

Metabolic rate, context-dependent selection, and the colonisation-competition trade-off

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Abstract

Metabolism sets the pace-of-life, co-varying with survival, growth and reproduction. Metabolic rates should therefore be under strong selection and, if heritable, become less variable over time. Yet intraspecific variation in metabolic rates is ubiquitous, even after accounting for body mass and temperature. Theory predicts variable selection maintains trait variation but field estimates of how selection on metabolism varies are rare. We use a model marine invertebrate to estimate selection on metabolic rates in the wild under different competitive environments. Fitness landscapes varied among environments separated by a few centimetres: interspecific competition selected for higher metabolism, and a faster pace-of-life, relative to competition-free environments. Populations experience a mosaic of competitive regimes; we find metabolism mediates a competition-colonisation trade-off across these regimes. Spatial heterogeneity and the variable selection on metabolic rates that it generates is likely to maintain variation in metabolic rate, despite strong selection in any single environment.

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