

First record of the stone crayfish *Austropotamobius torrentium* (Schrank, 1803) (Crustacea: Decapoda: Astacidae) from Saxony (Germany)

PEER MARTIN, MATTHIAS PFEIFER & GERT FÜLLNER

Saxon State Institute for Agriculture, Fisheries Department,
Gutsstraße 1, 02699 Königswartha, Germany; E-Mail: Gert.Fuellner@smul.sachsen.de

Abstract. Till recently, the stone crayfish *Austropotamobius torrentium* (Schrank, 1803), a highly endangered crayfish species, was still considered as nonexistent in the federal state of Saxony (Germany). Carrying out a regional crayfish monitoring in summer 2007, however, we surprisingly caught five specimens in a small brook on the southern outskirts of the Saxon capital of Dresden. This is the first record of the stone crayfish from Saxony, which represents its northernmost habitat known to date.

Kurzfassung. Erstnachweis des Steinkrebse *Austropotamobius torrentium* (Schrank, 1803) (Crustacea: Decapoda: Astacidae) in Sachsen. Noch bis vor kurzem wurde angenommen, dass der Steinkrebs *Austropotamobius torrentium* (Schrank, 1803), eine vom Aussterben bedrohte Flusskrebbsart, im Freistaat Sachsen nicht vorkommt. Bei einem regionalen Flusskrebbs-Monitoring im Sommer 2007 wurden jedoch überraschenderweise fünf Exemplare in einem kleinen Bach am südlichen Stadtrand der sächsischen Metropole Dresden gefangen. Dieses Vorkommen ist der erste Nachweis des Steinkrebse in Sachsen und stellt sein nördlichstes bisher bekanntes Habitat dar.

Key words. *Austropotamobius torrentium*, Saxony, natural range, northernmost habitat

Introduction

The stone crayfish *Austropotamobius torrentium* (Schrank, 1803) is one of the most threatened species in Europe (e.g. STREISSL & HÖDL 2002a). Water pollution, habitat destruction, and the lethal crayfish plague *Aphanomyces astaci* (Schikora 1906) have brought the stone crayfish to the brink of extinction (FÜREDER & MACHINO 1998). Thus, *A. torrentium* was listed in the appendix II of the Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) as a species of community interest whose conservation requires the designation of protected areas for habitat conservation (TAYLOR 2002; STRÄTZ 2007).

In Saxony, a federal state situated in the south-eastern part of Germany bordering Poland and the Czech Republic, the occurrence of only four crayfish species were known till recently (FÜLLNER et al. 2005): The indigenous noble crayfish *Astacus astacus* (Linnaeus, 1758), the eastern European narrow-clawed crayfish *Astacus leptodactylus* (Eschscholtz, 1823), the spiny-cheek crayfish *Orconectes limosus* (Rafinesque, 1817) and the signal crayfish *Pacifastacus leniusculus* (Dana, 1852), two species originating from North America. The stone crayfish was regarded as nonexistent in the Saxon area until now due to the large distance to the known natural range which has its northernmost extension in the drainage basin of the river Main (GROSS 2002) (Fig. 1).

