Island versus mainland evolution of a 'great speciator': contrasting patterns of morphological diversification in the white-eye radiation

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Abstract

Islands and continents have had profound effects on how biodiversity is shaped. While evolutionary processes are predicted to follow different patterns in island and mainland radiations, the extent to which these geographical contexts influence evolutionary trajectories remains poorly understood. This is in part because few studies have focused on species-rich groups that are highly dispersive, and which can colonise continents and archipelagos over comparable timeframes. To address this knowledge gap, this talk will focus on *Zosterops* (white-eyes), a highly diverse, yet cryptic songbird genus that has been lauded as a 'great speciator.' Focusing on taxa from Africa-Arabia and associated islands, including the archipelagos of the western Indian Ocean and Gulf of Guinea, a comprehensive multi-locus phylogeny for the region was generated harnessing field and museum collections. The resulting hypothesis revealed exceptionally recent colonisation of the mainland (1.3-2.78 Ma) from Asia, with subsequent independent colonisations of islands, as well as highlighting substantial hidden diversity. Trait data from museum specimens was also generated and combined with the phylogeny using various comparative methods, allowing hypotheses of morphological evolution to be tested in a radiation spanning different geographic scales. Although an early burst and slowdown pattern of lineage accumulation for this radiation was identified supporting a previous study, this is coupled to apparent convergence on particular phenotypes. An absence of an adaptive signal of phenotypic evolution in *Zosterops* is not, however, unsurprising given the overall remarkably cryptic phenotypes exhibited in this genus. Notably, this phenotypic signal is shown to be strongly driven by mainland taxa, which is suggested to have been caused by niche divergence through repeated speciation between highland and lowland habitats, in which phenotypes appear to be highly constrained within particular environments. In contrast, island birds are generally not distinguishable from a random-walk model and have repeatedly expanded into novel areas of morphospace. It is suggested the different trajectory of evolution in insular *Zosterops* radiations arises from a lack of species competition, with an increase in ecological opportunity thereby providing a release to phenotypic constraints experienced by continental taxa.

Keywords: Disparity, through, time, cryptic species, diversification, niche divergence, competition

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