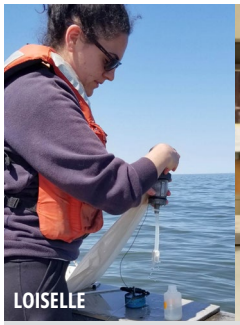
Community dynamics of cyanobacteria in Lake Erie: Testing environmental drivers of bloom succession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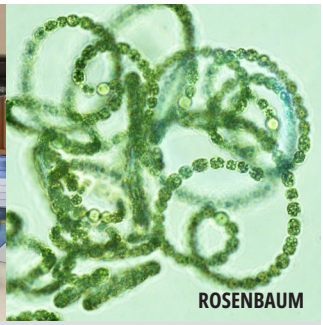
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CORE QUESTION:
How do environmental factors affect cyanobacterial populations in Lake Erie's harmful algal blooms?

Harmful algal blooms caused by cyanobacteria (cHABs) pose significant threats to water quality, ecosystems, human health, and coastal communities. Western Lake Erie's shallow, warm waters are especially susceptible to annual blooms.

These blooms are largely fueled by excess nutrients entering the lake from land-based sources. Prior to phosphorus control policies established in the 1970s, Lake Erie's cHABs were dominated by nitrogen-fixing cyanobacteria like *Dolichospermum* and *Aphanizomenon*. When blooms started recurring in Lake Erie during the 1990s, *Microcystis*, a non-nitrogen fixer, became dominant.

Environmental drivers such as water column stratification, light availability, nutrient concentrations, and temperature affect which species thrive. Current efforts to study and forecast Lake Erie's cHABs focus mostly on *Microcystis* and tend to overlook other ecological processes and community dynamics that can influence bloom duration, toxicity, and species composition. A better understanding of these factors could lead to more accurate models for predicting the extent and composition of a bloom, enabling managers to make informed decisions about monitoring, treating, and mediating risks from cHABs.

SURVIVING AND THRIVING

Michigan State University PhD student Carol Rosenbaum received a MISG Graduate Research Fellowship to investigate how environmental factors influence the shifting array of algae species in Lake Erie's harmful algal blooms. Rosenbaum will focus primarily on how effectively three genera of Lake Erie algae grow and compete under different nitrogen, phosphorus, and temperature conditions. Her experiments will use strains of *Microcystis*, *Dolichospermum* and *Aphanizomenon* isolated from Lake Erie water samples.

Rosenbaum's results have the potential to refine cHABs forecasting models, contributing to broader efforts by local, state, and federal agencies to assess the impact of environmental policies and manage cHABs in the Great Lakes.

CONTACT

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