

## Current implications in distribution problems of crayfish in Romania

Lucian Pârvulescu

West University of Timișoara, Faculty of Chemistry, Biology, Geography, Timișoara, Romania. Corresponding author: L. Pârvulescu, lucian.parvulescu@cbg.uvt.ro

**Abstract.** The current short paper is a summary of several research papers regarding the distribution of crayfish species in Romania.

**Key Words:** *Astacus astacus*, *Astacus leptodactylus*, *Austropotamobius torrentium*, conservation, invasive species, *Orconectes limosus*, native species, population history.

**Rezumat.** Această scurtă notă este un rezumat al mai multor lucrări pe probleme de distribuție a speciilor de raci din România.

**Cuvinte cheie:** *Astacus astacus*, *Astacus leptodactylus*, *Austropotamobius torrentium*, conservare, specii invazive, *Orconectes limosus*, specii native, populații.

**Summary.** The biogeographic distribution of a species can provide a useful insight into species history, thus extending the knowledge on requirements for conservation. Romania is an ideal case to analyse a natural crayfish distribution, which has not been disturbed by translocations due to a low interest in crayfish farming (Perdikaris et al 2012). The most important native species in terms of conservation are the stone crayfish (*Austropotamobius torrentium*) and the noble crayfish (*Astacus astacus*) (Council of Europe 1992). The stone crayfish is one of the oldest freshwater crayfish in Europe (Trontelj et al 2005), showing restriction in its distribution to the western part of Romania (Pârvulescu & Zaharia 2013). In the same time, the phylogenetically newer noble crayfish is largely widespread. It is likely that the Pleistocene climate conditions led to this picture, the karst underground refuges playing the decisive role by enabling stone crayfish survival during the colder glacial cycles. After the last glaciations, the stone crayfish competed with the noble crayfish, reaching the nowadays balance (data under publication process). It is worth noting that, most of the actual stone crayfish populations were found living in habitats with little anthropic impact. The favourable conditions suggest equilibrium between the availability of dissolved oxygen, moderate river velocity and low concentration of organic pollutants, the species being restricted to sub-montane areas (Pârvulescu & Zaharia 2013). Noble crayfish occupies a much wider range, being therefore a more tolerant species (data under publication process).

The spectrum of limitations of native crayfish populations is completed by invasive species and the crayfish plague agent *Aphanomyces astaci*. Contact of the protected crayfish species with non-indigenous *Orconectes limosus* and the crayfish plague is a real threat, especially to the populations inhabiting the order I tributaries of the Danube (Pârvulescu et al 2012). Native *Astacus leptodactylus* are even threatened. The species relative abundance dramatically decreased over time, while the invasive *O. limosus* steadily increased in abundance. *O. limosus* expanded downstream at a rate of 15 km every year (Pârvulescu et al 2012). The presence of *A. astaci* was also detected in the invasive and native crayfish species coexisting in the Danube. Furthermore, *A. astaci* was also detected in *A. leptodactylus* captured in the sensitive protected area of the Danube Delta (Schrimpf et al 2012). *A. astaci* may have reached the Delta by long-range passive dispersal of infected hosts or pathogen spores, or by infected upstream populations in a

stepping-stone manner. Alternatively, the crayfish plague may have persisted in the Danube Delta from an old infection wave in the nineteenth century (Schrimpf et al 2012).

Taking these current threats into account, all native crayfish species require more attention in conservation planning. It is very possible that the next decades will greatly require restocking programs for reestablishment of lost native populations. Thus, all of the south-eastern crayfish populations (including the Romanian populations) become a valuable wild-stock reserve (Schrimpf et al 2011).

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Author:

Lucian Pârvulescu, West University of Timișoara, Faculty of Chemistry, Biology, Geography, Timișoara, Romania, e-mail: lucian.parvulescu@cbg.uvt.ro

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