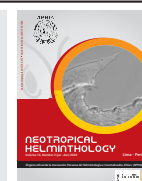




Neotropical Helminthology



RESEARCH NOTE / NOTA CIENTIFICA

FIRST RECORD OF *BIOMPHALARIA HELOPHILA* (D'ORBIGNY, 1835) IN JUTIAPA, GUATEMALA

PRIMER REPORTE DE *BIOMPHALARIA HELOPHILA* (D'ORBIGNY, 1835) EN JUTIAPA, GUATEMALA

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ABSTRACT

The presence of the freshwater mollusk *Biomphalaria helophila* (d'Orbigny, 1835) (Gastropoda: Planorbidae) in Jutiapa, Guatemala is reported. The 11 specimens with different stages of growth were captured at two sites, in Laguneta El Muchacho, San Diego la Danta Village, Moyuta municipality (n=6) and in a puddle in Achotal Village, Asunción Mita municipality (n=5). This is the first report of the species for Jutiapa, Guatemala.

Keywords: chonchology – Gastropoda – Guatemala – Mollusca – morphology - parasitology

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RESUMEN

Se reporta la presencia del molusco de agua dulce *Biomphalaria helophila* (d'Orbigny, 1835) (Gastropoda: Planorbidae) en Jutiapa, Guatemala. Los 11 ejemplares con diferentes etapas de crecimiento fueron capturados en dos sitios, en Laguneta El Muchacho, San Diego la Danta Village, municipio Moyuta (n=6) y en un charco en Achotal Village, municipio Asunción Mita (n=5). Este es el primer reporte de la especie para Jutiapa, Guatemala.

Palabra clave: Concología – Gastropoda – Guatemala – Mollusca – morfología – parasitología

INTRODUCTION

The genus *Biomphalaria* (Preston, 1910) (Gastropoda: Planorbidae) is well known for its important role in the transmission of the relevant medical and veterinary diseases, such is the case of schistosomiasis (Yong, 1998), considered one of the most important parasitic diseases in the world (WHO, 2002), the which is produced by parasites of the genus *Schistosoma* (Weinland, 1858) within which *Schistosoma mansoni* (Sambon, 1907) stands out (Caldeira *et al.*, 2016; Mitta *et al.*, 2017).

The malacological studies that intensively began in 2017 in Jutiapa, Guatemala, allowed to preliminarily knowing the richness of existing species in the country, as well as the areas where an outbreak of diseases in which they are involved may occur sporadically (Diéguez *et al.*, 2019). Planorbids are generally associated with certain types of freshwater habitats in which many other vector species can be found (Vázquez *et al.*, 2010), and in which there is significant anthropic activity as occurs in the Department of Jutiapa. This fact increases the risk of transmission of diseases to man, since natural water bodies have a wide use by the local population, such as for washing, commercial fishing, various recreational activities and where there may be mollusk freshwater situation that brings them closer to man considerably, for it reason we need to try to diminish or in the best in the cases to prevent the parasites incidence in probable transmission areas (Vázquez *et al.*, 2013, 2015).

Although in Guatemala there are still no official reports of cases of schistosomiosis in humans, we intend with this study to report the presence of an important species of freshwater mollusk, involved

in the transmission of the disease in the region of the Americas.

MATERIAL AND METHODS

Two small populations of *Biomphalaria helophila* (d'Orbigny, 1835) (Gastropoda: Planorbidae) (Figure), consisting of 11 specimens with different growth stages were discovered on March 7, 2019 in Laguneta El Muchacho, San Diego la Danta Village, Moyuta municipality (n=6) (Reg.=No.46-2019-Jut), which is used for public baths and commercial fishing, as well as on December 13, 2019 in a puddle in the Achotal Village (n=5) (Reg.=No.5-2019-Jut), Asunción Mita municipality both of the Department of Jutiapa, Guatemala.

In the capture of the specimens, a bronze strainer (15 cm in diameter with 1 mm mesh pitch) was used to remove the different substrates and once sieved; the entire content was poured into a white plastic tray on which the specimens were separated with the help of a soft copper clamp. The method consisted of capture per unit of effort for 30 min without replacement (Diéguez *et al.*, 2019). A total of 25 bodies of natural fresh water were surveyed, of the lentic and lotic type, shallow with and without aquatic vegetation, floating and adjacent, resulting in two bodies of water with the presence of the species (8,00 %).

Biomphalaria helophila is characterized by presenting a shell of up to seven mm, with four turns that increase rapidly; opening slightly tilted upwards; generally more than six prostatic diverticula (Vázquez & Sánchez, 2015).

Ethic aspects:

This investigation was subject to ethical norms that facilitated to reduce to the minimum the damage possible to the gathered specimens, to the breeding places, as well as to the technical personnel involved in the identification of the gathered samples, for this way, to be able to generate new knowledge without violating the established ethical principles for these cases. All the authors involved in the investigation, publication and diffusion of the results, we are responsible for the dependability and accuracy of the shown results (DHAMM, 2013).

Competing Interests:

The authors declare that there is no conflict of interests regarding the publication of this paper.

RESULT AND DISCUSSION

Schistosomiasis remains one of the most prevalent parasitic diseases worldwide and endemic in many countries and territories (Engels *et al.*, 2002). In Latin America 24 species and one subspecies were registered of genus *Biomphalaria* involved in the transmission of the disease, four of them can be found naturally infected by *S. mansoni*, whereas six were found to be susceptible in the laboratory (Caldeira *et al.*, 2016).

