

Aquatic Invasions Records

Occurrence of the non-native blenny *Omobranchus punctatus* (Valenciennes, 1836) (Perciformes: Blenniidae) in the Amazon coastal zone, Brazil

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Abstract

The muzzled blenny *Omobranchus punctatus* (Valenciennes, 1836) is native to the Indo-Pacific region. The species has been recorded at a number of locations in the southwestern Atlantic, including the Brazilian states of Bahia, Santa Catarina, and Rio de Janeiro. This fish was probably introduced accidentally in ship fouling, and poses a potential threat to the local ecosystem.

Key words: non-native species, Amazonia, estuary

Introduction

Omobranchus punctatus (Valenciennes, 1836) (Perciformes: Blenniidae) inhabits brackish coastal waters, primarily in benthic habitats, occupying cracks in rocks and mangroves (Ismail and Clayton 1990). The original geographic range of the species included parts of the Indian and Pacific oceans, between Japan and Australia, in the east, and the Persian Gulf, in the west (Golani 2004). Since the first record outside of its original range, in Trinidad and Tobago (Springer and Gomon 1975), the species has been found in a number of parts of the western Atlantic, from Panama and Venezuela to northern, eastern, and southern Brazil (Gerhardinger et al. 2006; Lasso-Alcalá et al. 2008; Freitas and Velastin 2010; Loebmann et al. 2010; Costa et al. 2011).

Wonham et al. (2000) relate the invasion and dispersion success of the blennies and gobies into novel environments to the physiological and behavioral characteristics of these taxa, including their cryptic habits, occupation of refuges, and spawning in crevices. These fish also tolerate a wide range of salinity levels. Together, these attributes allow the fish to survive in harbors, where they use ship hulls as refuges and spawning grounds, and are taken up in ballast water, which often leads to them being released into new environments.

In the present note, the occurrence of *O. punctatus* is reported from tidal pools on the Amazon coast of northern Brazil, where it coexists with a number of native species.

Methods

Specimens of *Omobranchus punctatus* (Figure 1) were collected from tidal pools on the Algodão-Maiandeuá Island Environmental Protection Area (APA Algodão-Maiandeuá) in the municipality of Maracanã in the Brazilian state of Pará. The island is located at the mouth of the Maracanã and Marapanim estuaries, between the coordinates 00°35'0"– 00°38'29"S and 47°31'54"– 47°34'57"W (Figure 2). Specimens were collected in April, June, September, and November, 2008, and between January and April, 2010. The specimens were collected at low tide at Caixa D'Água and Princesa beaches, in tidal pools that forms in depressions within the intertidal zone using a hand-net with a 5 mm mesh. A sample of 16 specimens was analysed.

Specimens were identified at the Vertebrate Ecology and Zoology Laboratory of the Biological Sciences Institute of the Federal University of Pará (UFPA). Following the procedure established by Springer and Gomon (1975), the standard length, length of the pectoral and pelvic fins, head length and orbit



Figure 1. Specimen of *Omobranthus punctatus* collected on Algodual-Maiandeuá Island in 2010.

Figure 2. Location of the study site, Algodual-Maiandeuá Island in northeastern Pará (Brazil), where the specimens of *Omobranthus punctatus* were collected in tidal pools in 2008 and 2010.

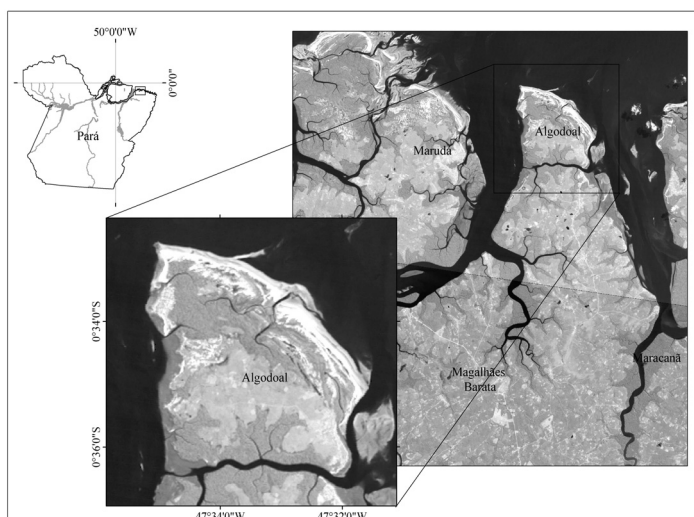
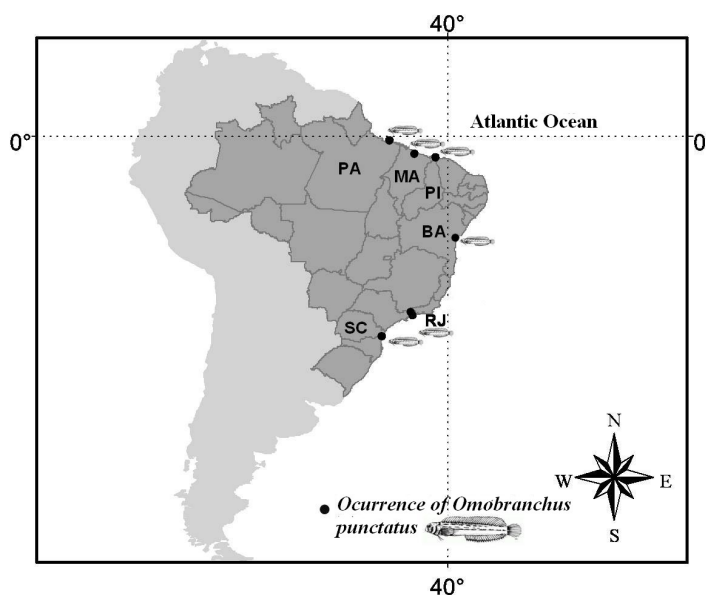


