



New occurrence of exotic mollusk *Helisoma duryi* (Wetherby, 1879) (Gastropoda: Planorbidae) in Maranhão State, Brazil

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Abstract: The present study expands the distribution of *Helisoma duryi* (Wetherby, 1879) to Maranhão State, northeastern Brazil. The specimens were sampled in fish tank for commercial purposes. In the country, there are records in nine states and this new one raises the problem of the species bioinvasion in Brazil.

Key words: Northeast Brazil; Geographic Distribution; Radula; Biodiversity; Pisciculture.

Nova ocorrência do molusco exótico *Helisoma duryi* (Wetherby, 1879) (Gastropoda: Planorbidae) no Estado do Maranhão, Brasil. Resumo: Este estudo expande a distribuição de *Helisoma duryi* (Wetherby, 1879) para o estado do Maranhão, nordeste do Brasil. Os espécimes foram amostrados em tanque de peixes para fins comerciais. No País há registros da espécie em nove estados e este novo registro pode ser um alerta de bioinvasão no Brasil.

Palavras-chave: Nordeste do Brasil; Distribuição geográfica; Radula; Biodiversidade; Piscicultura.

In the last decade, the study of invasive species has become fundamental for the establishment of bioinvasion models and prevention and control policies, as well. Several freshwater mollusks are currently considered bioinvaders, competing with native species, causing economic damage and human health problems (McGeoch *et al.* 2010; Darrigran *et al.* 2020). Molluscs represent 4% of the number of exotic species in Brazilian continental aquatic ecosystems (MMA, 2016), including the classes: Bivalvia, *Corbicula* spp. and *Limnoperna fortunei* (Dunker, 1857), predominantly; and Gastropoda, represented by *Melanoides tuberculata* (Müller, 1774), *Physa acuta* Draparnaud, 1805 and *Helisoma duryi* (Wetherby, 1879). This species beside to be important cause of biodiversity loss, alterations of ecosystem structure and function and taking the role of intermediate host

of several trematode parasites, some of which have a potential impact on human health (Graber *et al.* 1980, Darrigran *et al.* 2020, Pinto & Melo 2011).

The planorbid *H. duryi* originally from the United States of America (Type locality: Everglades, Florida) was first reported in Brazil in 1972, in the State of Goiás (Paraense 1975). To date here are records of occurrence in the states of Bahia, Ceará, Goiás, Minas Gerais, Paraíba, Rio de Janeiro, Rio Grande do Norte and São Paulo, generally associated with aquariophily activity (Fernandez *et al.* 2010, Fernandez *et al.* 2013, Simões & Fernandez, 2019). The mollusk can be confused with others planorbids beside the congenera *Helisoma trivolvis* (Say, 1817) as of genera *Biomphalaria*: *Biomphalaria tenagophila* (d'Orbigny 1835) and *B. occidentalis* Paraense, 1981. The identification of these species is possible after dissection of the snail

followed by observation of the male reproductive system, in addition to the characters of the shell (Fernandez *et al.* 2012).

Specimens were found in the municipality of Chapadinha in the state of Maranhão (3 ° 44 '31 "S, 43 ° 21' 36" W), in the period of May-November 2016, from the Mutirão neighborhood of a farm fish of *Colossoma macropomum* (Cuvier, 1818) and *Piaractus brachypomus* (Cuvier, 1818). In addition, specimens were found in breeding tanks, and ornamental fish aquariums containing algae from the same fish culture at the Centro de Ciências de Chapadinha (CCCh / Universidade Federal do Maranhão) of the same municipality (Fig. 1).

The species was identified based on the external morphological characters and the male reproductive system, following the key to Planorbinae (Fernandez *et al.* 2020), and deposited in the Collection of Mollusks of the Oswaldo Cruz Institute (CMIOC), Rio de Janeiro, Brazil. Scanning electronic microscopic as used to examine radulae, as it is an important diagnosis in the identification of

some taxonomic groups, as reported by Burch (1989).

The shell of *H. duryi* presents a planispiral shape (Fig. 2) with dilated opening and with turns that grow rapidly in diameter with the suture deep on both sides; the right side is concave and the left is little excavated, tending to flattened. The reproductive system presents a penis sheath pyriform with a dorsal globular and a basal portion narrower continuous with prepuce (Fig. 3), characteristic of this species.

The analysis of radula, done with a TM3030 tabletop microscope (Hitachi) operated at 15 kV (Fig. 4), show the pattern illustrated by Smith (1990).

