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Ecological interactions of the microparasite Caullerya mesnili and its host Daphnia galeata

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ABSTRACT: It has been repeatedly suggested that parasites play an important role in the ecology and evolution of *Daphnia* populations; however, little is known about *Daphnia*-parasite interactions in lakes with vertebrate predation on *Daphnia*. Between September 1997 and April 1998, an epidemic of the protist parasite *Caullerya mesnili* in *Daphnia* galeata and *Daphnia* hyalina occurred in Lake Constance (Germany), infecting up to 50% of all individuals. Using laboratory experiments, we investigated the epidemiological interactions between this parasite and its host *D. galeata* at the individual and the population level. *C. mesnili* was found to be transmitted directly and horizontally through waterborne infection stages. Transmission of the parasite was dependent on the host density, and all life stages of female *D. galeata* were susceptible to infection. In a life table experiment at low and high food levels, the life expectancy and fecundity of infected *D. galeata* were dramatically reduced at both food levels as compared to the uninfected controls. Additionally, we found a significant interaction between infection and food level, indicating a stronger parasitic effect in well-fed hosts. To test the effects of the parasite at the population level, we compared the size of *D. galeata* populations infected with *C. mesnili* with the size of parasite-free microcosm populations. The population size of infected *D. galeata* was significantly lower than that of uninfected populations after 4 weeks. In all four infected replicate populations, the parasite drove the host population to extinction.

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