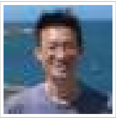
2 Historical contingency in species interactions: towards niche-based predictions.

Vannette RL, Fukami T.

Ecol Lett. 2014 Jan; 17(1):115-24

Recommendations:

15 Jan 2014 Recommended



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New Finding

DOI: 10.3410/f.718220273.793489553

Sequence of arrival of species critically determines the ecological community structure because early-arriving species can have effects on later species through direct (e.g. competition) and indirect (e.g. change of the environment) species interactions. This is known as priority effects. In other words, priority effects have important consequences on the sequence of community assembly. But what determines priority effects? To tackle this issue, Vannette and Fukami propose to consider niche components (niche overlap, impact niche, and requirement niche) to predict the priority effects. Using a model system of nectar-inhibiting microorganisms, Vannette and Fukami for the first time show empirically that priority effects can be predictable based on classic niche theory. Their findings make a significant contribution to our understanding of community assembly, with implications on predicting ecosystem functioning in the context of environmental changes.

Disclosures
None declared

Comments:

No comments yet.

Abstract:

The way species affect one another in ecological communities often depends on the order of species arrival. The magnitude of such historical contingency, known as priority effects, varies across species and environments, but this variation has proven difficult to predict, presenting a major challenge in understanding species interactions and consequences for community structure and function. Here, we argue that improved predictions can be achieved by decomposing species' niches into three components: overlap, impact and requirement. Based on classic theories of community assembly, three hypotheses that emphasise related, but distinct influences of the niche components are proposed: priority effects are stronger among species with higher resource use overlap; species that impact the environment to a greater extent exert stronger priority effects; and species whose growth rate is more sensitive to changes in the environment experience stronger priority effects. Using nectar-inhabiting microorganisms as a model system, we present evidence that these hypotheses complement the conventional hypothesis that focuses on the role of environmental harshness, and show that niches can be twice as predictive when separated into components. Taken together, our hypotheses provide a basis for developing a general framework within which the magnitude of historical contingency in species interactions can be predicted.

DOI: 10.1111/ele.12204

PMID: 24341984