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## Distribution of Decapoda Species along the Hungarian Danube Section and Some Tributaries with Special Emphasis on their Conservation Status

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**Summary:** Decapoda are among the most threatened animals on Earth. In spite of this, the distribution of Decapoda species in Hungary is poorly known. The main aim of the study was to survey the fauna of different running waters and describe their conservation status. Besides the main arm of the Danube, two rivers (the Rába and the Ipoly), a lowland (the Szdrákos stream) and seven mountain streams (the Bükkös stream, the Malom stream, the Morgó stream, the Malom-völgyi stream, the Bernece stream, the Kemence stream, the Csarna stream) were surveyed. Samples were collected mainly by trapping and individual collection. All four Decapoda species present in Hungary were recorded in the investigated running waters. However, the present status of native Decapoda species along the Hungarian Danube section and its investigated tributaries is a cause of concern not only from a conservation but also from an ecological viewpoint. Legal and practical measures should also be taken to ensure the survival of the native species, which is threatened by several factors .

**Zusammenfassung:** Die Decapoda gehören zu den meistgefährdeten Lebewesen der Erde. Trotzdem stehen uns nur sehr wenige Angaben über die einheimischen Decapoda-Arten zur Verfügung. Vorliegende Arbeit bezweckt vor allem die Untersuchung der Decapoda-Fauna verschiedener strömender Gewässer und die Beschreibung ihrer Lage auf der Palette des Naturschutzes. Neben der Untersuchung des Hauptarmes der Donau wurden zu diesen Zwecken auch die Untersuchungen von zwei Flüssen (Rába und Ipoly) sowie von sieben nördlich von Budapest gelegenen Gebirgsbächen (Bükkös-, Morgó-, Malomvölgyi-, Bernece-, Kemence- und Csarna-Bach) durchgeführt. Die Proben wurden entweder mit Hilfe der Fallen gesammelt oder durch Einzelsammlungen. Alle vier in Ungarn lebenden Decapoda-Arten kamen in den untersuchten Gewässern vor. Trotz dieses Vorkommens ruft die Lage der autochthonen Decapoda-Arten der Donaustrecke und der untersuchten Zuflüsse dennoch Bedenken hervor und zwar nicht nur vom Standpunkt des Naturschutzes, sondern auch vom Standpunkt der Ökologie. Zu ihrem Schutze und im Interesse ihrer Erhaltung müssen praktische Massnahmen eingeleitet werden, da ihr Dasein von mehreren Faktoren gefährdet wird.

**Keywords:** Decapoda, *Astacus*, *Austropotamobius*, *Orconectes*, distribution, conservation

## Introduction

Freshwater organisms are among the most threatened animal groups on Earth (ABRAMOVITZ, 1996). Decapoda are especially vulnerable, 23.4% of the species are listed in the International Red Data Book (IUCN, 1996) and only nine orders contain more internationally threatened species (Stylommatophora, Mesogastropoda, Unionoida, Lepidoptera, Perciformes, Cypriniformes, Passeriformes, Rodentia and Chiroptera). It represents 3.3% of all listed species, and decapods are under most categories (extinct, critically endangered, endangered, vulnerable, data deficient). Their increased sensitivity can be traced in Europe, too. The native *Astacus astacus* for example was recorded at only one locality in the Netherlands in 1988 (ADEMA, 1989).

In spite of the special geographical situation with the Danube as a main corridor, the distribution of Decapoda species in Hungary and its recent changes are poorly known. Four species live the country, the noble crayfish, *Astacus astacus*, the Pontian crayfish, *Astacus leptodactylus*, the stone crayfish, *Austropotamobius torrentium* and *Orconectes limosus*, which is native for North-America and was introduced to Europe at the end of the last century. The national conservation status of the species is strikingly different from the international protection level. Only *A. torrentium* is protected nationally, while *A. astacus*, which is also internationally endangered have got no legal protection in the country so far.

The primary aim of the present study was to investigate the Decapoda fauna of the upper 200 km-s of the Hungarian Danube section and several tributaries with special emphasis on the presence of *O. limosus* and the conservation status of the European species.

## Materials and Methods

Diverse aquatic habitats were studied. Besides the main arm of the Danube, two rivers (the Rába and the Ipoly), a lowland (the Sztrákos stream) and seven mountain streams (the Bükkös stream, the Malom stream, the Morgó stream, the Malom-völgyi stream, the Bernece stream, the Kemence stream, the Csarna stream) were surveyed. Their location can be seen in Figure 1. Samples originated from as far as 200 km south of Budapest were also taken into account in the evaluation.

Trapping and individual collection were used to collect Decapoda individuals. Occasional catches by electrofishing were also taken into consideration (SALLAI and PUKY, 1998; GUTI, pers. com.). Individual collection seemed to be the most effective sampling method.