The specimens were deposited in the Coleção de Moluscos do Instituto Oswaldo Cruz (CMIOC) at the number 10554. In this Scientific Collection, recognized as the Trustee of samples of the Brazilian Genetic Heritage by the Ministry of the Environment (Deliberation N° 97 of March 22, 2005), there are specimens from Brazil, Barbados, Bolivia, Chile, Costa Rica, Cuba, Guadeloupe, Mexico, Peru, Martinique, Saint Vincent and Uruguay.

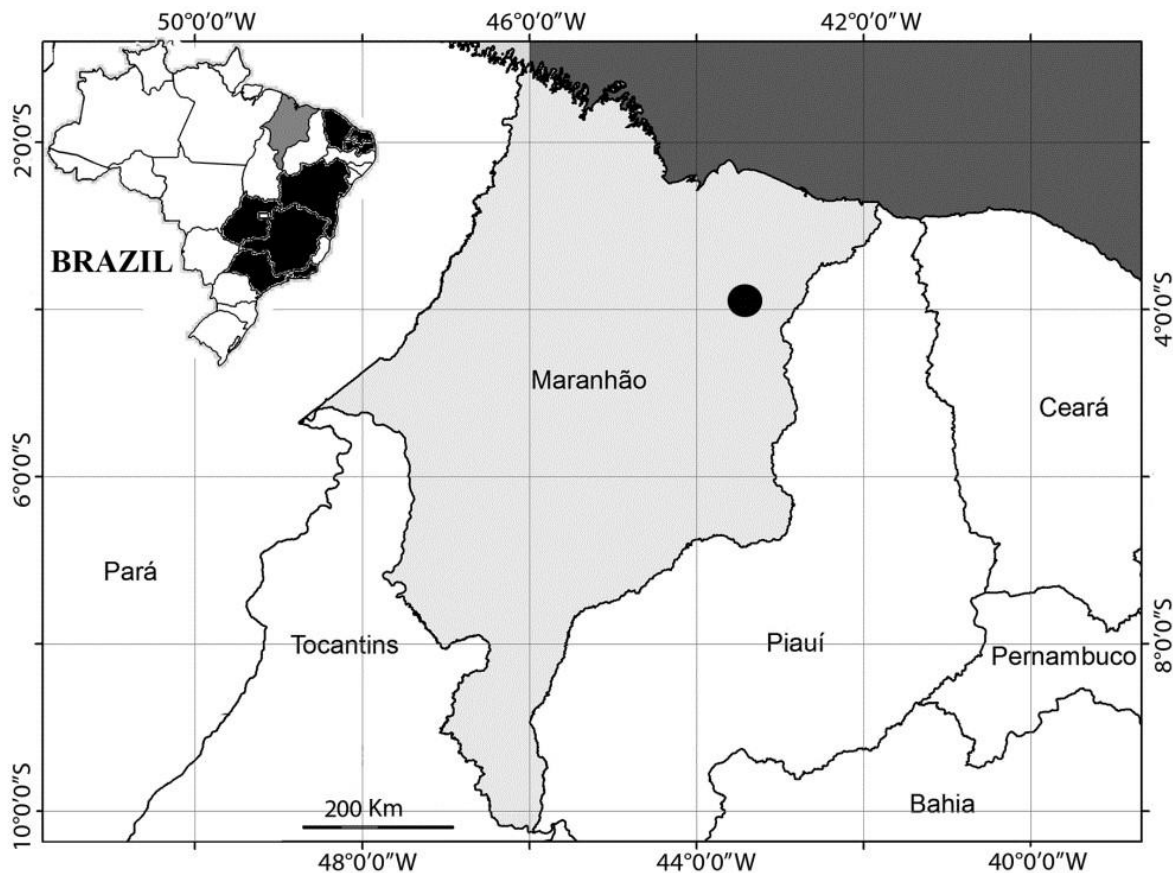


Figure 1. Map with distribution records of *Helisoma duryi*. In map of Brazil: in gray the Maranhão State and in black previous records. In map of Maranhão State: solid dot localization of Chapadinha municipality where specimens are found.