Figure 3. Locations at which the non-native blenny *Omobranthus punctatus* has been recorded on the Brazilian coast in published and unpublished reports, including the present study.



diameter were measured in triplicate using a 150-mm caliper with a precision of 0.1 mm, and the mean of the three values was used for analysis. The rays of the dorsal, pectoral, ventral, and anal fins were counted in each specimen.

Physical-chemical properties of the pools in which the specimens were found were measured (Table 1).

Results and discussion

In total, we sampled 16 specimens from 11 different tidal pools on Caixa d'Água and Princesa beaches. Standard length varied between 17.37 mm and 70.54 mm (mean \pm SD = 44.69 \pm 16.25 mm). This mean value was similar to that recorded by Gerhardinger et al. (2006), with average length of 44.23 mm. The mean value found in this study was smaller than that reported by Loebmann et al. (2010), that they have collected species with average length of 86.00 mm. But neither of these two studies sampled specimens smaller than 25.00mm. The dorsal rays of the specimens presented between 32 and 35 rays (Table 2), while the anal fins had 22 to 24 rays. All the specimens presented small branchial apertures on each side of the head, above the upper extreme of the pectoral fin, head lacking cirri or crests, body elongated and flattened (Figure 1).

The *O. punctatus* specimens showed a coloration pattern typical of the species, characterized by: head with uniform dark brown tonality, and darker spots near the operculum; dorsal surface brown, with dark brown transverse stripes running to the vertical median region of the body; cream-colored ventral surface; base of the pectoral fin cream, rays uniformly unpigmented, appearing translucent; insertion of the dorsal fin dark brown, pigmentation of the rays of the anterior three-quarters of the fin fading distally, posterior quarter uniformly beige; insertion of the anal fin brown, with uniformly brown rays; brown spot in the region of the caudal peduncle; rays of the caudal fin light brown, becoming uniformly unpigmented and translucent apically.

The pools in which the specimens were collected were also inhabited by a number of native fish species, including *Bathygobius soporator* (Valenciennes, 1837) (Perciformes: Gobiidae), which is common in coastal waters of up to 2 m in depth. Like *O. punctatus*,

B. soporator is a benthic species, and seeks refuge in rock crevices. Other species found in the pools included *Mugil hospes* (Jordan and Culver, 1895) (Mugiliformes: Mugilidae), *Lutjanus jocu* (Bloch and Schneider, 1801) (Perciformes: Lutjanidae), *Atherinella brasiliensis* (Quoy and Gaimard, 1824) (Atheriniformes: Atherinidae), *Colomesus psittacus* (Bloch and Schneider, 1801) (Tetraodontiformes: Tetraodontidae), and *Batrachoides surinamensis* (Bloch and Schneider, 1801) (Batrachoidiformes: Batrachoididae).

Copp et al. (2005) defined non-native species as those which do or did not occur naturally within an area, and which reached this area through direct or indirect human action, intentional or not. The introduction of invasive species into native communities is almost always the result of human activities (Carlton 1985), such as aquaculture or shipping activities, where the discharge of ballast water or the fouling leads to the introduction of many species, including fish (Ferreira et al. 2008). And it is suggested ballast water and biofouling as the most important vectors of introduction of species in the Brazilian marine realm (Lopes et al. 2009; Ferreira et al. 2009).

O. punctatus has been introduced into areas outside its natural range mainly through the discharge of ballast water of ocean-going vessels or through disposal of ship fouling (Gerhardinger et al. 2006; Golani 2004; Springer and Gomon 1975; Lasso-Alcalá et al. 2008). Loebmann et al. (2010) recorded *O. punctatus* in a number of different localities in northeastern Brazil, and concluded that the species may have dispersed naturally to some areas, where potential for the discharge of water ballast would be limited. Francis et al. (2004) concluded that the species *Omobranchus anolius* (Valenciennes, in Cuvier and Valenciennes, 1836) probably reached New Zealand in ballast water, given the biological characteristics of the species made natural dispersion virtually impossible. In Venezuela, Colombia, and Panama, *O. punctatus* has been recorded in areas adjacent to major ports, making dispersion through ballast water the most likely scenario (Lasso-Alcalá et al. 2008). However, there is increasing evidence that ship fouling may be at least as important as a vector. For example, Ferreira et al. (2006) identified 22 exotic species from a total of 118 benthic taxa collected in the region of Arraial do Cabo, on the southeastern Brazilian coast, in the fouling of

Table 1. Physical-chemical parameters of the water from the tidal pools in which the specimens of *Omobranchus punctatus* were collected on Algodual-Maiandeuá Island in 2008 and 2010.

