

The value of an egg: resource reallocation in ladybirds (Coleoptera: Coccinellidae) infected with male-killing bacteria

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Abstract

Male-killing bacteria are thought to persist in host populations by vertical transmission and conferring direct and/or indirect fitness benefits to their hosts. Here, we test the role of indirect fitness benefits accrued from resource reallocation in species that engage in sibling egg cannibalism. We found that a single-egg meal significantly increased larval survival in 12 ladybird species, but the value of an egg (to survival) differed substantially between species. Next, we tested the impact of three male-killing bacteria on larval survival in one ladybird species, *Adalia bipunctata*. *Spiroplasma* reduced larval survival, whereas *Wolbachia* and *Rickettsia* had no effect. However, *Spiroplasma*-infected larvae showed the greatest response to a single-egg meal. The indirect fitness benefit obtained from a single egg is thus so large that even male-killing bacteria with direct fitness costs can persist in host populations. This study supports the hypothesis that fitness compensation via resource reallocation can explain male-killing bacteria persistence.

Published In: *J Evol Biol.* 2011 Oct;24(10):2164-72