

Range extension of the Patagonian seahorse in Brazil: a biological treasure hauled up by local fishermen

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Abstract

The Patagonian seahorse *Hippocampus patagonicus* occurs between the southern coast of Argentina and southern Brazil. The present study documents the first occurrence of *H. patagonicus* in Guanabara Bay, Rio de Janeiro, where it was taken as a fishery bycatch. They were caught in gillnets and had been preserved by the fishermen in absolute alcohol. The females were in reproductive stage 3, which indicates that they may migrate to Guanabara Bay to reproduce.

Keywords: Brazil, bycatch, fish, Guanabara Bay, *Hippocampus patagonicus*, Syngnathidae

Introduction

Seahorses have a worldwide distribution, being found primarily in shallow coastal waters (Lourie et al., 1999). These fish are benthic and use their prehensile tails to grasp supports (known as holdfasts) which they use to anchor their bodies when resting or foraging, as well as during courtship (Foster & Vincent, 2004; Felicio et al., 2011). Despite their benthic habits, seahorses are often taken as bycatch by fisheries using several different types of gear, which results in the death of millions of seahorses each year around the world (Lawson et al., 2017). Despite the major impact of bycatch on seahorse populations, specimens caught in this way may often provide important insights into the biology of poorly-known species that occur in deeper water.

The Patagonian seahorse, *Hippocampus patagonicus* Piacentino and Luzzatto, 2004, is the most recent seahorse species to have been recorded in Brazil and is now known to occur between Argentina and the southern coast of the Brazilian state of Rio de Janeiro (Luzzatto et al., 2012, 2013; Silveira et al., 2014; Pereira et al., 2016). Two populations in Argentina are known to inhabit shallow water (Luzzatto et al., 2012), but there are other reports of the species occurring at depths of more than 40 meters, which may reflect the dispersal of the juveniles by rafting, as suggested by Luzzatto et al. (2013), or seasonal migrations, as suggested by Foster and Vincent (2004) for *Hippocampus erectus* Perry, 1810.

Up to now, the only reports of the occurrence of *H. patagonicus* in Brazil have come from specimens captured as fishery bycatch, suggesting that the species inhabits deeper water off the Brazilian coast, which may restrict ecological studies to specimens obtained during offshore fishery operations (Pereira et al., 2018; Silveira et al., 2018). The present study provides the first record of the occurrence of *Hippocampus patagonicus* at the entrance to Guanabara Bay in southeastern Brazil, in addition to morphometric data and some observations on the considerations of the fishermen that had caught the specimens

Material and methods

Guanabara Bay is located on the coast of the state of Rio de Janeiro (22°50'S, 43°10'W), in southeastern Brazil. It is 36 km in length and reaches a depth of up to 30 m in the entrance channel (Amador, 1997). This bay is surrounded by several urban centers and industrial plants, which all release effluents into the bay (Carreira et al., 2002). Despite being a highly polluted environment, the biodiversity of Guanabara Bay is still relatively rich (Soares-Gomes et al., 2016).

Six specimens of *H. patagonicus* were captured by two fishermen from the Copacabana fisher colony (Z13), in the city of Rio de Janeiro, Brazil (Fig. 1). These seahorses were caught in gillnets set in the entrance channel to Guanabara Bay at depths of 30–40 meters. The conditions specified by the fishermen were choppy seas under a crescent or full moon. The seahorses were found grasping several different types of the holdfast, including the gillnet itself, leaves of *Terminalia catappa*, and plastic bags. The seahorses captured alive in the gillnet were set free, while the dead individuals were taken by the fishermen to their homes, where they were preserved in absolute alcohol. While discolored, these specimens were all well preserved. *Hippocampus patagonicus* was only ever captured in the gillnets between March and October, with the first specimen being collected in 2000 and the most recent, in 2021.

