

# Community Ecology Stuff

Some types of community interactions:

Competition

Predation

Spectrum of symbioses (Commensals, Parasites, Mutualists)

Niches

Resource partitioning

Competitive exclusion

Trophic structure (Drivers and consequences)

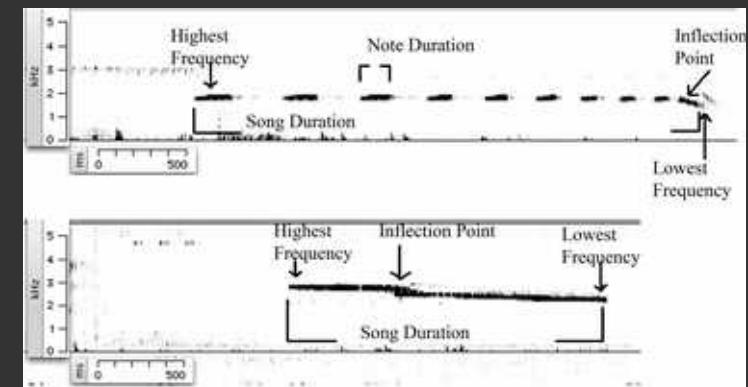
Disturbance / Succession / Priority effects

Biodiversity (Meaning, Measurement, Comparisons)

