Integrating Phylogenetics and Morphology to Study Diversification and Species Limits in Madagascar's Tenrecs (Tenrecidae)

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Abstract

Madagascar is one of the world's hottest biodiversity hotspots and a natural laboratory for evolutionary research. Tenrecs (Tenrecidae; 32 currently recognized species) – small placental mammals endemic to Madagascar – colonized the island >35 million years ago and have evolved a stunning range of behaviors and morphologies, including heterothermic species; species with hedgehog-like spines; and fossorial, aquatic, and scansorial ecotypes. In 2016, we produced the first taxonomically complete phylogeny of tenrecs, which has served as a framework for studying morphological evolution, phylogeography, and species limits. Most recently, we have built on this phylogeny to incorporate an enormous database of genetic, morphometric, and geographic data from >800 vouchered tenrec specimens. These data have revealed interesting and unexpected aspects of their evolutionary history, including decoupled diversification of the cranium and postcranium. Using a machine learning approach, we have also uncovered numerous new, cryptic species in the family Tenrecidae. As phylogenetic and phenotypic data become more readily available through online repositories, we expect that the same approaches can be applied to other taxonomic groups, providing unprecented resolution of the tree of life.

Keywords

Madagascar, tenrecs, morphology, phylogenetics, cryptic species, machine learning

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