

**The invasive amphipod
Gammarus tigrinus Sexton,
1939, in Puck Bay***

OCEANOLOGIA, 45 (3), 2003.
pp. 507–510.

© 2003, by Institute of
Oceanology PAS.

KEYWORDS

Gammarus tigrinus
Alien species
Baltic Sea

ANNA SZANIAWSKA
TOMASZ ŁAPUCKI
MONIKA NORMANT

Institute of Oceanography,
University of Gdańsk,
al. Marszałka Piłsudskiego 46, PL-81-378 Gdynia, Poland;
e-mail: anna@sat.ocean.univ.gda.pl

Manuscript received 14 January 2003, reviewed 23 May 2003, accepted 5 June 2003.

Abstract

The paper is a report on the occurrence of the species *Gammarus tigrinus* Sexton, 1939, in the coastal waters of Puck Bay.

Many species of benthic invertebrates have been introduced into the Baltic Sea (Leppäkoski 1984, Olenin & Leppäkoski 2001). Many of them, like the hydrozoan *Cordylophora caspia*, bivalve *Mya arenaria*, barnacle *Balanus improvisus* and zebra mussel *Dreissena polymorpha*, have been present in the Baltic Sea for over 100 years. The rapid expansion of human activities during this period has given rise to a multitude of new phenomena in the environment. Many species have disappeared, while some have migrated to other water basins, where they have found appropriate ecological niches and expanded again. In the 1950s a sudden increase in the rate of primary introductions was observed (Leppäkoski & Olenin 2000). *Gammarus tigrinus* (Crustacean, Amphipod), a necto-benthic

* This research was supported by the BALTDER project funded by the European Community under contract number EVK3-CT-2002-80005.

species introduced into British waters from the offloaded ballast waters of vessels travelling between North America and Europe (Hynes 1955, Tesch & Fries 1963), first appeared in the Baltic Sea in 1975 (Leppäkoski & Olenin 2000). Its presence in the Polish coastal zone of the Baltic Sea – in the Szczecin Lagoon, to be precise – was first recorded by Gruszka (1995, 1999). A few years later the species was also reported from the Vistula Lagoon (Jażdżewski & Konopacka 2000). In summer 2001 Gruszka (2002) caught a number of specimens of *G. tigrinus* in the coastal zone of Puck Bay, off the town of Puck, and in September 2002 we found the species at 9 coastal stations at a depth of 0.4 m (Fig. 1).

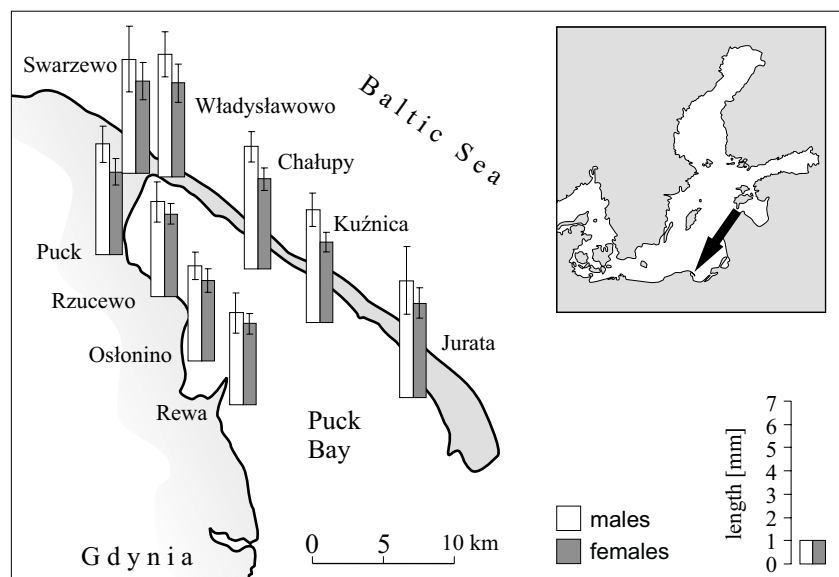


Fig. 1. Location of sampling stations and average lengths (\pm SD) of *Gammarus tigrinus* males and females there

The materials were collected in September 2002 using a strainer fitted with a 1-mm mesh sieve (Jęczmień & Szaniawska 2000a). Later, all individuals assumed to belong to the species *G. tigrinus* were isolated on the basis of the characters specified by Lincoln (1979). All individuals belonging to the species were counted and sexed on the basis of the sexual dimorphism characters listed by Lincoln (1979).

