

Rediscovery of Brazilian corambids (Gastropoda: Onchidorididae)

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Three specimens of the genus Corambe were found in the intertidal zone of Santos, São Paulo (Brazil); two of them were identified as C. evelinae and one as C. carambola. Both species are reported for the first time since more than about 40 years ago.

Keywords: biodiversity, *Corambe*, Gastropoda, Nudibranchia, Brazil

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INTRODUCTION

Current knowledge about Brazilian opisthobranchs is mostly derived from the taxonomic studies of Ernst and Eveline Marcus on material from the intertidal zone of São Paulo State and a few samples from other regions of the Brazilian coast (e.g. Marcus, 1955, 1957, 1970). As is the case for other species described by Ernst Marcus (e.g. *Plocamopherus gulo* Marcus, 1979), *Corambe carambola* (Marcus, 1955) and *C. evelinae* Marcus, 1956 have never been collected again since their original description (Martynov & Schrödl, 2011). This is partly because corambids are very small animals, living camouflaged under rocks, and because of a lack of collections featuring them. However, recent efforts by researchers, especially in the last two decades, conducting new faunal surveys have brought to light poorly known species (Padula & Santos, 2006; Lima & Delgado, 2011; Padula *et al.*, 2011, 2012) and updated the Brazilian opisthobranch fauna with the description (Pola *et al.*, 2005; DaCosta *et al.*, 2007; Domínguez *et al.*, 2006a, b, 2008; Padula & Delgado, 2010; Alvim *et al.*, 2011; Cunha, 2011; Silva *et al.*, 2013; Alvim & Pimenta, 2013).

During collection along the rocky shore of Santos Bay (São Paulo State, Brazil) three specimens of the onchidoridid genus *Corambe* were collected. Corambids comprise fewer than 20 species (Martynov, 1994) and are considered aberrant or primitive dorid nudibranchs owing to their singular morphology (Schrödl & Wägele, 2001). They have a flat oval shape, posteroventral gills formed by a thin lamellar layer, the anus located between the gills, a notal cuticle, a lobed digestive gland, a dorsoventral septa and a peculiar circulatory system (Martynov & Schrödl, 2011). The species are small (usually 5–10 mm), mainly found under or on rocks in littoral

and sublittoral temperate waters, and most of them feed on encrusting bryozoans (Yoshioka, 1986; Valdés & Bouchet, 1998).

One of our collected specimens was identified as *C. carambola* (Marcus, 1955) and the other as *C. evelinae* Marcus, 1958. Thus, in this contribution *C. carambola* (Marcus, 1955) is recorded for the first time after Marcus (1970) and *C. evelinae* Marcus, 1958 is recorded for the first time after their original descriptions; also photographs of both the living specimens of these species are presented.

MATERIALS AND METHODS

Study area

Santos Bay (Figure 1A, B), is located on the coast of the State of São Paulo, Brazil (23°30'5''S–24°S 46°05'W–46°30'W), part of the Santos and São Vicente Estuarine System (Figure 1B) and it shelters part of the Baixada Santista Metropolitan Region. The Santos and São Vicente Estuarine Systems are surrounded by mangroves which make up 43% of the total mangrove area of São Paulo (Lamparelli *et al.*, 2001; Cesar *et al.*, 2009). Despite the area's ecological importance, it is a densely urbanized region, containing the Port of Santos (a major Latin American port) and it houses the biggest Brazilian industrial complex, consisting predominantly of petrochemical, siderurgy, and fertilizer industries (Boldrini & Navas-Pereira, 1987; Abessa *et al.*, 2001; Lamparelli *et al.*, 2001; Cesar *et al.*, 2006, 2009).

The study area is a rocky shore consisting of a continuous range of small and medium stones that can be easily lifted. This area ranges from 1–3 m spread and extends ~3 km along the entrance channel of the port of Santos, in São Vicente Island (Figure 1B). The specimens were found in a specific locality (Figure 1C) in this area.

