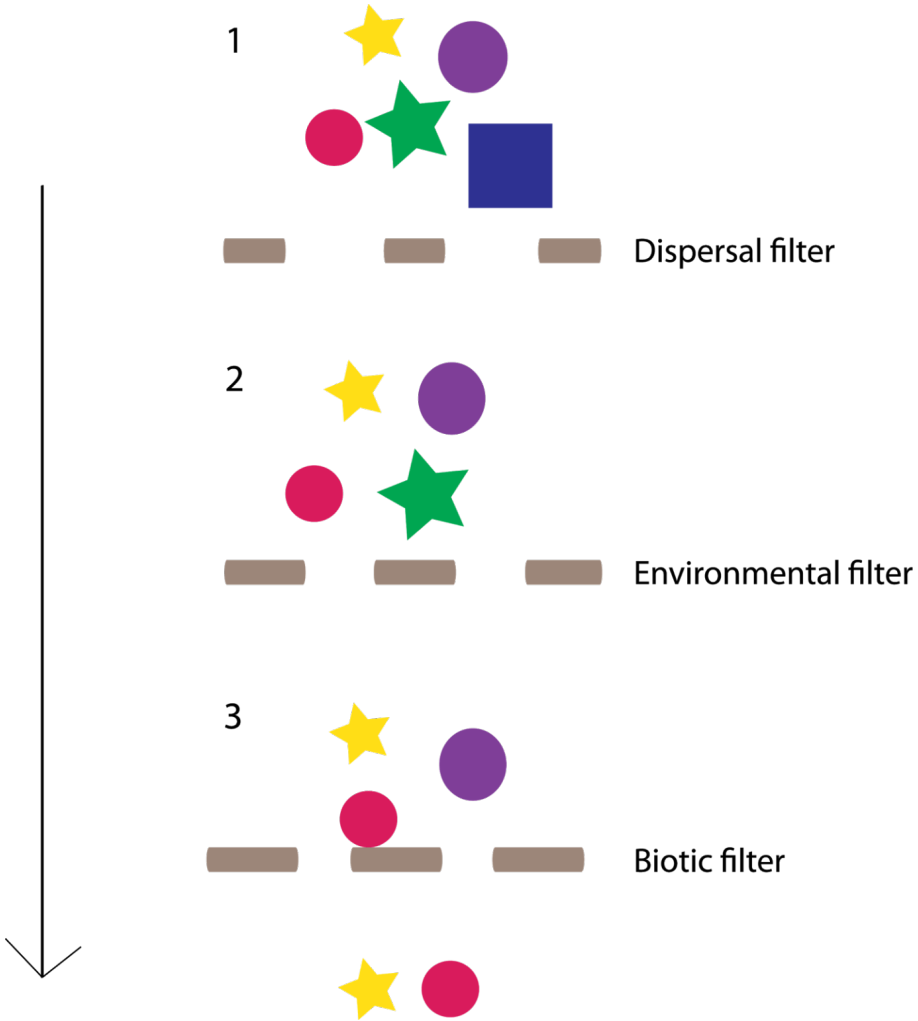
Phylogenetic community ecology

Species coexistence and phylogenetic trees



The process of community assembly

https://evol-eco.blogspot.com/2016/02/new-ways-to-address-old-idea-rethinking.html

Habitat filters select for species with similar traits

Introduction

Bromus

Phleum

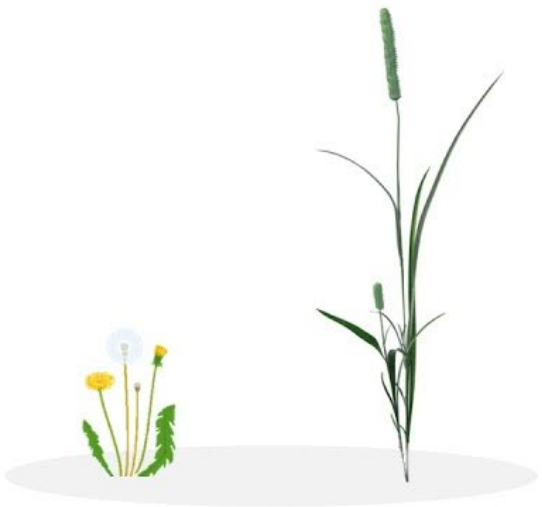
LIMITING SIMILARITY

The environment limits the coexistence of functionally similar, co-occurring species

