

The presence of the seahorse *Hippocampus patagonicus* in deep waters: additional evidence of the dispersive capacity of the species

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Rafting is proposed as the mechanism of dispersal influencing the speciation and population structure of Hippocampus. Recently, rafting was confirmed in Hippocampus patagonicus by the direct observation of juveniles attached to floating debris. This study discusses the implications of the record of an individual in deep waters, suggesting that the species can disperse away from their coastal populations.

Keywords: Syngnathidae, south-west Atlantic Ocean, record

Submitted 21 April 2014; accepted 27 June 2014

The wide geographical range, the limited population structure and the speciation pattern observed in several species, or cluster of species, suggest that the bone fish of the genus *Hippocampus* Rafinesque, 1810 may disperse long distances passively (Teske *et al.*, 2005, 2007; Woodall *et al.*, 2011; Boehm *et al.*, 2013). Previous studies suggest that juveniles of *Hippocampus* exhibit rafting behaviour (Powell, 2000; Kanou & Kohno, 2001; Vandendriessche *et al.*, 2006), and recently, juveniles of *Hippocampus patagonicus* Piacentino & Luzzatto, 2004 were observed directly exhibiting this behaviour (Luzzatto *et al.*, 2013). Thus, rafting is hypothesized as an important mechanism of passive dispersion of this genus, even though evidence of long distance dispersion is limited.

The patagonian seahorse *Hippocampus patagonicus* has an extended geographical range in the south-west Atlantic Ocean. It is distributed from Brazil (Casey *et al.*, 2004; Boehm *et al.*, 2013) to Puerto Madryn, North Patagonia, Argentina (Piacentino & Luzzatto, 2004). Along the Argentine coast its distribution is patchy and sparse; two stable and discrete populations inhabit shallow waters at depths less than 15 m, near the shoreline. Isolated records between these populations have been reported as by-catch by fishermen (Luzzatto *et al.*, 2012).

This paper describes a *Hippocampus* specimen captured in a research survey, aiming at assessing the common hake (*Merluccius hubbsi* Marini, 1933). Surveys were carried out by the Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP) covering the Argentine–Uruguayan Common Fishing Zone (AUCFZ). Five benthic surveys were

conducted in this area: OB-05/98; EH-05/99; OB-06/00; OB-09/01; and CC-12/09. The *Hippocampus* specimen was captured during the first research mentioned by the RV 'Capitán Oca Balda', on 23 May 1998 at 35°34'S 53°33'W; AUCFZ, approximately at 120 km from the coastal city of La Paloma in Uruguay. The capture occurred at 60 m depth. The *Hippocampus* specimen was fixed in 10% formaldehyde and it was deposited at the INIDEP Fish Collection as INIDEP 614 (Figure 1). No other *Hippocampus* individual was captured during these research surveys (Martín Ehrlich, Ichthyoplankton Laboratory, INIDEP, personal communication). The specimen collected was measured following the methods of Lourie *et al.* (2004). It was a male of 6.8 cm height with 18 dorsal fin rays, 14 pectoral fin rays, 4 anal fin rays, 11 trunk rings and 37 tail rings. Using these taxonomic criteria, it was identified as *H. patagonicus* (Piacentino & Luzzatto, 2004).

The zone in which this *H. patagonicus* individual was collected corresponds to the transition between two biogeographical provinces, Argentinean and Magellanic. The main distribution of *H. patagonicus* is along the Argentinean Province (Rosa *et al.*, 2011; Luzzatto *et al.*, 2012), which is characterized by being influenced by the Brazilian warm oceanographic current. The Magellanic Province corresponds to colder and deeper waters influenced by the Malvinas/Falkland cold current (Ballech & Ehrlich, 2008).

Evidence from a previous study proposes that *H. patagonicus* has a potentially dispersive juvenile stage characterized by rafting (Luzzatto *et al.*, 2013). The record in deeper waters of the individual described above suggests that some can successfully settle further away from their original populations after dispersing by this mechanism.

An alternative hypothesis is that some *Hippocampus* species may perform seasonal migrations to deeper waters

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Fig. 1. *Hippocampus patagonicus* individual sampled (35°34'S 53°33'W): deposited in the INIDEP fish collection as INIDEP 614. Scale bar: 1 cm.

during the winter months (Foster & Vincent, 2004). This behaviour had been proposed for *Hippocampus erectus* Perry, 1810 (Wicklund *et al.*, 1969), the sister species of *H. patagonicus* (Luzzatto *et al.*, 2012).

Isolated and sporadic *Hippocampus* specimens indicate that those individuals do not belong to a stable population and might be the consequence of long-distance migration. On the other hand, they might have the potential to interconnect with existing populations, potentially contributing to the wide distributional range found in this and other seahorse species with limited population genetic structure (Woodall *et al.*, 2011).

ACKNOWLEDGEMENTS

We thank R. Estalles who helped revise and proofread this paper, and the anonymous referees who guided the process of reshaping this work with their valuable contributions.

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