The effect of life-history strategies on local adaptation

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Abstract

Natural populations typically experience heterogeneous environments and can adapt to their local conditions. The extent of local adaptation is influenced by the balance of divergent selection, gene flow and genetic drift. Here, we investigate the role of life history in this process. Life history can inform traits relating to a species' ecology, some of which could presumably impact the evolution of local adaptation. Using individual-based simulations, we explored the effects of different plant life-history strategies on local adaptation. The resulting levels of local adaptation were highly dependent on how often individuals passed through the processes pertaining to selection and dispersal. In particular, local adaptation was reduced in species with prolonged seed dispersal, and favoured in species with high generation times, where individuals experienced selection multiple times throughout their lifespan. In small populations, we saw how the effects of increased genetic drift could be offset, when life history led to large effective population sizes, such as in annuals with a high germination rate. Our results show how life history could affect the evolution of local adaptation, by influencing the exposure of populations to its main underlying processes - dispersal, selection and drift.

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