

Research Project

DaphniaPasteuria

Third-party funded project

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Trans-generational effects of low food and pathogen exposure on the susceptibility of *Daphnia magna* to a bacterial pathogen

Stress conditions, such as low levels of food or parasite exposure, have been found to change the susceptibility of hosts or their offspring to infection. In earlier studies susceptibility was tested at just one parasite dose level, and therefore allowed conclusions only on mean susceptibility, without assessing the variation of host susceptibility and the change in the fraction of hosts that are assumed to be completely resistant. To understand the evolutionary ecology of a host-parasite system, however, knowledge about the variation of host susceptibility and how it changes in response to environmental conditions is required. Therefore, we investigated trans-generational effects of stress on the entire distribution of susceptibilities to infection. To this end, we first exposed *Daphnia magna* to low food levels or to a high dose of the bacterial pathogen *Pasteuria ramosa*. Subsequently, we measured the susceptibility of the offspring to different spore doses of the parasite. For the analysis we used a mathematical model that predicts the fraction of infected hosts at different parasite doses. This allowed us to estimate the mean, the variance of host susceptibility and the proportion of hosts that are assumed to be completely resistant. We find that low food levels reduce both the mean and the variance of offspring susceptibility. Parasite exposure, on the other hand, widens the offspring susceptibility distribution without affecting mean susceptibility and the fraction of completely resistant hosts. Our results emphasize the importance of previously undetected trans-generational effects on the distribution of susceptibilities. Such variability has been argued to impact host population dynamics and contribute strongly to the stability of host-parasite interactions.

Keywords host parasite interaction, evolution,

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