

Contrasting effects of ecological and evolutionary processes on range expansions and shifts

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Abstract

Research has conclusively demonstrated the potential for dispersal evolution in range expansions and shifts through a process termed spatial sorting. However, the degree of dispersal evolution observed has varied substantially among organisms. Further, it is unknown how the factors influencing dispersal evolution might impact other ecological processes at play. We use an individual-based model to investigate the effects of the underlying genetics of dispersal and mode of reproduction in range expansions and shifts. Spatial sorting behaves similarly to natural selection in that dispersal evolution increases with sexual selection and loci number. Contrary to our predictions, however, increased dispersal does not always improve a population's ability to track changing conditions. The mate finding Allee effect inherent to sexual reproduction increases extinction risk during range shifts, counteracting the beneficial effect of increased dispersal evolution. Our results demonstrate the importance of considering both ecological and evolutionary processes for understanding range expansions and shifts.

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