(MacArthur and Levins 1967; Diamond 1975; Watkins and Wilson 2003)

Taraxacum

Phleum

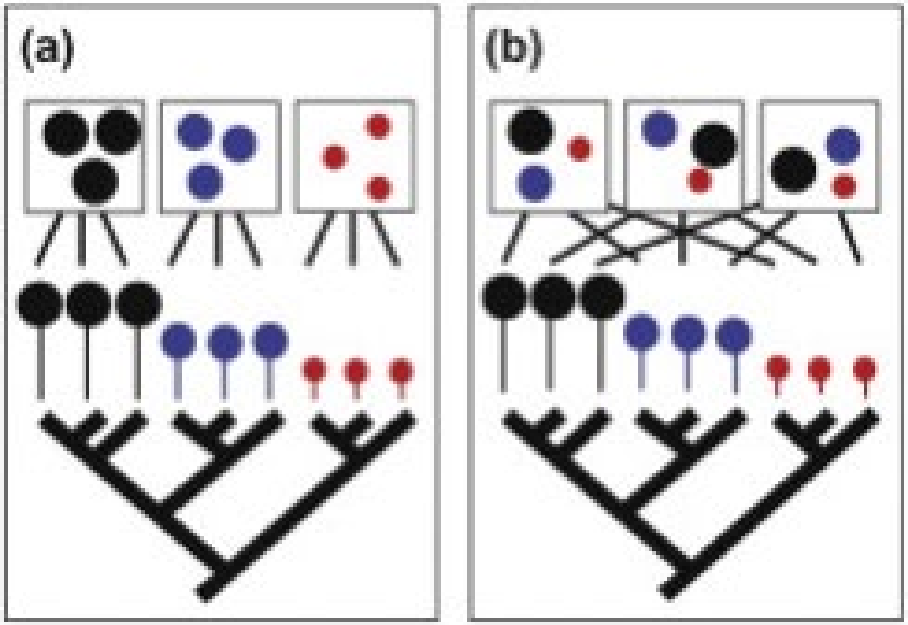


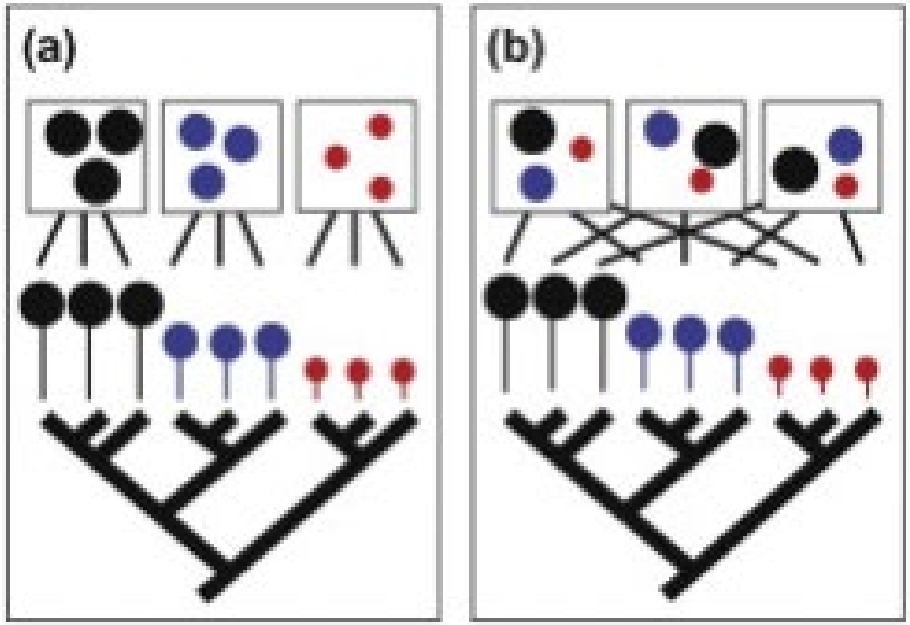
https://www.youtube.com/watch?v=sDSF7pKvp4o

