

**The natural infection of *Melanooides tuberculata* (Müller, 1774)
(Mollusca: Gastropoda) by *Centrocestus formosanus* (Nishigori, 1924)
(Platyhelminthes: Trematoda) in Paranoá lake, Brasília, Brazil**

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Melanooides tuberculata (Müller, 1774), a freshwater snail first described in Asia, belongs to the Thiaridae (Caenogastropoda: Cerithioidea), and it is considered an invasive species with features of an r-strategist. Those features have allowed this thiarid to rapidly reach a high population density in its new habitat. It is an iteroparous organism that protects its young, is capable of parthenogenesis, displays phenotypic and genetic variability, and possesses ecological plasticity. *M. tuberculata* can be found in the Old and New World and has been spreading in the Caribbean area and in North and South America (Quintana et al., 2001-2002; Letelier et al., 2007; Pointier et al., 2011; Peso et al., 2011). In Brazil, the first introduction of this snail probably occurred in 1967 (Vaz et al., 1986) and, since then, it has spread to several states (Thiengo et al., 2007; Santos and Eskinazi-Sant'Anna, 2010). Its introduction can directly alter biological communities through competitive interactions with endemic snails, which can lead to the decline or extinction of local species. In fact, *M. tuberculata* have already been successful in eliminating or reducing populations of schistosome-transmitting snails in some localities. Besides that, thiarids are intermediate hosts of helminthes, which infect mammals, birds and fishes, including parasites that are of medical and veterinary importance (Mitchell et al., 2005; Pointier et al., 2011; Pinto and Melo, 2011). Among these parasites, *M. tuberculata* can harbour larvae of *Clonorchis sinensis* (Cobbold, 1875) and *Paragonimus westermani* (Kerbert, 1878). These are two trematodes that affect human beings, mainly in Asia. Recently, this thiarid was recorded in Al-Abtal village (North Sinai) as being a natural intermediate host of *Angiostrongylus cantonensis* (Chen, 1935), which is a nematode that causes infectious eosinophilic meningitis (Ibrahim, 2007).

Since the first recording of *M. tuberculata* in Brazil, its natural infection by trematodes was reported in 2001 thirty-four years later in the state of Rio de Janeiro, and subsequently other findings were registered from the same state (Thiengo et al., 2007). Recently, Pinto and Melo (2010a, b) reported larvae from the Pleurolophocercous and Megalourous groups in *M. tuberculata* in the state of Minas Gerais; these larvae were identified as *Centrocestus formosanus*

(Nishigori, 1924) and *Philophthalmus gralli* Mathis and Leger, 1910, respectively.

The present note reports the natural infection of *M. tuberculata* by *C. formosanus* in Brazil's Federal Capital, Brasília. The material studied consisted of 48 snails collected with a scoop net and long forceps at the margins of Paranoá Lake (15° 51,608' S and 47° 52,346' W) in March and October of 2007. This is an artificial reservoir that was constructed in 1959 to provide recreational activities in Brasília (Monteiro and Dias, 1980; Padovesi-Fonseca et al., 2009). All procedures, such as collecting thiarids, detecting larval trematode, the experimental infection of fish *Poecilia reticulata* (Peters, 1859), the infection of mice (AKR/J strain), metacercariae recovery, and the fixation and colouration of the obtained parasites were performed as described by Pinto and Melo (2010a). Trematode larvae were found in 16 snails (33%) and were preliminarily identified as Pleurolophocercous cercariae. Infection of fifteen fish with these cercariae resulted in the formation of metacercariae in the gills. After recovering the metacercariae, they were administered orally to two male adult mice (fifty metacercariae/mouse). Twenty-five adult parasites were recovered from the small intestine of the mice 15 days after infection. The morphological analysis of the developmental stages (cercariae, metacercariae and adult parasites) was performed as described in Pinto and Melo (2010a); this confirmed the presence of *C. formosanus* in *M. tuberculata* from Paranoá Lake. The studied snails and adult trematodes obtained in this study were deposited respectively in the collections of the Departments of Zoology (2688-2689 and 2692-2696) and Parasitology (5923a-d) at the Universidade Federal de Minas Gerais.

Although Monteiro and Dias (1980) reported several snails species from lake Paranoá basin, *M. tuberculata* was first registered in this Lake by Vaz et al. (1986) and later by Martins-Silva and Barros (2001). However, only now, thirty years after the first reporting, their natural infection by trematodes has been investigated. *C. formosanus* is a trematode that originated from Asia, and there are several reports of its introduction and the involvement of *M. tuberculata* in its transmission in the Americas (Cortés et al., 2010; Pinto and Melo, 2010a; Pointier et al., 2011). Specimens of this thiarid were reported in several Brazilian states, presenting high densities in eutrophic and

impacted environments such as Paranoá Lake (Rocha-Miranda and Martins-Silva, 2006), which may favour the maintenance of the life cycle of *C. formosanus* in these localities. This parasite requires a wide variety of fishes as a second intermediate host, and piscivorous birds and mammals are its definitive hosts. *C. formosanus* is responsible for a human food-borne intestinal infection that is acquired by the ingestion of raw or undercooked freshwater fish (Scholz and Salgado-Maldonado, 2000).

In addition to the diverse ecological problems, *M. tuberculata* and *C. formosanus* also generate economic impacts in some localities. *C. formosanus* is called the “gill trematode” because it affects the health of fishes, causing losses estimated to be \$3.5 million (USD) annually. Law-protected aquatic birds in United States can carry this parasite, and thus, research efforts have been directed to find a means to control the snails that serve as the vectors for the trematode (Mitchell et al., 2005). However, the extension of the damage caused in Brazilian fauna is still unknown. The invasive snail hosts can establish new sites of parasite transmission in parasite-free areas such as Paranoá Lake, where there are species that can act as intermediate and definitive hosts for the parasite (Padovesi-Fonseca et al., 2009; Pointier et al., 2011). Since *M. tuberculata* was recorded in Brazil, few studies have assessed its geographical distribution, infection status and ecology, which all are considered important topics in biological invasion studies (Thiengo et al., 2007; Santos and Eskinazi-Sant’Anna, 2010). This note is the second reporting of *M. tuberculata* as an intermediate host of this heterophyid in Brazil.

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