

# PONTO-CASPIAN INVADING PREDATORY WATER-FLEA *CERCOPAGIS PENGROI* IN THE GULF OF GDANSK, POLAND (CRUSTACEA, CLADOCERA)

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## Abstrakt

Ďuriš Z., Jurasz W., Kublákova M., Vařecha D.: Ponto-Caspian invading predatory water-flea *Cercopagis pengroi* in the Gulf of Gdansk, Poland (Crustacea, Cladocera). Acta Fac. Rer. Nat. Univ. Ostraviensis 192, Biologica-Ecologica.6-7:51-56. 2000

A predatory water-flea, cladoceran crustacean *Cercopagis pengroi* of the Ponto-Caspian origin has recently been recorded from distant areas of the World, from the Baltic Sea and from North American Great Lakes. The present data report on the occurrence of this invasive species in the Puck Bay, the Gulf of Gdansk, northeastern Poland (August 1999), where it lives in low-salinity brackish waters. Parthenogenetic females and males were found in the material studied. The present record is the third for *C. pengroi* in Polish waters.

## Introduction

Several specimens of an unusual species of a predatory cladoceran were found in plankton samples collected during the summer zoological practice of Czech students of University of Ostrava at the Marine Biological Station of University of Gdansk, Hel, Poland. The species was subsequently determined as *Cercopagis pengroi* a recent Ponto-Caspian invader in the Baltic Sea (KRYLOV, PANOV, 1998; SIMM, OJAVEER, 1999). *C. pengroi* has been reported recently from the Vistula Lagoon and the Gulf of Gdansk, N. E. Poland (HOR-NATKIEWICZ-ŽBIK, 1999; ZMUDZIŃSKI, 1999). The present record is the third for Poland, and, together with the latter report, extends the known range of the species more to the west along the southern Baltic coast.

## Material and Results

### Family: Cercopagidae Mordukhai-Boltovskoi, 1968

*Cercopagis pengroi* (Ostroumov, 1891) (Fig. 1)

*Cercopagis tenera*. - Manuilova, 1964: 295 (key), 299, fig. 168.

*Cercopagis pengroi* - Mordukhal-Boltovskoi, 1969: 20. Pl.2 fig. 1- Krylov, Panov, 1998: 383, Figs 1-4. - Hornatkiewicz-Žbik. 1999: 10, Figs 2-4 (text of fig 4 transposed with fig. 1). MacIsaac et al., 1999: 1. Figs 1-2. - Simm, Ojaveer. 1999: 169. Fig.1. - Zmudziński. 1999:95.

*Cercopagis (Cercopagis) pengroi*. - Negrea, 1983: 54, 360. Fig. 148. - River. 1998: 174-175 (key), 178-179. figs 219. 220. 221. 224.

Material. 17 spms (8 males, 9 females) - Hel, near inner wall of commercial port. Gulf of Gdansk, Poland, 16.-17. Aug. 1999. day time, N.E.wind, waves, qualitative samples, plankton net - mesh size 0.1 mm, depth 5-0 m, coll.: M. Kubláková, D.Vařecha.

Remarks. The eye is large, spherical, slightly turn down, subequal or slightly larger than the gastric part of the body. The carapace is absent, the females bear dorsal brood chamber increasing in size with the growth of embryos. The chamber is long, subcylindrical. with acute Up, directed anteriorly. The abdominal part is well developed, unsegmented. sub-equal to thoracal length. The caudal process is 2.5-6 times longer than the body length, with up to three pairs of thin, divergent and posteriorly curved barbs, and with the S-shaped bend with acute spinules. Four pairs of raptorial thoracic appendages are present, the first pair is extremely long, but shorter in males than in females. Males differ also by a pair of penises situated after the fourth pair of the thoracic legs, and by a short, sub-triangular dorsal lobe (instead of a female's brood chamber). The number of paired barbs proximally on the process may depend on the age and the body length; the distance between them is much longer in females.

Measurements (Table 1).

Colour. Transparent.

