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Contributions of ecophysiological divergence to Neotropical plant diversity

Understanding the evolutionary mechanisms behind the extreme plant biodiversity in the Neotropics remains a focal topic in biology. Adaptation to the environment can lead to species divergence, although empirical evidence for this process in the Neotropics is sparse. An ecophysiological approach can assess the interrelationship between physiological function and environment as a driver for speciation. The diversity and geographic radiation of species in *Costus* render the genus an excellent study system to explore how ecophysiological traits may confer adaptation and contribute to the functional diversity of Neotropical understory herbs. I investigate how a suite of ecophysiological traits measured in *Costus* species in a common greenhouse environment correlate with source climatic conditions and assess the capacity for these relationships to drive speciation. I utilize comparative phylogenetics to evaluate how constrained or labile these traits are over evolutionary time through the calculation of phylogenetic signal and evolutionary rate. Here I show that ecophysiological traits are not tightly correlated with source climatic conditions, and I demonstrate that half of traits display strong phylogenetic signal and low evolutionary rates. This suggests that trait-macroclimate relationships alone do not drive speciation in the Neotropics, but may be one of several abiotic and biotic factors contributing to the diversity of Neotropical flora. This study also contributes to the ongoing dialogue on how phylogenetic signal relates to trait lability and conservatism in the evolutionary process.