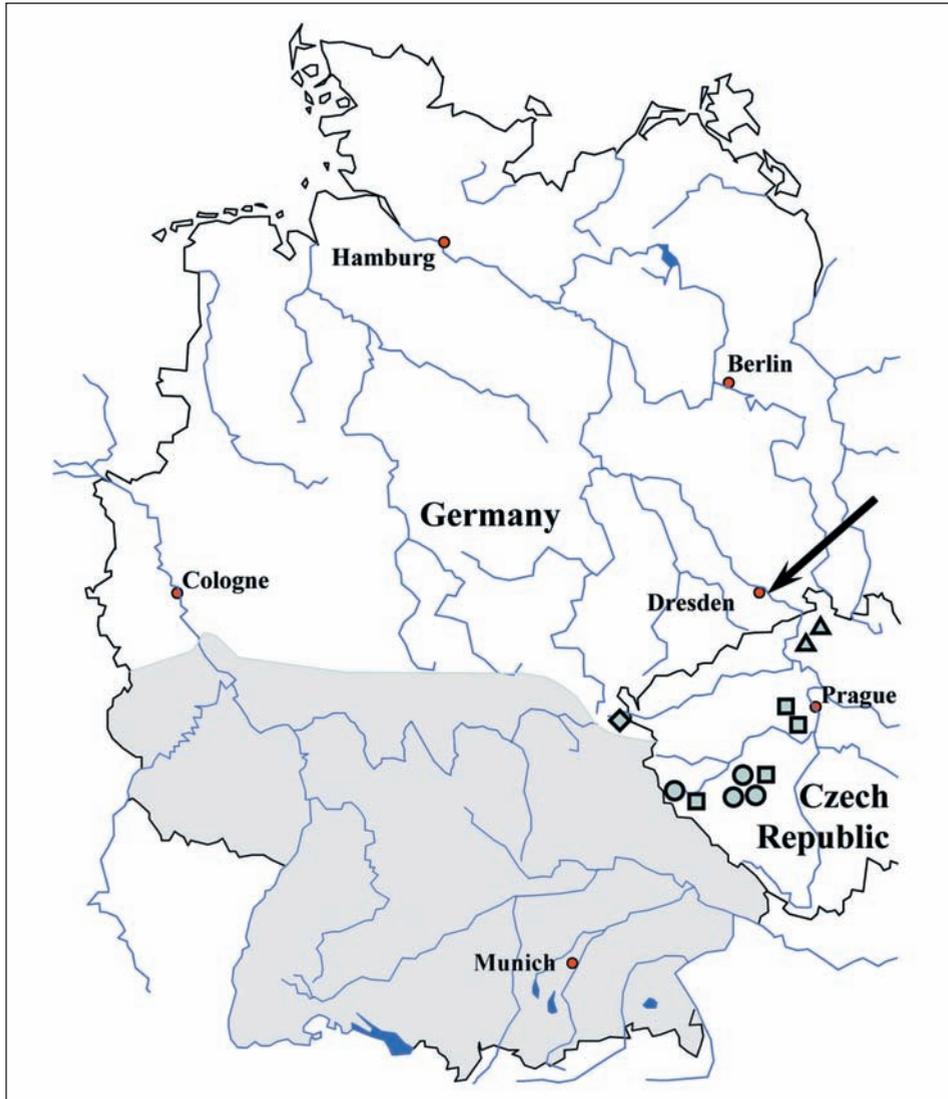


Fig. 1: Distribution of the stone crayfish *Austropotamobius torrentium* in Germany and the adjacent territory of the Czech Republic. The arrow shows the described location of its first evidence in Saxony. The grey coloured area is its natural range in Germany according to GROSS (2002). Squares represent populations confirmed by KOZÁK et al. (2002), circles are occurrences described by FISCHER et al. (2004) and the rhombus stands for the habitat published by STRÁTZ (2007). Triangles show populations recently detected in North Bohemia (personal communication B. FRANĚK, Administration of the České středohoří Protected Landscape Area).

Study site and sampling

The discovery location of the stone crayfish is a small brook situated in the southern outskirts of the Saxon capital of Dresden (13°53'E, 51°01'N). The water rises in the uplands of the Schönfelder Hochland at an altitude of 300 m and flows 200 m downward to the river Elbe.



Fig. 2: Typical aspect of the first detected stone crayfish habitat in Saxony.

At two locations, the brook flows through a small retention pond. The total stream length is 3.5 km, the width ranges from 0.5 to 1.5 m and the average depth is about 10 cm. The streambed is well-structured by stones, potholes and roots. The region around the headwaters is dominated by fields and grasslands while the mouth of the stream lies in a built-up area. The intermediate sectors are situated in a deciduous forest, which is part of a nature reserve already protected by the Habitat Directive.