Associated fauna and habitat. The qualitative planktonic sample includes, together with *C. pengoi*, also another cladocerans (*Bosmina longirostris*, *Chydorus sphaericus*), calanoid copepods (*Eurytemora cf. lacustris*), and rotatorians (*Keratella cochlearis*, *K. cruciformis*, *K. quadrata*, and *Synchaeta* sp). It is interesting that despite an extensive effort to collect more material of *C. pengoi* the specimens examined were caught near the port wall at Hel only during two windy periods with clouds and waves.

**Tab. 1. Measurements (mm) of the specimens of *Cercopagis pengoi* collected.**

B - barb pairs number, BD - barb pairs distance (1 - for two anterior pairs, 2 - for two next pairs, if present), BC - brood chamber, CP - caudal process, F - female, LBC - length of brood chamber, LCP - length of caudal process, M - male, S - sex, TL - total body length (without caudal process).

S	TL	LBC	LCP	LCP/TL	B	BD 1	BD 2	Remarks
F	2,3	1,6	9,0	3,95	3	1,0	0,8	Not differ. mass of embryos
F	2,2	1,8	-	-	2	1,2	-	Not differentiated mass of embryos, CP broken
F	2,1	1,7	9,2	5,41	3	0,9	0,8	Appr. 8 less differ. embryos
F	1,8	1,3	-	-	2	0,9	-	Appr. 11 embryos, CP broken
F	1,7	1,4	-	-	3	1,0	0,8	Not differentiated mass of embryos, CP broken
F	1,6	1,3	9,1	5,68	3	1,0	1,0	Not differ. mass of embryos
F	1,5	0,7	8,0	6,00	2	0,9	-	BC short, not differentiated mass of embryos
F	1,2	0,3	-	-	1	-	-	BC short - juv.spm. (?), CP broken
F	-	-	-	-	2	0,9	-	Spm.broken, fragmentary
M	2,1	0,2	5,6	2,66	3	0,2	0,4	
M	1,9	0,2	5,9	3,10	3	0,3	0,4	
M	1,8	0,2	-	-	3	0,3	0,3	CP broken
M	1,7	0,2	5,2	3,05	3	0,3	0,4	
M	1,7	0,2	6,6	3,88	3	0,3	0,4	
M	1,5	0,2	5,5	3,66	2	0,4	-	
M	1,4	0,2	6,5	4,64	2	0,4	-	
M	1,4	0,2	6,6	4,71	3	0,3	0,4	

## Discussion

The present specimens agree well with the previous descriptions (MANUILOVA, 1964; MORDUKHAI-BOLTOVSKOI, 1969; NEGREA, 1983). The differences may be found in the variable characters. The body length (without the caudal

process) of the females with three pairs of claws is larger (1.6-2.3 mm) than the data given by MORDUKHAI-BOLTOVSKOI (1969) for females from the Caspian and Aral Seas (1.2-2.0 mm), and by NEGREA (1983) for the Romanian lagoons of the Black Sea (0.7-1.1 mm). The same may be found in males (1.4-2.1 mm: 1.1-1.4 mm; up to 1.8 mm - respectively). Our measurements correspond with the data given for Baltic populations (Simm, Ojaveer, 1999).