Roller Derby

Dusty houses

Leafcutter ants



# Population or community?



# Inter- and Intra-specific interactions



Competition



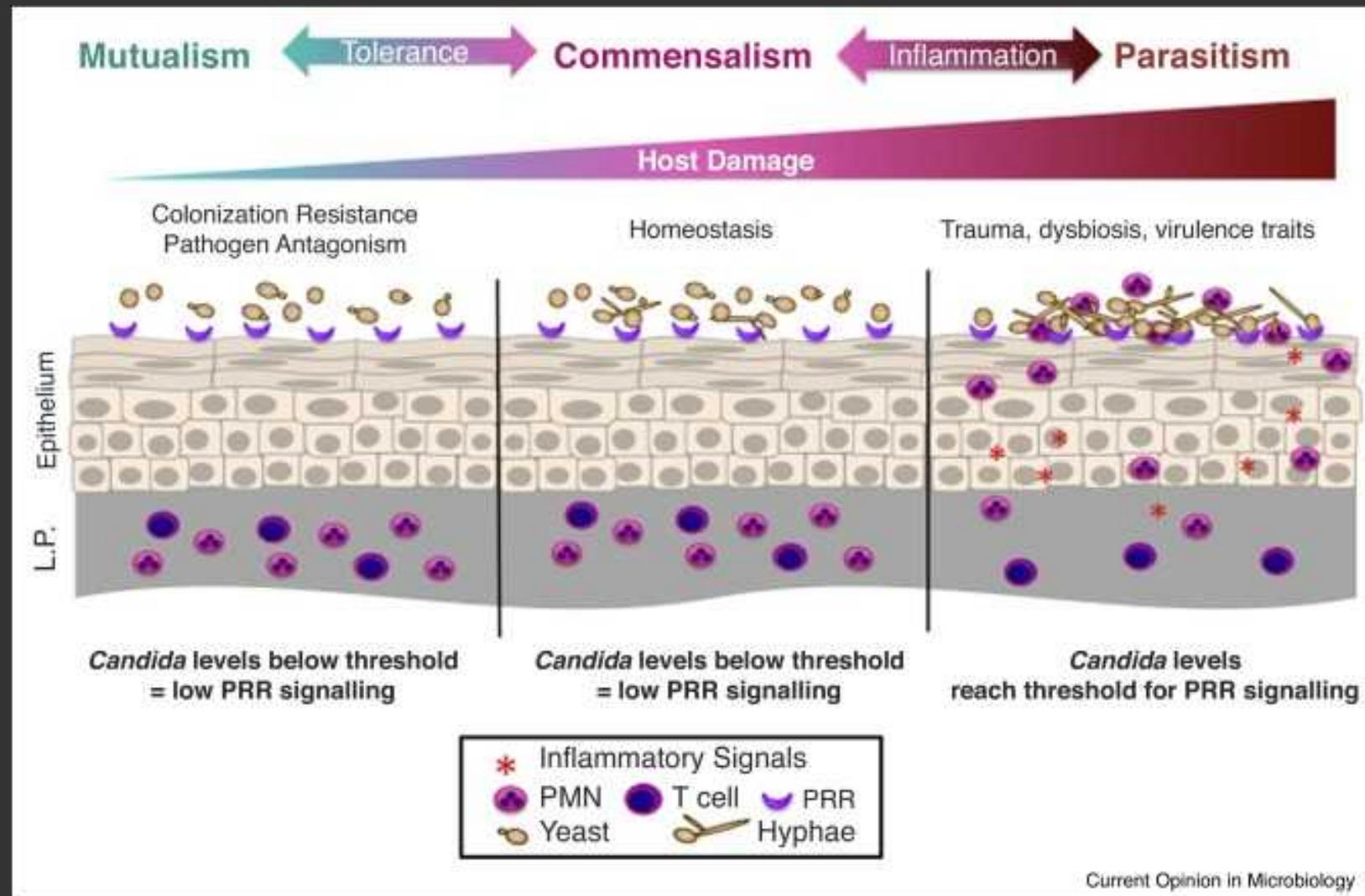
Predation



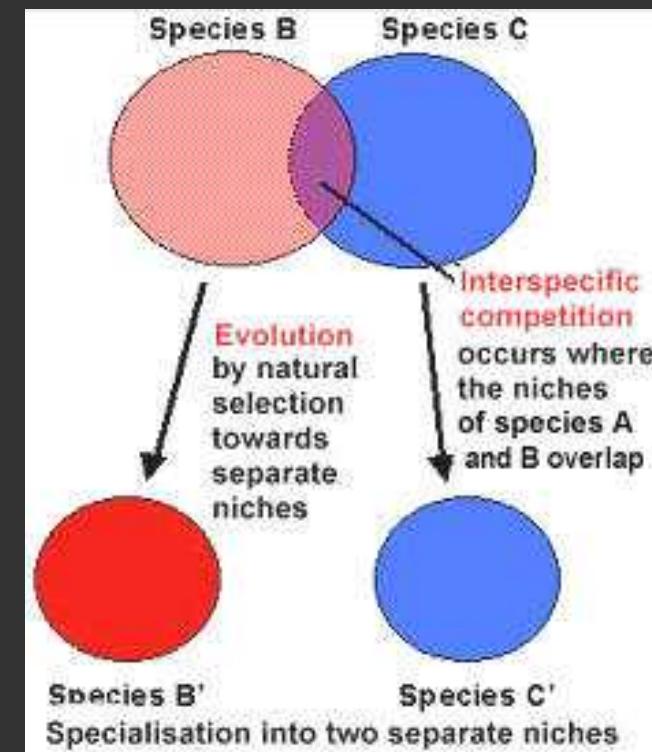
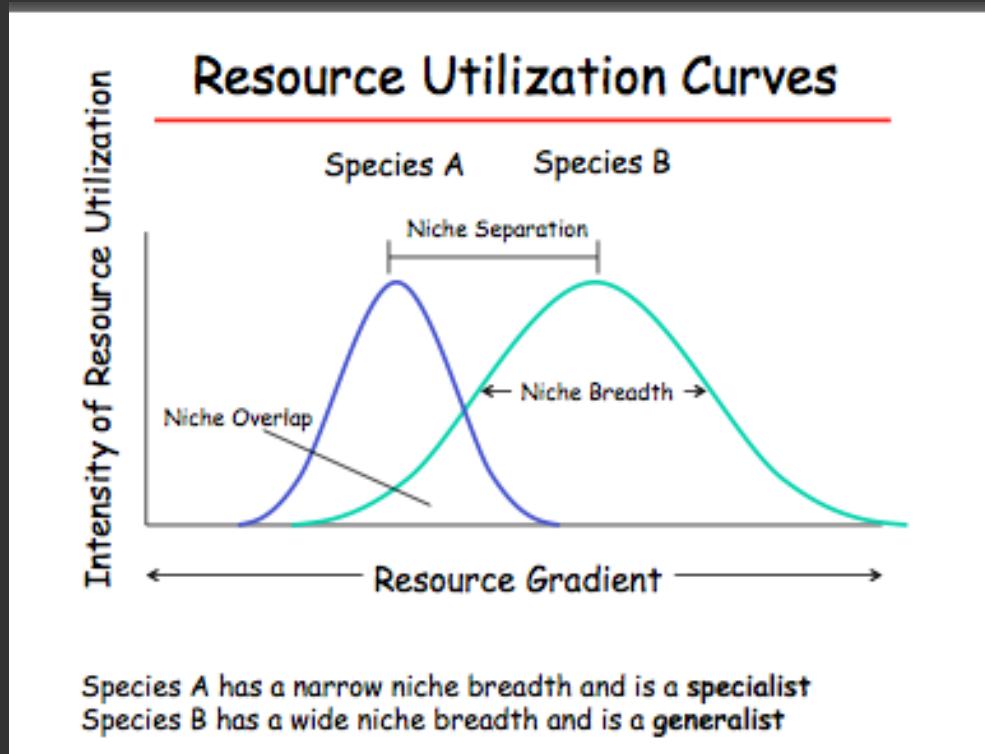
Symbioses



