

## Rapid Communication

## New record of the spiny-cheek crayfish, *Orconectes limosus* (Rafinesque, 1817) in the catchment of Lake Balaton (Hungary)

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### Abstract

Lake Balaton in Hungary is the biggest shallow lake in Europe and has two main invasion pathways: a canal (Sió Canal), which connects the lake to the watershed of the River Danube and fishponds on the south of the lake. The spiny-cheek crayfish was intentionally introduced to Hungary in the 1950s for farming, and was first detected in the wild in the Újpest-branch of the River Danube in 1985. Its occurrence in the Sió Canal was first reported in 2004, and a dead specimen was found in Lake Balaton. In our study the species is described from a fish pond with a possible connection to the lake.

**Key words:** Sió Canal, Danube, unintentional introduction, *Orconectes limosus*, fish pond

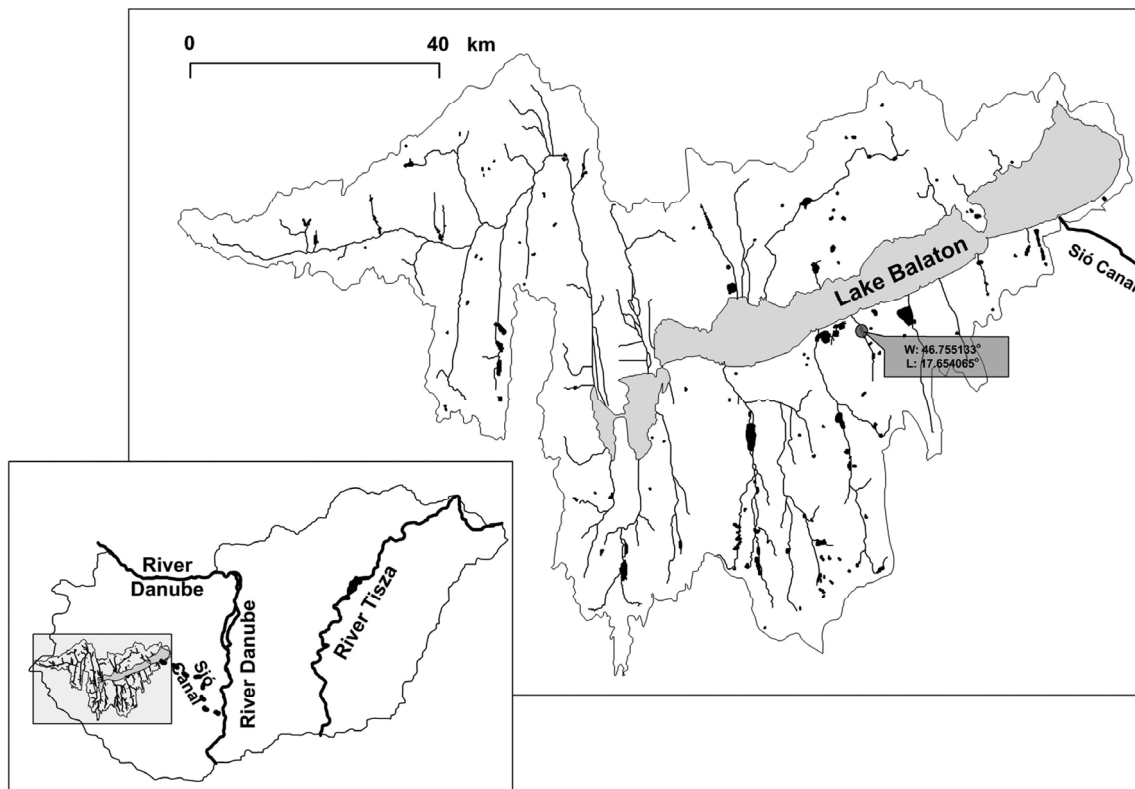
### Introduction

The spiny-cheek crayfish, *Orconectes limosus* (Rafinesque, 1817) [Crustacea: Decapoda: Cambaridae] is of North American origin (Souty-Grosset et al. 2006). Its invasion history and present status in Europe is discussed by Holdich et al. (2009). As in other European countries it was intentionally introduced to Hungary for farming in the late 1950s (Thuránszky 1960), though that venture remained unsuccessful (Puky and Schád 2006). In the wild, it was first observed in 1985 in the Újpest-branch of the River Danube at Budapest (Thuránszky and Forró 1987). Since then, it has colonized the complete Hungarian stretch of the River Danube, with a colonization rate estimated at 13 km/yr (Puky and Schád 2006). Also, the species entered the River Drava through the River Danube from Hungary (Maguire and Klobučar 2008). The species was detected in Slovakia, in the Ipel and Váh rivers (Janský and Kautman 2007, Puky 2009), both tributaries of the River Danube. In

the River Danube, *O. limosus* was also reported from Serbia (Pavlović et al. 2006) and from Romania (Parvulescu et al. 2009). In Croatia, *O. limosus* is spreading in the Drava River: the first record of the species was reported at a site approximately 10 kms upstream from the mouth of the Drava River, where it connects with the Danube River (Hudina et al. 2009).

