Understanding the effects of invasive mussels on freshwater bacterial communities in the Great Lakes

CORE QUESTION:
How do invasive dreissenid mussels alter bacterial communities, and how are some harmful bacteria, such as *Microcystis*, able to avoid being eaten?

CHANGES FROM INVASIVE MUSSELS

In the Great Lakes, invasive dreissenid mussels – commonly known as zebra and quagga mussels – are threatening the health of coastal ecosystems. These invasive mussels alter food webs and have been linked to occurrences of harmful cyanobacterial blooms and avian botulism outbreaks.

Previous research has shown that invasive mussels alter bacterial community composition by decreasing both richness and evenness, or the relative abundances of different species in the water. Bacteria are the primary producers and decomposers of the aquatic food web. Changes in bacterial biodiversity can lead to shifts in how matter cycles and energy flows through different components of an ecosystem. Moreover, bacteria are one of the first communities to respond to ecosystem changes and can exacerbate or buffer the effects of human-driven change. Therefore, to have a complete picture of the effects of invasive mussels on coastal Great Lakes ecosystems, it is important to improve understanding of the impacts of invasive mussels on bacterial biodiversity.

EFFECTS OF GRAZING ON BACTERIA

Nikesh Dahal, PhD candidate in Ecology and Evolutionary Biology at the University of Michigan, will investigate how predation by invasive mussels alters the structure and function of freshwater bacterial communities in Lake Erie and Lake Huron. Dahal will use genomic sequencing to analyse distribution of two functional trait categories: response traits, which determine how species respond to environmental change (for example, through grazing resistance); and effect traits, which determine how they affect ecosystem processes (for example, breaking down carbohydrates).

Understanding these traits might help explain distribution of certain bacteria in the Great Lakes. For example, *Microcystis*, a cyanobacteria genus that causes harmful algal blooms in a variety of coastal Great Lakes ecosystems may avoid being eaten through a stress response or other means, allowing it to maintain a competitive dominance. Dahal's findings can build a deeper understanding of how invasive species affect these crucial freshwater ecosystems and inform future management strategies.

CONTACT

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