



Mobile access

Artigo

Submetido 26 jan 2023

Aceito 07 fev 2023

Publicado 28 fev 2023

Autor Correspondente

R.A. Chagas

rafaelanaisce@hotmail.com

ISSN

2357-8068

URL

www.actapescanews.com

DOI da Revista

10.46732/actafish

Indexadores/Diretórios

Sumários

www.sumarios.org

Miguilim

<https://miguilim.ibict.br/>

Diadorim

www.diadorim.ibict.br





Latindex

www.latindex.org

OPEN ACCESS

FIRST OCCURRENCE OF THE EXOTIC GASTROPOD *Melanoides tuberculata* IN THE STATE OF AMAPÁ (BRAZILIAN AMAZON REGION)

Primeiro registro do gastrópode exótico *Melanoides tuberculata* no estado do Amapá (Região Amazônica brasileira)

Rafael Anaisce das Chagas^{1,2} , Mara Rúbia Ferreira Barros^{1,3} , Thibério Carvalho da Silva⁴  & Wagner César Rosa dos Santos^{4,5} 

¹Museu de Zoologia da Universidade Federal Rural da Amazônia - MZUFRA

²Pós-Graduação em Ecologia, Universidade Federal do Pará - UFPA

³Pós-Graduação em Ecologia Aquática e Pesca, Universidade Federal do Pará - UFPA

⁴Secretaria de Estado do Meio Ambiente do Amapá - SEMA

⁵Centro de Pesquisa e Conservação da Biodiversidade Marinha do Norte, Instituto Chico Mendes de Conservação da Biodiversidade - ICMBio

ABSTRACT

This study reports the first occurrence of the invasive gastropod *Melanoides tuberculata* (Müller, 1774) in the state of Amapá. *M. tuberculata* was first detected in a lake in Praça Floriano Peixoto, a city park located in Macapá, the state capital, on May 2, 2022. The lake has a substantial amount of foliage on the banks and relatively turbid water (with a green tint). This environmental characteristic is similar to that found in existing literature. As a consequence of this detection, it can be surmised that *M. tuberculata* is spreading through the Amazon region – thus far, its presence was restricted to the states of Pará, Mato Grosso, and Tocantins. Due to the potential ecological and economic impact, it is considered necessary to monitor the population density of *M. tuberculata* in Amapá, as well as to investigate possible mitigation measures, such as the introduction of a native fish that is capable of feeding itself on this invasive species.

Keywords: Amazon exotic species, “caramujo-trombeta”.

RESUMO

O presente trabalho apresenta o primeiro registro do gastrópode invasor *Melanoides tuberculata* (Müller, 1774) para o estado do Amapá. O registro de *M. tuberculata* ocorreu em um lago situado ao longo da Praça Floriano Peixoto, localizado em Macapá, capital do estado, em 2 de maio de 2022. O local de ocorrência apresenta incidência de folhagem nas margens e água relativamente turva (esverdeada). Essa característica do ambiente é similar a encontrada na literatura. Com esse registro evidencia-se que *M. tuberculata* está se espalhando pela região amazônica, sendo que até este registro, sua presença era restrita aos estados do Pará, Mato Grosso e Tocantins. Conclui-se que, devido o potencial impacto ecológico e econômico, faz-se necessário um monitoramento da densidade populacional de *M. tuberculata* no Amapá, bem como inferir possíveis medidas mitigatórias, como a inserção de um peixe nativo que seja capaz de alimentar-se desta espécie invasora.

Palavras-chave: Amazônia, espécie exótica, caramujo-trombeta.

INTRODUCTION

Melanoides tuberculata (Müller, 1774) is a freshwater gastropod mollusk belonging to the family Thiaridae. Popularly known as “caramujo-asiático” or “caramujo-trombeta”, *M. tuberculata* is a species native to the Middle East, East Africa, and Southeast Asia, which is now distributed worldwide (Barros et al., 2022; Dudgeon, 1986).

The first occurrence of *M. tuberculata* in Brazilian waters is reported by Vaz et al. (1986) in the municipality of Santos - SP, in 1967. Currently, the mollusk is reported in 20 states and the Distrito Federal (Barros et al., 2022; Franco et al., 2020). Its dissemination in Brazilian waters is common in the Northeast, South, Southeast and Midwest regions (Coelho et al., 2018). Recently, Barros et al. (2022) assessed the invasion status of *M. tuberculata* in the Amazon region and found that the species has apparently not expanded throughout the region, being present only in the states of Pará, Mato-Grosso, and Tocantins.

