

Publication

Accumulation of mutational load at the edges of a species range

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Why species have geographically restricted distributions is an unresolved question in ecology and evolutionary biology. Here, we test a new explanation that mutation accumulation due to small population size or a history of range expansion can contribute to restricting distributions by reducing population growth rate at the edge. We examined genomic diversity and mutational load across the entire geographic range of the North American plant Arabidopsis lyrata, including old, isolated populations predominantly at the southern edge and regions of postglacial range expansion at the northern and southern edges. Genomic diversity in intergenic regions declined toward distribution edges and signatures of mutational load in exon regions increased. Genomic signatures of mutational load were highly linked to phenotypically expressed load, measured as reduced performance of individual plants and lower estimated rate of population growth. The geographic pattern of load and the connection between load and population growth demonstrate that mutation accumulation reduces fitness at the edge and helps restrict species' distributions.

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