Competition selects for species with different traits

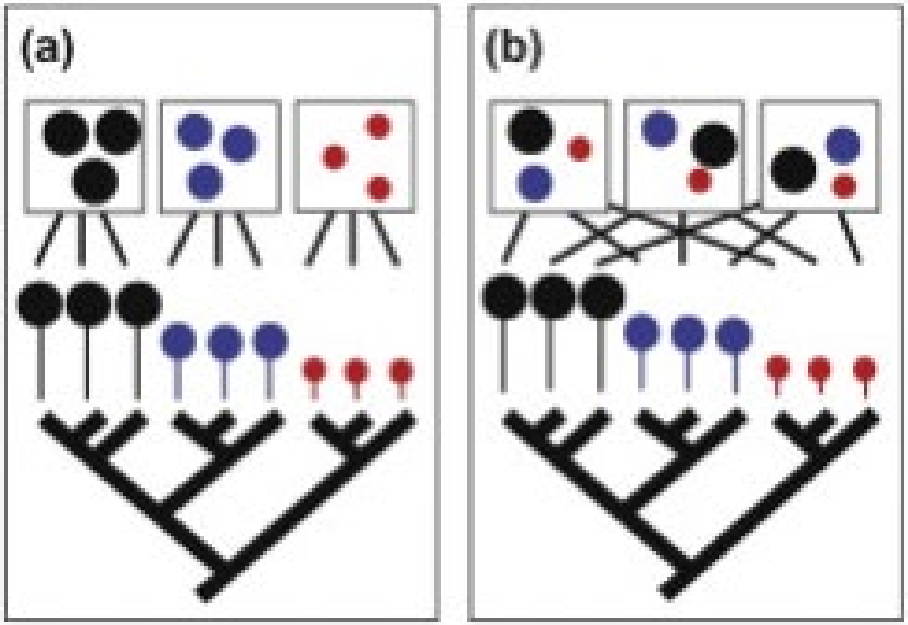
The core idea of **phylogenetic community ecology** is that we can use the tree as a proxy for the traits that allow species to coexist in communities

If we assume similar species have similar traits:


(a)
(b)

