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First finding of the Ponto-Caspian gammarid species *Pontogammarus robustoides* and *Dikerogammarus haemobaphes* (Crustacea: Amphipoda) in the post-glacial lake of the Vistula valley

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With 2 figures

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Invasive *Pontogammarus robustoides* (G. O. Sars, 1894) and *Dikerogammarus haemobaphes* (Eichwald, 1841) were found to co-occur with native *Gammarus lacustris* G. O. Sars, 1863 in the Lucieńskie Lake – a mesotrophic, postglacial channel valley lake in Central Poland. This is a first finding of the species in any of the postglacial lakes in the Vistula valley. Introduction of these aliens is most probably of a very recent origin.

1 Introduction

The Vistula (Wisła) River is the largest river in Poland and one of the major European watercourses. At the same time it is a crucial part of the so-called central corridor of migration for various Ponto-Caspian hydrobionts from the Black and Caspian Sea basins to Western Europe (Bij de Vaate et al. 2002). Since 1990's the gammarid fauna of this river is almost completely dominated by the Ponto-Caspian species: *Dikerogammarus haemobaphes* (Eichwald, 1841) and *Pontogammarus robustoides* (G. O. Sars, 1894) (Jażdżewski et al. 2002, 2004). The former species has entered the Vistula system from the Dnieper drainage through the Prypeć (Pripet)-Bug canal. In contrary, *P. robustoides* entered the Vistula most probably from the Curonian Lagoon using Baltic littoral waters or Pregoła (Pregel) system joining the Vistula and the Curonian lagoons. Also, along the Baltic shores it colonised the Szczecin Lagoon (Gruszka 1999, Jażdżewski et al. 2002). In opposition to the former species preferring more lotic conditions, the latter is known to be phytophilous and occurring in warm, rich in nutrients, lentic sections of large rivers, or shallow lakes and brackish coastal lagoons (Dedju 1967). The recent invasion of the oligohaline Ponto-Caspian species via European large rivers has been attributed to raised level of salinity in these waterbodies (Den Hartog et al. 1992, Jażdżewski et al.

2002). In Poland the species were found usually in waters of the salinity not lower than 0,4 PSU (unpublished data). None of the species in question has been known to enter any of the numerous postglacial lakes located in the Vistula valley. We attributed that situation to environmental features of these basins (mostly mesotrophic, salinity level below 0.2 PSU) opposite to that found in the middle and lower Vistula (eutrophic, salinity level most often between 0.5 and 0.8 PSU). PSU means practical salinity unit; 1 PSU = 1 ‰ = 1000 mg/l salt content.

2 Locality and methods

Lucieńskie Lake, located in Central Poland (Fig. 1), is a mesotrophic, postglacial channel valley lake cut in a sand-flat of Pleistocene origin. It is relatively large (surface 2,033 km²) and deep (max. 20,0 m, mean 8,4 m). Sandy bottom of this lake is rich in sublacustrine springs and submerged vegetation (12 % of surface), water conductivity in this lake does not exceed 0.2 PSU (Wojewódzki Inspektorat Ochrony Środowiska 2002). The lake is connected to the Włocławski Reservoir located on the middle section of the Vistula River, through the Skrwa Lewa River, being the Vistula's small left affluent. During the faunistic survey in June 2000, only the native *Gammarus lacustris* was found in the lake (own unpublished data).

Samplings were performed at two sites located along the southern bank of the lake (N 52°29' E 19°25') (Fig 1). Sandy bottom sampled in these places was covered by *Dreissena polymorpha* beds, and associated detritus patches containing branches and leaves of the surrounding black alder and pine trees (depth 0.5-1 m). Numerous minute sublacustrine spring are present in the area. Additional samplings were done in neighbouring reed beds (depth 0.5 m), as well as along the lake bank in tree and grass roots (depth 0.3 m). Samples were taken with a hand-net in a semiquantitative way (2 persons' effort for 30 min at each site). This way it was possible to collect samples large enough to be representative. This method has been used for many years by our research team. It proved to be a very efficient, giving reliable results in faunistic surveys performed on various geographical scales (Jażdżewski al. 2002, 2004). Material was sorted at a place, found gammarids (ca. 100 individuals per site) were preserved in 75 % ethanol and identified according to the review by Konopacka (2004).

