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Evolution of dispersal under variable connectivity

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1 **Abstract.** The pattern of connectivity between local populations or between microsites sup-
 2 porting individuals within a population is a poorly understood factor affecting the evolution of
 3 dispersal. We modify the well-known Hamilton-May model of dispersal evolution to allow for
 4 variable connectivity between microsites. For simplicity, we assume that the microsites are ei-
 5 ther solitary, i.e., weakly connected through costly dispersal, or part of a well-connected cluster
 6 of sites with low-cost dispersal within the cluster. We use adaptive dynamics to investigate the
 7 evolution of dispersal, obtaining analytic results for monomorphic evolution and numerical re-
 8 sults for the co-evolution of two dispersal strategies. A monomorphic population always evolves
 9 to a unique singular dispersal strategy, which may be an evolutionarily stable strategy or an
 10 evolutionary branching point. Evolutionary branching happens if the contrast between connec-
 11 tivities is sufficiently high and the solitary microsites are common. The dimorphic evolutionary
 12 singularity, when it exists, is always evolutionarily and convergence stable. The model exhibits
 13 both protected and unprotected dimorphisms of dispersal strategies, but the dimorphic singular-
 14 ity is always protected. Contrasting connectivities can thus maintain dispersal polymorphisms
 15 in temporally stable environments.

16

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