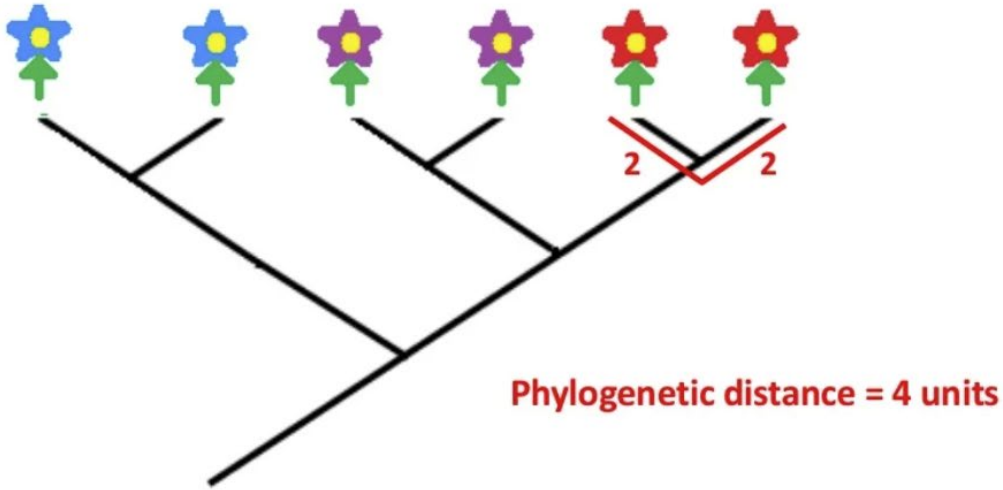


Clustered pattern = environmental filtering



Overdispersed pattern = competition

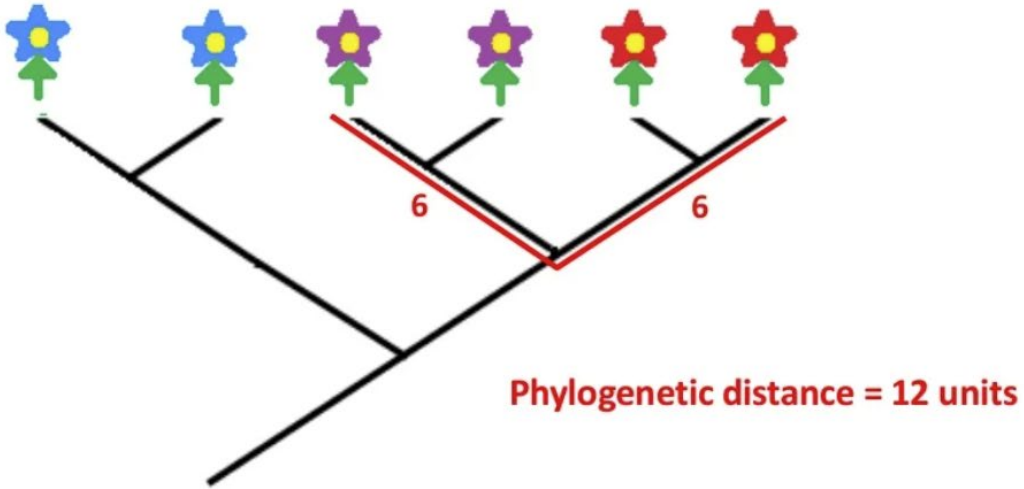
Phylogenetic distance to estimate community relatedness



Because branch lengths are proportional to evolutionary time, we can sum them for the community

Rachael Germain

Phylogenetic distance to estimate community relatedness



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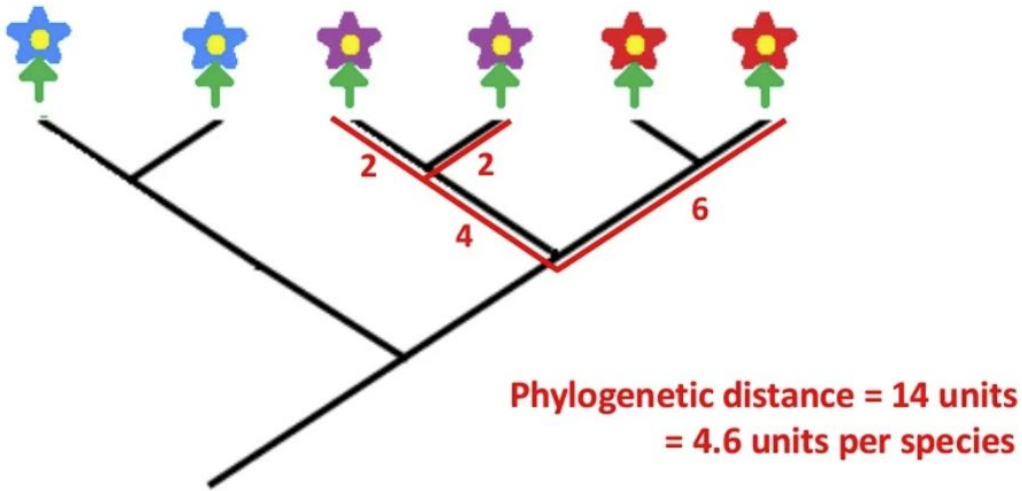

