



Dominance of the noxious cyanobacterium *Microcystis aeruginosa* in low-nutrient lakes is associated with exotic zebra mussels

Raikow, David F., Orlando Sarnelle, Alan E. Wilson, Stephen K. Hamilton

Limnol. Oceanogr., 49(2), 2004, 482-487 | DOI: 10.4319/lo.2004.49.2.0482

ABSTRACT: To examine the hypothesis that invasion by zebra mussels (*Dreissena polymorpha*) promotes phytoplankton dominance by the noxious cyanobacterium *Microcystis aeruginosa*, 61 Michigan lakes of varying nutrient levels that contain or lack zebra mussels were surveyed during late summer. After accounting for variation in total phosphorus (TP) concentrations, lakes with *Dreissena* had lower total phytoplankton biomass, as measured by chlorophyll a and algal cell biovolume. Phytoplankton biomass increased with TP in both sets of lakes, although the elevations of the relationship differed. The percentage of the total phytoplankton comprised by cyanobacteria increased with TP in lakes without *Dreissena* ($R^2 = 0.21$, $P = 0.025$) but not in lakes with *Dreissena* ($P = 0.79$). Surprisingly, there was a positive influence of *Dreissena* invasion on *Microcystis* dominance in lakes with $TP < 25 \mu\text{g L}^{-1}$ ($P = 0.0018$) but not in lakes with $TP > 25 \mu\text{g L}^{-1}$ ($P = 0.86$). The finding that *Microcystis*, a relatively grazing-resistant component of the phytoplankton, was favored by *Dreissena* in low- but not in high-nutrient lakes is somewhat counterintuitive, but predator-prey models make this prediction in certain cases when the cost for the prey of being consumption resistant is a low maximum population growth rate. This *Dreissena*-cyanobacteria interaction contradicts well-established patterns of increasing cyanobacteria with nutrient enrichment in north-temperate lakes and suggests that the monitoring and abatement of nutrient inputs to lakes may not be sufficient to predict and control cyanobacterial dominance of *Dreissena*-invaded lakes.

Article Links

[Download Full-text PDF](#)

[Return to Table of Contents](#)

Please Note

Articles in L&O appear in PDF format. Open access articles may be freely downloaded by anyone. Other articles are available for download to subscribers only, or may be purchased for \$10 per