

First record of the Ponto-Caspian amphipod *Echinogammarus trichiatus* (Martynov, 1932) (= *Chaetogammarus trichiatus*) (Crustacea: Amphipoda) for the Middle-Danube (Slovakia and Hungary)

Péter Borza^{1,2}

¹Eötvös Loránd University, Institute of Biology, Department of Systematic Zoology and Ecology, Pázmány Péter sétány 1/C, H-1117 Budapest, Hungary

²Hungarian Academy of Sciences, Institute of Ecology and Botany, Hungarian Danube Research Station, Jávorka S. u. 14., H-2131 Göd, Hungary

E-mail: borzap@gmail.com

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Abstract

The Ponto-Caspian amphipod *Echinogammarus trichiatus* (= *Chaetogammarus trichiatus*) was found for the first time in Slovakia (22 August 2007, near Bratislava) and in Hungary (15 September 2009, near Rajka). This range expansion is probably a result of a recent downstream spread of the Upper-Danubian populations. Our records indicate that the species can inhabit artificial rip-raps as well as near-natural gravel banks, and co-occurs with its relatives already present. Suitable habitats can be found all along the Middle-Danube, so further spread of the species is anticipated.

Key words: Amphipoda, *Echinogammarus trichiatus*, *Chaetogammarus trichiatus*, range expansion, invasive species, River Danube, Hungary, Slovakia

The invasion of Ponto-Caspian fauna elements has been one of the most striking changes in the macrofauna of large European rivers in recent times (Bij de Vaate et al. 2002). Amphipod crustaceans are among the most prominent groups of these newcomers; there are at least 12 Ponto-Caspian species involved all over Europe (Eggers and Martens 2001, 2004; Bij de Vaate et al. 2002), some of which are considered to be among the most successful invaders. In the main arm of the Middle-Danube all amphipod species currently occurring are of Ponto-Caspian origin (Muskó 1994; Nesemann et al. 1995; Brtek 2001; Paunovic et al. 2007). Most of these species were found already in the first half of the 20th century (*Chelicorophium curvispinum* (G.O. Sars, 1895); *Ch. sowinskyi* (Martynov, 1924); *Dikerogammarus haemobaphes* (Eichwald, 1841); *D. villosus* (Sovinskij, 1894); *D. bispinosus* Martynov, 1925; *Echinogammarus ischnus* (Stebbing, 1899) (= *Chaetogammarus ischnus*); Unger 1918; Dudich 1927; 1947; Štraskraba 1962), while *Obesogammarus obesus* (G.O. Sars, 1894) turned

up in the early '90s (Csányi 1994), and *Chelicorophium robustum* (G.O. Sars, 1895) in 2009 (unpublished data). In this paper we report on the appearance of a further species, *Echinogammarus trichiatus* (Martynov, 1932), (formerly also treated as *Chaetogammarus tenellus major* Cărăușu, 1943; Figure 1).

On 22 August 2007, 28 specimens of *E. trichiatus* were collected on the right bank of the Danube near Bratislava (rkm 1869, Table 1) in the course of the "Joint Danube Survey 2" (organised by the International Commission for the Protection of the Danube River, ICPDR) using a "kick and sweep" net (mesh size 500 µm, aperture 25×25 cm) from the littoral zone (<1 m water depth). The site was characterised by coarse gravel sediments. The sample was sorted in the field and preserved in 4% formaldehyde solution. The record at Bratislava was the furthest downstream occurrence of the species in the Joint Danube Survey 2 "kick and sweep" samples (except for the Lower-Danube).

