Differential virulence in a multiple-host parasite of bumble bees: resolving the paradox of parasite survival?

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ABSTRACT

Parasite virulence determines both the impact that parasites have on their hosts and parasite fitness. While most studies of virulence have involved single-species host-parasite interactions, the majority of parasites are likely to use multiple concurrent host species. Our understanding of how this impacts on parasite epidemiology and virulence is limited. Using the bumble bee *Bombus lucorum*, which exists in sympatry with *B. terrestris* in multi-species assemblages, and their generalist micosporidian parasite *Nosema bombi*, we tested whether the apparent paradox of parasite maintenance due to parasite virulence in a single host, *B. terrestris*, could be resolved through understanding the parasite's virulence in this sympatric host species. *N. bombi* significantly impacted colony growth, individual longevity, and individual development in *B. lucorum*. However, these effects were different both qualitatively and quantitatively to the parasite's impact in *B. terrestris*. Infected colonies of *B. lucorum* successfully produced both male and female reproductives, and infected female reproductives were capable of successful mating. Variation in life-history across host species may explain differences in the virulence, or impact of the parasite in *B. terrestris* and *B. lucorum*, with species with shorter life-cycles being more likely to transfer the parasite from one annual generation to the next. These results suggest that to understand the virulence and epidemiology of multi-host parasites we need to examine their ecological interactions across their various host species.