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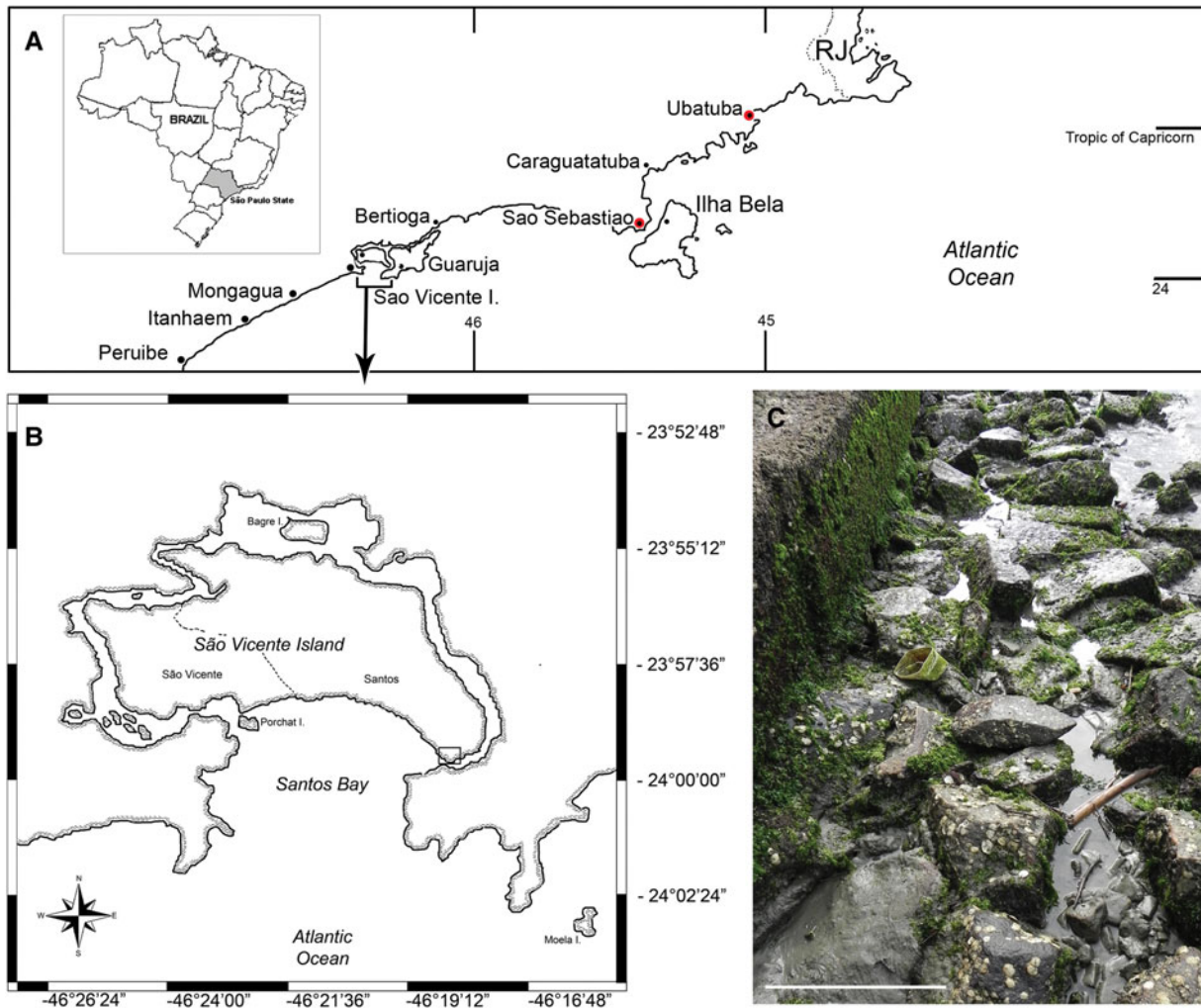


Fig. 1. Study area: (A) map of north coast of São Paulo, São Paulo State, Brazil; (B) map detail of the rock shore position located in São Vicente Island, Santos Bay; (C) rock shore area where the specimens were found. RJ, Rio de Janeiro State; red dots, type localities. Scale bar: C = 100 mm.

Collection and material processing

Both *C. carambola* and *C. evelinae* were collected during the low tide and were living actively under rocks encrusted by the bryozoan *Biflustra denticulata* (Busk, 1856), on the rocky shore of Santos Bay, São Paulo State, Brazil.

