

# RECORD OF A NON-NATIVE MUZZLED BLENNY *OMOBRANCHUS PUNCTATUS* IN A TIDAL POOL OF SANTOS BAY, SOUTHEASTERN BRAZIL

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## ABSTRACT

Masetti, L.O., Vaske-Jr, T. & Rotundo, M.M. (2021). Record of a non-native muzzled blenny *Omobranchus punctatus* in a tidal pool of Santos Bay, southeastern Brazil. *Braz. J. Aquat. Sci. Technol.* 25(1). eISSN 1983-9057. DOI: 16902/bjast.v25n1. The presence of two specimens of *Omobranchus punctatus* (Blenniidae), on the central coast of São Paulo state, was reported for the first time inside the Bay of Santos. It is another important record related to the distribution of this alien species along the Southeastern/Southern coast of Brazil.

**Key Words:** Bioinvasion, Estuary, Blenniidae.

## INTRODUCTION

The muzzled blenny *Omobranchus punctatus* (Valenciennes, 1836) is native to the Indo-Pacific Ocean, common in intertidal habitats (Springer & Gomon, 1975; Springer, 1986), with reports of invasion in the southwest Atlantic (Wonham et al., 2000). Fowler (1931) first documented its presence in the Atlantic in 1930, related to ballast waters of ships coming from India to Trinidad (Lasso-Alcalá et al., 2011). Later, its appearance in Central American countries and the northern part of Brazil became relatively frequent (Cervigón, 1966; Springer & Gomon, 1975; Cervigón, 1994; Mendonça et al., 2005; Gerhardinger et al., 2006; Soares et al., 2011; De Paula-Costa et al., 2011), meaning an expansion of the range of the species. This expansion is possibly associated with the traffic of ships between Latin American ports and oil platforms, as well as larval dispersion along the littoral (Lasso-Alcalá et al., 2011). On the northern coast of São Paulo, southeastern Brazil, its occurrence has been registered recently inhabiting tide pools (Contente et al., 2015).

Understanding the distribution pattern of an alien species through registrations in new localities provides knowledge about the expansion of the occupied territory, population maintenance along space and time, and possible causes of invasion/dispersion (Gerhardinger et al., 2006). Thereby, the present report describes a new record of *Omobranchus punctatus* (Valenciennes, 1836) inhabiting tide pools of Santos Bay, southeastern Brazilian coast; and discusses the possible causes and consequences of the invasion.

## MATERIAL AND METHODS

### Study area

Two specimens of *O. punctatus* were collected in the lower estuary channel of São Vicente, beside Santos Bay (23°58'33"S, 46°22'19"W). This area is part of a highly anthropized region of the central coast of São Paulo state, near the port of Santos and large industrial centers located in the city of Cubatão. These and other activities, such as the increase of irregular occupation of all kinds, culminates in significant losses of natural vegetation cover and severely affect the quality of water, both estuarine and coastal (Silva et al., 1991).

Specimens were captured in September 2019 on the rocky shore of Millionaire's beach in a single tidal pool measuring 400 cm x 76 cm (Figure 1). The substrate, volume, average depth, ichthyofauna composition, and vegetation cover were measured and qualified. The average depth of the pool has been estimated by measuring ten points along the longest diameter. For the estimation of the area, the pool was compared to an ellipse, which:

$$\text{Area} = \pi \cdot r \cdot R \quad (\text{Equation 1})$$

Where "r" is the smallest radius and "R" is the largest radius. For the estimation of the volume, the pool was compared to a hemi-ellipsoid, according to Cavalieri's theorem, where:

$$\text{Volume} = (4 \cdot \pi \cdot r \cdot R \cdot p) / 6 \quad (\text{Equation 2})$$

Where "p" means the maximum depth, located in the center of the ellipsoid. Ichthyofauna composition was evaluated through seven daytime



Figure 1 – The city of São Vicente in the central coast of São Paulo state where white star is the site where *Omobranchus punctatus*.

collections, carried out between August and November 2019. Specimens were captured using traps made with two-liter plastic bottles and baited with *Perna perna* mussels. The individuals were identified according to Williams (2002). The total length was measured in millimeters with a caliper and then preserved in alcohol in a collection in the UNESP-CLP University located in São Vicente (SP) and at Zoological Collection in Santa Cecília University (AZUSC), (voucher #6138), located in Santos.



Figure 2 – The muzzled blenny, *Omobranchus punctatus* (Valenciennes, 1836) from the lower estuary channel of São Vicente.

## RESULTS

The total length of the specimens was 56 and 78 mm (Figure 2), being considered adult specimens (Springer, 1986). The average pool depth was estimated in 26 cm, surface area in 2.38 m<sup>2</sup>, and volume in 410 liters. Approximately 80% of the rocky substrate was filled with a large covering of macroalgae of the species *Ulva lactuca*, and *Enteromorpha intestinalis*.

Regarding the composition of the ichthyofauna, only two species were collected, where the gobiid *Bathygobius soporator* (Valenciennes, 1837) ranging from 27.7 to 110.3 mm of total length (mean = 61.9 mm; ±16.46 mm), was the most numerous, representing 96.5% of the fishes collected.

## DISCUSSION

The presence of *O. punctatus* inhabiting the littoral of Brazil has been first documented in the northeastern region, at Todos os Santos Bay, where 90 specimens were collected (Mendonça *et al.*, 2005). In the Southeastern/Southern Brazilian coastline, its occurrence has also been recorded. Gerhardinger *et al.* (2006) collected two specimens in an estuarine rocky shore at Ilha Grande Bay, Southern coastline of Rio de Janeiro state; and six individuals in Babitonga Bay, one of the largest estuarine systems of Southern Brazil located in Santa Catarina state (Figure 3).

