
The unextinct: Living fossils and their place in evolutionary theory

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Abstract

Session: Perspectives on Extinction (David Sepkoski, Julien Delord, Marco Tamborini)
There are many well documented living fossils, from Darwin's example of South American lungfish (*Origin*, first edition, p. 107), to the chambered nautilus, the coelacanth, ginkgos, and the wollemi pine tree (a.k.a. the "dinosaur tree"), not to mention the recently discovered single-celled "sea grapes" living on the ocean floor near the Bahamas. These examples show that in some cases, evolutionary history is characterized by long stretches of morphological stasis. Living fossils provide a good test case for thinking about two issues in evolutionary theory: (1) The first issue concerns natural state models and the burden of explanation. Is extinction the expected (or "natural") fate of every lineage, such that a failure to go extinct requires some special explanation? Or is persistence the default expectation, and extinction the phenomenon that needs explaining? (2) The second issue has to do with levels of explanation, and with the so-called hierarchical expansion of evolutionary theory. Some of the mechanisms proposed to explain stasis (e.g. stabilizing selection) would operate at the population level. There might also be differences among whole lineages that help explain differential persistence vs. extinction, raising the question whether a macro- vs. a micro-level explanation is more appropriate. Without addressing these philosophical issues concerning levels and direction of explanation, we will not have a good story to tell about the place of "the unextinct" in evolutionary theory.

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