For the first time, we carried out stone crayfish sampling during a regional freshwater crayfish monitoring by using commercial traps in summer 2007. Twenty traps were set in a brook section of approximately 250 m. Because of the generally low water level, the sampling was repeated by catching the animals by hand in autumn. Captured animals were sized, weighted and their sex was determined before being released again. In addition, during the second collection in autumn we took tissue samples from the animals for further genetic analysis without killing or seriously injuring them.

Results

The trap sampling yielded only five adult stone crayfish consisting of four females and one male (Figs 3–5), ranging from 6.0 to 7.0 cm. The specimens were mainly caught in potholes as the other sections of the brook were too shallow for setting the traps properly. In autumn, we caught 25 specimens by hand in a section of 100 m. To avoid greater damages to the habitat, we only turned smaller stones for seeking the stone crayfishes. Because of the relationship between stone size and crayfish length (STREISSL & HÖDL 2002b), we mainly captured specimens ranging only from 3.0 to 5.0 cm. However, we also found three berried females of 7.0 cm (Figs 3–5).



Figs 3–5: Stone crayfishes *Austropotamobius torrentium* from the Saxon habitat. Top left: Large male. Top right: Antennal scale with the characteristic serrated ventral keel (arrow). Bottom: Berried female.

Discussion

The occurrence of the stone crayfish, coincidentally detected in the periphery of the city of Dresden, is the first record of this species in Saxony and the northernmost place where this species has been found yet. According to the Habitats Directives evaluation scheme for stone crayfish population, given by TROSCHEL (2006), the abundance of more than 20 specimens caught per 100 m, the ratio of berried females of more than 5%, and the generally good habitat conditions allow us to classify the status of this stock as “good”. In addition, the major part of the area is already strictly protected by the Habitats Directive. Nevertheless, due to the low reproduction rate of the stone crayfish (BOHL et al. 2001) and its spatially limited habitat, the

only population in Saxony known so far continues to be endangered. Even the slightest disturbance could lead to its total extinction. Thus, precautionary measures are necessary to avoid potential water contamination by fertilizers or insecticides from the agricultural land in the upper part of the locality or to prevent an invasion of the spiny-cheek crayfish, the main carrier of the crayfish plague (OIDTMANN & HOFFMANN 1998) from the nearby river Elbe.

Further, it has to be regarded whether the detected Saxon population is an autochthonous one. In spite of intensive literature research, we could not find any information about a historical occurrence of *A. torrentium* in this region. Due to that fact and because of the long distance to the main distribution area, one could assume that the Saxon population has been introduced by man. On the other hand, the reason for the lack of past evidence could also be due to the fact that the small-sized stone crayfish has often been ignored because of its commercial irrelevance. It could also have been easily confused with other crayfish species. For example, some scientists considered *A. torrentium* an atrophied form of the noble crayfish, even until the beginning of the 20th century (SMOLIAN 1926).

However, the latest data from the Czech Republic and northeastern Bavaria (Kozák et al. 2002; FISCHER et al. 2004; STRÄTZ 2007; FRANĚK, personal communication) suggest that the natural distribution of the species also includes the drainage basin of the river Elbe (Czech: Labe) (Fig. 1). In contrast to MACHINO & FÜREDER (2005), who assume that the occurrences in the Czech Republic are anthropogenic, we assume that the Bohemian habitats are remaining populations of a past natural stock which widely disappeared because of the detrimental effects of the early industrialization in the middle of the 19th century in the region. Thus, we conclude that the Saxon stone crayfishes represent such a relict population as well. We are expecting more clarification of this problem by the genetic analysis of the obtained tissue samples, which will be carried out soon.

It is still in question whether the stone crayfish in Saxony is of anthropogenic origin far outside its natural range or whether it is an autochthonous relict population.

