

Invasive mussel is not harmed by toxins and invades the freshwaters of Europe and North America

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This shows zebra mussels colonizing an unio mussel and preventing it from breathing and eating. Credit: Vanessa Burmester

While most freshwater mussels react stressfully and weaken when exposed to the toxins in blue-green algae in their water environment, the

little zebra mussel is rather indifferent. It is not affected by the toxins, and this helps it outmatch stressed and weakened mussels, report researchers from the University of Southern Denmark. This is bad for the biodiversity, and in some countries the superior zebra mussels imposes great costs to the industry.

At first glance it looks like good news: Researchers have discovered that the freshwater zebra mussel (*Dreissena polymorpha*) is not damaged from exposure to toxins from blue-green algae (cyanobacteria) and other toxic substances that could constitute a problem for freshwater [mussels](#). On the contrary, they seem completely unaffected and thus they manage significantly better in a water environment than other freshwater mussels – and this is what worries the scientists: Many places in Europe the zebra mussels have already outmatched other mussel species and in the U.S. they are so widespread that they pose a threat.

"Zebra mussel live in large colonies in the Great Lakes in the United States, and they are a huge problem. They need something hard to attach themselves to and often they find a suitable surface on the inside of the pipes carrying water from the Great Lakes into factories and other industries along the lake. Often they sit so close that they block the water intake", explains associate professor Claudia Wiegand, who studies environmental stress physiology and aquatic toxicology at the Department of Biology, University of Southern Denmark.

Efforts to prevent the zebra mussels from attaching themselves to the pipes and remove those attached have already cost several million dollars.

"In European lakes we see that many zebra mussels attach themselves to other mussel species and suffocate them, so they cannot breathe or eat, and therefore die", says Claudia Wiegand.

Together with colleagues from the University of Rennes in France she has also looked at another freshwater mussel, Unio's ability to fight toxins.

"Unio is less able to combat toxins from blue-green algae. This may help explain why they are declining in some places in Europe", says Claudia Wiegand.

She and her colleagues tested how the unio react when exposed to blue-green algae in concentrations that freshwater mussels are realistically exposed to in the wild.

"We saw that the unio's ability to combat the [toxin](#) was inhibited. The enzymes that normally help the mussel secrete substances were blocked and thus the mussels could not get the poison out of their body. It became stressed and this may reduce its viability on the long run. Conversely we have seen that the zebra mussels intensify their detoxification mechanisms and secrete the toxin without being stressed or affected negatively", explains Claudia Wiegand.

The researchers also tested unio's ability to combat the pesticide Round Up and saw the same pattern: It became stressed and weakened. They now plan to test how [zebra mussels](#) react on Round Up.

Zebra mussels origin from Eastern Europe and the Caspian Sea. Over the past 200 years it has spread to the rest of Europe and North America.

Unio is a family of common [freshwater mussels](#). They live buried in the lake bottom and are easy to overlook since only a small piece of them stick up. They are native to Europe, where biologists over the last years have noticed their decline.

More information: Burmester, V., Nimptsch, J., Wiegand, C., (2012).

Adaptation of freshwater mussels to cyanobacterial toxins: response of the biotransformation- and antioxidant enzymes. *Ecotoxicology and Environmental Safety* 78, 296

Mélotie Malécot, Blandine Guevel, Charles Pineau, Bente Frost Holbech, Myriam Bormann and Claudia Wiegand: Specific proteomic response of the Union pictorum mussel to a mixture of glyphosate and microcystin–LR. *Journal of Proteome Research*, 9 September 2013.
pubs.acs.org/doi/pdf/10.1021/pr4006316

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