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Motivated by Transmission? The Behavioural Effects of Parasites on Snail Second Intermediate Hosts

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Abstract

Many parasites that use >1 host to complete their development alter the behaviour of their hosts to increase their survival and the likelihood that they infect their next host. However, we do not understand how commonly this phenomenon occurs in trematode parasites, especially for transmission between freshwater snail hosts. We predicted that first intermediate host snails will attract uninfected, potential second intermediate hosts while snails infected with trematodes that do not use a second intermediate host will not. We collected field-infected snails from wetlands in Manitoba, and identified the family of trematodes using cercarial morphology. Then we used a y-maze to assess the attraction of a responder (lab-raised uninfected Helisoma trivolvis*) to a stimulus (field-infected) snail. We found* H. trivolvis *field snails infected with two morphotypes (armatae, brevifurcate-apharyngeate) and* Lymnaea elodes *infected with one morphotype (monostome). Monostome and brevifurcate-apharyngeate cercariae do not use snail second intermediate hosts and we confirmed with laboratory exposures that armatae cercariae encysted within snail hosts as metacercariae. Sample sizes are currently small (<30 stimulus snails for each morphotype), but preliminary analysis with armatae-infected stimuli (n=6) suggested no response. This result corroborates the results of behavioural trials with echinostome trematodes when the responder and stimulus snail were* H. trivolvis. *Contrary to the prediction, these two types of trematodes did not alter the attraction of second host snails to first host snails. However, these results contrast the increased attraction between responder* H. trivolvis *and echinostome-infected* L. elodes *stimulus snails. Thus, not only may altered behaviour depend upon the life cycle but also the particular type of second intermediate hosts involved.*

An Extreme Bottleneck in the Founding of a Population of Invasive Ground Squirrel (*Atlantoxerus getulus*)

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Abstract

*The founder effect is a genetic bottleneck whereby a population is established by a small number of individuals. The resulting gene pool is limited compared to the source population. Nascent populations established by a few founders are therefore typically small and prone to the detrimental effects of inbreeding and genetic drift. Inbreeding depression, the accumulation of deleterious alleles, can contribute to the extinction of a population. Barbary ground squirrels (*Atlantoxerus getulus*) on the island of Fuerteventura, Spain, were reportedly introduced as a single pair approximately 50 years ago. This population has since grown to an island population of over a million, impacting the local habitats. We conducted genetic analysis of* A. getulus *to determine the number of founders and measure the level of genetic diversity using the displacement loop of mitochondrial DNA and microsatellite markers. The samples from across the island showed no variation in the d-loop, indicating a single founding female, while the samples from the source population had varied mitochondrial haplotypes. The microsatellite data revealed low levels of heterozygosity and high levels of inbreeding, with no more than four founding alleles per locus. Our results were consistent with the anecdotal account of a single founding event by two individuals. This population therefore seems to be an ideal model to study founder events. Further investigation may explain how* A. getulus *has avoided the worst effects of an extreme genetic bottleneck.*

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