M. tuberculata is a species found concurrently with aquatic macrophytes (Dudgeon, 1986) and adapts easily to the environmental conditions in which they are found, as can be seen, for example, in its resistance to variation in abiotic data (e.g., salinity, pH, DO, and temperature) (Abdelhady et al., 2018; Pointier et al., 1993; Silva & Barros, 2015). All these characteristics, added to the fact that *M. tuberculata* is a species that reproduces by parthenogenesis, forms population conglomerates, has a long lifespan, low mortality rates, and low intraspecific competition make the species efficient with regard to dispersal and consolidation (Pointier et al., 1991; Vogler et al., 2012).

Against this background, the present study reports the first occurrence of the invasive gastropod *Melanoides tuberculata* in the state of Amapá, aiming to contribute to the mapping of its dissemination in the Brazilian Amazon region, as carried out by Barros et al. (2022).

MATERIALS AND METHODS

The detection of *M. tuberculata* occurred (Figure 1) in a lake in Praça Floriano Peixoto, a city park located in Macapá, Amapá, on May 2, 2022. Immediately after shells of the gastropod were discovered on the banks of the lake, the sampling of the gastropods was performed manually. Subsequently, the gastropods were fixed in 70% ethanol and transported to the *Museu de Zoologia da Universidade Federal Rural da Amazônia - MZUFRA*.

The taxonomy of the species was confirmed after comparison with specimens available at MZUFRA (MZUFRA Moll081 - Banana Lagoon, Caucaia - CE; MZUFRA Moll240 - Igarapé Praquiquara, Castanhal - PA; MZUFRA Moll924/MZUFRA Moll1198/MZUFRA Moll1199 - Cacos River, Primavera - PA; MZUFRA Moll1015 - Lagoon, Ananindeua - PA), and deposited in the MZUFRA malacological collection with voucher MZUFRA Moll1212.

Figure 1. Specimen of *Melanoides tuberculata* found in the lake in Praça Floriano Peixoto (Macapá, Amapá State). Scale: 7 mm.



RESULT AND DISCUSSION

The lake has a substantial amount of foliage on the banks and relatively turbid water. This environmental characteristic is similar to that found in the literature (Franco et al., 2020). The presence of this species causes numerous impacts, for instance, it is potentially able to destabilize native benthic communities (Barros et al., 2020), especially the population of the native snails *Biomphalaria* sp., which act as an intermediate host for parasites (Bogéa et al., 2005; Pinto & Melo, 2010; Vaz et al., 1986).

The specimens collected have an elongated, moderately thick shell with a rather worn apex. The coloration is predominantly brown with well-marked striations. These characteristics are similar to those attested in literature (Barros et al., 2020; Santos et al., 2012; Simone, 2006; Vogler et al., 2012).

This first occurrence of *M. tuberculata* in the state of Amapá is very worrisome, because we believe that this is not an isolated case, especially since it occurred in a city-park lake.

We emphasize that this invasive gastropod is until now limited to the states of Pará, Mato-Grosso, and Tocantins. Pará has a total of eight reports (Barros et al., 2022; Barros et al., 2020; Coelho et al., 2018; Correia et al., 2012; Fernandez et al., 2003; Franco et al., 2020). Reports from other localities in the Brazilian Amazon region are presented in Figure 2, generated on the basis of data surveyed by Coelho et al. (2018) and expanded and organized by Barros et al. (2022) (Figure 2).

