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## OCCURRENCE OF DIFFERENT MORPHOLOGICAL FORMS OF *Cercopagis* IN THE BALTIC SEA

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**Abstract.** Two different morphological forms of cladocerans belonging to the genus *Cercopagis* were identified in the NE part of the Gulf of Riga (Baltic Sea). One of the forms dominated from midsummer and was characterized by a relatively long caudal process with S-bend and backwardly bent or straight tips of barbs. Individuals with these characteristics belong to the species *Cercopagis* (*Cercopagis*) *pengoi*. The other morphological form was found only from spring to early summer. It had a straight and relatively short caudal process with forwardly bent tips of barbs. Although the last form could be keyed to a separate species – *C. (C.) ossiani* – it seems more likely that it represents the first parthenogenetic generation of *C. (C.) pengoi*, hatched from resting eggs in spring. Thus, it is suggested here that the two morphological forms identified probably represent two different ontogenetic stages of *C. (C.) pengoi*.

**Key words:** *Cercopagis*, morphological forms, Gulf of Riga.

### INTRODUCTION

*Cercopagis* (*Cercopagis*) *pengoi* (Ostroumov 1891) was first found in the Baltic Sea in Pärnu Bay (shallow bay in the NE part of the Gulf of Riga) in 1992 (Ojaveer & Lumberg, 1995). The species has probably been introduced to the Baltic from the Ponto-Caspian region by ship ballast water. During the next years, the species spread all over the northern Baltic (e.g., HELCOM, 1996).

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## MATERIALS AND METHODS

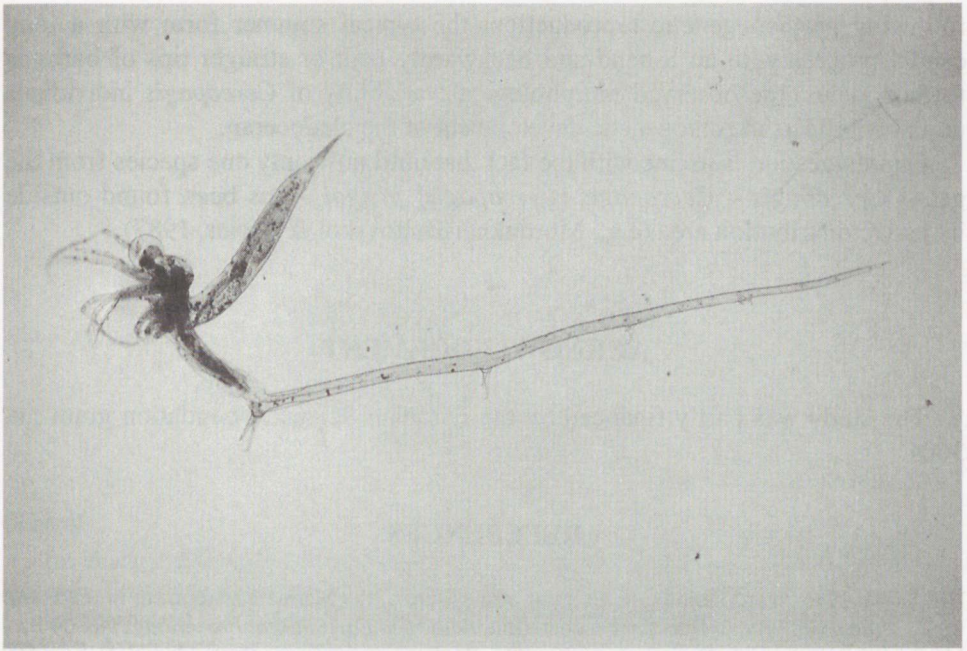
The current material was taken from larval fish samples (sampling gear – Hensen trawl) in the northeastern part of the Gulf of Riga in spring–summer 1997. The material of *Cercopagis* was separated into two groups, those with a straight and relatively short caudal process and those with a relatively long and S-bend one. Also, the direction of the curvature of the tips of barbs was determined.

## RESULTS AND DISCUSSION

In addition to earlier known typical representatives of *C. (C.) pengoi* in the Baltic, which occur in summer and are characterized by a relatively long caudal process with S-bend (here also called summer form), individuals with substantially different morphology were discovered in Pärnu Bay in spring. Their most distinctive features were a straight and relatively short caudal process and forwardly bent tips of barbs (so-called spring form, Fig. 1). According to Mordukhai-Boltovskoi & Rivier (1987), the last mentioned morphological features are characteristic of *Cercopagis (Apagis) ossiani* Mordukhai-Boltovskoi, 1968. However, we believe that the material belongs to another developmental stage of *C.(C.). pengoi* (see below).

