

## Study of the evolution of the microcrustacean group Cladocera

December 16 2016

Scientists of the Senckenberg Institute have studied the evolutionary history of the so-called "water fleas." These tiny crustaceans from the order Cladocera form the basis of the trophic pyramid and therefore play an important role in modern ecosystems. Due to the fact that they are rarely preserved as fossils, little is known about the water fleas' evolution. In their study, which was recently published in the scientific journal *Earth-Science Reviews*, the team of scientists presents the first comprehensive inventory of all Cladocera fossils in an ecological context. The scientists show that the animals' morphology has undergone very little change over the course of geological history. Nevertheless, the water fleas demonstrate a high adaptability to changes in environmental conditions.

A search for organisms in any lake or puddle will very likely turn up a representative of the Cladocera. With more than 700 species, these tiny animals – commonly referred to as "water fleas" due to their bouncing locomotion – inhabit almost all types of freshwater environments. "Despite this wealth of species and habitats, little is known about the evolutionary history of the Cladocera," explains Dr. Kay Van Damme of the Senckenberg Research Institute in Frankfurt, and he continues, "Since the animals do not possess a calcareous shell or carapace, they are only rarely preserved as fossils."

For the first time, Van Damme and his colleague, Prof. Alexey A. Kotov of the A.N. Severtsov Institute of Ecology and Evolution in Moscow, have now compiled a complete inventory of all known Cladocera



species. "The Cladocera constitute a crucial group in our effort to understand the development of freshwater ecosystems throughout geological history," says Van Damme in explanation of the team's motivation. Even today, water fleas still form the basis of many food chains, which makes them an important component of aquatic ecosystems.

Moreover, the <u>tiny crustaceans</u> are very sensitive to environmental changes and can thus be used to monitor water quality – for years, the genus Daphnia has served as a model organism in this regard. "In addition, Daphnia is the first representative of the crustaceans whose genome has been published – therefore, water fleas play a similar role in aquatic environmental genomics as does the fruit fly Drosophila in terrestrial environments," adds Van Damme.

According to the team of researchers, the first representatives of the water fleas appeared in the early Jurassic, about 180 million years ago. "Since then, the basic design of the Cladocera has hardly changed," says the biologist from Frankfurt, and he continues, "Nevertheless, this 'living fossil' was able to adapt very well to a variety of different <u>environmental</u> conditions." For example, the water fleas developed various defense mechanisms to escape predators. "Daphnia and company were even able to survive the massive extinction event at the Cretaceous/Tertiary boundary, which, among others, claimed all of the terrestrial dinosaurs," says Van Damme in closing.

**More information:** Kay Van Damme et al. The fossil record of the Cladocera (Crustacea: Branchiopoda): Evidence and hypotheses, *Earth-Science Reviews* (2016). DOI: 10.1016/j.earscirev.2016.10.009

Provided by Senckenberg Research Institute and Natural History



## Museum

Citation: Study of the evolution of the micro-crustacean group Cladocera (2016, December 16) retrieved 28 April 2024 from <u>https://phys.org/news/2016-12-evolution-micro-crustacean-group-cladocera.html</u>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.