



A Parthian shot at neutrality: revisiting the neutrality assumption for tropical tree species



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ABSTRACT:

Hubbell's neutral theory of biodiversity challenges the classical niche-based view of ecological communities, where species attributes and environmental conditions jointly determine community composition. Functional equivalence among species, as assumed by neutral ecological theory, has been recurrently falsified, yet many patterns of tropical tree communities appear consistent with neutral predictions. This may mean that neutral theory is a good first-approximation theory or that species abundance data sets contain too little information to reject neutrality. Here we present a simple test of neutrality based on species abundance distributions in ecological communities. Based on this test, we show that deviations from neutrality are more frequent than previously thought in tropical forest trees, especially at small spatial scales. We then develop a nonneutral model that generalizes Hubbell's dispersal-limited neutral model in a simple way by including one additional parameter of frequency dependence. We also develop a statistical method to infer the parameters of this model from empirical data by approximate Bayesian computation. In more than half of the permanent tree plots, we show that our new model fits the data better than does the neutral model. Finally, we discuss whether observed deviations from neutrality may be interpreted as the signature of environmental filtering on tropical tree species abundance distributions.

This study is mostly based on

F Jabot and J Chave, 2011, Analyzing Tropical Forest Tree Species Abundance Distributions Using a Nonneutral Model and through Approximate Bayesian Inference *American Naturalist*.

with some background information on the biological question for the broader audience of a biomathematics seminar.

Host: Elliot M. Landaw, M.D., Ph.D.

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