Communications

New data on the non-indigenous cladoceran *Cercopagis pengoi* (Ostroumov 1891) in the Gulf of Gdańsk (Baltic Sea)*

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Abstract

New data on the distribution of the invasive Ponto-Caspian species, *Cercopagis pengoi*, in the Gulf of Gdańsk are presented. The species, recorded in 2006, for the first time occurred continuously throughout the summer (July–August) at stations situated in the eastern and western parts of the gulf.

The hydrological and topographic specificity of the Baltic Sea makes it an excellent place for the settlement of non-indigenous species. As a consequence of their great plasticity, these can easily adapt to free ecological niches in which they establish productive and fertile populations. In recent years, allochthonous animals – immigrants from the Ponto-Caspian

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basin – have been reported in the Baltic Sea with increasing frequency. They colonise the pelagic and benthic zones (Leppäkoski et al. 2002).

With its specific thermohaline conditions, comparatively low biodiversity, and high level of anthropogenic pressure, the relatively strong isolation of the Baltic from the open sea is favourable to bioinvasions. Non-indigenous species introduced by humans either accidentally or intentionally therefore constitute an important part of the Baltic Sea's biodiversity (Leppäkoski & Mihnea 1996). The unique composition of marine, brackish, freshwater and even relict species characteristic of the Baltic is endangered by the unplanned introduction of non-indigenous species (Leppäkoski & Mihnea 1996).

Until the beginning of the 21st century, about 100 non-indigenous species had entered the Baltic Sea. They originated from different ecological formations and water bodies (Leppäkoski et al. 2002). One of them, the Ponto-Caspian cladoceran *Cercopagis pengoi* arrived during the last twenty years: its invasion history dates back to the early 1990s. The species was recorded for the first time in the Gulf of Riga in 1992 (Ojaveer & Lumberg 1995, Krylov et al. 1999). In subsequent years *C. pengoi* expanded its range into the Gulf of Finland (1992) (Leppäkoski & Olenin 2000), the central Baltic Sea (1997) (Leppäkoski & Olenin 2000), and the Gulf of Gdańsk (1999) (Żmudziński 1998, Bielecka et al. 2000, Duriš et al. 2000).

Some data are available on the occurrence of *C. pengoi* in lagoons, e.g. the Vistula Lagoon (Polunina 2005, Naumenko 2009), but there is not much information regarding its presence in the more saline waters along the Polish Baltic coast (Olszewska & Bielecka 2004, Bielecka et al. 2005, Olszewska 2006). There the species has been recorded only at irregular intervals and only at single sites. In 2002, the abundance of *C. pengoi* ranged from 0.1 indiv. m^{-3} near Żarnowiec (Olszewska 2006) to 400 indiv. m^{-3} in the Gulf of Gdańsk (Olszewska & Bielecka 2004). But in 2006 the authors of the present communication observed, for the first time, stable and relatively abundant populations of *C. pengoi*.

Planktonic material was collected in the Gulf of Gdańsk between February and December 2006, the samples being taken from the eastern (Krynica Morska profile – K1-K4, Świbno profile – Sw2-Sw4) and western (Mechelinki profile – M2, Sopot profile – So1-So4 and J23) parts of the gulf (Figure 1). Zooplankton samples were collected to a maximum depth of 40 m with a Copenhagen vertical haul plankton net (mesh size 100 μm) and preserved in 4% formaldehyde solution.

In 2006, the occurrence of *C. pengoi* in the Gulf of Gdańsk was the most abundant recorded up to that time. *C. pengoi* established a stable population and was observed continuously at all the stations and profiles

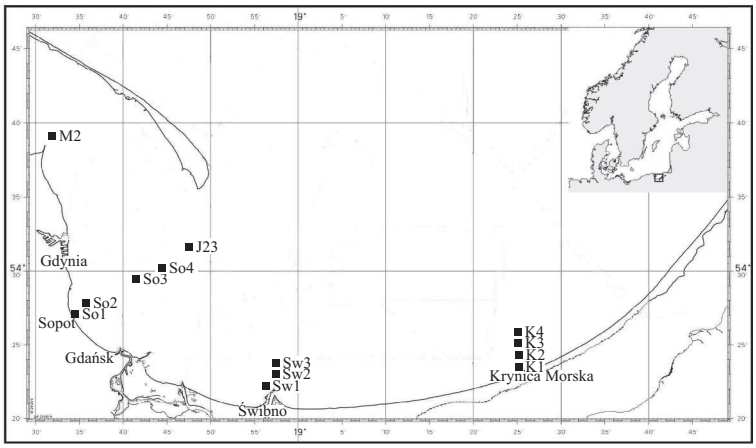

Figure 1. The occurrence of *Cercopagis pengoi* in the Gulf of Gdańsk in 2006

throughout the recording period (July–August). The maximum abundance, 370 indiv. m^{-3}, was noted in July, at 0–10 m depth, in the eastern part of the gulf. At that time, the average temperature of the surface water was 23.6°C and the salinity varied between 2.7 and 7 PSU. *C. pengoi* individuals were found mainly down to a depth of 20 m. The full population spectrum of *C. pengoi* (the presence of all developmental stages – juvenile females with 1 spine on the caudal process, parthenogenetic females with 2–3 spines on the caudal process, gamogenetic females with 2–3 spines on the caudal process, males with 1–3 spines on the caudal process) indicates that the environmental conditions in the Gulf of Gdańsk favour the occurrence and reproduction of the species. Parthenogenetic females constituted the predominant group, accounting for more than 50% of the population.

The high adaptive potential of *C. pengoi* and, in consequence, the effective and rapid colonisation of the Baltic Sea, is the reason for the detailed examination of this crustacean. Because of its mass occurrence in different Baltic regions, *C. pengoi* is not only an important food source but also a competitor for fish and native plankton species (Uitto et al. 1999, Antsulevich & Välipakka 2000, Gorokhova et al. 2000, Strake 2002, Ojaveer et al. 2004, Telesh 2004). Trophic relationships in the Baltic ecosystem different from those hitherto observed, the reduced abundance of key planktonic species resulting from the invasion of *C. pengoi*, and the diminished effectiveness of the food web are new challenges for the researchers of the Baltic environment. The dynamics of the *C. pengoi* invasion in the Gulf of Gdańsk and the Polish zone of the southern Baltic has not yet been described. The colonisation of *C. pengoi* in this region opens up new possibilities and requires comprehensive research to be undertaken

on the subject. The authors of this communication intend to carry out further research on certain aspects of the occurrence of *C. pengoi* in the Gulf of Gdańsk based on the analysis of successively and regularly collected plankton samples.

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