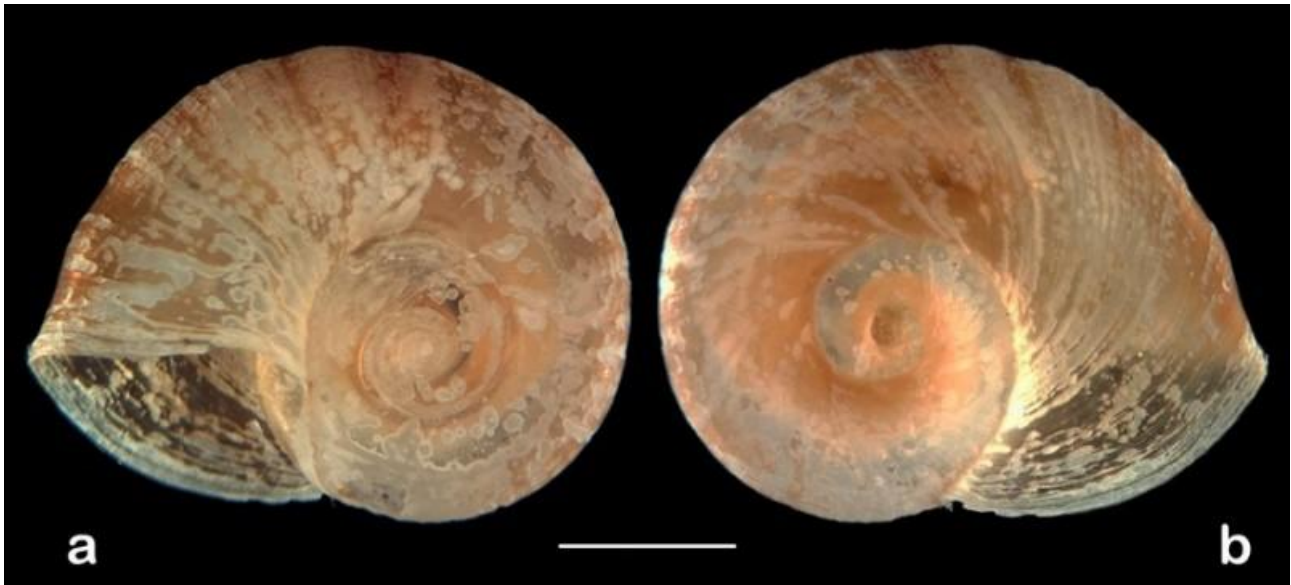


Figure 2. *Helisoma duryi* found in Maranhão State, Brazil; a) left side; b) right side. Scale bar 0,5mm.

