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DARWINIAN SPECIATION ON A REGULATED ADAPTIVE LANDSCAPE

Darwin envisioned speciation as a gradual transformation from within-species diversity to between species one, driven by the fitness-advantage of reduced competition via niche-segregation. However, this suggestion has been considered problematic since the New Evolutionary Synthesis and replaced by the theory of allopatric speciation by Ernst Mayr.

The underlying mathematical issue is that the notions of niche and reduced competition have no meaning in the context of a rigid adaptive landscape. Instead, one has to consider the landscape (i.e. the fitness function) as a function of the phenotype-distribution in a functional analytic context. The functional derivative of this map is the competition function with the correct biological meaning. The adaptive dynamics phenomenology, including evolutionary branching, can be derived from this setup. In this way, development of the mathematical theory recreates the original, Darwinian intuition on speciation in a precise form.