

Sexually Transmitted Mutualist Nematodes Promote Host Growth Across Dung Beetle Species

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Abstract

Many symbionts are sexually transmitted and impact their host's development, ecology, and evolution. While the significance of symbionts that cause sexually transmitted diseases (STDs) is relatively well understood, the prevalence and potential significance of the sexual transmission of beneficial symbionts remain elusive. Here, we study the effects of sexually transmitted mutualist nematodes on their dung beetle hosts. Symbiotic *Diplogastrellus monhysteroides* nematodes are present on the genitalia of male and female *Onthophagus* beetles and are horizontally transmitted during mating and vertically passed on to offspring during oviposition. A previous study indicates that the presence of nematodes benefits larval development and life history in a single host species, *Onthophagus taurus*. However, *Diplogastrellus* nematodes can be found in association with a variety of beetle species. Here, we replicate these previous experiments, assess whether the beneficial effects extend to other host species, and test whether nematode-mediated effects differ between male and female hosts. Rearing three distantly related dung beetle species with and without nematodes, we find that the presence of nematodes benefits body size, but not development time or survival across all three species. Likewise, we found no difference in the benefit of nematodes to male compared to female beetles. These findings highlight the role of sexually transmitted mutualists in the evolution and ecology of dung beetles. Furthermore, these results suggest a potential new avenue through which environmental pollution with veterinary deworming agents may affect dung beetles and their ecosystem services.

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