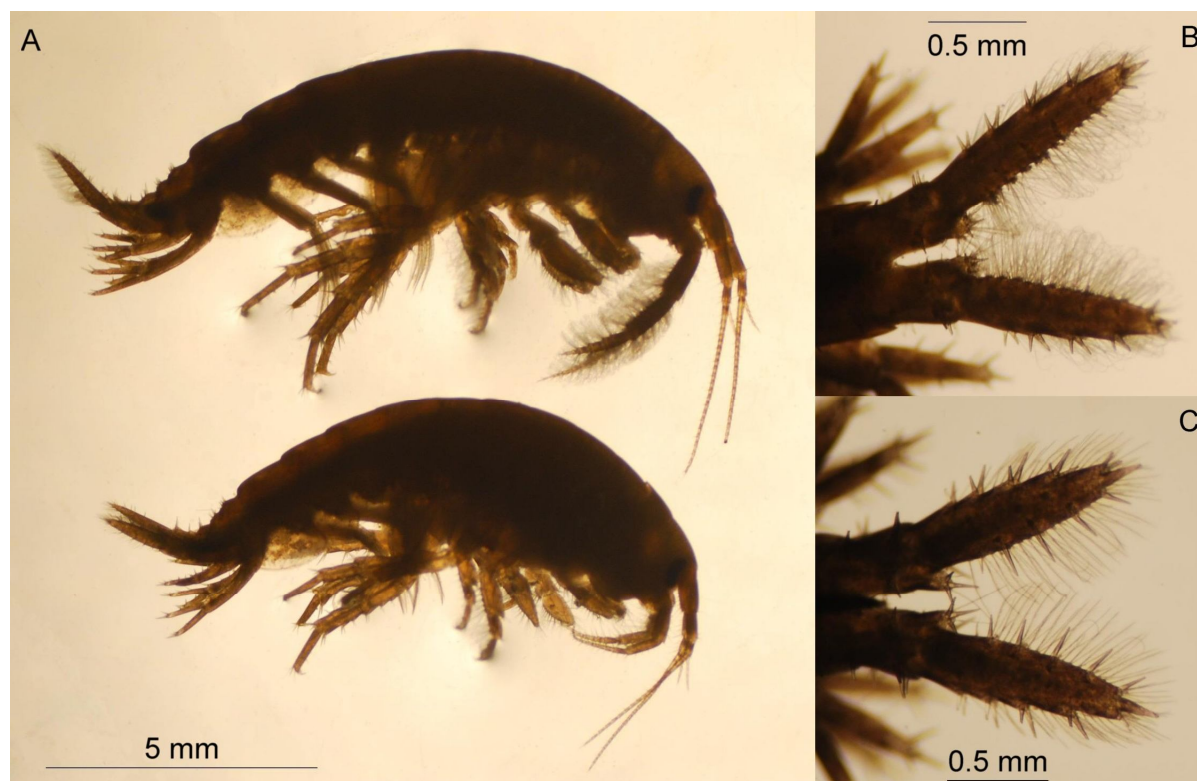


Figure 1. *Echinogammarus trichiatus* A) male (above) and female (below); B) male and C) female 3rd uropods (Credit: P. Borza)

Table 1. Records of gammaroid amphipods in the Middle Danube [Collectors: B. Csányi, M. Paunovic (2007); P. Borza (2009)]

Location	Geographic coordinates		Record date	Habitat characteristics	<i>E. trichiatus</i>	<i>E. ischnus</i>	<i>D. bispinosus</i>	<i>D. haemobaphes</i>	<i>D. villosus</i>	<i>O. obesus</i>
	Latitude, N	Longitude, E								
River Danube main arm at Bratislava	48°07'10"	17°08'30"	22.08.2007	coarse gravel	28	0	10	0	34	11
Mosoni-Danube-arm, near Rajka	48°00'44"	17°12'57"	15.09.2009	rip-rap (strong currents)	9	2	37	0	35	0
Abandoned Danube main arm at Dunakiliti	47°59'41"	17°18'55"	15.09.2009	rip-rap, mud	0	1	0	0	1	0
Danube side arm at Dunaremete	47°52'46"	17°27'49"	15.09.2009	stones, roots	0	1	0	1	0	0
Danube main arm at Vámoszabadi I.	47°47'19"	17°39'29"	16.09.2009	rip-rap	0	2	0	0	7	0
Danube main arm at Vámoszabadi II.	47°47'21"	17°39'25"	16.09.2009	rip-rap, gravel	0	3	0	0	11	0
Danube main arm at Gönyű	47°44'20"	17°49'31"	16.09.2009	gravel	0	1	1	7	279	1

On 15 September 2009 the species was found for the first time in Hungary near Rajka, downstream of the dam of the Mosoni-Danube-arm (rkm 123.7, Table 1) using a “kick and sweep” net (mesh size 450 µm, aperture 40×30 cm). The site was characterised by stony substrate and strong backward currents. The sample was preserved in 70% ethanol. On 15-16 September 2009 the species was not found at other sites in the Szigetköz area and the adjoining Danube section (Table 1). The animals were identified in both cases by the author using a Zeiss Stemi 2000-C stereomicroscope, based on the works of Cărauşu et al. (1955) and Eggers and Martens (2001).

E. trichiatus is native in the River Danube basin; its original distribution involved the Danube Delta and its limans, as well as the Romanian and Bulgarian reach of the river (Cărauşu et al. 1955; Dudich 1967; Russev 1979). No range expansion of the species had been reported in this basin, until in 1996 it was surprisingly found in the German section of the river (Weinzierl et al. 1997), and subsequently performed a rapid spread in the German waterways; it colonised the River Rhine as well as navigation canals in Central and North-East Germany (Podraza et al. 2001; Eggers 2005; Müller and Eggers 2006). This distributional leap cannot be explained by a gradual spread upstream in the River Danube, for the species was not recorded either previously, or since in the middle section of the river (e.g. Muskó 1994; Neseemann et al. 1995; Brtek 2001; Paunovic et al. 2007); therefore, the most probable explanation is a human-mediated transport. In conclusion, the range expansion reported here is most likely a result of a downstream spread of the Upper-Danubian populations.

The ecology of *E. trichiatus* is little known. Most publications report the species as occurring among stones (Cărauşu et al. 1955; Eggers and Martens 2001; Eggers 2005), while Müller and Eggers (2006) found it among reeds too. Our records indicate that the species can inhabit artificial rip-raps as well as near-natural gravel banks in the Middle-Danube. Suitable habitats can be found all along the Middle-Danube, so further spread of the species is anticipated.

Focused investigations on the impact of *E. trichiatus* on the resident biota of the recently invaded areas have not been published; nevertheless, obvious negative effects have not been observed. Our records denote, too, that the

species can coexist with its relatives already present (Table 1), but future changes in their relative abundances cannot be excluded.

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