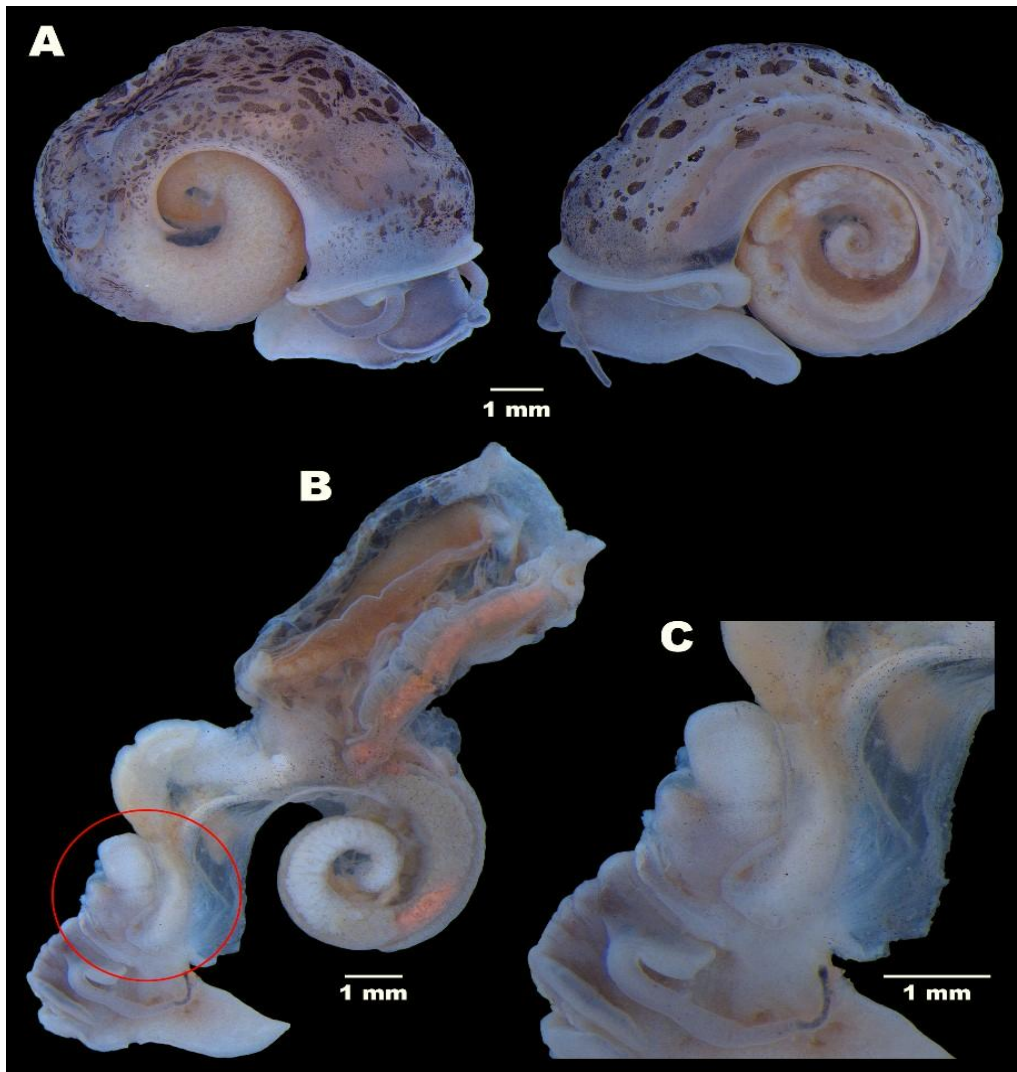


Figure 3. *Helisoma duryi* found in Maranhão State, Brazil; a) right side and left side; b) snail partially dissected for observation of the reproductive system (circle); c) penis sheath pyriform with a dorsal globular.

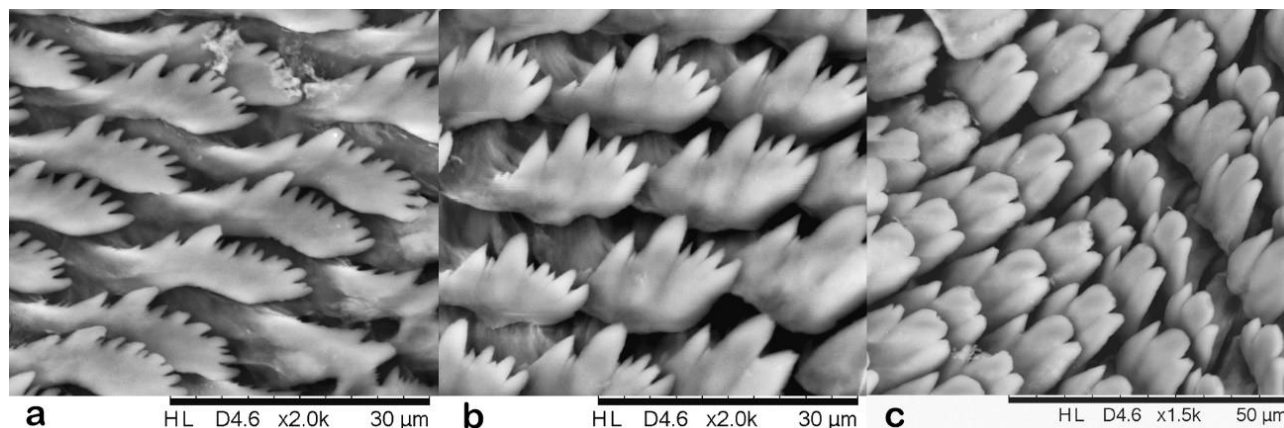


Figure 4. *Helisoma duryi* radula teeth's in scanning electronic microscopy; a) detail of marginal region; b) detail of latero-medial region; c) detail of central region.

This record expands the distribution limits of *H. duryi* providing a new distribution record of the Brazilian state of Maranhão, northeastern Brazil. In the State there are three species of *Biomphalaria*: *B. glabrata* (Say, 1818), *B. straminea* (Dunker, 1848) and *B. schrammi* (Crosse, 1864) (Cantanhede *et al.* 2014); of which the first two are natural hosts of *Schistosoma mansoni* Sambon, 1907 (Ministério da Saúde 2007, Scholte *et al.* 2012). *Helisoma duryi* beside to be an intermediate host of several trematode parasites can be competitor of some *Biomphalaria* species (Frandsen & Madsen 1979, Joubert & De Kock 1990) and result in a possible competitive displacement as recorded in Brazil for *M. tuberculata* (Guimarães *et al.* 2001).

The introduction and distribution of this exotic planorbidae, due to human actions related to the creation and transport of fish and aquatic plants, in an area with endemic to schistosomiasis and with fish production, especially with family fish farming for local production in expansion (Kirchner *et al.* 2016), lacking water waste treatment, sanitary controls and inspection and exotic species should be carefully studied by assessing its interference in the economy and health.

Ethical statement

The present investigation did not involve regulated animals and did not require approval by an Ethical Committee.

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