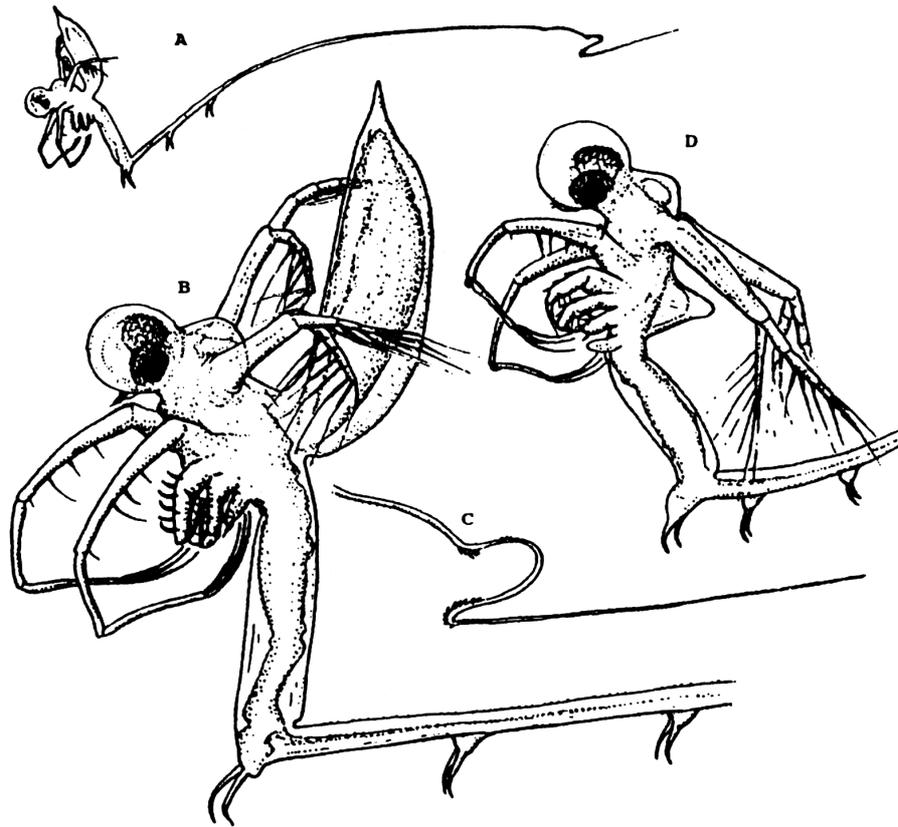
The caudal process length is also very variable in our specimens. SIMM and OJAVEER (1999) pointed out the difference in spring and summer morphological forms. Our material agrees with their summer form, while the spring forms bear shorter caudal process without the S-shaped bend and with anteriorly directed tips of claws. The length of the process differs in males (2.66-4.71 times body length) and in females (3.95-6.0 times body length). and may also be a function of the number (1-3) of the barb pairs. The latter indicate three development stages (KRYLOV, PANOV, 1998), however, according to our opinion, the last pairs may sometimes be accidentally lost during the catch and manipulation.

Wide variability is observed in the shape and size of the brood chamber in females. MORDUKHAI-BOLTOVSKOI (1969) stated that the chamber grows together with the eggs. Thus, the chamber length is not a function of the body length. The present females have the chamber of various length and egg developmental stages, from the non differentiated mass of embryos in 0.3-0.7 mm long chambers of the youngest females (1.2-1.5 mm of body length, and 1-2 pairs of claws) up to well distinguishable 8-11 eggs in 1.3-1.6 mm long chambers in adult females (1.6-2.3 mm of body length and 2-3 pairs of barbs).

Two types of egg-bearing females may be present in populations, the parthenogenetic females and the gamogenetic ones. The latter females dominate in the Baltic populations during the end of the summer and bear 2-3 resting eggs (KRYLOV, PANOV, 1999). The present females carry (if the contents is distinguishable) a higher number of softly covered eggs, thus, the females are parthenogenetic.

*C. pengoi* was originally an endemic species of the Ponto-Caspian basin and occurred in lakes and estuaries of the Black and Azov Seas, in Caspian and Aral Lakes. It is distributed in brackish waters with salinity up to 8-10 psu, mainly in gulfs and lagoons, but may also be present in a fully freshwater environments such as the lower Dnieper River reservoirs (MORDUKHAI-BOLTOVSKOI, 1969). The recent introduction to another regions is explained as an accidental transfer or a result of transfer of resting stages in the ballast waters of ships. The species appears in the Baltic Sea in the beginning of the 90-ies. It was recorded in the Gulf of Riga in 1992, in the eastern Gulf of Finland in 1995 (KRYLOV, PANOV, 1998; SIMM, OJAVEER, 1999), and subsequently it has been known also from the Aland Sea, Bothnic Gulf and the main sea proper (MacISAAC et al., 1999; H.J. MacISAAC - pers. comm.). These water-flea species has been lately, in 1998, for the first time found also in Polish waters, near Gdynia in the Gulf of Gdansk (L. BIELECKA - pers. comm.). then, in 1999, in the Vistula Lagoon (HORNATKIEWICZ-ZBIK, 1999) and again near Gdynia (ZMUDZINSKI, 1999; L. BIELECKA - pers. comm.). and by ourselves in the Gulf of Gdansk near Hel.

