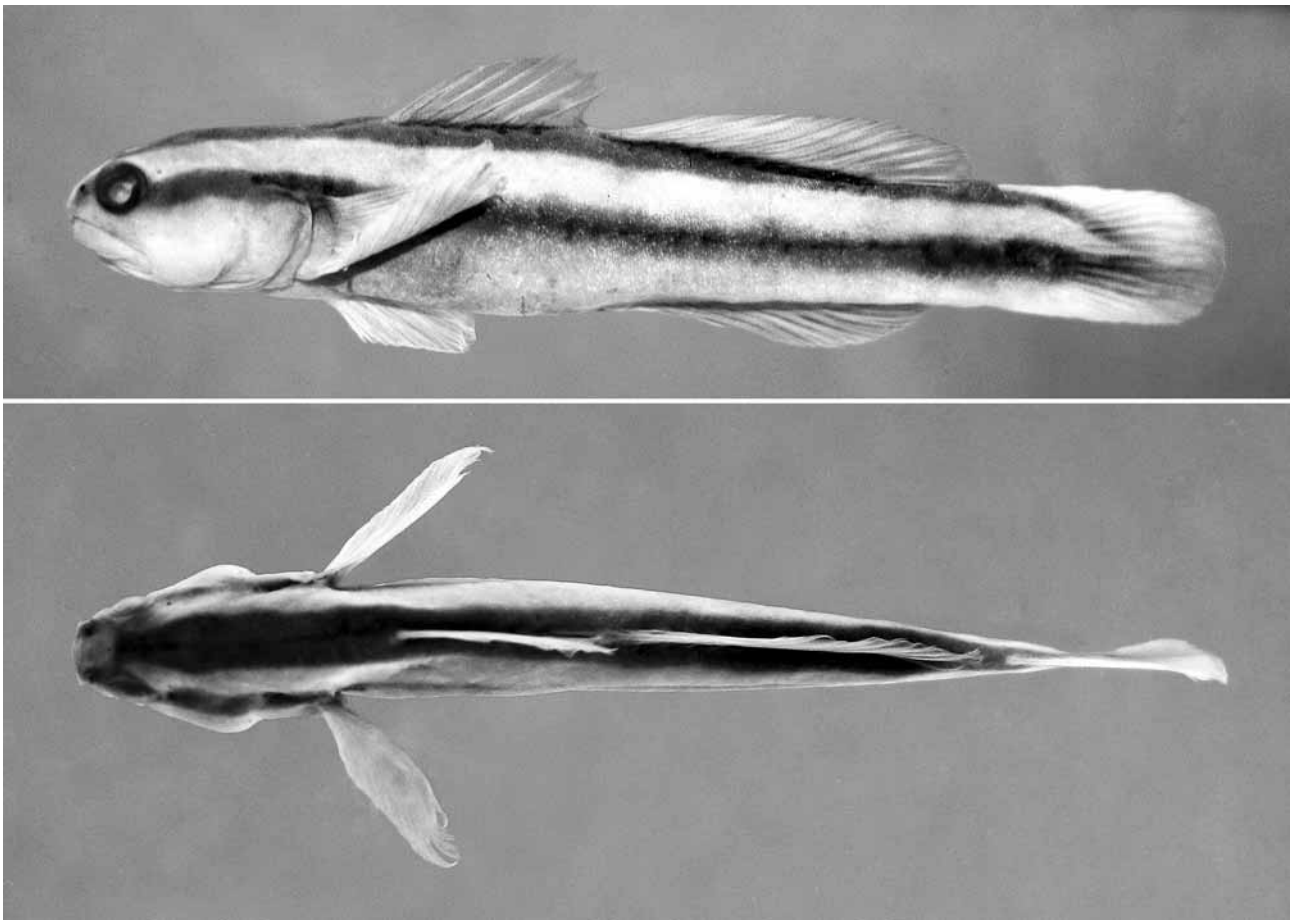

FIGURE 1: *Elacatinus phthirophagus* **sp. n.**, holotype (ZUEC 3895), 31.8 mm SL (Photograph by I. Sazima).