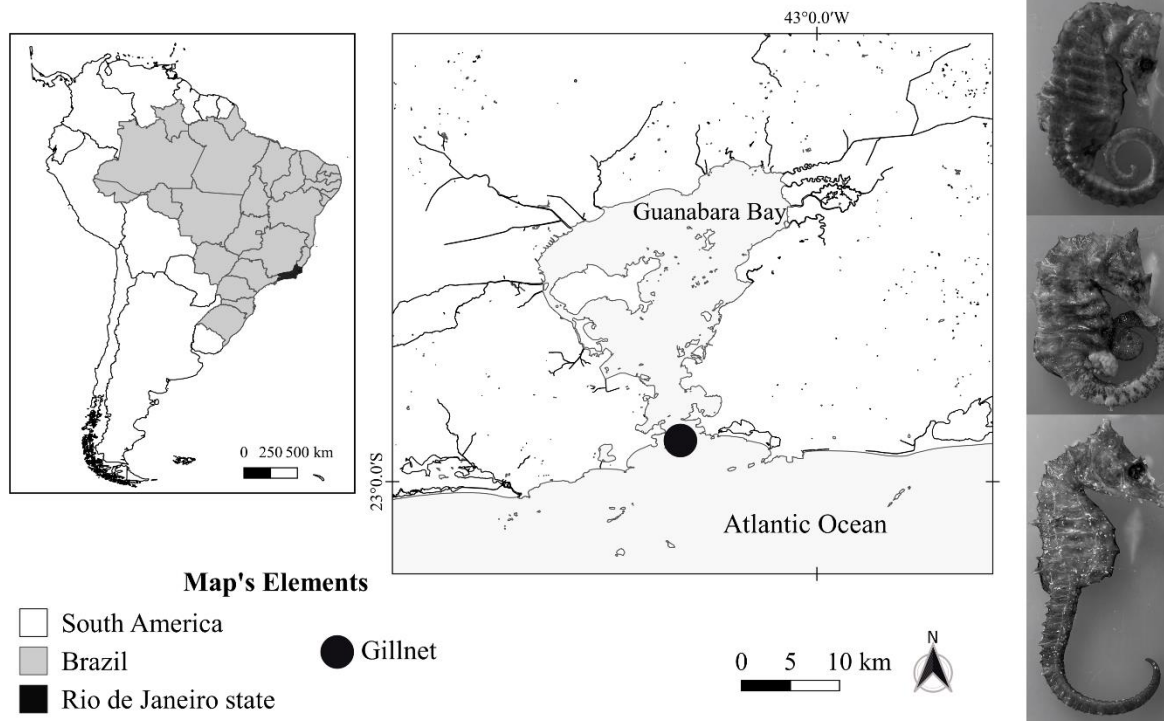


Figure 1. The area from which the Patagonian seahorses were obtained was bycatch (black circle) at the entrance to Guanabara Bay in Rio de Janeiro state, southeastern Brazil.

Although the fishermen allowed us to examine and photograph the specimens, they were only willing to donate one individual, which was deposited in the Animal Behavior and Conservation Laboratory at Santa Úrsula University. The specimens were photographed laterally, adjacent to a scale ruler, with a Nikon AW300. All measurements and descriptive morphological traits were documented following Lourie et al. (2004), Piacentino and Luzzatto (2004), and Lourie (2003).

The height of the specimens was taken using an ichthyometer and the other measurements were obtained with the ImageJ 1.45s software, using the straight-line calibration approach described by Koukalova and Medvedova (2016).

Results and discussion

The seahorse specimens (four males and two females) examined in the present study presented morphological traits diagnostic of *H. patagonicus* (Table 1). Both females were at reproductive stage 3, with part of the eggs already expelled. Three of the males were at reproductive stage 1 and the fourth was at stage 0. The mean height of the males (88 ± 18 mm) was greater than that of the females (76 ± 4 mm), and the standard length, trunk, tail, and post-orbital and dorsal fin lengths were all greater in the males. Except for the post-orbital length, however, the dimensions of the head were similar in the two sexes (Table 2).

Table 1. Diagnostic morphological traits of the six Patagonian seahorses, *Hippocampus patagonicus*, caught in gillnets set at the entrance to Guanabara Bay in Rio de Janeiro, southeastern Brazil. The individual identification codes represented the species (HP = *Hippocampus patagonicus*), sex (M/F = Male or Female), and the catalog number.

