



Cornell University detects two new non-native zooplankton species in western Lake Erie

By Audrey Stanton

Cornell University Biological Field Station (CBFS) has confirmed the presence of two new non-native species of crustacean zooplankton in the Great Lakes: the cladoceran *Diaphanosoma fluviatile* and the copepod *Mesocyclops pehpeiensis*.



Images of cladoceran *Diaphanosoma fluviatile* (left) and copepod *Mesocyclops pehpeiensis* (right).
Photos courtesy of Elizabeth Whitmore and Joseph Connolly, Cornell University

This new finding is a result of a collaboration between CBFS and the U.S. Environmental Protection Agency's Great Lakes National Program Office as part of EPA's long-term biology monitoring program in the open waters of the Great Lakes. Through this program, Cornell and EPA collect zooplankton from 72 routine sampling stations across all five Great Lakes twice each year using the EPA R/V *Lake Guardian*. The zooplankton samples are analyzed by Cornell's trained taxonomists at CBFS.

According to the U.S. Fish and Wildlife Service, the ecosystem risk posed by these species is uncertain because past introductions have not been studied to determine whether impacts occurred. Cornell will continue to work with researchers and agency partners to determine the extent of the population and further assess potential risk.

Both species were found in samples collected from western Lake Erie. *D. fluviatile* is native to South America, Central America, and the Caribbean. In the United States, *D. fluviatile* has been previously reported from Florida, Louisiana, and central Texas. This Lake Erie observation marks a dramatic northward expansion for this species. *M. pehpeiensis* is native to temperate and tropical areas of Asia. Its presence in Mexico, Cuba, and the southern United States (Louisiana, Mississippi, and the District of Columbia), first reported in the 1990s, is largely attributed to the transfer of ornamental aquatic plants.

These new findings of non-native species emphasize the importance of taxonomic expertise in biological monitoring programs. *Diaphanosoma fluviatile* and *Mesocyclops pehpeiensis* can be difficult to distinguish from similar-looking native species. However, with the help of global cladoceran expert Kay Van Damme and global copepod expert Janet Reid, Cornell taxonomists were able to confirm these species identifications using several fine-scale physical features.

Cornell taxonomists Joe Connolly and Elizabeth Whitmore sort thousands of individual zooplankton specimens over a typical year under high power microscopes. When a specimen looks different from species they typically encounter in Great Lakes samples, they investigate further using worldwide taxonomic keys, and once they suspect they have positively identified it as a non-native species, they contact globally recognized experts to help confirm the finding. It helps if both juvenile and adult specimens are collected, from both male and female sexes. Confirmations require locating several fine-scale features on the specimens and composing written and photographic documentation of these features.

The cladoceran (*D. fluviatile*) find was initiated during a May 2018 taxonomy workshop at CBFS with Van Damme when analyzing samples collected in September 2015 in the Maumee River near Toledo Harbor, Ohio. Two adults were initially confirmed, which led Whitmore to search for the species in additional archived samples. Further investigation found eight more specimens in samples from EPA monitoring stations collected in August 2015 in western Lake Erie.

The copepod (*M. pehpeiensis*) was first found by Connolly as juvenile specimens in an EPA western Lake Erie monitoring station sample collected April 2016. An adult specimen was later found from a November 2017 sample collected nearshore in East Harbor, Lake Erie, Ohio. An adult female crucial for final taxonomic confirmation was found in an EPA monitoring station sample collected from western Lake Erie in August 2017.

New introductions of non-native zooplankton species in the Great Lakes have been rare in the past decade. These new cladoceran and copepod detections bring the total to four new zooplankton species (two copepods, one cladoceran, and one rotifer) reported by Cornell and EPA in the past three years. Note that all four of these species are currently at low abundance in western Lake Erie. However, these species will now be closely monitored. Increasing taxonomic expertise is an important component in building non-native species detection capacity. Cornell Biological Field Station is creating a taxonomically-trained community through researcher-led workshops and collaboration with global experts.