



Speciation across biomes: rapid diversification with reproductive isolation in the Australian delicate mice.

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Phylogeographic studies of continentally distributed clades provide powerful insight into how environment drives speciation across climatic contexts. Australia, a continent of disparate modern biomes and dynamic climate change, is a model system for reconstructing the impact of past and present environments on diversification. Here we use genomic-scale data to investigate Pleistocene diversification, cryptic diversity, and secondary contact in the Australian delicate mice (Hydromyini: *Pseudomys*), a recent radiation spanning almost all Australian environments. Across northern Australia, we find no evidence for introgression between cryptic lineages within *Pseudomys delicatulus* sensu lato, with palaeoclimate models supporting contraction and expansion of suitable habitat since the last glacial maximum. Despite multiple contact zones, we also find little evidence of introgression at a continental scale, with the exception of a potential hybrid zone in the mesic biome. In the arid zone, combined insights from genetic data and palaeomodels support a recent expansion in the arid specialist *P. hermannsburgensis*, and contraction in the semi-arid *P. bolami*. Based on genomic and morphological data, we revise the taxonomy of the delicate mice. In the face of repeated secondary contact, sperm morphological differences and chromosomal rearrangements are potential mechanisms that maintain species boundaries in these recently diverged species.

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