The materials were found to contain 211 individuals belonging to *G. tigrinus*: 98 (46%) of them were males, 113 (54%) were females. Half of the females were carrying eggs. The males were larger than the females, the length of the former varying between 5.0 and 6.0 mm, that of the latter

between 4.0 and 5.0 mm (Fig. 1). *G. tigrinus* was present at all 9 stations. At the stations located along the Hel Peninsula no other species of the genus *Gammarus* Fabr. was present. Presumably, the native species had been displaced by invasive species such as *G. tigrinus*. In 1997 and 1998 at the same sites, *G. tigrinus* was absent and only native species were recorded (Jęczmień & Szaniawska 2000a, 2000b). However, at the stations off Swarzewo, Puck, Rzucewo and Osłonino *G. salinus*, *G. zaddachi* and *G. duebeni* were also present along with the dominant *G. tigrinus*. This may be a demonstration of the rapid invasion of *G. tigrinus* into new areas as well as its ability to displace native species. In his study of *Gammarus* species inhabiting the coastal waters of the Gulf of Gdańsk, Jażdżewski (2002) mentioned only the native species among those present in Puck Bay.

It is interesting that the *G. tigrinus* individuals found in the coastal zone of the Hel Peninsula were larger than those reported from the inner and southern part of the Bay. Very probably, the species entered Puck Bay from the western part of the Baltic Sea, having moved eastwards along the Polish coastline. Gradually colonizing ever more distant parts of Puck Bay, it displaced native species at the same time. In the southern and western parts of the Bay native species currently coexist with *G. tigrinus*. However, it is to be expected that, as in other waters where *G. tigrinus* has made its appearance, it will gradually displace native species here as well (Pinkster et al. 1992). This will happen because the species is very resistant to changing environmental factors and to pollutants. The scale and rate of the species' colonization of other European waters is also a result of its prolific rate of reproduction (Pinkster et al. 1977).

References

- Gruszka P., 1995, *Gammarus tigrinus* Sexton, 1939 (Crustacea: Amphipoda) – a new species for Polish fauna in the Oder estuary, [in:] *Scientific aspects of the studies on Odra Estuary and lake waters of the Szczecińskie Province*, Univ. Szczecin, Conf. mat. 7, 44 pp., (in Polish).
- Gruszka P., 1999, *The River Odra estuary as gateway for alien species immigration to the Baltic Sea basin*, Acta Hydrochim. Hydrobiol., 27 (5), 347–382.
- Gruszka P., 2002, *Gammarus tigrinus* (Sexton, 1939) (Crustacea, Amphipoda) – a new species in the Puck Bay (southern Baltic), pp. 40–41, Abstracts 4th European Crustacean Conf., 22–26 July 2002, Univ. Łódź (Poland).
- Hynes H. B. N., 1955, *Distribution of some freshwater Amphipoda in Britain*, Int. Assoc. Theor. Appl. Limnol. Proc., 12, 620–628.
- Jażdżewski K., 2002, *Changes in the diversity of the populations of gammarid crustaceans in the southern Baltic offshore waters*, Biomare Newslett., 2, 4–5.

- Jażdżewski K., Konopacka A., 2000, *Immigration history and present distribution of alien crustaceans in Polish waters*, [in:] *The biodiversity crisis and Crustacea*, Vol. 2, pp. 55–64, J. C. von Vaupel Klein & F. R. Schram (eds.), Proc. 4th Int. Crustacean Congress, 20–24 July 1998, Amsterdam (Netherlands), A. A. Balkema, Rotterdam–Brookfield.
- Jęczmień W., Szaniawska A., 2000a, *Changes in species composition of the genus Gammarus Fabr. in Puck Bay*, *Oceanologia*, 42 (1), 71–87.
- Jęczmień W., Szaniawska A., 2000b, *Quantitative studies on Gammarus Fabr. in Puck Bay (the Baltic Sea)*, *Pol. Arch. Hydrobiol.*, 47 (3)–(4), 561–568.
- Leppäkoski E., 1984, *Introduced species in the Baltic Sea and its coastal ecosystems*, *Ophelia*, 3, 123–135.
- Leppäkoski E., Olenin S., 2000, *Non-native species and rates of spread: lessons from the brackish Baltic Sea*, *Biol. Invasions*, 2, 151–163.
- Lincoln R., 1979, *British Marine Amphipoda: Gammaridea*, British Museum (Natural History), London, 657 pp.
- Olenin S., Leppäkoski E., 2001, *Baltic Sea Alien Species Database* [online] <http://www.ku.lt/nemo/mainnemo.htm> (10 January 2003, Klaipeda Univ., Lithuania).
- Pinkster S., Scheepmaker M., Platvoet D., Broodbakker N., 1992, *Drastic changes in the amphipod fauna (Crustacea) of Dutch inland water during the last 25 years*, *Bijdr. Dierk.*, 61 (4), 193–204.
- Pinkster S., Smit H., Brandse-de Jong N., 1977, *The introduction of the alien amphipod Gammarus tigrinus Sexton, 1939, in the Netherlands and its competition with indigenous species*, *Crustaceana*, Suppl. 4, 91–105.
- Tesh F., Fries G., 1963, *Die Auswirkungen des eingebürgerten Flohkreb (Gammarus tigrinus Sexton) auf Fischbestand und die Fischerei in der Weser*, *Fischwirtsch. Bremerh.*, 11, 1–18.