The abdomen of both morphological forms was relatively narrow, which gives an average of 21.5 and 26.3% of the total body length in the spring and summer form, respectively. The abdomen length was 47.8 and 50.3% of the total body length in the spring and summer form, respectively (Table 1). The length of barbs was on average 10.7% of the total length of the cladoceran in the spring form and 11.5% in the summer form. The shape and especially the size of the brood pouch depended on the number of embryos and their growth and development and were, in general, similar in the two morphological forms of *Cercopagis* identified. Representatives of the spring form were characterized by forwardly bent tips of barbs, whereas those of the summer form were backwardly bent or straight. The ratio of the caudal process/body length was 2–3 and 4–6 for the spring and summer form, respectively (Table 1). Thus, taxonomically important measures, such as relative dimensions of the abdomen and barbs and the shape of the brood pouch, were not different in the two morphological forms separated. Other characters, like the appearance of the caudal process and the morphology of the tips of the barbs exhibited considerable differences.

We suggest that the two different morphological forms separated here belong to the same species – *Cercopagis (Cercopagis) pengoi*. Although the ‘spring form’ could be identified as *Cercopagis (Apagis) ossiani*, it should be mentioned that this species has been described on the basis of 5 parthenogenetic females only, collected in the Caspian Sea in spring (Mordukhai-Boltovskoi & Rivier, 1987). Considering the results of the current study – the ‘spring form’ appeared first in



**Fig. 1.** A typical representative of the 'spring form' of *Cercopagis* (caught in the northeastern part of the Gulf of Riga on 16 June 1997). Magnification  $\times 17.8$ .

**Table 1.** Dimensions (mm, average  $\pm$  SD) of two different morphological forms of *Cercopagis* in Pärnu Bay in June–July 1997

Parameter	Spring	Summer
Number of individuals analysed	45	91
Length of caudal process	$4.58 \pm 1.05$	$8.26 \pm 3.20$
Maximum width of caudal process	$0.11 \pm 0.01$	$0.11 \pm 0.02$
Total body length	$2.04 \pm 0.42$	$1.74 \pm 0.53$
Length of abdomen	$0.98 \pm 0.09$	$0.88 \pm 0.23$
Width of abdomen	$0.21 \pm 0.02$	$0.23 \pm 0.04$
Length of barbs	$0.22 \pm 0.06$	$0.20 \pm 0.04$

the *Cercopagis* population in spring and was thereafter gradually substituted by the 'summer form' – the existence of *Cercopagis* (*Apagis*) *ossiani* as a separate species can be questioned. The description of *C. (A.) ossiani* has possibly been based on a spring form of *C. (C.) pengoi*. In addition, as the reproduction pattern of *Cercopagis* is clearly monocyclic in the Gulf of Riga in contrast to several *Cercopagis* species in the Caspian Sea, we believe that the 'spring form' represents the first parthenogenetic generation (hatched from resting eggs) of the species *Cercopagis pengoi* rather than belongs to a separate species. During the

following parthenogenetic reproduction, the typical summer form with a long caudal process with an S-bend and backwardly bent or straight tips of barbs is formed. Thus, the observed morphological variability of *Cercopagis* individuals probably reflects the ontogenetic development of the cladoceran.

Our suggestion is in line with the fact that until now only one species from the genus *Cercopagis* – *Cercopagis (Cercopagis) pengoi* – has been found outside its native distribution area (e.g., Mordukhai-Boltovskoi & Rivier, 1987).

## ACKNOWLEDGEMENT

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## *Cercopagis*'e ERINEVATE MORFOLOOGILISTE VORMIDE ESINEMISEST LÄÄNEMERES

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Läänemere hiljutine tulnukorganism, perekonda *Cercopagis* kuuluv vesi-kirbuline, esineb Liivi lahe kirdeosas kahe selgesti eristatava morfoloogilise vormina. *Cercopagis*'e suvine populatsioon koosneb suhteliselt pika ja kõvera sabaogaga ning sirgete või otsast tahapoole kõverdunud küünistega partenogeneetilistest paljunevatest emasisenditest. Need tunnused on iseloomulikud liigile *Cercopagis (Cercopagis) pengoi*. Vaid kevadel ja kevadsuvel esineva morfoloogilise vormi eristustunnusteks on tunduvalt lühem ning ilma kõveruseta sabaoga ja ettepoole kõverdunud küünised. Kuigi viimatimainitud isendid võib morfoloogia alusel klassifitseerida liiki *C. (Apagis) ossiani*, on siiski tõenäolisem, et nad esindavad *C. (C.) pengoi* esimest (puhkemunadest kooruvat) partenogeneetilist põlvkonda. Seega on alust arvata, et leitud erinevate morfoloogiliste tunnustega isendid kuuluvad liiki *C. (C.) pengoi*, esindades liigi ontogeneetilisi staadiume.