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A new alien snail species from the Eger stream, Hungary (Mollusca, Ampullariidae)

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Abstract. Our macrozoobenthon samplings carried in the Eger stream during 2015–2016 resulted in recording an alien species *Marisa cornuarietis* (Linneaus, 1758) the giant ramshorn snail which has not been reported so far from outdoor-waters in Hungary. Here we report on collecting several specimens from the urban section of the stream close to the outflow of the Eger thermal spa.

Keywords. Introduction, alien species, giant ramshorn snail, new record, temperate region, hypothermal water

INTRODUCTION

The register of the alien invasive species for Europe (DAISIE 2008) lists 10822 allochtonous (alien, non-indigenous or exotic) species. Not all of these listed species are regarded invasive, but *ca.* 10–15 % of the total represent potential threats to the European biodiversity (ALARM 2003).

A species is regarded invasive when it spreads effectively and has a considerable negative effect on the environment (Rosenzweig 2001, Pyšek & Richardson 2010). In Hungary, the official list of invasive species lists 69 plants and animals including 12 mollusc species (KvVm-TH 2005). It means that *ca*. 6% of the 200 Mollusca species recorded for Hungary (Pintér & Suara 2004) proved to be invasive in the country, and *ca*. 10 percent of the 90 species of molluscs reported from Hungarian waters represent alien invasive species. A smaller part of these aliens are aquarium species which are able to survive in outdoor waters or hypothermal water reservoirs. (Horváth 2010).

The molluscan species of the thermal and hypothermal waters in Eger has recently been reviewed by Gál (2016) who reported on four non-indigenous species. The occurrence of *Physella acuta* (Draparnaud, 1805) the acute bladder snail in the Eger stream has already been reported by Lukács (1950). Apart from this species, Gál (2016) recorded also the presence of *Potamopyrgus antipodarum* (Gray, 1883) the New Zealand mud snail, *Planorbella duryi* (Wetherby, 1879) the seminole ramshorn, and *Melanoides tuberculata* (Müller, 1774) the red-rimmed melania. However, the giant ramshorn snail has not been found during this survey and it is not reported so far from any outdoor-waters in Hungary (Gojdičová *et al.* 2014)

MATERIALS AND METHODS

The material was collected in the Eger stream near to the "Érsek-kert" outflow of the thermal spa. The spa is supplied by two thermal springs. One of the springs from the nearby produces 28 °C slightly radioactive water, the other is located a bit further from the spa and its 47 °C in sulphur calcium and hydrogen-carbonate rich water is conveyed by aqueduct in the spa (Schréter 1923, Kleb & Scheuer 1983, Deák & Scheuer 2009) (Fig. 1). The macrozoobenton samplings were carried out using the "kick-and- sweep" method combined with occasional sampling in different

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Figure 1A. Eger stream near to Érsek–kert, Eger.

Figure 1B. Outflow of the Eger thermal Spa.

Figure 2. Shells of the giant ramshorn snail collected.

Figure 3. Living specimen of *M. cornuarietis* collected and kept further in an aquarium at Department of Zoology, EKU, Eger.

habitat types in 18.11.2015, 17.05.2016 and 07. 07.2016. Both, living animals and empty shells were gathered. The living animals were transferred into the Department of Zoology, Eszterházy University for further breeding. Four empty shells as voucher specimens are deposited in the Mollusca Collection of the Hungarian Natural History Museum, Budapest.

RESULTS

During our first sampling 14 giant ramshorn snail specimens were collected including 5 living adult and juvenile specimen and 9 empty shells. In the second and third samplings six and five empty shells have been found respectively. Altogether five living specimen and 20 empty shells were gathered in this small, urban section of the Eger stream (Figs. 2–3).

The adult *Marisa cornuarietis* (Linneaus, 1758) is 3–5 cm in diameter possessing 3–4 spiral turns. Its colour varies between dark yellow and dark brown with 3–6 blackish spiral stripes. The snail is omnivorous but it more known as a generalist herbivore. In case of food shortage the adult animals can feed on eggs of other freshwater molluscs. As it reproduces rapidly it could threaten the population of the native snails (Hofkin *et al.* 1991, Pointier & David 2004, Howells *et al.* 2006).

