Evolutionary divergence in replicate pairs of ecotypes of Lake Victoria cichlid fish

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ABSTRACT

Questions: (1) Do replicate pairs of ecotypes of cichlid fish represent different stages of ecological speciation? (2) Are phenotypic and genetic divergence correlated with each other and with the steepness of the habitat gradients?

Study system: Three replicate pairs of putative ecotypes of cichlid fish in the genus *Neochromis* from three islands in Lake Victoria. The three pairs present similar trophic polymorphisms. The three islands differ in steepness of the benthic habitat gradients mediated by variation in water clarity, shore slopes, and depths of the rock–sand interface.

Analytical methods: We quantified fish body morphology and dentition, typed population samples at nine microsatellite loci, and analysed how phenotypic and neutral genetic variation were distributed among ecotypes and along the habitat gradients.

Results: Despite weak or absent genetic differentiation at neutral markers, ecotypes were divergent in phenotypes in a replicated manner, involving from one to many different traits in a nested series. Variation in eco-morphological traits and allelic variation at neutral marker loci were associated with depth of habitat at some islands.

Keywords: divergent selection, $F_{ST}$, speciation, trophic polymorphism.

INTRODUCTION

Divergent selection between habitats or niches, resulting from the interaction of individuals with their biotic and abiotic environment, is thought to be a common mechanism of population divergence and speciation (Schluter, 2000; Rundle and Nosil, 2005; Maan and Seehausen, 2011). Spatially coincident habitat and resource structure (i.e. coincidence of alpha and beta niche) is thought to facilitate this process (Schluter, 2000; Via, 2001). When mating and feeding occur in...
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