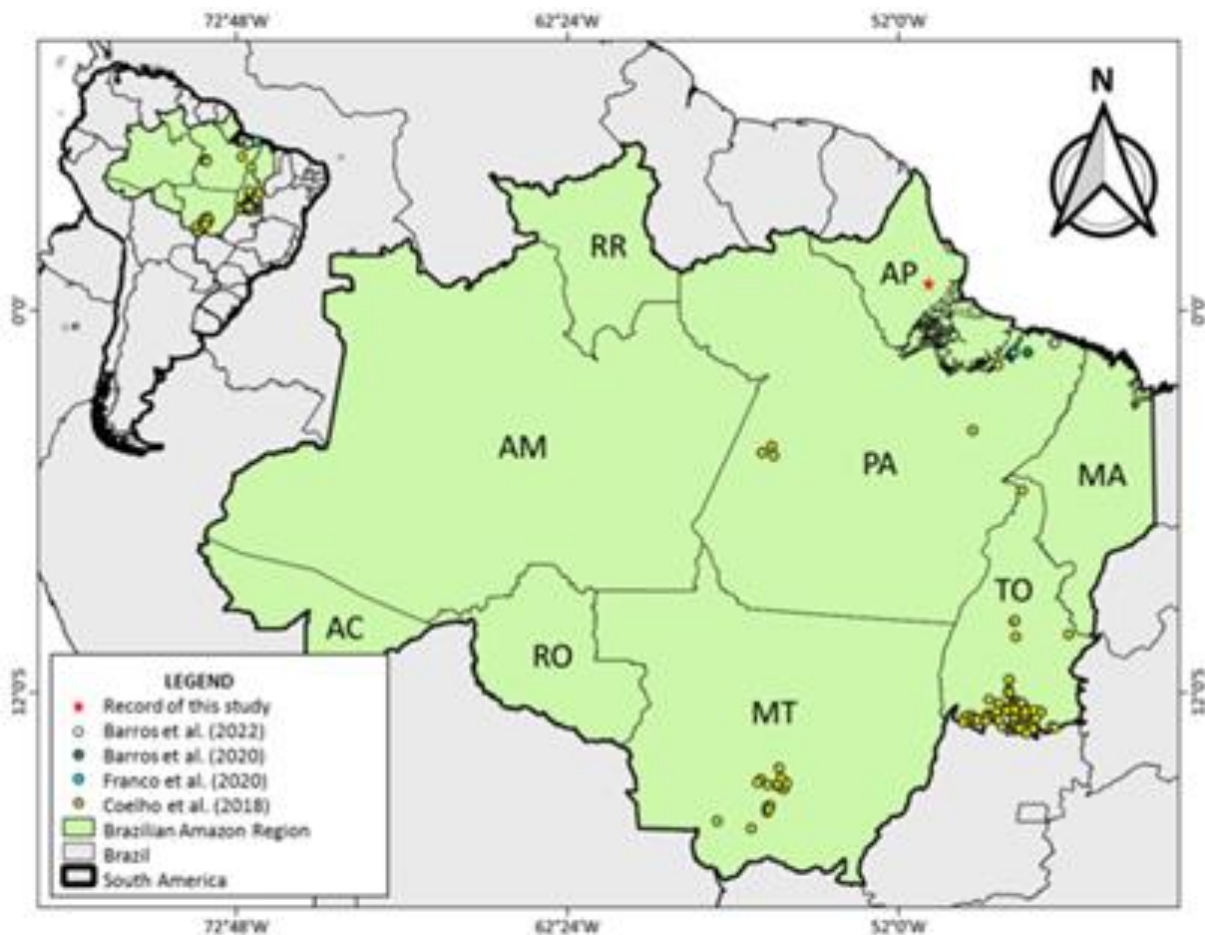


Figure 2. Distribution of the species *Melanoides tuberculata* in the Brazilian Amazon region from reports over the years. Expanded from Barros et al. (2022).

With regard to the Brazilian Amazon region, occurrences of the gastropod *Melanoides tuberculata* are restricted to the states of Pará, Mato Grosso, and Tocantins. However, the distribution is still fragmentary documented, mainly due to the absence of sampling in the other Amazonian states (Barros et al., 2022; Coelho et al., 2018; Santos et al., 2012).

In this study we present the first occurrence of the invasive gastropod *Melanoides tuberculata* in the state of Amapá. This report is of great concern because it indicates that the bio-invasion of the species in the Brazilian Amazon region is most likely underestimated. Therefore, we recommend that researchers from other states, especially malacologists and ecologists, include observation protocols for recording and monitoring the species.

ACKNOWLEDGMENTS

To the Coordination of Higher-Level Staff Improvement (“Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES”) for the research grant given to the authors R.A. das Chagas (2019/20), and M.R.F. Barros.

