

DISTRIBUTION OF *AUSTROPOTAMOBIOUS TORRENTIUM* (DECAPODA: ASTACIDAE) IN SLOVAKIA

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ABSTRACT

The distribution of the stone crayfish *Austropotamobius torrentium* (SCHRANK, 1803) in Slovakia is restricted to only some creeks in the Malé Karpaty Mountains. Most of new sites have been discovered due to intensive investigations during the past three years. The occurrence of this species in other mountain ranges in Slovakia, as mentioned by other authors, has not been confirmed by recent research. *A. torrentium* is among the rarest species of invertebrates listed in Annex II of the EU Habitats Directive occurring in Slovakia.

Key-words: *Austropotamobius torrentium*, crayfish, distribution, Slovakia.

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RÉSUMÉ

La répartition géographique de l'écrevisse de torrent *Austropotamobius torrentium* (SCHRANK, 1803) en Slovaquie se restreint à quelques ruisseaux des montagnes de Malé Karpaty. Au cours d'investigations approfondies pendant les trois dernières années ont été découverts de nouveaux sites où l'espèce est également présente. La présence de cette espèce dans les autres régions de montagnes de Slovaquie, telle qu'elle est mentionnée par d'autres auteurs, n'a pas été confirmée par les récentes recherches. *A. torrentium* est parmi les espèces les plus rares d'invertébrés de l'annexe II de la Directive Habitat de l'Union Européenne, encore présentes en Slovaquie.

Mots-clés : *Austropotamobius torrentium*, torrents, distribution, Slovaquie.

INTRODUCTION

The stone crayfish *Austropotamobius torrentium* (SCHRANK, 1803), the rarest of three crayfish species (Decapoda) recently known in Slovakia, is commonly mentioned as being present in the Vydrlica Creek in the Malé Karpaty Mts. (e.g. HALGOS, 1972).

The very first report of the occurrence of *A. torrentium* was published by ORTVAY (1902), who reported the species in the environs of Bratislava as *Astacus saxatilis*. MATIS (1971) also reported its occurrence in the Teplička Creek at the town of Trenčianske Teplice, and a single occurrence in the Slovak section of the Danube River was reported

by JANSKÝ (1987). The regular occurrence of a stable population of *A. torrentium* in the Vydrlica Creek was confirmed by STLOUKAL (2002), who studied epibiotic organisms associated with the stone crayfish in the Malé Karpaty Mts.

While *A. torrentium* is a common species in many creeks and rivers in Austria (PÖCKL, 2002; FÜREDER and MACHINO, 1999; STREISSL and HÖDL, 2002), Germany (RENTZ, 1988, VOGT *et al.*, 1999) and some other countries (HOLDICH, 2002; MACHINO and HOLDICH, 2005), Slovakia is situated close to the northeastern edge of its distribution area and it is considered a very rare species in this country (STLOUKAL *et al.*, 2003). Similar situation with the occurrence of *A. torrentium* is in the Czech Republic, where are known only four sites (KOZÁK, ĎURIŠ and POLICAR, 2002). General information on the recent distribution of stone crayfish throughout Europe was published by HOLDICH (2002). Concise but complete overview of the knowledge on all three crayfish species distribution in Slovakia is provided by MACHINO and HOLDICH (2005), who mention also the doubtful record of the *A. torrentium* occurrence in the Dunajec River (National Park Pieniny, northern Slovakia) published by KOKORĎÁK (1975).

Crayfish populations of eastern Slovakia have been well investigated (HUDEC 1994; HUDEC, KOŠČO and KOŠUTH, 1993, HUDEC, KOŠČO and PLATKO 1994, HUDEC, SPIŠÁKOVÁ and HUDAČIN, 2001), however *A. torrentium* was not reported there. *Astacus astacus* (LINNAEUS, 1758) is a relatively common species in rivers and streams there, mainly in mid-altitudes, as well as in the northern mountainous areas of Slovakia. *Astacus leptodactylus* ESCHSCHOLTZ, 1823 is also present in a few localities in Slovakia.

All the crayfish species in Slovakia have been strictly protected by law in recent decades. The implementation of the European Union environmental legislation prior to the membership affiliation should lead to even better protection based mainly on habitat preservation (STLOUKAL *et al.*, 2003).

MATERIAL, METHODS AND AREA DESCRIPTION

The Malé Karpaty Mountains form the westernmost part of the Carpathian Mountains range. With the altitude reaching from 120 to 768 metres, a length of about 100 km and maximum width of 16 km, these mountains are mild uplands covered mostly by deciduous forest. There are about a hundred streams, brooks and small rivers as well as 35 reservoirs. The average annual temperature ranges from 7 to 9°C in the mountainous areas while in the lowlands it is 9-10°C. The rainfall varies between 650-900 mm in mountains and 600-650 mm in the lowlands. All the streams here form part of the River Danube catchment area. Exact description of sampling sites including some physical and chemical parameters were published by STLOUKAL *et al.*, 2004 and georeferenced localities became a part of the site database of the Databank of Slovak Fauna (STLOUKAL and GRUJBÁROVÁ, 2004).

The Malé Karpaty Mountains are a protected landscape area – the second highest category of protected large-scale territories in Slovakia.

Almost all of the streams are extensively used as sources of water for drinking and irrigation in their lower reaches. Many of them have also been dammed at the limits between the mountains and the lowlands.

RESULTS

During the intensive research in the years 2002-2005, forty-one creeks were repeatedly checked for the presence of crayfish in the Malé Karpaty Mountains where the Vydrlica Creek is situated. We managed to find four new localities with stone

crayfish in these mountains. So there are now six confirmed sites with the occurrence of *Austropotamobius torrentium* in Slovakia (Fig. 1).

