









First record of the gastropod *Tenagodus modestus* (Dall, 1881) (Mollusca, Siliquariidae) in the intertidal zone

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Abstract

This study records the first occurrence of *Tenagodus modestus* (Dall, 1881), a representative of the Siliquariidae family, in the intertidal zone. The record occurred in 2020 in a mangrove area located in the Primavera River estuary, on the Amazon coast. Due to the scarcity of information about the species in the scientific literature, we encourage surveys of benthic fauna on the Brazilian coast to include gastropod mollusks in order to collect data about the species, aiming at its preservation.

Keywords: geographical distribution, marine gastropod, occurrence record.

Resumo - Primeiro registro do gastrópode *Tenagodus modestus* (Dall, 1881) (Mollusca, Siliquariidae) em zona intertidal

O presente estudo registra a primeira ocorrência de *Tenagodus modestus* (Dall, 1881), um representante da família Siliquariidae, em zona intertidal. O registro ocorreu em 2020 em área de mangue situada no estuário do Rio Primavera, no litoral amazônico. Devido à escassez de informações sobre a espécie na literatura científica, incentivamos que as prospecções da fauna bentônica no litoral brasileiro incluam moluscos gastrópodes com o intuito de levantar dados acerca da espécie, objetivando a sua preservação

Palavras-chave: Distribuição geográfica, gastrópode marinho, registro de ocorrência.

Resumen - Primer registro del gasterópodo *Tenagodus modestus* (Dall, 1881) (Mollusca, Siliquariidae) en la zona intermareal

El presente estudio registra la primera aparición de *Tenagodus modestus* (Dall, 1881), representante de la familia Siliquariidae, en la zona intermareal. El récord tuvo lugar en 2020 en una zona de manglares ubicada en el estuario del Río Primavera, en la costa amazónica. Debido a la escasez de información sobre la especie en la literatura científica, animamos a los estudios de fauna bentónica en la costa brasileña a incluir moluscos gasterópodos con el fin de recolectar datos sobre la especie, con el objetivo de su preservación

Palabras clave: Distribución geográfica, gasterópodos marinos, registro de ocurrencia.

Introduction

Marine gastropods of the Siliquariidae family are known worldwide as "snail worms" due to the spiral shape of their shells (Bieler, 1996); Rios (2009). Members of this family predominantly inhabit sandy or muddy substrates, being found buried or under the surface and, occasionally, associating with sponges (Bieler, 1990, 2004; Pansini, Cattaneo-Vietti, & Schiaparelli, 1996). With subterranean habits, siliquariids are rarely the

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object of observation, collection and studies, mainly due to their reclusive nature. In addition to presenting a symbiotic behavior with sponges (Bieler, 1992). In this context, Bieler (2004) provided the first detailed functional morphological study of the group and carried out a systematic review of the Western Atlantic members of the genus *Tenagodus*.

In the Western Atlantic Ocean, a total of three species of the genus are known. *Tenagodus* Guettard, 1770: *Tenagodus modestus* (Dall, 1881), *Tenagodus squamatus* (Blainville, 1827) and *Tenagodus barbadensis* Bieler, 2004 (Bieler, 2004). Among these species, *T. modestus* it has a whitish coloration, which can vary in light brown tones (Dall, 1981). Specimens are generally found with less than 80 mm in total length, being considered a relatively large species, but there are still records of individuals with 150 mm in length (Bieler, 2004; Rosenberg, 2009).

T. modestus has a distribution in deeper waters of the western Atlantic, ranging from Bermuda, Florida, Gulf of Mexico, Caribbean Sea, Bahamas to Brazil (Bahia to Espírito Santo) (Rios, 2009; Rosenberg, 2009). This species has been found at depths of 18 meters, with records at depths of up to 1,472 m (Dall, 1981). *T. modestus* It is a gastropod with limited vision, feeding on suspended debris. In addition, it has restricted mobility (stationary), reaching densities of up to 5,400 individuals/m² (Bieler, 2004).

Thus, the present study aims to record the first occurrence of *Tenagodus modestus* (Dall, 1881) in the intertidal zone, being the first record for the Amazon coast.

