Density, parasitism, and sexual reproduction are strongly correlated in lake *Daphnia* populations

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Abstract

Many organisms can reproduce both asexually and sexually. For cyclical parthenogens, periods of asexual reproduction are punctuated by bouts of sexual reproduction, and the shift from asexual to sexual reproduction has large impacts on fitness and population dynamics. We studied populations of *Daphnia dentifera* to determine the amount of investment in sexual reproduction as well as the factors associated with variation in investment in sex. To do so, we tracked host density, infections by nine different parasites, and sexual reproduction in 15 lake populations of *D. dentifera* for three years. Sexual reproduction was seasonal, with male and ephippial female production beginning as early as late September and generally increasing through November. However, there was substantial variation in the prevalence of sexual individuals across populations, with some populations remaining entirely asexual throughout the study period and others shifting almost entirely to sexual females and males. We found strong relationships between density, prevalence of infection, parasite species richness, and sexual reproduction in these populations. However, strong collinearity between density, parasitism, and sexual reproduction means that further work will be required to disentangle the causal mechanisms underlying these relationships.

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