

The Effect of Host's Dispersal Ability on Fine-Scale Spatial Differentiation

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ABSTRACT

Gene flow of a parasite is commonly contingent upon its most motile host's dispersal rate. High gene flow can reduce local differentiation and potentially the rate of adaptation to local hosts (Blasco-Costa, Waters, & Poulin, 2011; Louhi, Karvonen, Rellstab, & Jokela, 2010). We investigated fine-scale spatial differentiation in a parasitic trematode (*Microphallus sp.*), which alternates between two hosts: a relatively sedentary invertebrate, a freshwater snail (*Potamopyrgus antipodarum*), and a highly motile vertebrate, a duck (Hechinger, 2012). In 2014, adult snails were sampled from 13 different sites around a New Zealand lake to determine the distribution of infection. Juvenile snails were also collected from these sites for experimental manipulation. Finally, parasite eggs were collected by sampling duck feces from a northern and southern site on the lake. Juvenile snails from each site were exposed to parasites from either the northern or southern source. The infection status of field-collected adults and experimental juveniles was determined by dissection. Given the close proximity between sites and the duck host's strong dispersal ability, we predicted low spatial variation in infectivity of the two parasite sources. The results, however, indicate significant spatial variation in both host resistance and parasite infectivity. Though infection rates across host sites were significantly correlated, the two sources differed significantly in their infectivity to hosts from different sites. This result suggests that the two parasite sources are adapted to infect different hosts, indicating genetic differentiation of the parasite. In addition, the frequency of infection and resistance of the freshwater snail differed significantly between sites within close proximity to one another. Detection of strong variation indicates that dispersal of the vertebrate host does not prevent fine-scale spatial differentiation in this host-parasite system. Further studies are needed to investigate the forces that maintain the extensive spatial variation in disease observed.

KEYWORDS: gene flow, dispersal ability, spatial differentiation

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