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Experimental test for a co-evolutionary hotspot in a host–parasite interaction

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ABSTRACT

Observation: Two independent experiments have shown that freshwater snails (*Potamopyrgus antipodarum*) collected from the shallow-water margins of a lake are more susceptible to infection by a trematode worm (*Microphallus* sp.) than snails collected from deeper habitats.

Question: Is this cline in susceptibility caused by (1) inherent differences in susceptibility, or (2) the presence of a co-evolutionary hotspot in the shallow water?

Organisms: The freshwater New Zealand snail, *Potamopyrgus antipodarum*, and its common parasite, *Microphallus* sp. (Digenea, Trematoda).

Methods: We exposed snails collected from shallow-water (< 1 m), mid-water (1–3 m), and deep-water (4–6 m) habitats to parasites dissected from snails sampled from the shallow and deep habitats. We also exposed random samples of this same set of snails to parasites collected from two remote lakes, which have no co-evolutionary history with the Lake Alexandrina snails.

Results: Snails collected from the shallow habitat were more susceptible to infection regardless of the source of infection, which is inconsistent with the co-evolutionary hotspot hypothesis. In addition, parasites from Lake Alexandrina were more infective to snails collected from Lake Alexandrina than from the two allopatric lake populations, and the shallow-water source of parasites was more infective than the deep-water source of parasites.

Keywords: co-evolution, local adaptation, *Microphallus*, parasitism, parthenogenesis, ploidy, *Potamopyrgus antipodarum*, Trematoda.

INTRODUCTION

Individuals that reproduce sexually are at a disadvantage compared with those that reproduce asexually. They either produce fewer grand-offspring than asexuals [the cost of producing males (Williams, 1975)] or they contribute fewer copies of their genes to the next

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