

Publication

Assessment of parasite virulence in a natural population of a planktonic crustacean

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Background: Understanding the impact of disease in natural populations requires an understanding of infection risk and the damage that parasites cause to their hosts (=virulence). However, because these disease traits are often studied and quantified under controlled laboratory conditions and with reference to healthy control hosts, we have little knowledge about how they play out in natural conditions. In the *Daphnia*-*Pasteuria* host-parasite system, field assessments often show very low estimates of virulence, while controlled laboratory experiments indicate extremely high virulence. **Results** To examine this discrepancy, we sampled *Daphnia magna* hosts from the field during a parasite epidemic and recorded disease traits over a subsequent 3-week period in the laboratory. As predicted for chronic disease where infections in older (larger) hosts are also, on average, older, we found that larger *D. magna* females were infected more often, had fewer offspring prior to the onset of castration and showed signs of infection sooner than smaller hosts. Also consistent with laboratory experiments, infected animals were found in both sexes and in all sizes of hosts. Infected females were castrated at capture or became castrated soon after. As most females in the field carried no eggs in their brood pouch at the time of sampling, virulence estimates of infected females relative to uninfected females were low. However, with improved feeding conditions in the laboratory, only uninfected females resumed reproduction, resulting in very high relative virulence estimates. **Conclusions** Overall, our study shows that the disease manifestation of *P. ramosa*, as expressed under natural conditions, is consistent with what we know from laboratory experiments. However, parasite induced fecundity reduction of infected, relative to uninfected hosts depended strongly on the environmental conditions. We argue that this effect is particularly strong for castrating parasites, because infected hosts have low fecundity under all conditions.

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