Food quality effects of unsaturated fatty acids on larvae of the zebra mussel Dreissena polymorpha

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ABSTRACT: In standardized growth experiments, newly hatched larvae of the zebra mussel *Dreissena polymorpha* were fed diets representing different biochemical compositions. Algae that were rich in (n-3) polyunsaturated fatty acids (PUFAs), except for long-chained (>C18) PUFAs (*Chlorella minutissima* and *Monoraphidium minutum*) were of low food quality. Higher growth than on *C. minutissima* or *M. minutum* was supported by a culture of the cyanobacterium *Aphanothece* sp., which contained traces of a long-chained (n-3) PUFA, docosahexaenoic acid (DHA, 22 : 6n-3). The alga *Isochrysis* aff. *galbana*, which contained high amounts of the longchained (n-3) PUFAs DHA and eicosapentaenoic acid (EPA, 20 : 5n-3), supported the highest growth. The alga *Nannochloropsis limnetica*, which differed from *I. galbana* by a deficiency in DHA, allowed slightly, but significantly lower, growth. Growth of larvae on *N. limnetica* was increased by enrichment of *N. limnetica* cells with a lipid extract of *I. galbana*, showing that larval growth on N. limnetica was limited by the deficiency of a compound that was present in *I. galbana*. Growth was also enhanced by feeding *N. limnetica cells* supplemented with DHA, but not by cells enriched with EPA, indicating that DHA was the limiting factor. We conclude that, on DHA-deficient food, the larvae of *D. polymorpha* were not able to sufficiently convert C18-PUFAs into long-chained (n-3) PUFAs and that the rates for elongation and desaturation of EPA into DHA limited growth.