Morphological trait	The number recorded in the specimen:						Min - Max
	HPM1	HPM2	HPM3	HPM4	HPF1	HPF2	
Trunk rings	11	11	11	11	11	11	11
Tail rings	38	39	39	41	37	36	36 – 41
Dorsal fin rays	15	15	14	15	15	14	14 – 15
Pectoral fin rays	16	15	16	15	16	16	15 - 16
Anal fin rays	4	4	4	4	4	4	4

Table 2. Mean morphometric parameters (mm) of the six Patagonian seahorses (*Hippocampus patagonicus*) specimens captured in gillnets at the entrance to Guanabara Bay, Rio de Janeiro, Brazil.

Morphometric trait	Male – Mean \pm SD (mm)		Female – Mean \pm SD (mm)		Total – Mean \pm SD (mm)	
Height	88	± 18	76	± 4	84	± 15
Standard Length	102.5	± 14	84.5	± 3.5	96.5	± 14
Head Length (HL)	16.5	± 1	15.5	± 0.5	16.1	± 1.6
Trunk Length	24.5	± 4	20	± 0	23	± 4
TailL	61	± 6	49	± 4	57	± 8
HL/SnL	3.42	± 0.70	3.47	± 0.27	3.44	± 0.57

Brood pouch Length	16	± 6	n/a	n/a	16	± 6
Brood pouch width	3.2	± 1.5	n/a	n/a	3.25	± 1.5
Coronet length	5.7	± 0.9	5.5	± 0.5	5.6	± 0.8
Snout length (SnL)	5	± 1.4	4.5	± 0.5	4.8	± 1.1
Snout depth	2.2	± 0.5	2	± 0	2.1	± 0.4
Orbital length	2.2	± 0.5	2	± 0	2.1	± 0.4
Post orbital Length	8	± 1.4	6.5	± 0.5	7.5	± 1.3
Head depth	8.75	± 0.9	8	± 1	8.5	± 1
Dorsal fin length	8.5	± 1.2	6.5	± 0.5	7.8	± 1.4
Pectoral fin length	3	± 0.8	2.5	± 0.5	2.8	± 0.7

This is the first report of the occurrence of the Patagonian seahorse in Guanabara Bay, in southeastern Brazil. Given the reproductive condition of the specimens, it seems likely that they were approaching the shore to breed. Silveira et al. (2018) reported capturing Patagonian seahorses in open water, around 36 nautical miles offshore, in southern Brazil, and that most of the individuals were juveniles, with mean heights of 5.87 ± 2.95 cm (females) and 5.70 ± 2.62 cm (males). This suggests that *H. patagonicus* migrates north to reproduce, possibly during the austral winter, as commented by the fishermen in the present study. This would also be consistent with the seasonal breeding migration reported for *Hippocampus mohnikei* Bleeker, 1853 (Qin et al., 2017), during which the seahorses migrate to bays to reproduce.

Guanabara bay is one of the most important natural anchorages on the Brazilian coast and is also one of the most polluted areas, subject to intense anthropogenic impacts (Carreira et al., 2002). Given this, it is remarkable that the seahorses may still use this bay as a reproductive site, and highlights the need to review current approaches to the sustainable development of the bay.

Luzzatto et al. (2013) recorded the occurrence of *H. patagonicus* in San Antonio Bay, located in the northwestern extreme of San Matías Gulf, in northern Patagonia, Argentina. In this area, the seahorses were found either attached to floating debris, such as seaweed and crab carapaces or swimming freely at the surface of the water. In contrast with the present study, in which all the individuals were adults, the *H. patagonicus* collected from San Antonio Bay were all juveniles, at the planktonic stage.

Conclusion

The present study represents the first record of the Patagonian seahorse, *Hippocampus patagonicus*, in Guanabara Bay, southeastern Brazil. As this species is classified as vulnerable in both the Brazilian (MMA, 2018) and the IUCN red lists (IUCN, 2017), any advance in the understanding of its occurrence, population structure, and biology may represent a valuable contribution to the conservation of these animals. Our findings also reinforce the value of artisanal fishing operations as a research tool for the collection of data on fish biology.

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