Posteriorly, De Paula-Costa *et al.* (2011) documented different stages of larval specimens and their spatial-temporal distribution at the same estuary (Babitonga Bay). Finally, the last record of

*O. punctatus* on the South/Southeastern Brazilian coast was made by Contente *et al.* (2015), describing the presence of a single juvenile inhabiting a tidal pool in the estuary of São Sebastião, Northern littoral of São Paulo state (Figure 3).

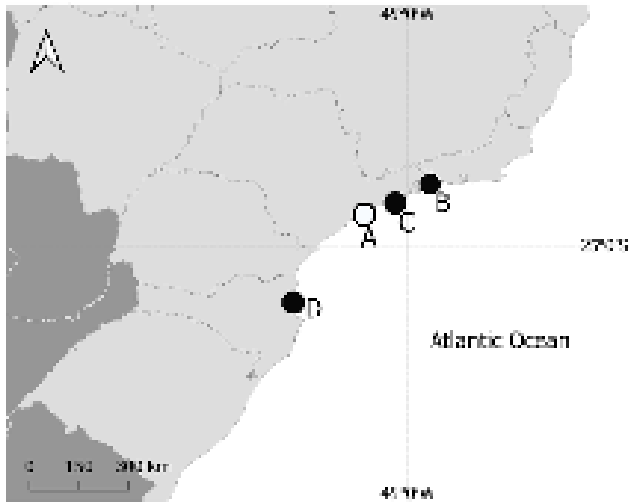


Figure 3 – Locations in the South/Southeastern Brazilian coast where *Omobranchus punctatus* was recorded, including the present study. A: Santos Bay; B: Ilha Grande Bay; C: São Sebastião Estuary; D: Babitonga Bay.

The invasive success of the species may be attached to physiological and ecological characteristics shared within blennies and gobies. Cryptic behavior, tolerance to salinity/temperature variations, and a reproductive behavior that consists in laying eggs in small holes (Gerhardinger *et al.*, 2006), enable *O. punctatus* and other blennies to transpose the three phases of a successful invasion (1) dispersion, (2) introduction and (3) establishment (Wonham *et al.*, 2000).

These characteristics, possibly, allow this blenny to live in ballast tanks and associated with ship's fouling for long periods (Golani, 2004), two of the most common vectors for invasive marine species (Gollasch, 2002; Lasso-Alcalá *et al.*, 2011). Thus, the occurrence of *O. punctatus* on the Southwest Atlantic has been frequently linked with the presence of ports (Springer & Gomon, 1975; Golani, 2004; Contente *et al.*, 2015), in such a way that Gerhardinger *et al.* (2006) states that all occurrences of the species in the Brazilian coast were close to large ports.

The occurrence of *O. punctatus* occupying tidal pool habitats is frequent (De Paula-Costa *et al.*, 2011; Soares *et al.*, 2011; Chargulaf *et al.*, 2011; Contente *et al.*, 2015). These environments present intense physical-chemical variations of parameters such as temperature, salinity, dissolved oxygen, and pH, due to the daily emersion and submersion dynamics along

with tide changes (Metaxas & Scheibling, 1993). This scenario benefits resistant species such as *O. punctatus*, that avoid possible predators and competitors that are not adapted to these extreme environments. Sharing this habitat with the species *B. soporator* was formerly reported as being relatively common (Gerhardinger *et al.*, 2006; Soares *et al.*, 2011; Machado *et al.*, 2015; Contente *et al.*, 2015). It is known that both species are omnivorous (Emmanuel & Ajibola, 2010; Hundt *et al.*, 2014), thus share the same resources provided by the local environment (algae and small invertebrates) and, eventually, may compete for them.

However, the ecological future of this scenario, with the presence of an invasive species, is unknown since the beginning of colonization. Therefore, periodic monitoring can be useful to verify if the number of individuals is stable or increasing along the years, which may imply in potential change on native species' niches, causing disturbs in tide pool communities and trophic chains Rilov & Crooks, 2009; Gallardo *et al.*, 2016; Arndt *et al.*, 2018).

The presence of *O. punctatus* in the estuary channel of São Vicente (SP) can be explained by two hypotheses. The first one is based on the proximity of the sampled area with Santos port. So the arrival of these organisms in the São Vicente's estuary may have occurred due to ballast water changes near the port as observed in other places (Mendonça *et al.*, 2005; Gerhardinger *et al.*, 2006; De Paula-Costa *et al.*, 2011; Soares *et al.*, 2011; Contente *et al.*, 2015). The second hypothesis is the arrival by natural dispersion of the species along the coast, once the northern report in São Sebastião Bay (SP) (Contente *et al.*, 2015) is 100 km far from São Vicente and the southern report in Babitonga Bay (SC) is 330 km away (De Paula-Costa *et al.*, 2011).

It is important to highlight that the present report relates the occurrence of two other exotic fish species in the estuary-bay complex of Santos-São Vicente. Once *Butis koilomatodon* (Butidae) have been recorded in the upper region of the estuary (Rotundo *et al.*, 2020) and *Opsanus beta* (Batrachoididae) is already stabilized in the area (Caires *et al.*, 2007; Tomás *et al.*, 2012).

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