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FIRST OCCURRENCE OF *Sphenia fragilis* (H. Adams & A. Adams, 1854) (BIVALVIA: MYIDAE) ON THE AMAZON COAST

Primeira ocorrência de *Sphenia fragilis* (H. Adams & A. Adams, 1854) (Bivalvia: Myidae) no litoral amazônico

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ABSTRACT

ABSTRACT *Sphenia fragilis* is a bivalve mollusk, belonging to the family Myidae, which has a habit of digging unconsolidated or consolidated substrates. Its estimated distribution indicates the presence of the species in the eastern Pacific and western Atlantic oceans. The present study indicates the first occurrence of *S. fragilis* on the Amazon coast (Urindeua River, Salinópolis, State of Pará). Additionally, it presents updated data on the species biogeography on the Brazilian coast. Altogether, 309 specimens of *S. fragilis* were found between the years 2013 and 2016, at depths between 1 and 4 meters, always associated with the surface of oysters. Based on these occurrences, added to the records made available on the Global Biodiversity Information Facility - GBIF platforms and the speciesLink network, it indicates an expansion of the biogeography of *S. fragilis* on the Brazilian coast, extending between the state of Pará and Rio Grande do Sul.

Keywords: Amazon, estuary, occurrence record, benthos.

RESUMO

Sphenia fragilis é um molusco bivalve, pertencente a família Myidae, que possui hábito de cavar substratos inconsolidados ou consolidados. Sua distribuição estimada indica a presença da espécie nos oceanos leste do Pacífico e oeste do Atlântico. O presente estudo apresenta a primeira ocorrência de *S. fragilis* no litoral amazônico (rio Urindeua, Salinópolis, estado do Pará). Adicionalmente, apresenta dados atualizados da biogeografia da espécie no litoral brasileiro. Ao todo encontrou-se 309 espécimes de *S. fragilis* entre os anos 2013 e 2016, em profundidades entre 1 e 4 metros, sempre associados a superfície das ostras. Com base nessas ocorrências, somadas aos registros disponibilizados nas plataformas Global Biodiversity Information Facility - GBIF e na rede speciesLink indica uma ampliação da biogeografia de S. fragilis no litoral brasileiro, estendendo-se entre o estado do Pará e Rio Grande do Sul.

Palavras-chave: Amazônia, estuário, registro de ocorrência, bentos.

INTRODUCTION

Benthic invertebrates, whether free or fixed, are organisms that live directly on the sediment and depend on the sediment for basic functions, such as feeding and reproduction (Bernardino et al., 2015; Brusca & Brusca, 2007; Neves & Valentin, 2011). The benthic community associated with consolidated and unconsolidated substrates is very diverse and complex, showing great importance in nutrient cycling (Amaral & Nallin, 2011; Bernardino et al., 2015; Lacoste & Gaertner-Mazouni, 2014).

Benthic molluscs found on all continents, being considered as environmental indicators. They have a great diversity of morphology, being able to inhabit the most diverse types of environments (Rios, 2009). In addition, they have numerous species with added economic value, often being the main source of income for human communities (Chagas et al., 2018; Leal, 2002).

The bivalves of the Myidae family have a habit of digging substrates, with some species being able to perforate the clay substrate. The species of this family, live together in open spaces, cavities or cracks left by other organisms (e.g., mussels and oysters). The external morphology of the myids has varied characteristics, such as: equilateral and equivalent shell, white color, ornaments in the form of concentric striations and long and wide posterior region (Coan, 1999; Pastorino & Bagur, 2011; Rios, 2009). Another peculiar characteristic in the shell of the myids is the presence of a prominent chondrophagus in the form of a spoon in only one of the valves. This is the main characteristic in distinguishing the species of the family (Coan, 1999).

The taxonomy of the genus *Sphenia* (Turton, 1822) is one of the least studied among the myids, being rarely observed in collections and generally identified until genus. Among myids, *Sphenia fragilis* (H. Adams & A. Adams, 1854) is a small, thin, fragile, sub-squared, irregularly shaped shell. It has a right valve slightly larger than the left, with a small white tooth under a yellowish periostrac. External surface with concentric growth lines (Coan, 1999; Pastorino & Bagur, 2011; Rios, 2009). It is usually associated with worms, banks of oysters and mussels, living trapped by a small bison (Rios, 2009).

