

The Evolutionary Consequences of Phenotypic Plasticity: Adding a Spatial Dimension

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ABSTRACT

I describe a model for the evolutionary consequences of plasticity in an environmentally heterogeneous metapopulation in which specialists for each of two alternative environments and one plastic type are initially present. The model is derived from that proposed by Moran (1992), extending her work to two sites. I show that with migration between sites, the plastic type is favored over local specialists across a broad range of parameter space. Migration relaxes the thresholds for both environmental heterogeneity and accuracy of plastic response above which plasticity is favored. The plastic type may dominate or be fixed even in an environmentally uniform site, and even if the plasticity has imperfect accuracy. These results suggest that differences among taxa in dispersal and hence realized migration rates may play a heretofore unrecognized role in their patterns of adaptive population differentiation. Furthermore, small changes in response accuracy can dramatically and abruptly alter the evolutionary outcome in the metapopulation.

Keywords: evolution, plasticity, migration