There is a strong and stable crayfish population in the upper section of the Vydrica Creek. This creek is the only stream in Slovakia, where two species of crayfish occur together. *Astacus astacus* is present here and it is in contact with the population of stone crayfish. Further ten localities with a population of noble crayfish are also known in the Malé Karpaty Mountains.

All localities where stone crayfish are present are characterised by having both banks of the river shaded by trees, with the exception of the Vydrica which forms the border to forests and meadows frequently used for picnics by people of Bratislava, so there is no protection from sunlight, or from wading and “damming” by large number of children.

The substrate usually consists of stones and gravel. They also occur in sandy parts of brooks or streams with mud at the bottom, however stony streams are the typical habitat of the stone crayfish. Discharge depends on the season – crayfish were caught in fast flowing parts of brooks during the spring season, but they prefer slower-flowing parts with suitable shelters that are available mainly in the summer. The temperature of water

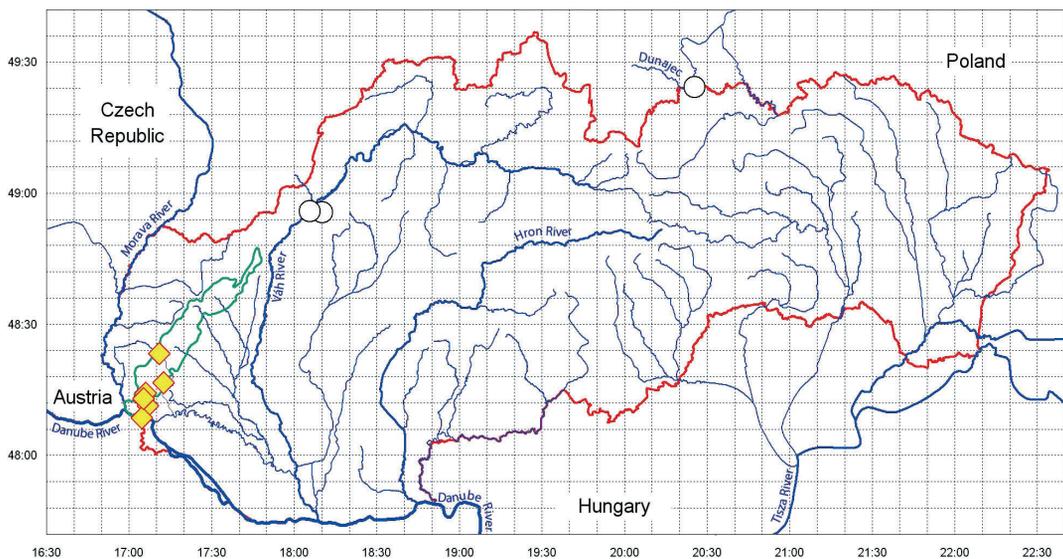


Figure 1
Distribution of *Austropotamobius torrentium* in Slovakia.

Legend:

Diamond = present occurrence.

Circle = sites not confirmed by recent investigation.

Square grid size = 11 × 11 km.

Figure 1
Distribution géographique d'*Austropotamobius torrentium* en Slovaquie.

Légende:

Losanges = sites confirmés de présence.

Cercle = sites non confirmés par les récentes observations.

Taille de la grille = 11 × 11 km.

in these brooks ranges from 0°C up to 20°C through the year and has no influence on the presence of crayfish, but influences their activity. The lowest temperature measured during a successful search for crayfish in February was 0.3°C and the highest was 20°C during the summer months.

DISCUSSION

Understanding the habitat requirements and characteristics of a species is very important for its effective protection.

The origin of the occurrence of *Austropotamobius torrentium* on the territory of Slovakia is not clear, because it appears to form an isolated island on the left bank of the Danube River at the Western Carpathian Mountains (STLOUKAL, HARVÁNEKOVÁ and JANSKÝ, 2004). There is no evidence on its introduction in the time of the former Austrian-Hungarian Monarchy, so we consider this species as indigenous to the Slovak environment and a very important element of the biodiversity of fauna in Slovakia.

Known and proven sites of *A. torrentium* in Slovakia are situated only in the Malé Karpaty Mts. Intensive research and revision of collections in the Slovak National Museum, Bratislava, revealed six sites of recent occurrence (STLOUKAL, HARVÁNEKOVÁ and JANSKÝ 2004). Evidences to three other sites from different areas of Slovakia (MATIS 1971; KOKORDÁK 1975) are missing.

The Vydrica brook is the only stream in Slovakia, where two species of crayfish partially share their habitats. Interaction of *A. torrentium* with other species was analysed by LAURENT, 1988.

The presence of *Austropotamobius torrentium* mentioned by MATIS, 1971 in other areas of Slovakia (two localities in the vicinity of the Trenčín City – Váh River catchment area) was recently revised, however the presence of *A. torrentium* was not confirmed there.

There have been no recent reports about the presence of any non-native, American crayfish species such as the spiny cheek crayfish *Orconectes limosus* (RAFINESQUE, 1817), the signal crayfish *Pacifastacus leniusculus* (DANA, 1852) or *Procambarus clarkii* (GIRARD, 1852) in Slovakia. These species have been recorded in many European countries, including all Slovakia's neighbouring countries except Ukraine, which is in accordance with the implication of HOLDICH, 2002. The legislation of Slovak Republic does not allow import of the non-indigenous species of crayfish, however the invasive expansion of *P. leniusculus* in Austria (described e.g. by POCKL and PEKNY, 2002) emphasize the risk if its invasion to Slovakia.

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