The temperature demand of the giant ramshorn snail is quite wide it prefers 18–30 °C water temperature but the ideal range is 20–26 °C. At 18 °C the snail became almost inactive and does not tolerate 12 °C or below for a longer time (Ghesquiere 2016, Howels *et al*. 2006).

Marisa cornuarietis shows wide range of tolerance toward water oxygen content possessing duplicate respiratory system. It has gills as well as a lung to ensure an efficient respiration also in waters with lower dissolved oxygen level. It is able to close the shell with an operculum and in case of risk of desiccation and able to dig itself deep into the soil for surviving (Akerlund 1969, 1974).

Regarding the physicochemical requirements the giant ramshorn snail prefers the neural pH (7.2 – 8.0) and high calcium concentration which is essential for proper shell building; the ideal range is between 70–90 ppm In case of lower calcium content the shell bears smaller or larger holes (Meier-Brook 1978, Dillon 2000).

DISCUSSION

Here we report for the first time the outdoor water occurrence of this decorative and popular aquarium snail. Aquarium hobbyists sell it in Hungary under the name "cölöpszarvú csiga" which is the direct translation of the English ramshorn snail. Apart from this vernacular name *Marisa cornuarietis* is frequently called as Colombian ramshorn snail, marisa snail or South American giant ramshorn snail in the literature (Horváth 2010).

According to the recently accepted system, *Marisa cornuarietis* belongs to the family Ampullariidae and native in Central and South America and has moderately recently been introduced into Cuba (1940), Puerto Rico (1952), Florida (1970's) and Texas (1990's) (Cowie & Thiengo, 2003, *Hayes et al.* 2009, Ghesquiere 2016). In outdoor waters of Europe it was first reported not long ago from Spain (Arias, Torralba & Burrial 2014). The Hungarian outdoor population surely represents a recent introduction because the previous study in the Eger stream region carried out during 2013–2014 did not mention presence of this easily recognizable species (Gál 2016).

Apart from being a common aquarium snail the giant ramshorn snail is used also as ecotoxicological test organism (Oehlmann *et al.* 2006, Forbes *et al.* 2007) and in several regions (Puerto Rico, Brazil, Venezuela, Caribbean etc.) as biological control agent against *Biomphalaria* snails (*B. glabrata* (Say, 1818) and *B. straminea* (Dunker, 1848)) which are well known vectors of *Schisostoma mansoni* Sambon, 1907 one of the important schistosomes causing human schisostomiasis (Cedeño-León & Thomas 1983, Lockyer *et al.* 2008). It plays a similar role in the control

of *Melanoides tuberculata* (Müller, 1774) a vector of the oriental lung fluke (*Paragonimus westermanni* Kerbert, 1878) (Ferrer *et. al.* 1991, Howells *et al.* 2006).

The spread of *Marisa cornuarietis* in outdoor waters in North America and Europe is possibly due to the aquarium trade of the snails and aquatic plants and also its use as biological control agent (Pointier 2001, Ghesquiere 2016). From 2013 the tread and release into natural waters of the giant ramshorn snail in the European Union is strictly prohibited. Due to its potential threat to the native flora and fauna in Hungary it is allowed to keep only in aquaria or garden ponds not connected to natural waters. The specimens reported here from the Eger stream might be escaped from the warm-water plant and animal exhibition pool of the Eger Thermal Spa or represents deliberate introduction by aquarists.

The outdoor population of *Marisa cornuarietis* is currently confined to a short section of the Eger stream where the outflow of the thermal spa maintains a year-round warmer water temperature. Their further spread at the present climatic condition is not anticipated however, a continuous monitoring of the population is needed as suggested earlier for the thermal and hypothermal waters which often serve as the first stepping stone for establishment of these tropical species in the temperate regions (Majoros *et al.* 2008).

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