On the biogeography of adaptive radiations

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Adaptive radiation is a key process in the generation of novel species and biodiversity on earth, and understanding its basic mechanisms of high scientific interest. In a spatial setting, the relative rates of dispersal, local adaptation and local diversification (branching) determine much of the emerging patterns in terms of 'phylogenetic clustering', 'habitat filtering' or the biogeographical mode of speciation (allopatric vs. sympatric). We here investigate the emerging patterns from a simple but versatile model, with varying degrees of dispersal between habitats of different types. The whole range of divergence scenarios, from allopatric to sympatric, occur in the model, depending on the ecological setup. The extremes are well covered by contemporary understanding, but the middle-ground reveals new mechanisms of ecological divergence. We discuss the problem of determining the process from the pattern, but also the basic biogeography of ecological divergence and the spatial scale of selection.