*C. pengoi* as invading species, has recently much extended its distribution range. It was discovered in 1998 in Lake Ontario, Canada (MacISAAC et al., 1999), and in the Lake Michigan in 1999 (RICCIARDI, MacISAAC, 2000). The updated reports provide information on an invasion to six lakes in the finger lakes region of New York state (H. J. MacISAAC - internet pages). The Ontario specimens are distinctly smaller than the individuals from the Baltic Sea, and the ratio of parthenogenetic females to gamogenetic ones is higher in comparison with Baltic populations (PANOV, KRYLOV, 1998; MacISAAC et al., 1999).



**Fig. 1. *Cercopagis pengoi*, Hel, Gulf of Gdańsk. A-C - parthenogenetic female, 2.05 mm (without caudal process): A - total view, B - lateral view of the body, C - S-shaped bend of the caudal process; D - male, 1.65 mm, lateral view. (Orig. pictures - Z.Đuriš)**

*C. pengoi* is known as predatory water-flea tearing integuments and ingesting contents of nauplii, copepodites, and adult calanoid copepods, and may be expected to have a greater impact on small-bodied zooplankton and foodweb dynamics in the areas of its introduction (MacISAAC et al., 1999). It may affect planktivorous fish populations being less attractive for selective planktonophages because of the long caudal process discouraging predators to swallow the cladoceran (HORNATKIEWICZ-ZBIK, 1999). The species may occur in high densities reaching 300-2000 ind.m<sup>-3</sup> in the Baltic Sea (KRYLOV, PANOV, 1999; MacISAAC et al. 1999), and up to 600-1000 ind.m<sup>-3</sup> in Lake Ontario (H. J. MacISAAC - internet pages). MacISAAC et al. (1999) have also cited unpublished data on a population of more than 100 000 ind.m<sup>-3</sup> from cooling reservoirs of Ukrainian nuclear power plants.

The problem of the invasion of nonindigenous species through discharge of ballast tanks of ships has risen mainly in last few decades over the world, and is widely reported also from both the regions mentioned above, the Baltic Sea and the North American Great Lakes. The latter have been invaded and dramatically altered by more than 145 alien species (RICCIARDI, MacISAAC, 2000). European and North American scientists are concerned that the water-flea could affect biological conditions in fishery important regions, and the recent state and development of the population should be closely studied as well as its impact on plankton and pelagic fish. HORNATKIEWICZ-ZBIK (1999) mentions that several specimens of *C. pengoi* may aggregate locking together by their S-shaped bends leading finally to its mass sticking on underwater objects. The first information on the occurrence of *C. pengoi* in a new area should be provided by local fishermen whose fishing lines may be fouled by *Cercopagis* (H. J. MacISAAC - internet pages).

**Dravá ponto-kaspická perloočka *Cercopagis pengoi*  
v Gdaňském zálivu, Polsko (Crustacea, Cladocera)**

Dravá perloočka *Cercopagis pengoi* je původním obyvatelem brakických vod Kaspického a Azovského moře, poloslanovodních zálivů při pobřeží Černého a Aralského moře. Vyskytuje se rovněž ve zcela sladkých vodách vodních nádrží Dněpru a některých jezer v Bulharsku. Počátkem 90. let byla jeho invazní stádia zavlečena pravděpodobně v balastových nádržích lodí do Rížského a Něvského zálivu v Baltském moři, odkud se druh dále rozšířil do oblasti Alandských ostrovů, Botnického zálivu a otevřeného moře. Koncem 90. let se *C. pengoi* objevil v masovém měřítku v několika lokalitách Velkých jezer v Severní Americe. Kanadští i evropští vědci se obávají vážného ohrožení planktonních společenstev tímto masově se vyskytujícím dravým druhem. V létě r. 1999 byl *C. pengoi* námi zjištěn ve vzorcích planktonu odebraného v Gdaňském zálivu, v přístavu města Helu v severovýchodním Polsku během zoologické praxe se studenty Ostravské univerzity. Jedná se o třetí nález tohoto druhu v Polsku.

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