Material and Methods

Study area

The study area was delimited in the estuarine region of the Primavera River, located in the Municipality of Primavera (Figure 1), State of Pará (Eastern Amazon). The region has a hot and humid tropical climate (average temperature of 27.7 °C and air humidity between 80 and 85%), and also has high rainfall levels, with precipitation variations throughout the year (Moraes et al., 2005), determining two seasonal periods: a dry season (or less rainy season), with monthly rainfall averaging less than 60 mm from June to December, regionally known as the “Amazonian summer”; and a rainy season, with rainfall between 2500-3000 mm, which lasts from January to June, known as the Amazonian winter.

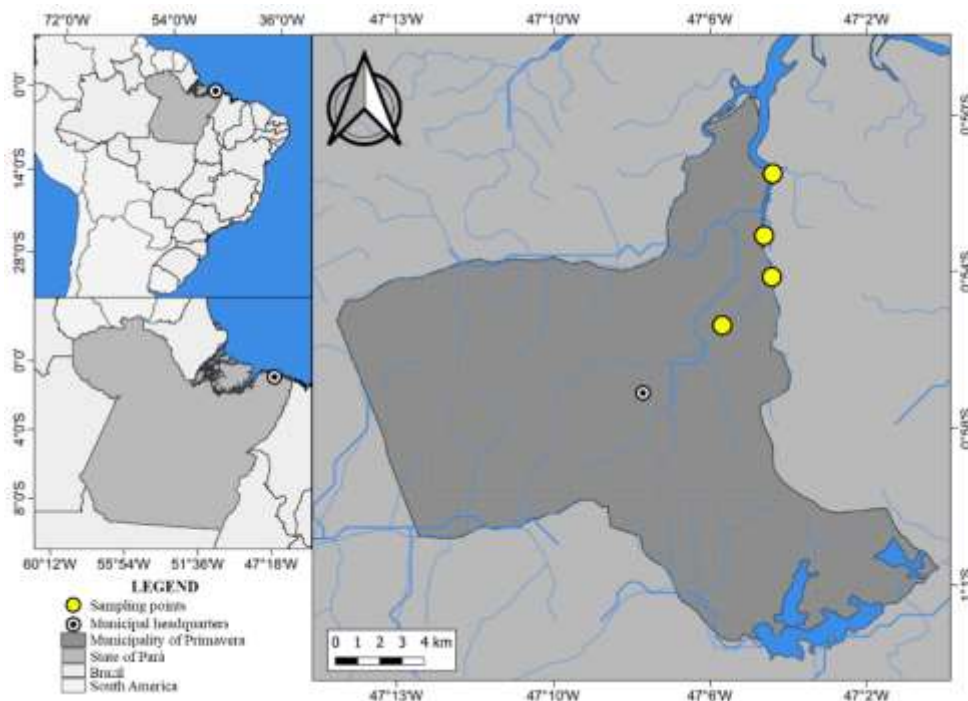


Figure 1. Sampling points located in the intertidal zone of the Primavera River, Pará state, Eastern Amazon.

Sampling methodology

The sampling methodology initially aimed to characterize the estuarine benthic community of the Primavera River. To this end, in September 2020 (Amazonian summer), four collection points in the mangrove area were defined (Figure 1), and at each point, sampling was carried out in two strips, one on the banks of the river (or main channel) and the other within the mangrove forest. In each strip, we extended a line parallel to

the river bank, where four quadrants of 1 m² each were arranged, spaced 25 m apart. Thus, at each sampling point, a total of eight quadrants were obtained, totaling 32 quadrants collected at the four sampling points. All sampling was carried out during low tide. In each quadrant, we collected, with the aid of a shovel, 5 cm of sediment depth. The samples were sieved in situ through a 0.5 mm mesh sieve, labeled, and the material preserved in 70% ethanol.

Screening and taxonomic identification

In the laboratory, the samples were washed in running water using sieves with a 0.5 mm mesh. After washing and sorting, all specimens were quantified and identified at the lowest possible taxonomic level using specialized bibliography for each taxon. In the case of *T. modestus*, the references available for the genus were used: Bieler (1992) and Bieler (2004).