*O. limosus* has also colonised the other big Hungarian river, the River Tisza (Sallai and Puky 2008). Its recent distribution in Hungary is reviewed by Györe et al. (2013).

Lake Balaton is the largest shallow, freshwater lake in Central Europe (Istvánovics et al. 2007). It is located in West-Hungary, with a total area of 596 km<sup>2</sup>, and mean depth of 3.25 m. The lake was in the past characterized by extreme water level fluctuations (Korponai et al. 2010). In order to control the water level, a canal (Sió Canal), approximately 120km long was built in the 19th century, which connects the lake to the River Danube (Figure 1). The canal had an important effect on the functioning of the lake's ecosystem.



**Figure 1.** Lake Balaton and its watershed. The large map indicates the location of the *Orconectes limosus* record. The small map shows its connection to the watershed of the River Danube through the Sió Canal.

Originally, the lake and its watershed formed a 'closed' system, but when the lake got connected regularly to the watershed of the River Danube, a corridor opened, which in fact provided the opportunity for the spread of non-native species, *Dreissena polymorpha* being the most well-known example (Sebestyén 1938). *Orconectes limosus* has already been reported from the lower section of Sió Canal (Puky 2004; Puky et al. 2005), with a dead specimen found in Lake Balaton (Bódis et al. 2012).

On the south-west of the lake, several fish ponds have been built. *Orconectes limosus* was found in one of these in summer 2013. Possible connections with the lake are discussed here.

### Material and methods

Figure 1 shows the watershed of Lake Balaton; in the south tributaries (canals and streams), form a dense network. Fish ponds built on these tributaries are marked by dark patches. As the

fish-pond where *O. limosus* was found is a private pond, the locality is indicated only by GPS coordinates. The dammed Jamai-stream flows into the southern part of the pond and the outflow is regulated by a sluice located in the northern side. The average depth is approximately 1.5m. The pond surface area approximately 25 hectares, and surrounded by a narrow reed-bed. Specimens were caught near the shoreline by electrofishing from a boat, using a 12V battery powered device (used at pulse DC 580V; 60Hz). The identification of the specimen was made based on the work of Füreder and Machino (2002).

### Results and discussion

On 16<sup>th</sup> August, 2013, three adult specimens of *O. limosus* were found in the pond (one is shown in Figure 1), the biggest specimen was approximately 12 cm long. Two of them were males, and there was one female. The photo shows melanisation (Figure 2). As the pond is



**Figure 2.** An adult *Orconectes limosus* with its characteristic colouration and spiny cheeks (inset).

located approximately 9.2 km from the lake and direct connection is available only in wet periods, it seems that Lake Balaton is threatened by two risk factors. *O. limosus* might migrate from the River Danube through the Sió Canal and from the fish ponds situated on the south of the lake, through small streams and canals. Though its occurrence was reported from the Sió Canal, the species has not colonized the lake yet. Most possibly, its occurrence in this fish pond should be treated as the result of some unintentional introduction and as such, it is independent from the natural migration from River Danube. It is also supported by the fact that *O. limosus* could not be detected in any basins of Lake Balaton or in any other fishponds situated along 11 tributaries on the south, even though these were intensively surveyed by us in 2012–2013 (Lake Balaton is considered the most deeply investigated lake in Europe, together with Lake Constance). Considering non-intentional introduction of alien species to Lake Balaton, the other hazard is the operation of fish ponds on the south-west of Lake Balaton, where streams and canals form a very complex system, and several fish ponds have been built on these tributaries. Owners of these ponds regularly stock fish. This isolated appearance of the species seems to be the consequence of stocking from an unchecked source. After its deliberate introduction to Germany, Poland and France, the species has spread naturally within Europe through interconnecting river and canal systems; also it might be transferred by man for example as fish food, or fish bait (Holdich and Black 2007). Similarly, expansion of the species might be expected within the Balaton-catchment and it might subsequently appear in the lake.

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