Differences in Excretion between Dreissenid Congeners: Implications for the Lake Erie Ecosystem

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Zebra mussels, *Dreissena polymorpha*, invaded the Lake Erie ecosystem through ballast water exchange in the mid-1980’s. They quickly spread over suitable habitat in the shallow, productive lake areas. Subsequent to this invasion was another by the quagga mussel, *D. bugensis*. After several years of zebra mussel prevalence, the quagga has displaced the zebra mussel. The reasons, either physiologically or ecologically, for this displacement are not completely understood. Concurrent with this shift was an increase in phytoplankton biomass in the lake. We hypothesized that a shift from zebra to quagga mussel, coupled with a possible shift in amounts of excreted nutrients, could be the explanation for the increases in phytoplankton biomass. To investigate this hypothesis, we measured ammonia-nitrogen and phosphate-phosphorus excretion of the congeners. We found no difference in size-class averaged nitrogen excretion between zebra and quagga mussels (7.34 and 7.04 µgN/mg dry weight/day, respectively). However, zebra mussels excreted more size-class averaged phosphorus than did quagga mussels (0.62 and 0.44 µgP/mg/day, respectively). Combined N and P data suggest that zebra mussels excrete at significantly lower N:P ratios than do quagga mussels. Combining these findings with the high abundances of dreissenids in the shallow, highly mixed Western Basin leads to the suggestion that dreissenid mussels may significantly contribute to the internal soluble nutrient loads. Consequently, these loads are suitable for phytoplankton growth and may influence the formation of the Lake Erie “Dead Zone”.