Results and Discussion

The only specimen found is preserved in 70% ethanol and deposited in the Zoology Museum of UFRA under voucher MZUFRA Moll 1702 (Figure 2). This is the first occurrence of the species in the intertidal zone recorded in the literature and the first record for the Amazon coast. *T. modestus* was found in a region with a tidal range of up to 10 meters in depth, below the depth recorded in the literature for the species (from 18 m) (Dall, 1981). In Brazil, *T. modestus* have been recorded at depths of 20 to 787.5 m in Bahia and Trindade and Martim Vaz, respectively.

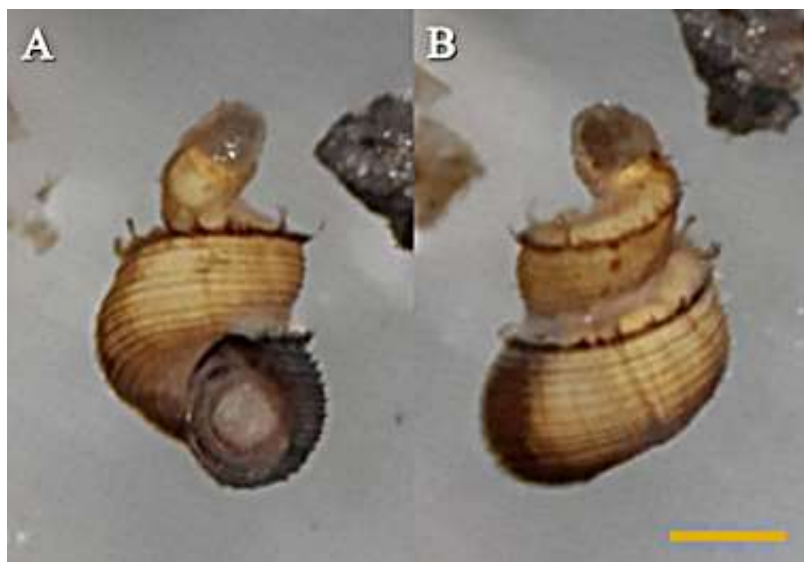


Figure 2. Occurrence records of the gastropod *Tenagodus modestus* (Dall, 1881) in the western Atlantic Ocean and the present study occurred in the intertidal zone of the Primavera River (Pará State, Brazil). The distribution limits (red dotted line) of the species from Florida, USA, and Bermuda to Brazil are indicated.

The gastropod *T. modestus*, due to its density, was classified as “rare” in the Primavera River, and furthermore, it stands out as a species that is not included in the lists of threatened species of the Brazilian Ministry of the Environment, nor in the IUCN Red List of Threatened Species.

There is little information about *T. modestus* in the world scientific literature and, in Brazil, and although there are several records of the species (Figure 3), there is no information available in the “Catálogo Taxonômico da Fauna do Brasil” (Spotorno, 2025).

Currently, the distribution of *T. modestus* is limited to Florida (in the USA) and Bermuda in Brazil, but in Brazilian waters, even though there were records on the Brazilian North Coast in 1975 (GBIF Secretariat, 2025), scientific literature indicates its extension only from the coast of the state of Bahia to Espírito Santo (Rios, 2009; Rosenberg, 2009). Thus, the present study presents a new record for the northern region, indicating the presence of the species extending from the coast of the state of Pará to southeastern Brazil.

Siliquariid gastropods correspond to the group of non-parasitic species that have adopted a sessile lifestyle, generally associated with sponges (Bieler, 1990). The association of siliquariids and sponges appears to be relatively frequent in deeper waters, mainly in the tropics (Pansini, Cattaneo-Vietti, & Schiaparelli, 1996). In this context, the present study, by reporting *T. modestus* in the intertidal region, indicates that in addition to sponges, other organisms or dense (and not hard) substrates can serve as a place for the species to settle. However, the benefits of colonization with sponges are more beneficial for the species (Pansini, Cattaneo-Vietti, & Schiaparelli, 1996).

