

Being different makes all the difference in an ever changing world

November 8 2016, by Annika Sand

Biodiversity is challenged by environmental modifications brought about by altered land use and climate change. Species that fail to adapt or adjust their geographic distribution can be driven to extinction. Individual variation makes all the difference here. A new study published in *Scientific Reports* demonstrates that poleward range shifts have been faster in moths with more variable colour patterns. Rates of range shifts have also increased over time, and depend on study duration and latitude. Results will help improve projections of biodiversity responses to climate change and aid conservation efforts, the authors say.

What regulates the spatial distribution of plants and animals is a key question in ecology and evolution. Expanding species that establish outside their natural distribution range can alter community compositions and disrupt ecosystem functioning. However, little is known about why the pace of range shifts varies considerably among different species.

In this study, researchers from Linnaeus University in Sweden together with a colleague from Germany analysed how range limits for 416 species of moths in Sweden changed between 1973 and 2014. They found that poleward range shifts were three times faster on average in species with highly variable colour patterns, compared with species having non-variable colour patterns.

Lead author Professor Anders Forsman elaborates: "High variation among individuals in functionally important traits reflects ecological

generalization. There is evidence from several animal groups that species with more variable colour patterns have larger range sizes, higher establishment success, and lower extinction risk. However, we are not aware of any previous demonstration that species with more variable colour patterns have undergone faster range shifts."

Range shifts were not strongly linked to number of host plants use, flight activity period, dispersal capacity, or overwintering life stage. There was however an association with latitude. Study co-author Associate Professor Per-Eric Betzholtz explains: "We found that northerly expansion rates of moths decreased with increasing latitudes. This indicates that poleward range shifts from southern, biologically diverse, regions to northern depauperate areas have been limited more by lack of suitable habitats, resources and temperature conditions than by poor dispersal capacity and species interactions."

Estimates of expansion rate vary considerably among studies. Range shifts are driven partly by climate change, and the rate of warming varies among biomes and has increased over time. If species are keeping pace with moving climates, range shifts should differ among studies carried out in different periods and regions. Analysis of range shifts reported in previous studies support this reasoning. "Overall, range shifts have been faster in studies conducted over shorter intervals, during more recent time periods, and at lower latitudes" says co-author Dr. Markus Franzén.

Knowledge of how distribution range shifts change with time, location, study duration, and species characteristics may improve projections of biodiversity responses to [climate change](#), according to the authors. Anders Forsman concludes: "Information on species traits that can be readily obtained at low cost might serve as a proxy for responsiveness and help identifying which species are more or less prone to become endangered or invasive. This is promising news for the protection of biodiversity."

More information: Anders Forsman et al. Faster poleward range shifts in moths with more variable colour patterns, *Scientific Reports* (2016). [DOI: 10.1038/srep36265](https://doi.org/10.1038/srep36265)

Provided by Expertsvar

Citation: Being different makes all the difference in an ever changing world (2016, November 8) retrieved 16 August 2024 from <https://phys.org/news/2016-11-difference-world.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.