The specimens were taken to the laboratory, analysed, photographed under a stereomicroscope, and deposited in the following institutions: Museu de Zoologia da Universidade de São Paulo (MZSP; São Paulo, Brazil); and Zoologische Staatssammlung München (ZSM Mol; Munich, Germany). The external morphology of both species agrees with the original descriptions.

RESULTS

SYSTEMATICS

NUDIBRANCHIA Cuvier, 1817
 Family ONCHIDORIDIDAE Gray, 1827
Corambe Bergh, 1869
Corambe carambola (Marcus, 1955)
 (Figures 2 A–D)

Corambe carambola, Marcus, 1955: 163–167, figures 209–217.

Corambe carambola, Martynov & Schrödl, 2011: 587–600, tables 1 & 2, figures 3 & 4; Bouchet, 2013.

Doridella carambola, Marcus, 1970: 210; Abbott, 1974: 365; Rios, 1985: 187, pl. 66, figure 951, 1994: 209, pl. 71, figure 1015.

Corambe obscura, Swennen & Dekker, 1995: 105, table 2 (in part); Rios, 2009: 412, unnumbered figure of same drawing of original description of *C. carambola*; Rosenberg, 2009 (in part) [*non* Verrill, 1870].

TYPE LOCALITY

Ubatuba and São Sebastião Island, São Paulo, Brazil (Figure 1A).

DISTRIBUTION

So far, São Paulo (Brazil).

MATERIAL EXAMINED

Under rocks encrusted by the bryozoans *Biflustra denticulata* (Busk, 1856) at low tide, Brazil; São Paulo, Santos, Ponta da Praia, 23° 59' 29.37" S 46° 18' 16.26" W, MZSP 111021 (Figure 2A–D), 1 specimen (living 4.2 mm long, Cunha col. 2 August 2011).