Biomphalaria helophila is one of the best represented species in the American region and is frequently found in stable aquatic ecosystems (Perera, 1996). It is also usually associated with

aquatic vegetation, reaching high population densities when it finds appropriate environmental conditions (Yong *et al.*, 2001).

Based on this report, it is necessary to intensify malacological surveys to locate other populations of the species inside and outside the Department, and with it, determine the mechanisms that it may be using to colonize natural water bodies in the country, studies that in other countries of Central America and the Caribbean have already been previously described (Pointier *et al.*, 2005), since the presence of the species constitutes a potential risk of becoming ill, especially in aquariums where human activity is important, as it is a potential intermediate host for *Schistosoma mansoni*.

It has been observed in the studies carried out to date in the Department, that the abundance of planorbids is much lower compared to other species such as *Melanooides tuberculata* (Müller, 1774) (Diéguez *et al.*, 2019), fact that is beneficial since this thiarido is an effective bioregulator of other undesirable mollusk species, about whose effectiveness important experiences have been developed in Cuba without causing problems to the ecosystem (Perera & Walls, 1996).

We recommend expanding these investigations to other Departments of the country, as well as developing detailed "*in situ*" studies of the ecology of the detected species, in order to know the distribution patterns and their interspecific relationships, which will contribute to the more successful design of surveillance strategies and control of undesirable mollusk for the Central American region.

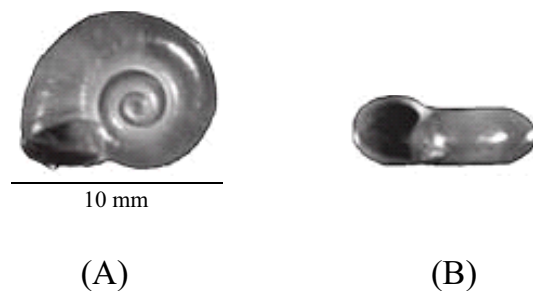


Figure 1. *Biomphalaria helophila* shell. (A): Side view. (B): View of the aperture.

BIBLIOGRAPHIC REFERENCES

- Caldeira, R.L.; Teodoro, T.M.; Jannotti-Passos, L.K.; Lira-Moreira, P.M.; Goveia, CH.O. & Carvalho, O.S. 2016. *Characterization of South American snails of the genus Biomphalaria (Basommatophora: Planorbidae) and Schistosoma mansoni (Platyhelminthes: Trematoda) in Molluscs by PCR-RFLP*. BioMed Research International, vol. 2016, pp. Article 1045391.
- DHAMM (Declaración de Helsinki de la AMM). 2013. *Principios éticos para las investigaciones médicas en seres humanos*. 64^a Asamblea General, Fortaleza, Brazil, octubre. World Medical Association, Inc. – All Rights reserved. 9 pp.
- Diéguez, L.; Monzón, M.V.; Rodríguez, J.; Juárez, J.A.; Iannaccone, J. & Fimia, R. 2019. *Distribución y hábitats preferenciales de los moluscos dulceacuícolas provenientes de Jutiapa, Guatemala*. Biotempo, vol. 16, pp. 11-21.
- Engels, D.; Chitsulo, L.; Montresor, A. & Savioli, I. 2002. *The global epidemiological situation of schistosomiasis and new approaches to control and research*. Acta Tropica, vol. 82, pp. 139–146.
- Mitta, G.; Gourbal, B.; Grunau, C.; Knight, M.; Bridger, J.M. & Théron, A. 2017. *The compatibility between Biomphalaria glabrata snails and Schistosoma mansoni: An increasingly complex puzzle*. Advances in Parasitology, vol. 97, pp. 111-145.
- Perera, G. 1996. *Ecologie des mollusques d'eau douce d'intérêt médical et vétérinaire à Cuba*. PhD Thesis, Perpignan, 105 pp.
- Perera, G. & Walls, J.G. 1996. *Apple snails in the aquarium*, TFH Publications, New Jersey, 121 pp.
- Pointier, J.P.; Yong, M. & Gutiérrez, A. 2005. *Guide to the freshwater molluscs of Cuba*. Conchbooks, Hackenheim, 120 pp.
- Yong, M. 1998. *Biosystématique des mollusques d'eau douce d'intérêt médical et vétérinaire à Cuba*. PhD Thesis, Perpignan, 104 pp.
- Yong, M.; Gutiérrez, A.; Perera, G.; Durand, P. & Pointier, J.P. 2001. *The Biomphalaria havanensis complex (Gastropoda: Planorbidae) in Cuba: a morphological and genetic study*. Journal of Molluscan Studies, vol. 67, pp. 103-111.
- Vázquez, A.A.; Sánchez, J. & Hevia, Y. 2010. *Distribution and habitat preferences of the genus Biomphalaria (Gastropoda: Planorbidae) in Cuba*. Memórias do Instituto Oswaldo Cruz, Rio de Janeiro, vol. 105, pp. 41-44.
- Vázquez, R.; Diéguez, L.; Fimia, R. & Iannaccone, J. 2015. *Environmental influence on the abundance of two populations of Physella acuta (Pulmonata: Physidae) from Camagüey (Cuba)*. Neotropical Helminthology, vol. 9, pp. 243-252.
- Vázquez, R.; Diéguez, L.; del Risco, U.; Fimia, R. & Vázquez, A.A. 2013. *Pseudosuccinea columella (Mollusca: Gastropoda: Lymnaeidae) en Camagüey*. Revista Cubana de Medicina Tropical, vol. 65, pp. 388-393.
- World Health Organization (WHO). 2002. *Prevention and control of schistosomiasis and soil-transmitted helminthiasis*. WHO Technical Report Series 912, Geneva, 57 pp.

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