Evolutionary change in metabolic rate of Daphnia pulicaria in response to the invasive predator Bythotrephes longimanus

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Abstract

Metabolic rate is a trait that can be hypothesized to evolve in response to a change in predation. In the current study, we address this question by utilising an invasive event by the predatory zooplankton Bythotrephes longimanus in Lake Mendota, Wisconsin, US. This invasion dramatically impacted the prey Daphnia pulicaria, causing a ˜60% decline in their biomass. Using a resurrection ecology approach, we compared the metabolic rate of D. pulicaria clones originating from prior to the Bythotrephes invasion with that of clones having evolved in the presence of Bythotrephes. We observed a 7.4% reduction in metabolic rate among post-invasive clones compared to pre-invasive clones. This change is in the opposite direction to what might be expected to evolve in response to increased predation. The evolution of a lower metabolic rate may instead be due to a habitat shift in the prey species into deeper and less productive waters and associated changes in the optimal metabolic rate.

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