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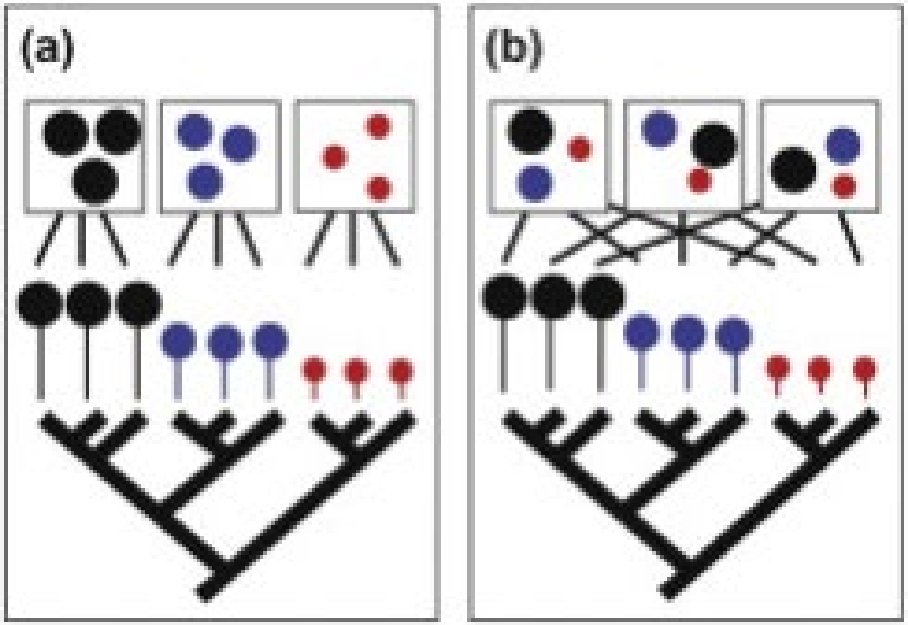
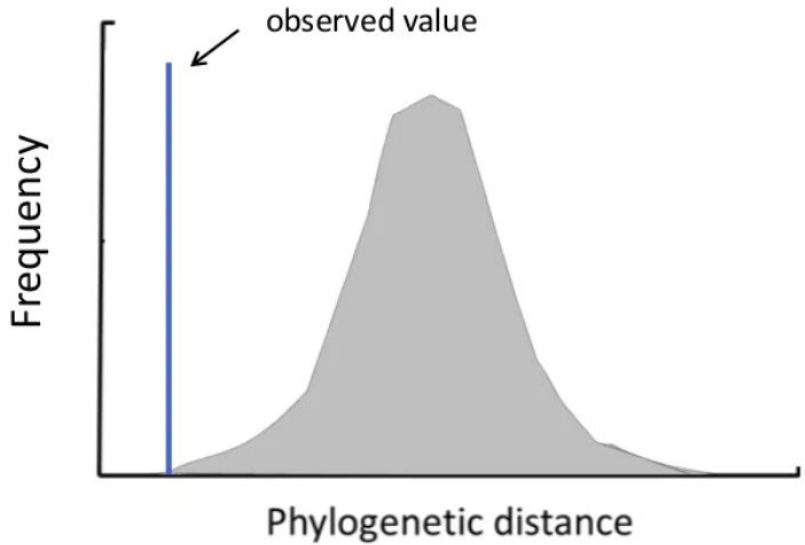
We can then compare our metrics to a null distribution of randomly assembled communities

