

## First record of *Pontogammarus robustoides* Sars, 1894 (Crustacea: Amphipoda) in the Gulf of Riga (Baltic Sea)

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### Abstract

The paper presents the first record of the Ponto-Caspian amphipod crustacean *Pontogammarus robustoides* G.O. Sars, 1894, in the Gulf of Riga, Baltic Sea. Eight individuals of this invasive amphipod were found in June 2009, in shallow waters of the gulf near Yurmala city. Most likely this species entered the Gulf of Riga from Latvian rivers emptying into the Baltic Sea, where it was previously found. However, introduction via ships coming from either southern or north-eastern parts of the Baltic Sea is also a possibility.

**Key words:** *Pontogammarus robustoides*, invasive species, Ponto-Caspian, Daugava River basin, Baltic Sea

### Introduction

The Gulf of Riga (18, 100 km<sup>2</sup>) is a large shallow bay in the eastern part of the Baltic Sea, with a maximum depth of 62 m. The salinity regime of the gulf is characterized by variability from 0.5–2.0 PSU in spring in the surface layers up to 7.7 PSU at the bottom of the Irbe Strait in spring and summer (Ojaveer 1995). The relatively low salinity of the Gulf of Riga is the result of isolation of the basin from the Baltic Proper and the high freshwater inflows therein (Daugava, Lielupe, Gauja rivers). A number of non-indigenous species were found in the Gulf of Riga during recent decades. Among 58 macro-zoobenthic species recorded in the Gulf of Riga at the end of the 1990s, seven species such as *Cordylophora caspia* (Pallas, 1771), *Eriocheir sinensis* (Milne-Edwards, 1853), *Mya arenaria* Linnaeus, 1758, *Dreissena polymorpha* (Pallas, 1771), *Potamopyrgus antipodarum* (Gray, 1843), *Balanus improvisus* Darwin, 1854, *Marenzelleria neglecta* Sikorski and Bick, 2004 have allochthonous origins (Leppäkoski et al. 2002). Later (in 2003), the North-American amphipod *Gammarus tigrinus* Sexton, 1939 was found in Kõiguste Bay, northern Gulf of Riga (Estonia) (Herkül and Kotta 2007). However, another non-native amphipod *Pontogammarus robustoides*

Sars, 1894 has never previously been recorded in the Gulf of Riga, although it established self-reproducing populations in the north-eastern Baltic Sea including Russian (Neva Bay in 1999, Berezina and Panov 2003) and Estonian (Narva Bay in 2006, Herkül et al. 2009) parts of the Gulf of Finland. Also, this species inhabits the southern and south-eastern Baltic Sea (Ezhova et al. 2005; Daunis and Zettler 2006; Grabowski et al. 2006; Arbačiauskas 2008).

An original distribution area of *P. robustoides* included the brackish and freshwater bays of the Black, Azov and Caspian seas, coastal lakes and lagoons in their basins and the lower courses and estuaries of the incoming rivers (Volga, Don, Bug, Dnepr, Prut, Dniester, Kura, Danube, Terek, Kuban, etc.) as well as lakes near the Marmara Sea (Carausu et al. 1955; Markovskij 1954; Mordukhai-Boltovskoj 1960; Dedyu 1980; Özbek and Ustaoglu 2006). The history of *P. robustoides* in the Baltic Sea basin started in the 1960s when it was introduced from the Black Sea basin (from Dnepr Reservoir and Simferopol Reservoir, Crimea) to Kaunas Reservoir on the Neman River, Baltic Sea (Gasiunas 1972; Arbačiauskas 2002; Arbačiauskas and Gumuliauskaite 2007), and then to regions located to the north of Lithuania, including Latvia (Grudule et al. 2007).

**Figure 1.** Map of study region indicating the new *P. robustoides* record at Yurmala, Gulf of Riga.



**Figure 2.** *P. robustoides* from the Gulf of Riga. A – general view, B – basiopodite of pereopod 7. Photograph by N.A.Berezina.



From 1999-2005 this species was recorded as an established biological component of the lower reaches or mouths of Latvian rivers emptying into the Baltic Sea (Grudule et al. 2007) and the subsequent risk of *P. robustoides* expanding to the Gulf of Riga believed therefore to be potentially high. In fact this communication announces the first record of the Ponto-Caspian amphipod *P. robustoides* in Latvian waters of the Gulf of Riga (Baltic Sea).

### Material and methods

The amphipod *P. robustoides* was collected on June, 28 (2009) near Yurmala city (56.97°N; 23.73°E) during evaluation sampling of amphipods in the sandy littoral zone of the gulf (Figure 1). Several qualitative samples of bottom sediments were collected by hand net in shallow (0.3-0.5 m) areas, and amphipods were also

collected from beached macrophytes. All amphipods were picked up from the sediments and wracks, preserved in 70% ethanol and transported to the laboratory (Zoological Institute, St. Petersburg, Russia), where species were identified and the sex and size of the specimens were evaluated.

### Results and discussion

*Pontogammarus robustoides* (Figure 2) was identified in samples from shallow areas with a total number of eight specimens including five ovigerous females (with body length of 6.7-10 mm), one male (12 mm) and two juveniles (5.5-6.0 mm). Together with the invasive *P. robustoides*, two native Baltic amphipods namely *Gammarus salinus* Spooner, 1947 (one male and one female), *G. zaddachi* Sexton, 1912 (two females and 12 juveniles) were also recorded.

It is likely that *P. robustoides* expanded into the Gulf of Riga from the lower reaches of the Lielupe River, where this species is also present (1999-2005) resulting from the intentional introduction of this amphipod into the Keguma Reservoir (Daugava River) and the subsequent natural dispersal (Grudule et al. 2007). Also, migration through Baltic Sea waters (from southern or northern-eastern coastal areas) via hull fouling of ships destined for the Gulf of Riga cannot be ignored because the salinity of Baltic coastal waters (up to 7 PSU) permits a high survival rate and reproduction of this amphipod species (Berezina and Panov 2003). The closest source of a population, which might have contributed to the dispersal of *P. robustoides* across Latvian waters, resides in the Curonian Lagoon and in the Gulf of Finland. Further information about current distribution area and the ecological significance of this Ponto-Caspian invader in the Gulf of Riga demand further research.

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