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SHORT COMMUNICATION

Alien tropical snail, the red-rimmed melania *Melanoides tuberculata* Müller, 1774 (Thiaridae) from artificial lake in Warsaw, Central Poland

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ABSTRACT

This paper describes the case of introduction of an exotic ornamental snail, *Melanoides tuberculata* (Thiaridae) in an artificial water reservoir in Pole Mokotowskie park complex in Warsaw, Poland. Observed individuals have been identified, described and presented in photographs. The basic physicochemical parameters of water were analyzed and prospects for the population were evaluated. Another second species of aquatic ornamental snail - *Physa acuta* (Physidae) was found in the same water reservoir. The observation was analyzed with available literature describing introductions of alien species of aquatic origin in Polish waters.

Keywords: aquarium, invasive species, freshwater mollusc, ornamental pet, tadpole snail, Pole Mokotowskie park complex, *Melanoides tuberculata*

1. INTRODUCTION

The red-rimmed melania, *Melanoides tuberculata* (Müller, 1774) is a viable, parthenogenetic species of snail that naturally inhabits freshwaters of southern Asia, Africa, Madagascar and northern Australia. It is characterized by a spindle-shaped, spirally-twisted, dextrorotacular shell with olive-beige color, although darker varieties are also observed (Duggan, 2002). Due to its attractive appearance, cleaning of dead organic matter and removal of algae and high ratio of reproduction, it is a species valued by aquarists, as well as willingly kept in home ponds and gardens (Berry and Kadri, 1974).

Melanoides tuberculata belongs to one of the most invasive water snails in the world. It has been introduced into the areas of European countries, South America, Central America, as well as the southern United States, where it competes with native molluscs (Giovanelli et al., 2005). In Poland, it was recorded for the first time in 1993 in the Botanical Garden of the Jagiellonian University in Cracow. Open water sites were identified in the area of the thermally polluted Konin lake system, where the population extincted within few years (Piechocki et al., 2003) and Żerański Channel (Maciaszek et al., 2019). This work presents data on the presence of *Melanoides tuberculata* in an artificial water reservoir in Pole Mokotowskie park complex in Warsaw, Poland.

2. MATERIAL AND METHODS

The work was part of the Alien Hunter project (pl: Łowca Obcych), which aims to locate and cover the monitoring of plants and aquarium animals introduced into Polish waters, where they may pose a threat to the natural ecosystem. It is an initiative based, among other things, on information made available to authors of this paper by people who observed alien ornamental species in Polish waters.

Locality

Pole Mokotowskie park complex is located in the central part of Warsaw, Poland. In the green area of 73 hectares there are two shallow concrete ponds connected by a channel that drains the excess water from the smaller tank to a bigger one. The total area occupied by water is about 1.5 ha, and their average depth is about 40 cm.

Water facilities are located 3.24 km in a straight line from the open waters of the Vistula River and 1.68 km from the nearest water reservoir located in Morskie Oko Park. With the exception of the channel covered by adjacent trees, the reservoirs are very sunny (Fig. 1A), which leads to the formation of large algae colonies that create favorable conditions for reproduction of amphibians (1B).

Ponds are surrounded by park vegetation, including garden plants that sometimes enter the reservoirs. Water facilities are drained for winter season. Ponds are filled again in the spring. Due to their location, water facilities along with their surroundings are used as a place of rest for the residents of Warsaw, also despite the ban as a place for bathing people and for walking dogs.

Control stations were determined on both tanks and their connection in accordance with the diagram shown in Fig. 1C.

Snail detection and identification

During one of the daily inspections of the water facilities on July 6, 2019 following observation of alien species of ornamental fish, a discovery of alien snail fauna was made. Localized individuals were caught using aquarium mesh. After initial consultation with ornamental aquarium molluscs keepers, individuals were identified using available scientific literature (Paraense and Pontier, 2003; Bolaji et al., 2011).