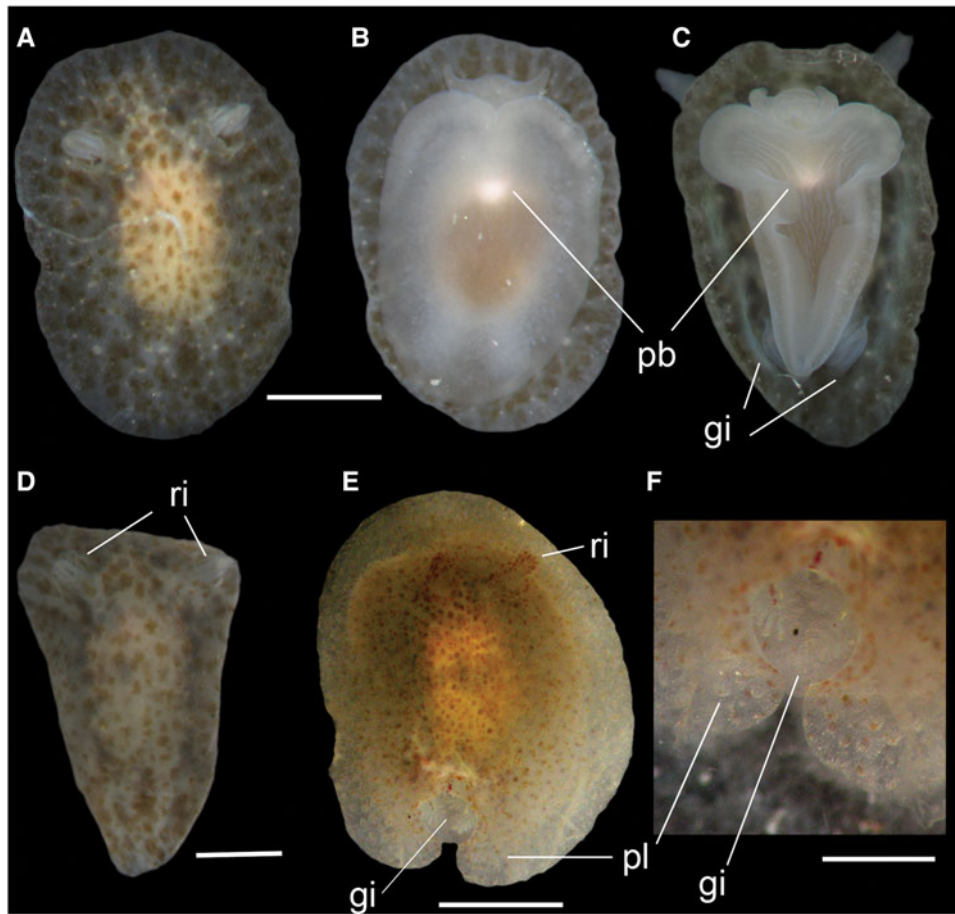


Fig. 2. Brazilian corambids: *Corambe carambola*: (A) dorsal view of living specimen (MZSP 111021), with notum and foot expanded; (B) same, ventral view, with notum and foot expanded; (C) same, contracted; (D) same view of (A), but with notum and foot contracted; *Corambe evelinae*, (E) dorsal view of living specimen (MZSP 111020); (F) same specimen, detail of posterior notch. gi, gills; ri, rhinophores; pb, circular bright white patch; pl, posterior notal lobes. Scale bars: E = 3 mm; F = 1 mm; A–D = 2 mm.

REMARKS

This species was reported after its original description (from Ubatuba and São Sebastião Island, São Paulo State, Brazil) only once more, from Cananéia (southern São Paulo, about 300 km to the south of the type locality), by Marcus (1970: 210, as *Doridella carambola*). Afterwards, it was cited in Abbott's (1974: 365) and Rio's catalogues (1985: 187, pl. 66, figure 951; 1994: 209, pl. 71, figure 1015), also as *D. carambola*. Although many authors have afterwards treated *C. carambola* as a synonym of *C. obscura* (Swennen & Dekker, 1995; Rios, 2009; Rosenberg, 2009), Martynov & Schrödl (2011) recently revealed considerable differences between both species and regarded *C. carambola* as a valid species.

When analysed alive under a stereomicroscope the specimens of *C. carambola* which were observed to have a small (~0.3 mm) circular bright white ventral patch (Figure 2B, C). This feature, also observed by Dr Michael Schrödl (personal communication) in specimens of *C. cf. carambola* from Pernambuco (north-eastern Brazil) had not been reported previously.

As *Corambe carambola* were found upon a colony of the encrusting bryozoans *Biflustra denticulate*, this could suggest a predator–prey relationship with this species, although Marcus (1970) reports specimens of *C. carambola* from Cananéia (southern São Paulo) living upon hydrozoans.

Corambe evelinae Marcus, 1958 (Figures 2 E–F)

Corambe evelinae, Marcus, 1958: 53–56, figures 50–55; Abbott, 1974: 365; Rios, 1985: 187, pl. 65, figure 946, 1994: 209, pl. 71, figure 1014, 2009: 421, unnumbered figure of same drawing of original description; Martynov & Schrödl, 2011: 587–599, table 2, figures 3 & 4; Martynov *et al.*, 2011: 130–140; Rosenberg, 2013. *Neocorambe evelinae*, Swennen & Dekker, 1995: 105, table 2.

MATERIAL EXAMINED

Under rocks encrusted by the bryozoans *Biflustra denticulate* (Busk, 1856) at low tide, Brazil; São Paulo, Santos, Ponta da Praia, 23° 59' 29.37" S 46° 18' 16.26" W, MZSP 111020 (Figure 2E, F), 1 specimen (living 8.0 mm long, Cunha & Saad col. 26 July 2010), ZSM Moll 20120182, 1 specimen (living 7.4 mm long, Cunha & Saad col. 10 September 2010).

TYPE LOCALITY

Ubatuba, São Paulo, Brazil (Figure 1A).

DISTRIBUTION

So far, São Paulo (Brazil).

REMARKS

Although this species has been included in the Abbot (1974: 365) and Rios' catalogues (1985: 187, pl. 65, figure 946; 1994: 209, pl. 71, figure 1014; 2009: 421), and more recently quoted in the Martinov & Schrödl (2011) and Martynov *et al.* (2011) contributions, this is the first record of the species after its original description, from the city of Ubatuba in the State of São Paulo, Brazil.

As in the case of *Corambe carambola*, a predator–prey relationship with the bryozoan *Biflustra denticulata* could be suggested.

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