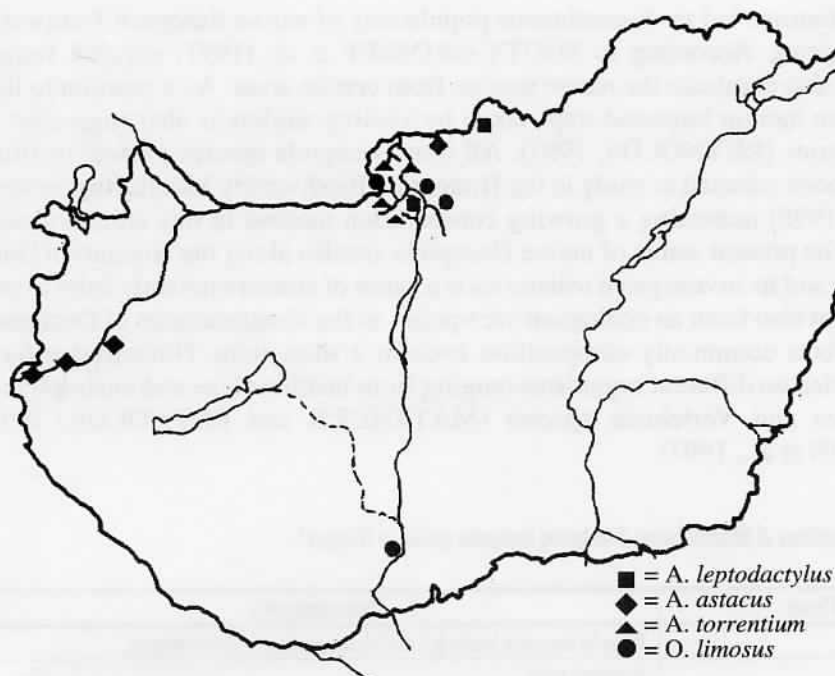


Figure 1. Distribution of Decapoda species along the investigated running waters

## Results and Discussion

All four Decapoda species present in Hungary were recorded in the investigated running waters. *A. leptodactylus* could be found only in the floodplain of the River Ipoly and one individual in the main arm of the Danube. The presence of this species along the Hungarian Danube section was also proved by NESEMANN et al. (1995). *A. astacus* was relatively common in the upper part of the River Rába and near the floodplain of the River Ipoly in the lowest section of the Varga Lake stream. *A. torrentium* was detected in each mountain stream, where no other Decapoda species was recorded. *O. limosus* successfully colonised the Danube Bend, the ratio of juveniles is high in the populations. It was also found along the Gemenc section of the Danube (1452 rkm) as well as in the Rákos stream, where it reached high density. A large number of juveniles were found in both running water types proving the successful reproduction of *O. limosus*, which is characterised by high fecundity, and larger size in Europe than in North-America (VAN DEN BRINK et al., 1988).

The role of exotic species in different ecosystems is heavily discussed in the scientific literature. While there are cases when a great decline or even loss of native species can directly be connected to invading species, TITTIZER (1997) found no such effect in the macrozoobenthos in the Danube. On the other hand, LOWERY and HOLDICH (1989) concluded that besides pollution, crayfish fungal plaque, transmit-

ted by *O. limosus*, led to discontinuous populations of native European freshwater crayfish species. According to SOUTY-GROSSET et al. (1997) crayfish fungal plaque can also eliminate the native species from certain areas. As a reaction to this phenomenon ban on imported traps taken by visiting anglers is also suggested in some countries (REYNOLDS, 1997). All four Decapoda species present in Hungary have been selected to study in the Hungarian Biodiversity Monitoring System (FORRÓ, 1998) indicating a growing conservation interest in this animal group. However, the present status of native Decapoda species along the Hungarian Danube section and its investigated tributaries is a cause of concern not only from a conservation but also from an ecological viewpoint, as the disappearance of Decapoda species affects community composition even in a short term. Numerous effects were recorded on different organisms ranging from benthic algae and macrophyton to Mollusca and Vertebrata species (MATTHEWS and REYNOLDS, 1992; AXELSSON et al., 1997).

Table 1. The importance of different factors threatening Decapoda species in Hungary\*.

Threat	Characterisation
Collection	It can be important locally but crayfish consumption is low in Hungary.
Disease	Important factor.
Eutrofication	A common feature in natural waters with secondary effects.
Habitat destruction or alteration	One of the most important factors.
Lack of information	An important threat.
Exotic Decapoda species	It can be important, at present mainly in the decline of <i>A. astacus</i> .
Isolation	It is important in the case of <i>A. torrentium</i> .
Desiccation of aquatic habitats	It can be important locally during drought.
Pollution	It is probably the most important factor in the decline of native Decapoda species.
Artificial water level regulation	It can lead to local declines.

\* The evaluation reflects the special requirements of the Decapoda species and not the general conservation importance of the discussed threats.

As a consequence, legal and practical measures should also be taken to ensure the survival of the native species, which is threatened by several factors (Table 1). The protection of *A. astacus* is especially urgent, as it is the most affected by collection, and is also suspected to be superseded by *A. leptodactylus* (PINTÉR and THURÁNSZKY, 1983). The conservation strategy of Decapoda species should also include the promotion of information about the species and their value as indicators of good or reasonable water quality.

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