Type series: Holotype: ZUEC 3895, (male, 31.8 mm SL), Ressurreta, Fernando de Noronha Archipelago (03°50'S, 32°25'W), collected by L. F. Mendes, 13 July 1998. Paratypes: MZUSP 57608 (4 ind., 21.3, 23.2, 25.5 mm SL, all females, 25.7 mm SL, male - c & s), Fernando de Noronha Archipelago (03°50'S, 32°25'W), collected by R. L. Moura & R. B. Francini Filho, 11 August 1997; ZUEC 3895 (1 ind., 31.5 mm SL, male), collected with the holotype; ZUEC 6291 (8 ind., 19.5, 20.3, 20.4, 20.7, 21.0, 22.2, 23.2, 31.5 mm SL, the last a male, the remainder females, 1 c & s), Ilha do Meio, Fernando de Noronha Archipelago (03°50'S,

32°25’W), collected by R. B. Francini Filho, R. L. Moura & L. F. Mendes, 8 June 1998; ZUEC 3318 (1 ind., 23.6 mm SL, female), Ilha da Rata, Fernando de Noronha Archipelago (03°50’S, 32°25’W), collected by L. F. Mendes, 24 November 1996; CIUFES 0893 (2 ind., 17.0–21.5 mm SL, females), Porto de Santo Antonio, Fernando de Noronha Archipelago (03°50’S, 32°25’W), collected by I. Sazima & C. Sazima, 19 October 2004.

FIGURE 2: *Elacatinus phthirophagus* **sp. n.**, adult individual in natural habitat, showing dark snout and lateral bright yellow stripe (Photograph by J. P. Krajewski).

Comparative material: *Elacatinus randalli*: USNM 202372 (paratype). *Elacatinus figaro*: MZUSP 50859 (holotype), 46164, 49139 (paratypes), USNM 342126 (paratype), ZUEC 3027 (paratype), 2724, 3012 (cleared and stained paratypes), 2706, 2772, 2773 (non-types). *Elacatinus pridisi*: ZUEC 5412 (paratype). *Elacatinus prochilos*: USNM 202371 (paratype). *Elacatinus atronasus*: USNM 202374 (paratype).

Diagnosis: *Elacatinus phthirophagus* **sp. n.** differs from its congeners of the putative “*randalli-evelynae*” cleaning clade (*sensu* Taylor & Hellberg 2005) by the following combination of characters: mouth subterminal, pale (bright yellow in life) elliptical spot on dark snout, width of lateral pale (bright yellow in life) stripe almost equal as eye diameter (slightly narrower in live individuals), light purplish sheen (in life) extending laterally from below eye to tail origin, no blue line (in life) from below eye to end of opercular margin, teeth multiserial on the distal portion of both jaws, males with 3 enlarged and recurved teeth on dentary inner row.

Description: Morphometrics of holotype (31.8 mm SL) and 16 paratypes (17.0–31.5 mm SL) as percent of standard length (range and mean of paratypes in brackets): head length 26.2 (24.1–28.6, 26.2); snout length 4.1 (3.5–4.7, 4.1); eye diameter 6.0 (5.4–7.6, 6.6); postorbital distance 16.1 (14.1–20.4, 16.4); body depth 17.3 (14.4–18.1, 16.1); caudal peduncle depth 11.4 (8.3–11.6, 10.4); upper jaw length 8.8 (4.6–10.8, 8.9); pectoral-fin length 20.4 (16.4–24.1, 21.7); ventral-fin length 14.8 (14.5–18.2, 16.8); caudal-fin length 17.3 (16.7–26.7, 20.4); pale lateral stripe width 6.3 (5.8–7.5, 6.6); black lateral stripe width 4.8 (4.0–6.0, 5.1).

Body naked, elongate and slightly laterally compressed. Mouth subterminal, U-shaped. Teeth conical and slightly curved on both jaws. Premaxillary teeth progressively larger and more curved distally, multiserial (3–5 series) on the distal third and uniserial on the proximal fourth of upper jaw. Males with 2 large recurved teeth (1.5–2 times larger than others) on premaxillary inner row. Dentary teeth progressively larger and more curved distally, multiserial (3–5) on the distal third and uniserial on the proximal fourth of jaw. Males with 3 enlarged and recurved “canines” (about 3 times larger than others) on dentary inner row. Females with no enlarged teeth on either jaw. Caudal-fin rounded to truncate. Dorsal-fin rays VII, 11 (10–11); anal-fin rays 11

(11); pectoral-fin rays 17 (15–17). Vertebrae 11+7 (c & s male and female paratypes).

Color pattern: bright yellow postocular stripe extending to the middle of caudal-fin (Figure 2); bright yellow elliptical spot on blackish snout (the latter less pigmented in small juveniles); upper portion of eye bright yellow and lower part black; black lateral stripe from lower half of eye's posterior edge to the middle of caudal-fin and more or less coincident with lateral septum (fading towards the end of caudal-fin); black dorsal stripe from middle of interorbital space extending in a curve to the anterior third of caudal-fin (in some large specimens the anterior part of this stripe is divided by a paler, grayish stripe); lower jaw and belly whitish, the anterior third of belly with a light purplish sheen; cheek and lower part of operculum to preoperculum rosy with purplish sheen; dorsal, pectoral and anal-fins, and outer border of caudal-fin pale with scattered dark chromatophores; pelvic-fin pale with no or fewer scattered chromatophores. In preservative (formalin or ethanol) the bright yellow color fades to yellowish light gray, and the rosy and purplish sheens disappear.

