Possible biological control discovered for pathogen devastating amphibians

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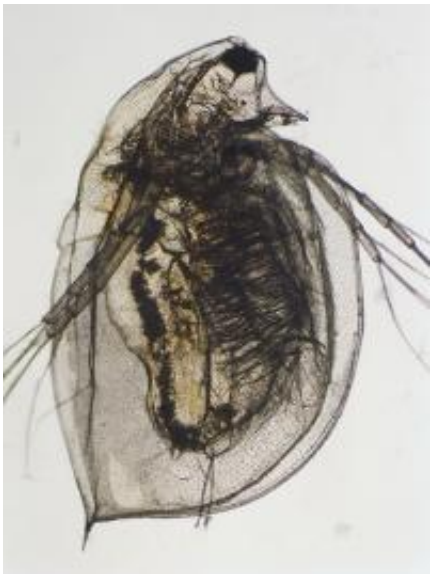

Researchers have confirmed that this zooplankton, Daphni magna, will eat a deadly fungus that is devastating amphibian populations around the world. It may provide a new biocontrol agent to help address this crisis. (Photo courtesy of Oregon State University)

Zoologists at Oregon State University have discovered that a freshwater species of zooplankton will eat a fungal pathogen which is devastating amphibian populations around the world.

This tiny zooplankton, called *Daphnia magna*, could provide a desperately needed tool for biological control of this deadly fungus, the

scientists said, if field studies confirm its efficacy in a natural setting.

The fungus, *B. dendrobatidis*, is referred to as a "chytrid" fungus, and when it reaches high levels can disrupt electrolyte balance and lead to death from cardiac arrest in its amphibian hosts. One researcher has called its impact on amphibians "the most spectacular loss of vertebrate biodiversity due to disease in recorded history."

The research, reported today in the journal *Biodiversity and Conservation*, was supported by the National Science Foundation.

"There was evidence that zooplankton would eat some other types of fungi, so we wanted to find out if Daphnia would consume the chytrid fungus," said Julia Buck, an OSU doctoral student in zoology and lead author on the study. "Our laboratory experiments and DNA analysis confirmed that it would eat the zoospore, the free-swimming stage of the fungus."

"We feel that biological control offers the best chance to control this fungal disease, and now we have a good candidate for that," she said. "Efforts to eradicate this disease have been unsuccessful, but so far no one has attempted biocontrol of the chytrid fungus. That may be the way to go."

The chytrid fungus, which was only identified in 1998, is not always deadly at low levels of infestation, Buck said. It may not be necessary to completely eliminate it, but rather just reduce its density in order to prevent mortality. Biological controls can work well in that type of situation.

Amphibians have been one of the great survival stories in Earth's history, evolving about 400 million years ago and surviving to the present while many other life forms came and went, including the dinosaurs. But in

recent decades the global decline of amphibians has reached crisis proportions, almost certainly from multiple causes that include habitat destruction, pollution, increases in ultraviolet light due to ozone depletion, invasive species and other issues.

High on the list, however, is the chytrid fungus that has been documented to be destroying amphibians around the world, through a disease called chytridiomycosis.

Its impact has been severe and defied various attempts to control it, even including use of fungicides on individual amphibians. Chytridiomycosis has been responsible for "unprecedented population declines and extinctions globally," the researchers said in their report.

"About one third of the amphibians in the world are now threatened and many have gone extinct," said Andrew Blaustein, a professor of zoology, co-author on this study and an international leader in the study of amphibian decline.

"It's clear there are multiple threats to amphibians, but disease seems to be a dominant cause," he said.

Although they have survived for hundreds of millions of years, amphibians may be especially vulnerable to rapid environmental changes and new challenges that are both natural and human-caused. They have a permeable skin, and exposure to both terrestrial and aquatic environments.

Because of this, OSU researchers said, other animals such as mammals, birds and fish have so far not experienced such dramatic population declines.

More information: The story this study is based on is available online:

www.springerlink.com/content/87544h87052r77p2/

Provided by Oregon State University