
Isolation by elevation promotes speciation on islands globally

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Abstract

Islands and elevational gradients provide valuable opportunities for testing hypotheses to explain diversity gradients. One such hypothesis, which has received recent support from a global study of islands, is that isolation from equivalent climates increases per-species speciation rate. Higher-elevation areas on islands and continental mountains tend to be separated by longer distances from equivalent climates, predicting higher speciation rate and endemism at higher elevations. So far, this has only been tested for archipelago-level isolation and endemism. Here we test novel predictions derived from the hypothesis, for island plants: single-island endemics are correlated only with within-archipelago elevational isolation (prediction 1); multi-island endemics are correlated more strongly with extra-archipelago elevational isolation (prediction 2). Using 100 m elevational bands and entire floras for each of 32 high-elevation islands, we calculated the proportion of native species that are (i) single-island endemics, (ii) multi-island endemics and (iii) archipelago endemics. We tested their correlations with the different measures of elevational isolation. The results were consistent with both predictions: the percentage of single-island endemics correlates with isolation from the next island, while the percentage of archipelago endemics correlates with isolation from the mainland. This may represent an important step forward in understanding island endemism, and patterns of biodiversity more generally.

Keywords: Archipelago, elevational gradients, endemism, isolation, speciation

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