FIGURE 3: *Elacatinus phthirophagus* **sp. n.** (left) and *Elacatinus randalli* (right) in natural habitats, showing differences in width of yellow lateral stripe, pigmentation on snout, and absence versus presence of blue line extending from below eye to end of opercular margin (Photograph on left by J. P. Krajewski, that on right by L. A. Rocha).

Etymology. From the Greek *phteir, phtheiros* = louse, and *phagein, phagos* = to eat, an allusion to this goby feeding mostly on larval, parasitic gnathiid isopods it picks from its clients.

Distribution: The new species is known only from Fernando de Noronha Archipelago (03°50'S, 32°25'W), a volcanic formation off NE Brazil, tropical Southwestern Atlantic.

Remarks: *Elacatinus phthirophagus* **sp. n.** likely belongs in the "*randalli-evelynae*" cleaning clade (*sensu* Taylor & Hellberg 2005), since it shares characteristics of the species in this clade such as cleaning behavior and a pale stripe running from eye to tail. The new species is readily distinguished from *Elacatinus evelynae* (Böhlke & Robins), *Elacatinus genie* (Böhlke & Robins), *Elacatinus illecebrosus* (Böhlke & Robins), and *Elacatinus oceanops* (Böhlke & Robins) by subterminal mouth (inferior, "shark-like" in the four latter species). From *Elacatinus atronasus* (Böhlke & Robins) and *Elacatinus prochilos* (Böhlke & Robins), the new species differs mostly by dark snout with yellow elliptical spot (dark snout with no spot in the first species, and a V-shaped white mark in the second species). From *Elacatinus pridisi* Guimarães, Gasparini & Rocha, the new species differs mostly by black narrow lateral stripe never reaching abdomen (black broad lateral stripe reaching abdomen in the first species). From *Elacatinus figaro*, the new species differs mostly by black lateral stripe more or less coincident with lateral septum and fading towards the end of caudal-fin (black lateral stripe partly running below lateral septum to abdomen and reaching end of caudal-fin in the first species), and shorter snout (3.5–4.7 and 4.6–6.3% of SL respectively). The new species differ from the similar *Elacatinus randalli* by yellow lateral stripe width almost equal as eye diameter (much narrower than eye diameter in the precedent species), yellow elliptical spot on dark snout (yellow spot on light snout in the precedent species), no blue line in life from below eye to end of opercular margin (very conspicuous in the precedent species) (Figure 3), and much shorter snout (3.5–4.7 and 6.7–8.7% of SL respectively).

FIGURE 4: *Elacatinus phthirophagus* **sp. n.** cleaning the head of the grouper *Cephalopholis fulva*, near a cleaning station on rocky substrate covered with incrusting algae and sponges (Photograph by I. Sazima).

The new species increases to three the number of cleaner gobies known in Southwestern Atlantic, one from the coast and two from oceanic islands (Sazima *et al*. 1997, Guimarães *et al*. 2004, present paper). The recently described, oceanic *Elacatinus pridisi* (Guimarães *et al*. 2004) likely belongs in the "*randalli-evelynae*" cleaning clade (*sensu* Taylor & Hellberg 2005) as well. Additionally, we suggest that *Elacatinus phthirophagus* **sp. n.** from Southwestern Atlantic and *E. randalli* from Northwestern Atlantic may be sister taxa.

Natural History: *Elacatinus phthirophagus* **sp. n.** is ubiquitous in the archipelago and was recorded in depths ranging 3 to 18 m. It tends cleaning stations on coral heads, sponges, and rocky substrata, with up to 15 individuals present in large stations, particularly those on sponges. This goby was recorded to clean about 30 species of fish clients (Francini-Filho & Sazima 2007, our pers. obs.), an assorted assemblage that include large carnivores such as the shark *Carcharhinus perezi* (Poey) (Sazima & Moura 2000) and smaller ones such as the grouper *Cephalopholis fulva* Linnaeus (Figure 4), besides small fishes like the planktivorous damselfish *Chromis multilineata* (Guichenot) and the zoobenthivorous butterflyfish *Chaetodon ocellatus* Bloch (Francini-Filho & Sazima 2007). Among its unusual clients is the island octopus *Octopus insularis* Leite, Haimovici, Molina & Warnke (Sazima et al. 2004, as *Octopus* cf. *vulgaris*).

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