Acknowledgements

We would like to cordially thank Borek Franěk from the Administration of the České středohoří PLA and Adam Petrusek from the Charles University in Prague, Department of Ecology, for their information about the current occurrences of *A. torrentium* in the Czech Republic. We are grateful to Clemens Fieseler from the Saxon State Institute for Agriculture, Fisheries Department, for excellent assistance in crayfish sampling. We are indebted to Pascal Irmscher from the University of Oklahoma, Department of Ecology and Evolutionary Biology, and Svenja Sottorf for critical review of the manuscript. The crayfish monitoring in Saxony was financially supported by the Structural Funds FIFG in accordance with Council Regulation (EC) No 279/1999.

References

- BOHL, E., KELLER, M. & OIDTMANN, B. (2001): Flusskrebse in Bayern. – Landesfischereiverband Bayern e.V.
- FISCHER, D., BÁDR, V., VLACH, P. & FISCHEROVÁ, J. (2004): Nové poznatky o rozšíření raka kamenáče v Čechách. – *Živa* 2/2004: pp. 79–81
- FÜLLNER, G., PFEIFER, M. & ZARSKE, A. (2005): Atlas der Fische Sachsens. Rundmäuler, Fische, Krebse. – Sächsische Landesanstalt für Landwirtschaft, Staatliche Naturhistorische Sammlung Dresden.
- FÜREDER, L. & MACHINO, Y. (1998): Historische und rezente Verbreitung von Flusskrebsen in Tirol, Südtirol und Vorarlberg. In: EDER, E. & HÖDL, W. (Hrsg.) Flusskrebse Österreichs. – Stapfia 58: 77–88.

- GROSS, H. (2002): Artenhilfsprogramm Steinkrebs. – Mitteilungen der Landesanstalt für Ökologie, Bodenordnung und Forsten des Landes Nordrhein-Westfalen (LÖBF) 4/02.
- KOZÁK, P., DURIS, Z. & POLICAR, T. (2002): The stone crayfish *Austropotamobius torrentium* (Schrank) in the Czech Republic. – Bulletin Français de Pêche et de Pisciculture 367: 707–713
- MACHINO, Y. & FÜREDER, L. (2005): How to find a stone crayfish *Austropotamobius torrentium* (Schrank, 1803): A biogeographic study in Europe. – Bulletin Français de Pêche et de Pisciculture 376–377: 507–717
- OIDTMANN, B. & HOFFMANN, R.W. (1998): Die Krebspest. In: EDER, E. & HÖDL, W. (Publ.) Flusskrebse Österreichs. – Stapfia 58: 187–196.
- SMOLIAN, K. (1926): Der Flußkrebs, seine Verwandten und die Krebsgewässer. In: DEMOLL, R. & MAIER, H.N. (Publ.): Handbuch der Binnenfischerei Mitteleuropas. – E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, pp. 1–422
- STRÄTZ, C. (2007): Der Steinkrebs (*Austropotamobius torrentium*) in Oberfranken – Kartierung, Monitoring, Artenhilfsprogramm. – Hrsg. Bezirksfischereiverband Oberfranken e.V.
- STREISSL, F. & HÖDL, W. (2002a): Growth, morphometrics, size at maturity, sexual dimorphism and condition index of *Austropotamobius torrentium* Schrank. – Hydrobiologia 477: 195–199
- STREISSL, F. & HÖDL, W. (2002b): Habitat and shelter requirements of the stone crayfish, *Austropotamobius torrentium* Schrank. – Hydrobiologia 477: 201–208
- TAYLOR, C.A. (2002): Taxonomy and Conservation of Native Crayfish Stocks. In: HOLDICH, D.M. (Ed.): Biology of freshwater crayfish. – Blackwell Science Ltd, pp. 467–510.
- TROSCHEL, H.J. (2006): Flusskrebse (Dekapoda). In: Empfehlungen für die Erfassung und Bewertung von Arten als Basis für das Monitoring nach Artikel 11 und 17 der FFH-Richtlinie in Deutschland. – Berichte des Landesamtes für Umweltschutz Sachsen-Anhalt, Halle (2006) Sonderheft 2: 114–120