



## A new species within the *Eurytemora affinis* complex (Copepoda: Calanoida) from the Atlantic Coast of USA, with observations on eight morphologically different European populations

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### Abstract

*Eurytemora carolleae* sp. nov. (Crustacea: Copepoda: Calaniformes) is described from the Chesapeake Bay, USA. The new species belongs to the Atlantic clade of the *Eurytemora affinis* complex outlined by previously published molecular work but poorly characterized morphologically. To discriminate *E. carolleae* we compare specimens from the Atlantic USA clade with specimens from the type population of *E. affinis* (Poppe, 1880) from the Elbe River Estuary (Germany), as well as with eight other European coastal populations. Several important morphological characters clearly separate the North American *E. cf. affinis* from the European clade that include both sexes: a large outside orientated dent on the mandible, and clearly observable seta segmentation in the caudal rami and swimming legs. Unlike *E. affinis*, the newly described species possesses wing-like outgrowths on the genital double-somite and a very small spine near the distal seta insertion point in P5 in females. In males, the specific characters include naked dorsal and ventral sides of the caudal rami, and a cylindrical shape of exopod on the left P5, in contrast to a triangular shape of the segment in *E. affinis*. The new species was also found in Canada (St. Lawrence Estuary) and as an invasive species in the Baltic Sea. *Eurytemora carolleae* is possibly widely distributed along the North American Atlantic coast, as well as in inland waters from Great Lakes to Mexico.

**Key words:** Copepod diversity, taxonomy, sibling species, North Atlantic, estuary

### Introduction

The estuarine copepod, *Eurytemora affinis* (Poppe, 1880) was suspected for a long time of being a species with a Holarctic distribution, having been recorded in cold and temperate latitudes of North America, Europe, and Asia (Dussart & Defaye 2002; Lee & Frost 2002). In Europe and North American Atlantic areas, this species is known from coastal brackish water environments, but also from large continental lakes like Ladoga Lake in Europe or Lake Erie in North America (Rylov 1922; Croskery 1978).

In the Baltic Sea *E. affinis* is a dominant copepod, both in littoral and pelagic ecosystems (Telesh & Hercloss 2004). In Asia, it is known from the Caspian Sea and from fresh water lakes in Japan (Lee 2000; Dussart & Defaye 2002). Due to its worldwide distribution and the key role in food-webs, *E. affinis* has been recently suggested as a model species in estuarine ecosystems (Souissi *et al.* 2010)

In contrast to morphology-based taxonomy, recent molecular-genetic and cross-hybridization studies demonstrated that *E. affinis* represents, in fact, a complex of sibling species with highly similar morphologies but isolated within the past million years (Knowlton 1993; Lee 1999, 2000; Lee & Frost 2002). Laboratory cross-hybridization studies between two divergent clades of *E. affinis* from Europe and North America indicated that hybrids in the second generation were sterile (Souissi S., pers. com). *Eurytemora cf. affinis* from Chesapeake Bay, USA was recently found in the Gulf of Finland in the Baltic Sea (Alekseev *et al.* 2009). Lee & Frost (2002) performed some morphometric analyses of a limited number of characters in the major clades of *E. cf. affinis*, including the American North Atlantic, Asian and European clades. Their previous study discovered that all the major clades of *E. affinis* are morphologically divergent from Europe.