Given the above, the present study records the first occurrence of the bivalve mollusc *S. fragilis* on the Amazon coast and indicates a possible extension of the species' biogeography on the Amazon coast.

MATERIAL AND METHODS

The municipality of Salinópolis is located in the microregion of salgado and northeast mesoregion, located in the Hydrographic Region Atlantic Coast - Northeast (Pará, 2012). The municipality has an average annual rainfall of 2,100 mm, with the rainy season between December and May, and the least rainy season (dry season) corresponding to the period from June to November. (Moraes et al., 2005).

The occurrence of *S. fragilis* occurred in the Urindeua River, during the collections of the project entitled "Composition of macrobenthos associated with mangrove oyster cultivated on the Amazon coast", carried out between the years 2013 and 2016, in the oyster culture of the "Associação de Agricultores, Pecuaristas e Aquicultores – ASAPAQ", of the village Santo Antônio de Urindeua. Sampling consisted of removing the macrobenthos associated with the oyster surface *Crassostrea tulipa* (Lamarck, 1819), according to Chagas et al. (2018).

The specimens found were fixed in 70% ethanol, transported to the Tropical Benthic Ecology Laboratory for taxonomic identification. In the laboratory, the individuals' shell morphometry was performed and, subsequently, some specimens were deposited in the Museum für Naturkunde - Leibniz Institute for Evolution and Biodiversity Science in Berlin (ZMB Moll 122209) and in the malacological collection of the Zoology Museum of the Federal Rural University of the Amazon - MZUFRA (MZUFRA Moll 1016).

In order to estimate the current biogeography of S. fragilis, searches were made in records of the species available on the platforms *Global Biodiversity Information Facility* - GBIF (https://doi.org/10.15468/dl.7aovg4) and on *SpeciesLink* (http://www.splink.org.br/).

RESULTS AND DISCUSSION

In this study, *Sphenia fragilis* (Figure 1) were recorded in October (one ind.) And December (148 ind.) 2013, August (one ind.), September (four ind.), October (64 ind.), November (10 ind.) And December (81 ind.) 2016, totaling 309 individuals found. The bivalves had a total length of 7.06±1.91 mm (mean ± SD), between 3.47 and 12.71 mm, width of 4.32±1.21 mm, between 2.03 and 7.67 mm , and height of 2.65±0.87 mm, between 1.12 and 5.22 mm. Raw data on *S. fragilis* morphometry is available on the PANGAEA - Data Publisher for Earth & Environmental Science (Silva et al., 2016).

Figure 1. Specimen of *Sphenia fragilis* found on the Amazon coast, Northern Brazil. Scale: 2 mm.

S. fragilis was found at depths between 1 and 4 meters, always associated with the surface of cultivated oysters. It is noteworthy that the species occurred only in the transition periods between the dry and rainy periods, in salinities above 30.

The average total length of *S. fragilis* found on the Amazon coast is within the range found in other Brazilian regions (maximum: 12.7 mm) (Coan, 1999). In addition, the depth of occurrence of the species in the present study is within that recorded in Brazilian waters, which is up to 10 m. However, there are records of occurrences up to 30 m deep in Argentina (Pastorino; Bagur, 2011). The association of *S. fragilis* with other bivalve molluscs is already documented in the literature (Pastorino; Bagur, 2011). In this study, *S. fragilis* uses the crevices from the cluster of oysters as a habitat. Such an association enables the growth of *S. fragilis* due mainly to protection against potential predators (e.g., fish).

The estimated distribution of *S. fragilis* indicates the presence of the species in the eastern Pacific and western Atlantic oceans (Coan, 1999). However, its distribution on the Brazilian coast was estimated between the geographical limits of the states of Ceará and Santa Catarina (Rios, 2009). However, with the occurrences in the state of Pará and the records made available in GBIF and in the *SpeciesLink* it appears that there was an expansion of the biogeography of S. fragilis on the

Brazilian coast, extending between the states of Pará and Rio Grande do Sul (Figure 2).

