
**A REPORT OF *ORCONECTES (FAXONIUS) LIMOSUS*
(RAFINESQUE, 1817) [CRUSTACEA: DECAPODA:
ASTACIDEA: CAMBARIDAE: ORCONECTES:
SUBGENUS FAXONIUS] IN THE SERBIAN
PART OF THE RIVER DANUBE**

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ABSTRACT

Spiny cheek crayfish (Orconectes limosus L.) were found in the Serbian part of the River Danube (August 2004, at 1112 km of the water course). A description of the biology, origin and distribution of this species, as well as the potential impact to the aquatic ecosystems is presented and discussed. This is the first record of this invasive crayfish in Serbian part of the River Danube. In addition, our results could indicate that there is potential risk for the expansion of O. limosus in other regional waters in the future.

Introduction

Europe has gained at least four non-indigenous species of crayfish from North America and one from Australia. The Spiny cheek crayfish *Orconectes limosus* (Rafinesque, 1817) is the native species from the eastern part of the USA. During the last century it was introduced into Europe and recently it was recorded in more than 20 European countries (1). Mass occurrence of Spiny cheek crayfish, as well as the considerable consequences caused by its high population density were reported in several recipient areas (2, 3). According to Lodge et al. (2000), (1) the introduction of *O. limosus* can induce reduction of the native crayfish populations. Furthermore, the presence of Spiny cheek crayfish can induce changes in the benthic community in fish populations, in the food chain (4) and consequently loss of the biodiversity (5, 6). However, mass occurrence of *O. limosus* can affect freshwater eco-

system function and reduce economic viability of native crayfish fisheries (7).

Materials and Methods

Orconectes (Faxonius) limosus (Rafinesque, 1817), (**Figure**).

Vernacular names: English-Spiny cheek crayfish, mitten crab; German-Kamberkrebs, Amerikanischer flußkrebs; French – Ecrevisse américaine; Italian-Gambero americano.

Thirteen individuals (3 males and 10 females) were identified as *O. limosus*, whereas one was identified as the Danube crayfish *Astacus leptodactylus* (Eschscholtz, 1823). All the specimens were collected with deep nets in August 2004 near the city of Smederevo (at 1112 km of the water course; 44°41'31.6'' N, 20°57'38.5'' E at an altitude 70 m above sea-level). Seven specimens of *O. limosus* were stored in the biological material collection within the Institute for Biological Research “Siniša Stanković” (Belgrade).



Figure. An example of *Orconectes limosus* caught in the Serbian part of the River Danube near the city of Smederevo – dorsal view.

Six living specimens are in the Public Aquarium in the Faculty of Sciences in Kragujevac University (Kragujevac).

The substrate of the sampling location mainly contained silt-clay and very fine sand (grains not perceptible by the naked eye; <0.125 mm). Areas with fine sand (grains perceptible by the naked eye; 0.125 - 0.5 mm), coarse sand (0.5 - 2 mm) and gravel (2 - 16 mm) were also observed.

The average length of the *O. limosus* specimens was 10.76 ± 0.26 cm and their weight was 43.10 ± 4.02 g. With regard to the length and weight of the specimens it appeared that they belonged to the same generation. Using the age scale for the Noble crayfish *Astacus astacus* L. (1758), it could be concluded that the collected Spiny cheek crayfish were aged between 3 and 4 years (scale according to Jarvekulg, 1958), (8). Considering the age of the observed specimens, as well as the fact that species was not observed before 2000 (AEDSer database), (9), we concluded that *O. limosus* had been introduced during the last 5 years.

Results and Discussion

During the observations of *O. limosus* in aquarium conditions, we found that it ate

the same kind of food as that of native crayfish species (*A. astacus*, *A. leptodactylus* and *Austropotamobius torrentium*), but in great extent consume food of animal origin. Also, we observed that it was easier to rear Spiny cheek crayfish in aquarium conditions compared with native crayfish.

The Spiny cheek crayfish is native to the Eastern part of the USA. It was deliberately introduced in Europe one century ago and now is widely distributed mostly in Northern and Central Europe (10). This species is abundant mainly in large rivers and it is resistant to pollution. As with other crayfish, *O. limosus* is primarily a consumer of benthic invertebrates, detritus, macrophytes and algae in streams (11, 12).

Earlier data in the literature (10), showed that the Eastern limit where this invasive species was detected was Hungary. Spiny cheek crayfish were introduced into Hungary in 1960 and now live in the North and South of this country. According to the recent data considering the distribution of *O. limosus* in Eastern Europe (13), as well as considering findings presented within the Database of International Commission for the Protection of the River Danube (JDS-ADS Database), (14) our finding of

Spiny cheek crayfish in the Serbian part of the River Danube now represents the most Eastern place in Europe.

In most parts of the world, non-indigenous species are among the most important threats to freshwater biodiversity and ecosystem function (15). The occurrence of *O. limosus* represents a potential danger, especially for the native Danube species *A. leptodactylus*, but also for the autochthonous Noble crayfish. Extirpation of native Danube crayfish has resulted primarily from the fungal plaque (*Aphanomyces astaci*) carried by non-indigenous *O. limosus* from North America to recipient areas. Namely, *O. limosus* is resistant to *A. astaci* but this disease is lethal to European crayfish (1). The problem of a lack of data on behavior, growth and reproduction of this species in some recipient areas that include Serbian part of the River Danube, is evident. It is obvious that mechanisms of impact on native crayfish include interspecific competition for shelter and food making the native species more vulnerable to predatory fishes. Interspecific matings can also lower the reproductive success of the native species. The American species are also more aggressive than the European species, so in competition for space and food foreign species tend to push native species out of their natural habitats (2). Our findings (13 collected individuals of *O. limosus* and only one of *A. leptodactylus*) could indicate the replacement of native Danube crayfish with invasive Spiny cheek crayfish.

Possible sources of Spiny cheek crayfish introduction in the Serbian part of the River Danube includes its migration within Europe via rivers and canals, via stocking for human food (legal or illegal), (1) and by shipping (ballast water and hull fouling of vessels).

In conclusion, our results could indicate that there is potential risk for the expansion of *O. limosus* in other regional waters in the future. One such argument for this con-

cern can be found in the data regarding *O. limosus* dispersal (1, 10) where mass occurrence and serious impact on the native fauna was reported.

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