
Is dispersal ability context- or phenotype-dependent in the long-lived land snail *Notodiscus hookeri*?

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Abstract

Dispersal is a fundamental life-history trait of organisms, with its costs/benefits balance shaping how eco-evolutionary processes unfurl in space. In land gastropods (> 20,000 species), variation in dispersal ability has been so far virtually unstudied outside of a few invasive or model species. This is despite the molluscs having one, if not the most costly movement type among animals.

On the Sub-Antarctic Possession Island, the endemic land snail *Notodiscus hookeri* is a lichen-feeding species that presents two contrasted shell ecophenotypes (soft organic shell or hard mineralised shell) depending on calcium availability.

We used mark-recapture to study the dispersal movements of three populations, differing in shell ecophenotype. Based on previous work on dispersal and this species ecology, we hypothesized that (i) dispersal in *N. hookeri* would be context-dependent, with unfavourable habitats left more readily, despite high movement costs making dispersal beyond short distances nearly impossible, (ii) lichen availability, and snails' trophic preferences, would drive this context-dependency, and that (iii) dispersal would be phenotype-dependent, with the morph investing less energy in shell production (i.e. the hard one) being potentially the most dispersive.

Patch choice after 28 days was strongly constrained by distance, with most recaptured snails settling within 0.5 m from their release point. Snails nonetheless made informed dispersal decisions, with low lichen availability and small patch size strongly increasing emigration probability (with a ~4-fold increase between the best and worst-quality patches). Dispersal was also seasonal, with limited movements during winter. Dispersal tendency varied among populations, but this could not be linked to shell phenotype.

These results confirm the ubiquitousness of context-dependent dispersal and add to our knowledge of an ecologically important but overlooked process in land gastropods; they simultaneously raise questions about how such a poor active disperser was able to colonize the near totality of Possession Island.

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