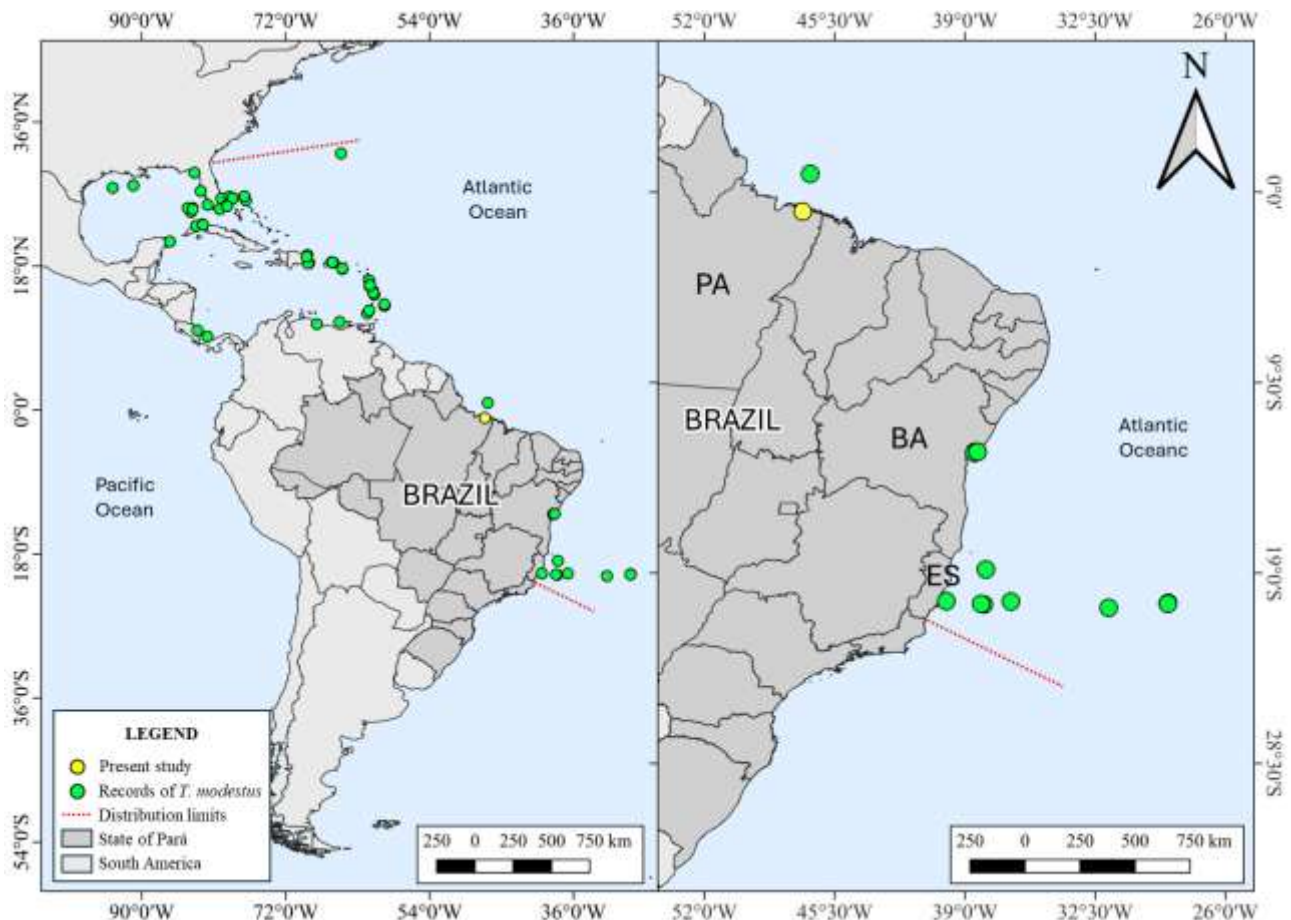


Figure 3. Specimen of *Tenagodus modestus* (Dall, 1881) in the intertidal zone of the Primavera River. Scale: 0.1 mm.

Conclusion

In this study, we recorded the first occurrence of the siliquid marine gastropod *Tenagodus modestus* (Dall, 1881) in the intertidal zone and the first for the Amazon coast. The record occurred unintentionally after collections of macrobenthos in the Primavera River estuary in 2020.

Due to the lack of knowledge about the species, we encourage surveys of benthic fauna on the Brazilian coast and coastal region to include gastropod molluscs with the aim of collecting data about the species, mainly aiming at its preservation.

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