Host-Symbiont Genetic Interactions on Resistance to Parasitoids and Life-History Traits in Aphids

Master thesis

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Abstract

Insects are associated with symbiotic bacteria, which provide a range of benefits to their host. In aphids, these benefits include the provision of essential nutrients, but also protection against natural enemies. In the black bean aphid *Aphis fabae,* the secondary symbiont *Hamiltonella defensa* provides protection against hymenopteran parasitoids including *Lysiphlebus fabarum.* In this system, the symbiont is assumed to alter host-parasite interactions leading to co-evolution under Red Queen dynamics. Previous studies provide evidence for genotypic variation in resistance to parasitoids, specific interactions on resistance between symbiont strains and parasitoid genotypes and costs for harbouring *H. defensa.* However, little is known about how the interaction between host and symbiont shapes the effectiveness of symbiont-mediated resistance and variation in costs has never been related to variation in benefits provided by protective symbionts. Furthermore, the role of sexual reproduction in aphids has never been examined in relation with innate physiological resistance to parasitoids.

This study investigates the interaction between *H. defensa* and its host by analysing a variety of fitness related traits. Sexually produced lines harbouring maternally transmitted symbionts were compared to their genetically identical, but symbiont-free sublines. Strong parental effects, but no interaction between the hosts genotypic background and the symbiont effect on resistance related traits could be found. Furthermore, reduced longevity in aphids harbouring *H. defensa* was not associated with a reduction in lifetime reproduction, but a cost of increased mortality for other reasons than mummification is supported by correlative evidence. The results of this study strengthen the concept of this host-parasite interaction being under symbiont-mediated negative frequency dependent selection. Furthermore, parental effects in genetically determined traits call for more detailed analyses, as they seem to shape clonal variation with consequences for the role of sexual reproduction in aphid resistance to parasitoid wasps.