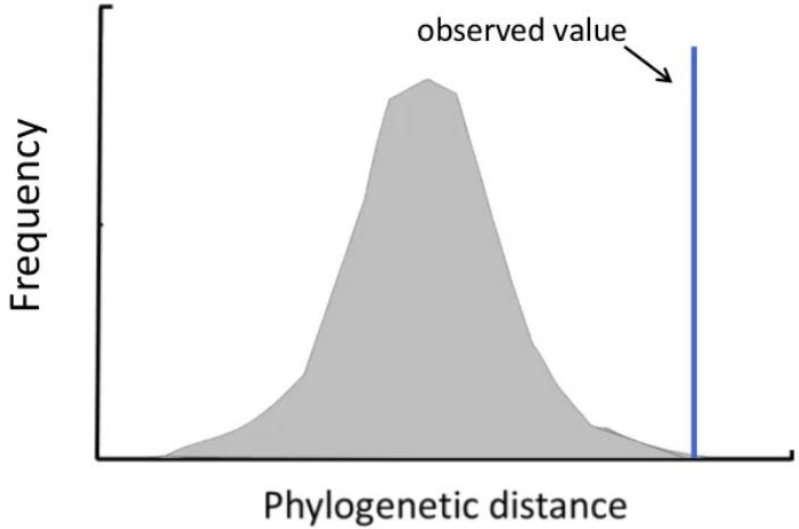

(a)
(b)

Null models in phylogenetic community analyses

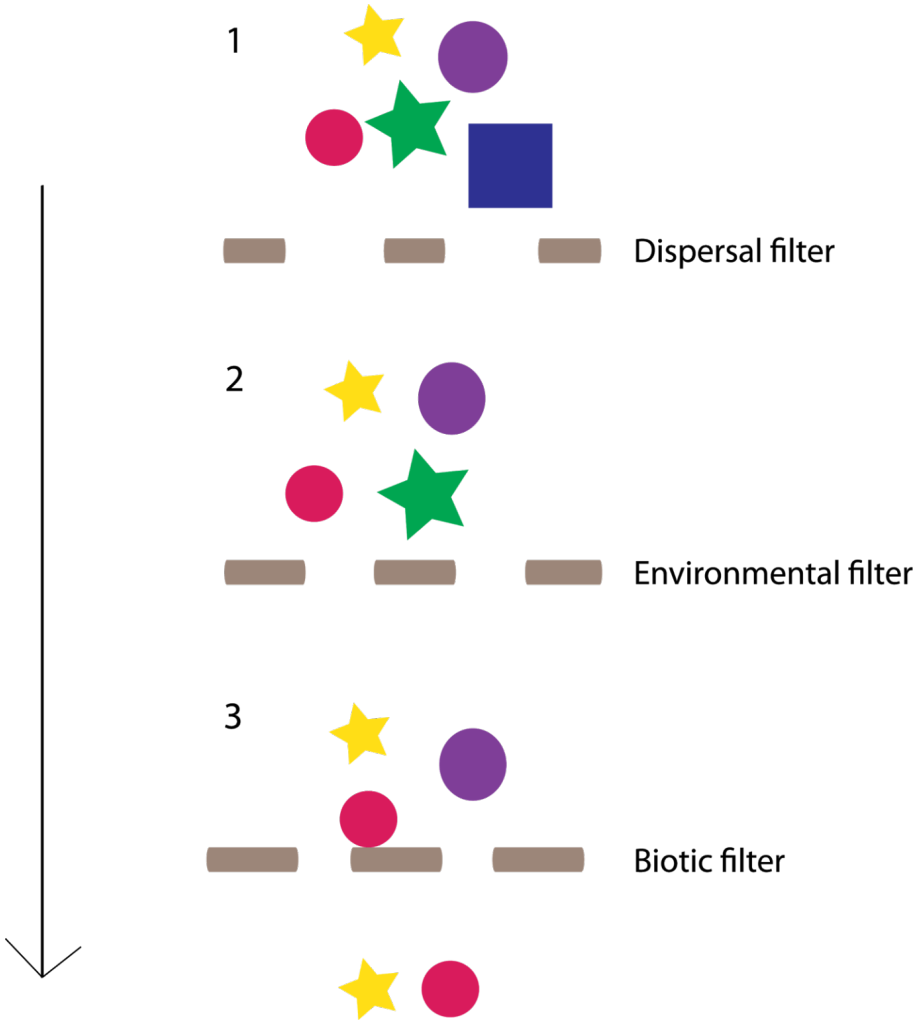


The observed value is significantly **less than** the null expectation under **environmental filtering**

Null models in phylogenetic community analyses



The observed value is significantly **greater than** the null expectation under **competition**



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