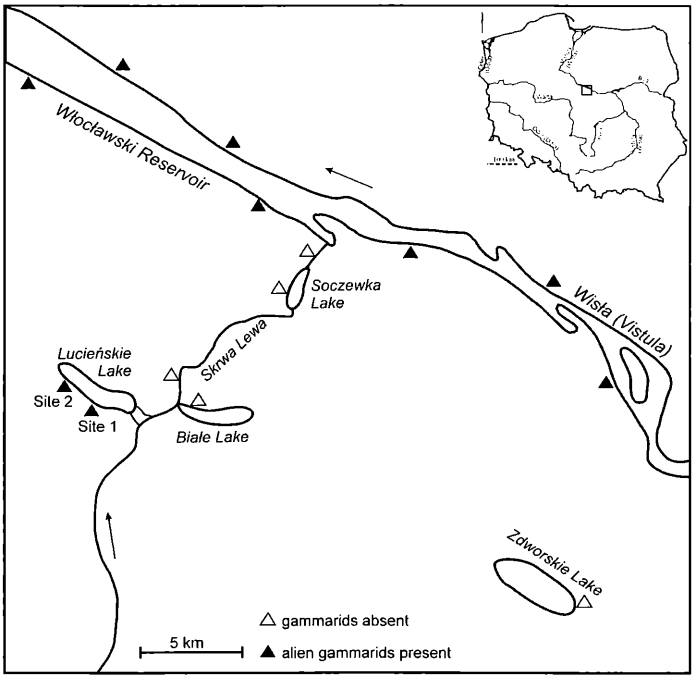

Fig. 1: Occurence of gammarids in the studied area

3 Results and discussion

Surprisingly, the taken samples contained three species: native *G. lacustris*, as well as alien *D. haemobaphes*, and *P. robustoides*. This is a first finding of these invasive species in the post-glacial lakes located in the Vistula valley. Until now they were known only from the Vistula itself. The gammarid communities at the sampling sites were dominated by the native *G. lacustris*, followed by *P. robustoides*, with small contribution of the third species (Fig. 2).

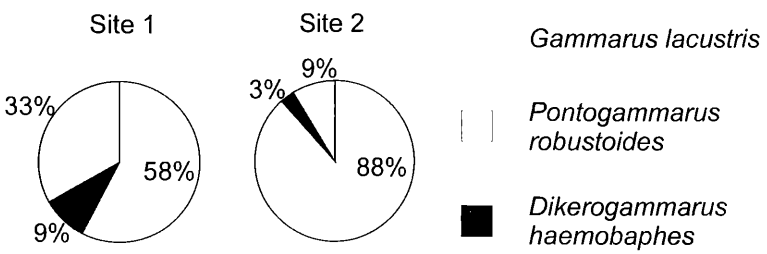

Fig. 2: Composition of gammarids communities in the Lucieńskie Lake

Both alien species were represented also by minute juvenile individuals showing that they reproduce successfully in the lake. The basin as well as the sampled habitat were not typical for these Ponto-Caspian species; particularly *P. robustoides* is known to be associated with submerged or emerged vegetation. The control samples taken in neighbouring reed beds, as well as in tree and grass roots contained none of the two invasive species. In other water basins (e.g. Vistula river, Vistula Lagoon) we observed that both species usually preferred such habitats. There are two main possibilities of the species reaching the Lucieńskie Lake from the Vistula river in which both species are very abundant (Jażdżewski et al. 2002, Konopacka 2004). The species could enter up the Skrwa Lewa river, however our samplings did not reveal presence of any gammarid species in this river between the lake and the Vistula. Also we have not found any amphipod species in the other two lakes (Białe and Zdworskie) in the area, connected to the Vistula by a net of small temporary canals and wetlands (Fig. 1). On the other hand, the Lucieńskie Lake is the only extensively used sailing lake in the area (Wojewódzki Inspektorat Ochrony Środowiska 2002) and the species could be transferred to the lake with boats. However transport via shipping was not recorded for the species in Polish inland waters so far, it is well known in Germany (Reinhold & Tittizer 1999).

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References

Bij de Vaate, A., K. Jażdżewski, H.A.H. Ketelaars, S. Gollasch & G. Van der Velde, G. (2002): Geographical patterns in range extension of Ponto-Caspian macroinvertebrate species in Europe.- Canadian Journal of Fisheries and Aquatic Sciences 59: 1159-1174, Ottawa

Dedju, I. I. (1967): Amfipody i mizidy bassejnov rek Dniestra i Pruta.- Izdatelstvo "Nauka", 172 pp., Moskva

Den Hartog, C., F.W.B. Van den Brink & G. Van der Velde (1992): Why was the invasion of the river Rhine by Corophium curvispinum and Corbicula species so successful.- Journal of Natural History 26: 1121-1129, London

Gruszka, P. (1999): The River Odra estuary as a gateway for alien species immigration to the Baltic Sea basin.- Acta hydrochimica et hydrobiologica 27: 374-382, Weinheim

Jażdżewski, K., A. Konopacka & M. Grabowski (2002): Four Ponto-Caspian and one American gammarid species (Crustacea, Amphipoda) recently invading Polish waters.- Contributions to Zoology 71(4): 115-122, The Hague

Jażdżewski, K., A. Konopacka & M. Grabowski (2004): Recent drastic changes in the gammarid fauna (Crustacea, Amphipoda) of the Vistula River deltaic system in Poland caused by alien invaders.- Diversity and Distributions 10: 81-87, Oxford

Konopacka, A. (2004): Invasive amphipods (Crustacea, Amphipoda) in Polish waters.– Przegląd Zoologiczny 27: 141-162, Wrocław

Ludwikowski, A. (ed.) (2002): Jakość i zagrożenia wód powierzchniowych w województwie mazowieckim.– Wojewódzki Inspektorat Ochrony Środowiska w Warszawie, 254 pp., Wojewódzki Fundusz Ochrony ?rodowiska i Gospodarki Wodnej w Warszawie, Warszawa

Reinhold, M. & T. Tittizer (1999): Verschleppung von Makrozoen durch Kühlwasserfilter eines Schiffes.- Wasser und Boden 51: 61-66, Berlin

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