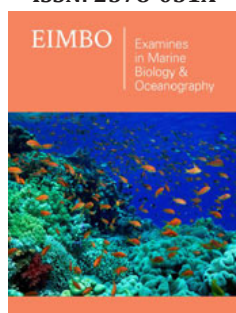


The mystery of *Styracura schmardae* stingrays from the Brazilian Amazon coast

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Abstract

The Atlantic Chupare stingray *Styracura schmardae* is a rare species with a range distribution from the Gulf of Campeche, in Mexico, to the state of Ceará, in Brazil. Herein we discuss the information gap of the *S. schmardae* population in the Brazilian Amazon coast (BAC), a place surrounded by mysteries.

Introduction

The Brazilian Amazon coast (BAC) is a large area comprising the states of Amapá, Pará and Maranhão, which suffers the influence of countless estuaries, voluminous rivers and dense mangrove forests. The coastline presents certain *sui generis* characteristics, such as a macrotidal regime with amplitudes reaching up to 7.5 m, a tropical weather with average temperatures above 27 °C throughout the year and a rainy season with a mean precipitation rate of about 2000 mm/year [1]. Due to the particularities of this environment, the local ichthyofauna displays significant physiological plasticity, and many species present adaptations to significant salinity variations [2], a striking condition of BAC estuarine systems due, mainly to the local rain volume [3]. However, ecology assessments usually focus on the importance of abundant species, rather than the role of rare species in various types of environments. Nevertheless, rare species presents restricted and specific relationships to certain types of environments or correspond to equally neglected endemic species [4].

In this context, the Atlantic Chupare stingray *Styracura schmardae* is considered a rare species throughout its distribution area, which ranges from the Gulf of Campeche, in Mexico, to the state of Ceará, in Brazil, including the Lesser and Greater [5,6]. Currently, the *Styracura* genus, plays an important role as a sister group of the Potamotrygoninae subfamily, composed by the freshwater rays of South America, based on morphological and molecular analyses [7,8,9]. Even though the *Styracura* genus was recently relocated, on a provisional basis, from the Dasyatidae family to the Potamotrygonidae family, it is possible that this genus may belong to a family of its own, since it inhabits in marine environments [9].

In Brazil, occurrence records are available only for *S. schmardae* [6,10-14], with no publications on its biology and ecology, except for information available in gray literature. This lack of information appears to occur globally, as this species is currently classified as Data Deficient (DD) by the International Union for Conservation of Nature's Red List (IUCN) [5]. Thus, a great mystery surrounds *S. schmardae*, since a BAC population is known, but specifically, where does it reside? Important ecological information on this species is being collected in the central Bahamas, located in the Northwest Atlantic Ocean [15], probably comprising a distinct population from the BAC, considering that the migration process of these demersal rays is difficult to occur, since individuals would have to find shallow migration routes or cross significantly deep locations.

The reduced number of records in Brazil is due not only to the southern limit of *S. schmardae*'s distribution, but also due to its environmental specificities, considering that records are available only for estuarine environments undergoing significant influence from the mouths of the Amazon rivers, supporting low salinity values [12]. In addition, few fishers in the region know how to fish this animal, which requires specific knowledge comprising type

of bait and hook, as well as location, moon phase and tidal dynamics. However, it is almost common knowledge that *S. schmardae* offers a higher risk for fisher accidents, as it is the only stingray that swims towards humans when caught in artisanal fishing (Palmeira-Nunes, unpublished data). This behavior led the species to be popularly known as Tatá in the state of Pará, an onomatopoeia in Portuguese for such a swimming movement.

In addition to its rare occurrences and restricted habitats, another mystery comprises adult specimen records, since, with the exception of a 2000 mm Disk Width (DW) observed in a specimen captured in Venezuela [16], all other records are for immature animals. Where are the adults of this species? Obviously, it is much more difficult to transport an adult individual belonging to a large species to an ichthyological collection than a young one, considering that *S. schmardae* appears to reach maturity at ~ 1000 mm DW (Palmeira-Nunes, unpublished data). However, no records are available, even considering current tools that allow for the cataloguing of live or freshly caught animals. In addition, little is known about the ecology of registered juvenile specimens, although they are indeed captured and consumed [5].

The series of unpublished studies from the central Bahamas will certainly shed new light on the population structure of *S. schmardae* in the Caribbean, since that is the largest population registered for this species until today [15]. However, a significant knowledge gap in this regard still remains for the BAC, exactly where the closest populations to the sister group restricted to the freshwater environment would be. We encourage researchers in the region to publish ecological data on this species, even if scarce, or to seek a network of contacts so that this puzzle may begin to be solved.

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