The specimens found showed high variation in shell morphology. This characteristic indicates restrictions imposed by the nesting habit and consequent dependence on substrates (Pastorino; Bagur, 2011). Thus, studies on the species' morphometric characteristics and a characterization of the Shell Shape Stabilization Indicator - IEF are recommended (Gil et al., 2007). The IEF may indicate the presence of a form stabilization index or possible anomalies (Chagas et al., 2019)

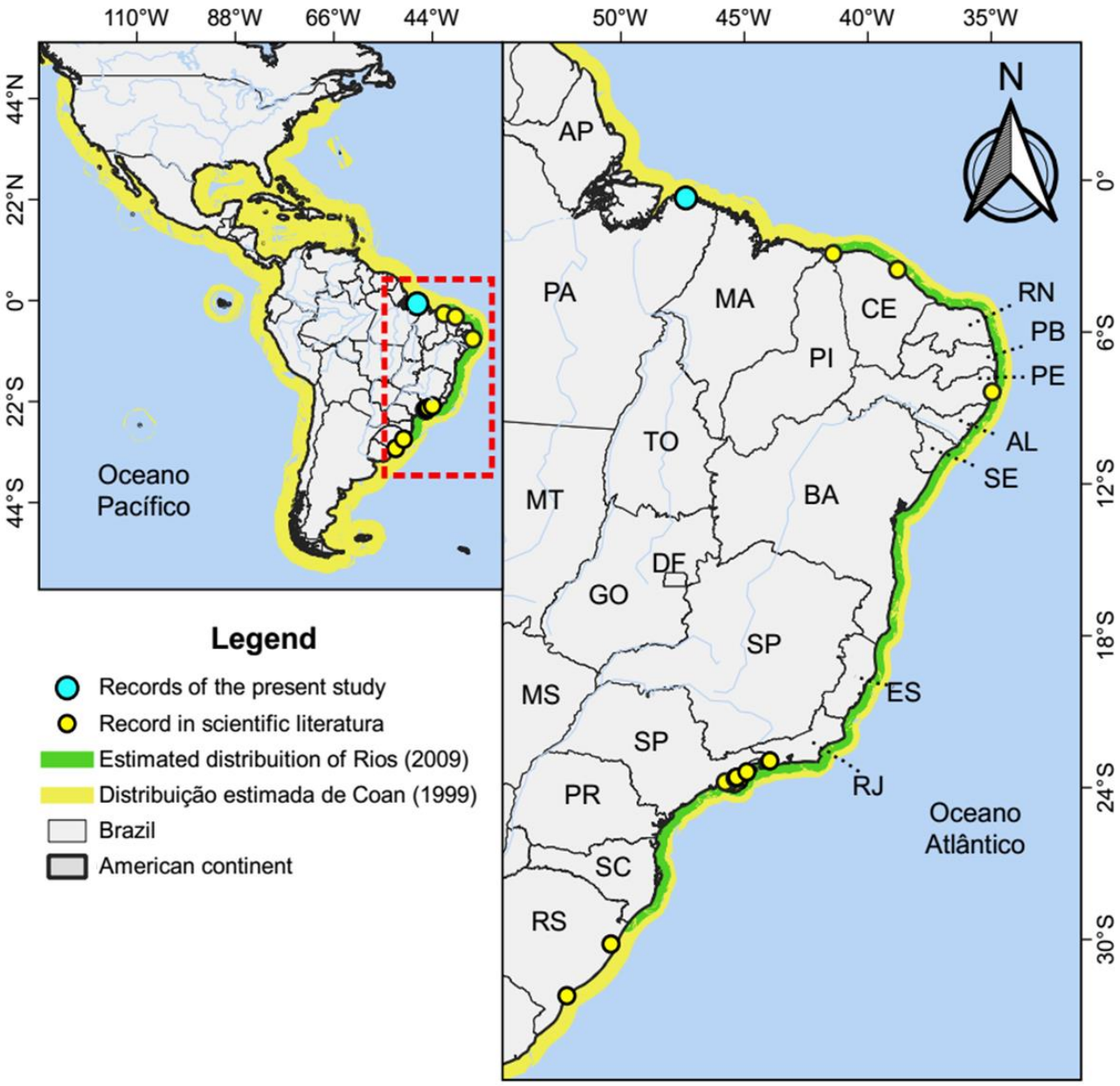

Figure 2 - Occurrences of *Sphenia fragilis* in the Brazilian coast (●: record in Salinópolis, State of Pará; ●: records from the Global Biodiversity Information Facility - GBIF and speciesLink network) and indication of estimated distribution in the Pacific and Atlantic Ocean (Coan 1999) and in Brazilian coast (Rios 2009).

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