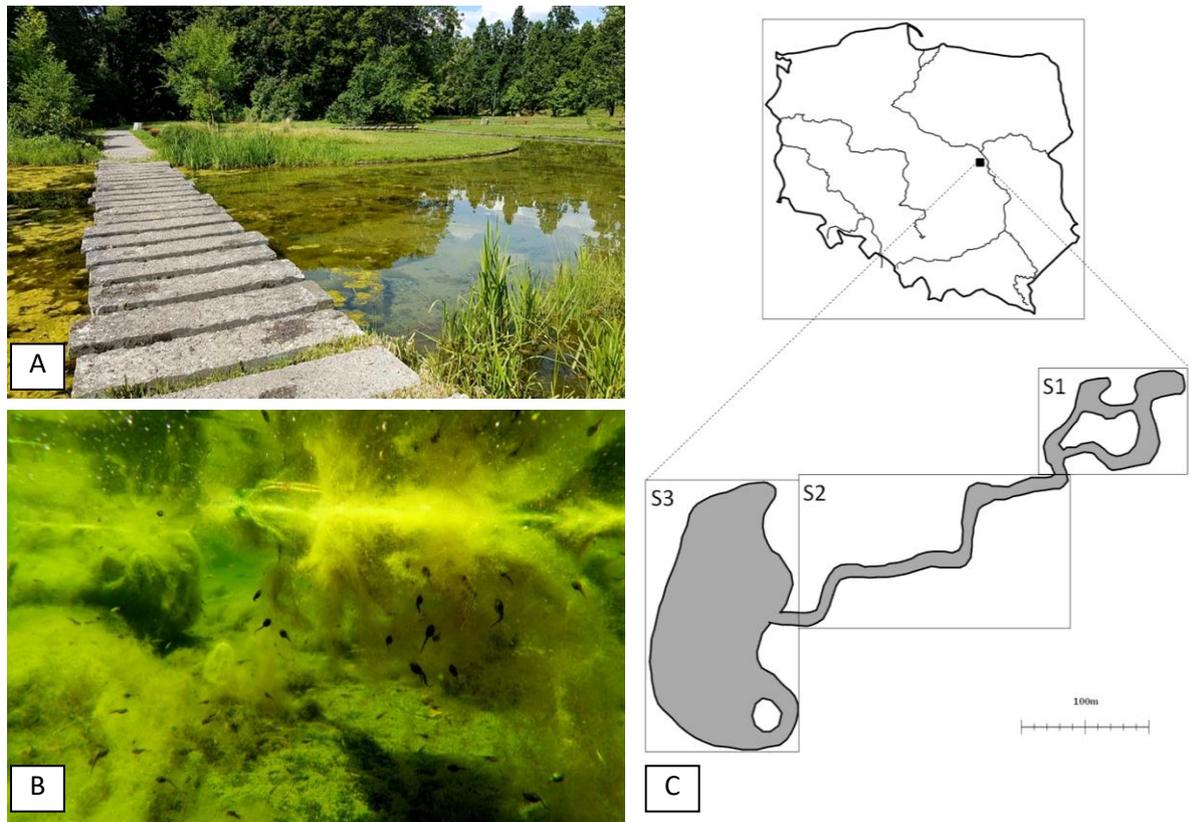


Figure 1. Location Pole Mokotowskie park complex: stands designated for water facilities (A), pond covered by S1 (B), reservoir ecosystem - underwater photography (C).

Additional measurements

The analysis of the physicochemical parameters of the water was performed using the pH98 meter HI9118- Hanna Instruments (pH, water temperature), the conductor AquaPro AP-2 -HM Digital (conductivity) and the Aquaset1 set -Zoolek (GH, KH, NO₂, NO₃, NH₃, PO₄).

3. RESULTS AND DISCUSSION

12 live snails were collected and identified as *Melanooides tuberculata* (Müller, 1774). All specimens were characterized by the uniform coloration of shells (Fig. 2A) and similar size

with an average shell height of 1.4 cm and 0.5 cm wide. The presence of the *Melanoides* genus was only found at site S1. Snails were tracked in a group from which the distance to the furthest forward did not exceed 10m. Numerous individuals of the species *Physa acuta* (Draparnaud, 1805), alien to Polish fauna (Figure 2A) were observed at all sites.

Water in ponds was alkaline with pH of 9.78 and water hardness of 13dGH. The analysis of physicochemical parameters of water did not show a significant level of contamination with nitrogen and phosphorus compounds, for which the tests reached the value of 0 mg / l.



Figure 2. Representatives of molluscs caught in Pole Mokotowskie park complex: *Melanoides tuberculata* (A), *Physa acuta* (B).

The captured red-rimmed melania was most likely the subject of introduction made by aquarists (Maciaszek et al., 2019), as alien aquarium fish were also observed at site S1. On the basis of the relatively short distance between each individuals, it can be assumed that the introduction occurred in the short time before the control. Because of the presence of garden plants in the park, it is not possible to exclude them from the decorative flora (Piechocki et al., 2003). Presence of *Physa acuta* can also be the result of introductions made by aquarists, because this species is common in aquarium hobby, often as a pest transmitted accidentally between aquariums (Duggan, 2010).

Its accidental transfer by aquatic birds from nearby reservoirs and watercourses (Van Leeuwen et al. 2013), including the Vistula River, in which this species occurs is also possible (Kostrzewa and Grabowski, 2003; Vinarski 2017). The presence of representatives of the *Physa* genus in all positions allows us to suppose that it was the object of another introduction, preceding the release of red-rimmed melania. Both identified species of snails do not pose a threat to artificial tanks. In any case, the population will extinct with the advent of the winter period and empty tanks from water. However, there is a risk of further expansion of snails by accidentally moving them by fowl to neighboring water reservoirs.

The survival of winter in Polish conditions for *Melanoides tuberculata* is possible only in heated waters (Duggan, 2002; Mitchell and Brandt, 2005), in Warsaw they are located at distant cogeneration plants, at least few kilometers away. Regardless the survivability of the species, it is recommended that the reservoirs located at Pole Mokotowskie park complex should be monitored on a regular basis as a place where undesired species occur. Observations will allow to determine which species may be introduced also in other parks and provide information on how alien species perform in conditions over which a man has limited control.

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