



Patterns of diversification and trait evolution in Australian orchids.

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Orchidaceae are one of ten largest vascular plant families of the Australian flora, constituting a rich and highly endemic orchid flora with more than 1600 species and displaying a high degree of endemism with over 90%. Many Australian orchid lineages have diversified significantly during the Cenozoic era amidst dramatic environmental shifts. Their diverse morphological, physiological, and ecological traits offer valuable insights into macroevolution, yet unresolved evolutionary relationships pose challenges to understanding the forces driving their unique diversity. Overcoming these challenges requires addressing issues such as minimal genetic differentiation among closely related taxa and the prevalence of hybridization and whole-genome duplication events in Australian orchids. The advent of high-throughput DNA sequencing methods presents an opportunity to untangle these intricate evolutionary relationships. This study aims to construct robust, extensively sampled phylogenies for selected Australian orchids lineages using high-throughput DNA sequencing data to explore the evolution of key morphological, physiological, and ecological traits. Through the application of macroevolutionary models, this study aims to identify traits associated with increased speciation or extinction rates, trace the evolutionary trajectory of these traits, and shed light on the processes that have shaped the present-day diversity of orchids in Australia.

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