



Dissolved organic matter and persistence of the invasive zebra mussel (*Dreissena polymorpha*) under low food conditions

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ABSTRACT: To determine whether the ability of zebra mussels (*Dreissena polymorpha*) to absorb and metabolize a variety of dissolved organic compounds allows them to persist when food levels are too low to sustain them, we compared how quickly starving mussels lost weight when kept in water with and without natural dissolved organic matter (DOM). Mussels fed a starvation ration of algae were maintained either in filtered Hudson River water or in ultraviolet-treated deionized water with major ions added at concentrations equivalent to those in the Hudson. Both types of water were continually filtered. Zebra mussels lost weight two- to fivefold faster in the absence of natural DOM, consistent with the idea that the uptake of DOM provides a substantial metabolic subsidy to these organisms. Ingestion of bacteria could not account for this effect. We calculate that the DOM subsidy amounted to more than half of the zebra mussel respiratory requirement under the experimental conditions, which is enough to double the length of time that zebra mussels can survive in the complete absence of particulate food. The effect of DOM on zebra mussel metabolism is 1.5- to fourfold larger than that predicted solely from estimates of amino and fatty acid uptake in the Hudson River. Because Hudson River DOM is largely allochthonous in origin, this subsidy could give zebra mussels a distinct advantage over other organisms competing for phytoplankton resources. We postulate that zebra mussels will have the largest effects on freshwater ecosystems that receive substantial inputs of organic matter from the surrounding watershed.

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