Pool	Salinity (PSU)	T (°C)	pH	Length (m)	Width (m)	Depth (m)
RT01		29	8,2	4,3	1,83 ± 0,76	0,1 ± 0,01
RT02	33	36	8	6,25	2,09 ± 0,42	0,11 ± 0,02
RT03	20		8,5	6,68 ± 7,01	5,58 ± 3,52	0,07 ± 0,02
RT04	20		8,5	7 ± 1,69	3,13 ± 0,42	0,1 ± 0,04
RT05	26	35,8	8	6,8	2,28 ± 0,79	0,17 ± 0,04
RT06	27	35,5	7,8	6,25	3,27 ± 0,42	0,11 ± 0,02
RT07	25	27,1	7,4	1,59 ± 0,87	1,47 ± 0,34	0,11 ± 0,03
RT08	19	30,4	7,82	1,34 ± 0,2	0,92 ± 0,6	0,13 ± 0,03
RT09	19	29,6	7,74	1,36 ± 0,38	1,31 ± 0,2	0,16 ± 0,06
RT10	20	30,1	8,6	8,48 ± 2,82	3,63 ± 0,41	0,14 ± 0,04

Table 2. Morphometric and meristic data for the specimens of *Omobranchus punctatus* collected on Algodual-Maiandeuá Island in the Brazilian state of Pará. The lengths of the head, and the pectoral and pelvic fins are expressed as a percentage of the standard length, and the orbit diameter as a percentage of the head length.

ID.Ind	N° MPEG	Standard length (mm)	Relative length (%) of the:			Number of soft rays in the:			
			Head	Pectoral fin	Pelvic fin	Orbit diameter	Dorsal fin	Anal fin	Pectoral fin
OP01	18650	45.37	19.73	17.68	11.18	26.17	32	23	13
OP02	18651	56.75	19.63	18.63	9.09	26.60	32	22	13
OP03	18651	18.08	24.93	19.23	12.84	25.37	32	22	13
OP04	18645	67.86	20.46	16.62	10.74	18.63	32	22	13
OP05	18644	56.34	20.5	17.58	100.9	24.16	33	23	13
OP06	18388	24.57	23.32	20.52	13.97	26.76	33	23	13
OP07	18436	70.54	19.15	16.53	10.09	22.61	33	23	13
OP08	18436	54.57	20.88	20.4	11.39	24.54	33	23	13
OP09	18436	40.1	23.38	19.94	11.4	23.07	32	22	13
OP10	18649	42.44	21.20	17.55	10.01	24.68	32	22	13
OP11	18649	40.69	22.62	18.65	11.77	23.87	32	22	13
OP12	18649	62.67	8.96	16.70	10.79	24.21	31	24	13
OP13	18647	45.09	19.57	15.82	9.51	26.11	32	22	13
OP14	18649	38.69	20.10	17.15	13.37	28.12	33	23	13
OP15	-	17.37	23.43	19.28	11.97	29.65	35	22	13
OP16	-	33.95	22.72	23.67	12.61	26.23	33	23	13

Table 3. Localities at which the non-native blenny *Omobranchus punctatus* has been recorded on the Brazilian coast in published and unpublished reports, including the present study in the Amazon region.

Brazilian State	Year	Latitude, S	Longitude, W	Reference
Santa Catarina (SC)	2006	26°40'00"	48°28'00"	Gerhardinger et al. 2006
Rio de Janeiro (RJ)	2006	22°50'00"	44°45'00"	Gerhardinger et al. 2006
Bahia (BA)	2005	23°10'00"	44°30'00"	Mendonça 2005
Piauí (PI)	2010	02°53'55"	41°34'17"	Loebmann 2010
Maranhão (MA)	2006	02°30'03"	44°07'08"	Júnior 2006
Pará (PA)	2011	00°34'42"	47°34'46"	Present study

two drill-ships, two oil platforms and two cargo ships. Ship fouling is also suspected as the vector for the introduction of the non-native blenny *Omobranchus punctatus* into the Parnaíba Delta, northeastern Brazil (Loebmann et al. 2010), Babitonga Bay, in Santa Catarina, and

Ilha Grande Bay, in Rio de Janeiro (Gerhardinger et al. 2006).

A trophic study in tidal pools on Maranhão Island, in Brazil (Júnior 2006; unpublished data), indicated that *O. punctatus* is a herbivore, which ranges out from its refuge to scrape algae from

the rocks, thus competing with the native species *Scartella cristata* (Linnaeus, 1758) (Perciformes: Blenniidae) for space and dietary resources.

Omobranchus punctatus has now been recorded along much of the coast of Brazil (Figure 3, Table 3), although the gaps in the available data make it unclear whether a continuous population has been established, and to what extent natural dispersion is occurring. More specifically, the possible impacts of the introduction of *O. punctatus* on the fauna the APA Algodóal-Maiandeuá have yet to be understood.

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