REFERENCES

- Abdelhady, A.A., Abdelrahman, E., Elewa, A.M.T., Fan, J., Zhang, S. & Xiao, J. (2018). Phenotypic plasticity of the gastropod *Melanooides tuberculata* in the Nile Delta: A pollution-induced stabilizing selection. *Marine Pollution Bulletin*, 133, 701-710.
- Barros, M., Santos, W. & Chagas, R.A. (2022). Bioinvasão de *Melanooides tuberculata* (Müller, 1774) na região amazônica: Novo registro e status de distribuição. *Acta of Fish. and Aquat. Resources*, 10(1), 54-59.
- Barros, M.R.F., Chagas, R.A., Santos, W.C.R. & Herrmann, M. (2020). Novo registro de *Melanooides tuberculata* (Mollusca: Thiaridae) na Amazônia Oriental. *Research, Society and Development*, 9(7), e774974461.
- Bogéa, T., Cordeiro, F.M. & Gouveia, J.S. (2005). *Melanooides tuberculatus* (Gastropoda: Thiaridae) as intermediate host of Heterophyidae (Trematoda: Digenea) in Rio de Janeiro metropolitan area, Brazil. *Revista do Instituto de Medicina Tropical de São Paulo*, 47(2), 87-90.
- Coelho, P.N., Fernandez, M.A., Cesar, D.A.S., Ruocco, A.M.C. & Henry, R. (2018). Updated distribution and range expansion of the gastropod invader *Melanooides tuberculata* (Müller, 1774) in Brazilian waters. *BioInvasions Records*, 7(4), 405-409.
- Correia, J.M.S., Barros, J.C.N., Camargo, M., Batista, J.C.L. & Souto, P.S.S. (2012). Malacofauna limnética da ecorregião aquática Xingu-Tapajós. In Z.C. Castilhos & P.A. Buckup (Eds.), *Ecorregiões Aquáticas Xingu-Tapajós* (pp. 139-162). Cetem/MCT.
- Dudgeon, D. (1986). The life cycle, population dynamics and productivity of *Melanooides tuberculata* (Muller, 1774) (Gastropoda: Prosobranchia: Thiaridae) in Hong Kong. *Journal of Zoology*, 208(1), 37-53.
- Fernandez, M.A., Thiengo, S.C. & Simone, L.R.L. (2003). Distribution of the introduced freshwater snail *Melanooides tuberculatus* (Gastropoda: Thiaridae) in Brazil. *The Nautilus*, 117(3), 78-82.
- Franco, J.N., Freitas, H.V.P., Vasconcelos, K.M.V.N., Santos, W.J.P., Barros, M.R.F., Chagas, R.A. & Bezerra, A.M. (2020). Primeira ocorrência do gastrópode invasor *Melanooides tuberculata* (Müller, 1774) (Mollusca: Thiaridae) no município de Ananindeua, Pará, Amazônia Oriental. *Scien. Amazonia*, 9(2), 9-14.
- Pinto, H.A. & Melo, A.L. (2010). *Melanooides tuberculata* (Mollusca: Thiaridae) as an intermediate host of *Centrocestus formosanus* (Trematoda: Heterophyidae) in Brazil. *Revista do Instituto de Medicina Tropical de São Paulo*, 52(4), 207-210.
- Pointier, J.-P., Théron, A. & Borel, G. (1993). Ecology of the introduced snail *Melanooides tuberculata* (Gastropoda: Thiaridae) in relation to *Biomphalaria glabrata* in the marshy forest zone of Guadeloupe, French West Indies. *Journal of Molluscan Studies*, 59(4), 421-428.
- Pointier, J.-P., Toffart, J.-L. & Lefèvre, M. (1991). Life tables of freshwater snails of the genus *Biomphalaria* (*B. glabrata*, *B. alexandrina*, *B. straminea*) and of one of its competitors *Melanooides tuberculata* under laboratory conditions. *Malacologia*, 33, 43-54.
- Santos, S.B., Thiengo, S.C., Fernandez, M.A., Miyahira, I.C., Gonçalves, I.C.B., Ximenes, R.F., Mansur, M.C. & Pereira, D. (2012). Espécies de moluscos límnicos invasores no Brasil. In M.C. Mansur, C.P. Santos, D. Pereira, I.C.P. Paz, M.L.L. Zurita, M.T.R. Rodriguez, M.V. Nehrke & P.E.A. Bergonci (Eds.), *Moluscos límnicos invasores no Brasil : biologia, prevenção e controle* (pp. 25-50). Redes Editora.
- Silva, E.C. & Barros, F. (2015). Sensibility of the invasive snail *Melanooides tuberculatus* (Müller, 1774) to salinity variations. *Malacologia*, 58(1-2), 365-369.
- Simone, L.R.L. (2006). *Land and Freshwater Molluscs of Brazil*. EGB, Fapesp: São Paulo.
- Vaz, J.F., Teles, H.M.S., Correa, M.A. & Leite, S.P.S. (1986). Ocorrência no Brasil de *Thiara* (*Melanooides*) *tuberculata* (O.F. Muller, 1774) (Gastropoda, Prosobranchia), primeiro hospedeiro intermediário de *Clonorchis sinensis* (Cobbold, 1875) (Trematoda, Plathyhelminthes). *Rev.Saúde Pública*, 20(4), 318-322.
- Vogler, R.E., Núñez, V., Gregoric, D.E.G., Beltamino, A.A. & Peso, J.G. (2012). *Melanooides tuberculata*: The history of an invader. In E.M. Hämäläinen & S. Järvinen (Eds.), *Snails: Biology, ecology and conservation* (pp. 65-84). Nova Science Publishers.