

Evolution of resistance in *Potamopyrgus antipodarum*

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Can hosts rapidly evolve resistance against coevolving parasites?

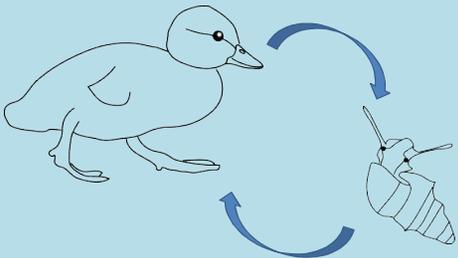
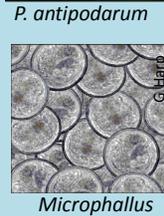
Coevolution of host and parasite

Parasites select for increased resistance in hosts
Hosts select for increased infectivity in parasites

Prediction: offspring of exposed hosts will exhibit increased resistance to infection

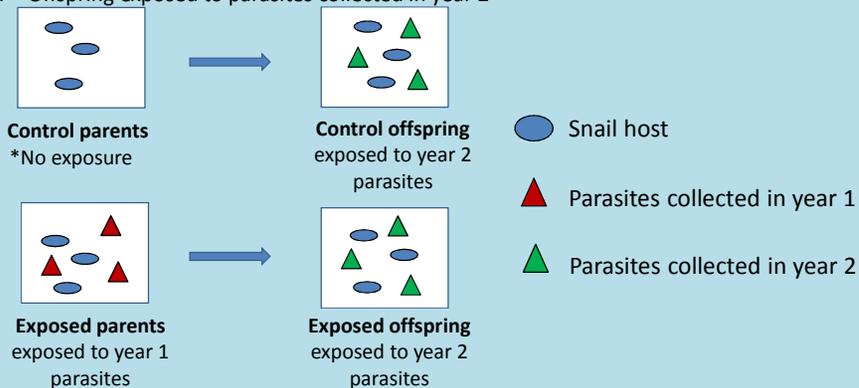
Model system

The trematode *Microphallus* multiplies in the snail *Potamopyrgus antipodarum*, castrating it. After a duck eats the snail, the parasite reproduces sexually in its gut and releases eggs that infect foraging snails



Experimental design

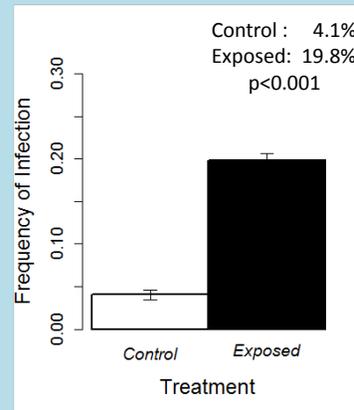
1. Snails and parasites collected in year 1
2. Exposed to parasites (Exposed) or not (Control)
3. Sterilizing parasite → only resistant individuals reproduce in Exposed treatment; all individuals able to reproduce in Control
4. Offspring exposed to parasites collected in year 2



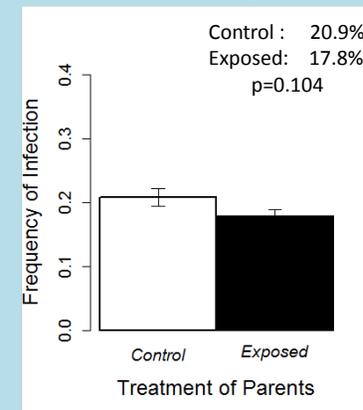
Resistance to infection can evolve, with sufficient selection

2012

Parents



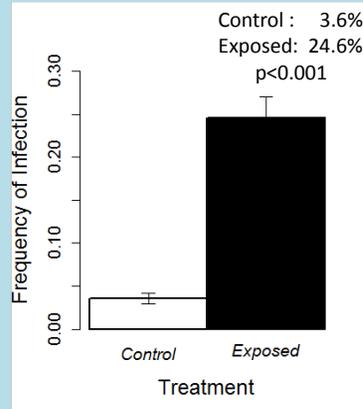
Offspring



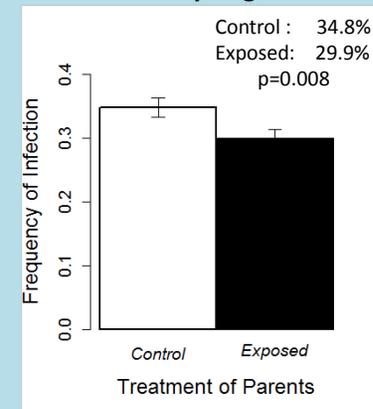
The increase in resistance in the offspring of exposed parents is not significant

2013

Parents



Offspring



Offspring of Exposed parents were significantly more resistant than offspring of Control parents

Difference between 2012 and 2013 experiments may reflect greater parasite selection on Exposed parents in 2013

CONCLUSIONS

Offspring of exposed hosts did exhibit increased resistance to infection in the experimental year in which the parent generation experienced greater parasite selection. This suggests that hosts can evolve resistance to parasites that are themselves rapidly adapting to infect their hosts.

List of works cited: Hechinger R. (2012). Faunal survey and identification key for the trematodes (Platyhelminthes:Digenea) infecting *Potamopyrgus antipodarum* (Gastropoda: Hydrobiidae) as first intermediate host; Koskella B, Lively, C. (2007). Advice of the rose: experimental coevolution of a trematode parasite and its snail host; Koskella B, Vergara D, Lively C. (2011). Experimental evolution of sexual host populations in response to sterilizing parasites; Lohse K, Gutierrez A, Kaltz O. (2006). Experimental evolution of resistance in *Paramecium Caudatum* against the bacterial parasite *Holospira undulata*