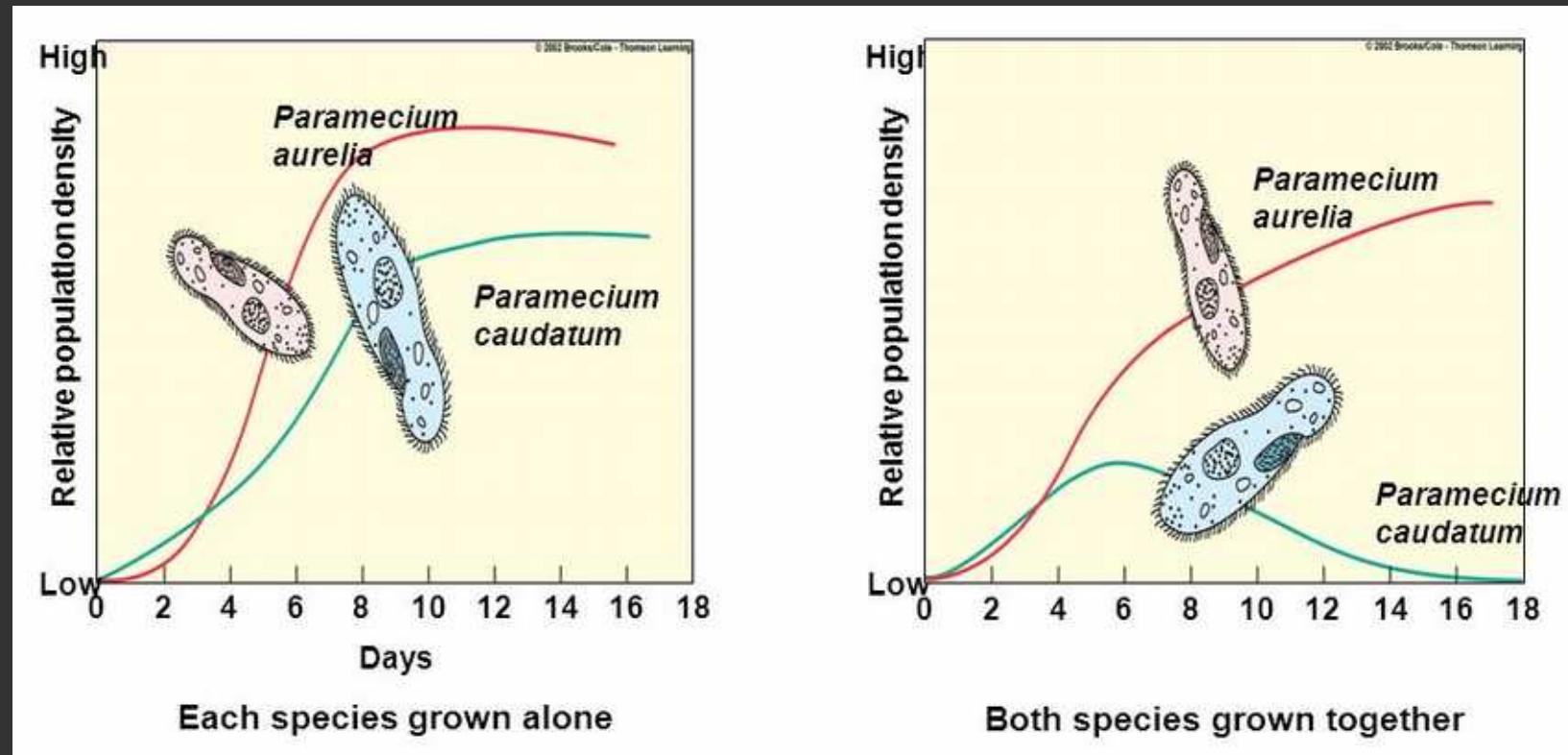
# Symbioses exist on a spectrum



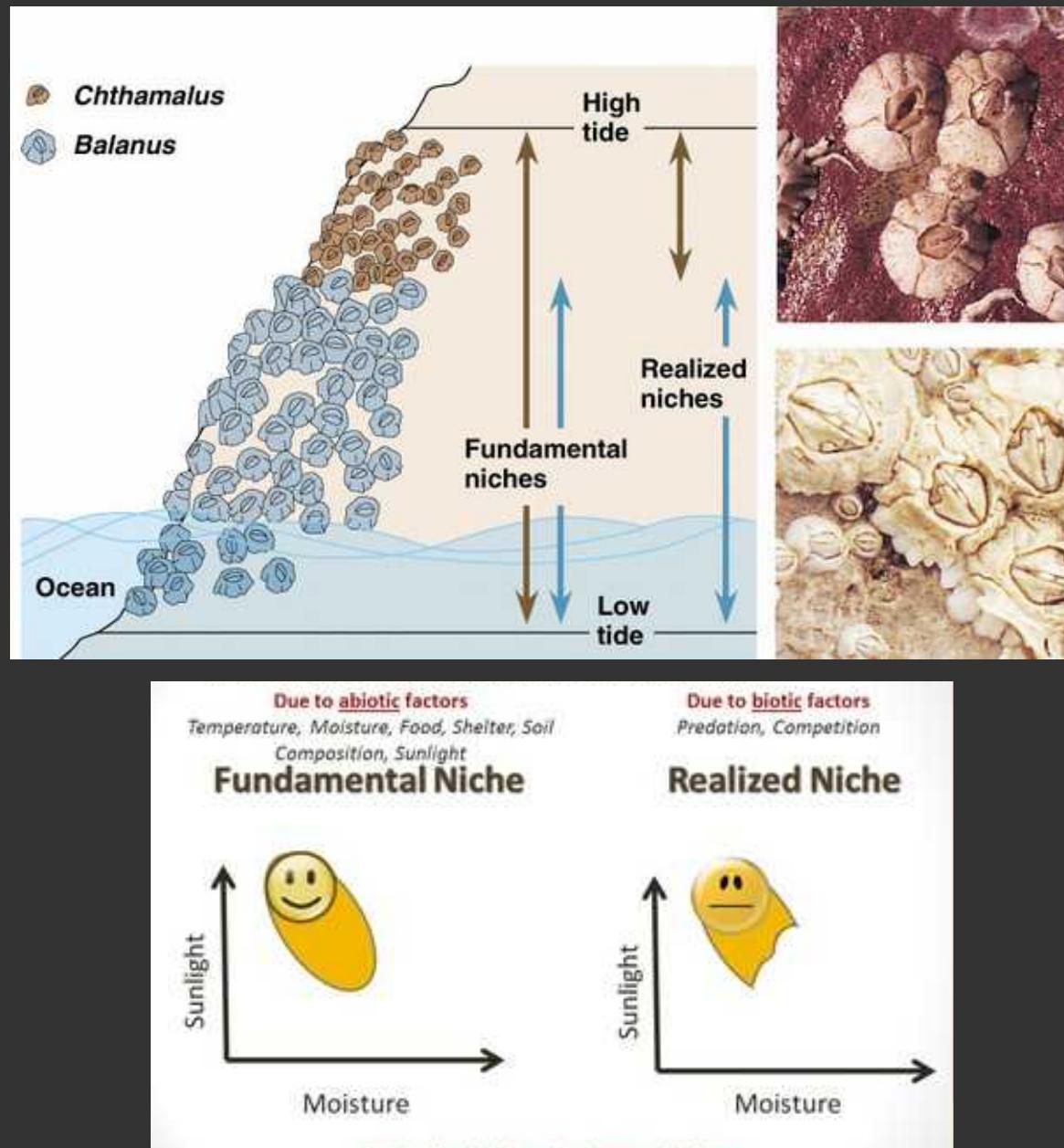
# How can many species inhabit the same area?



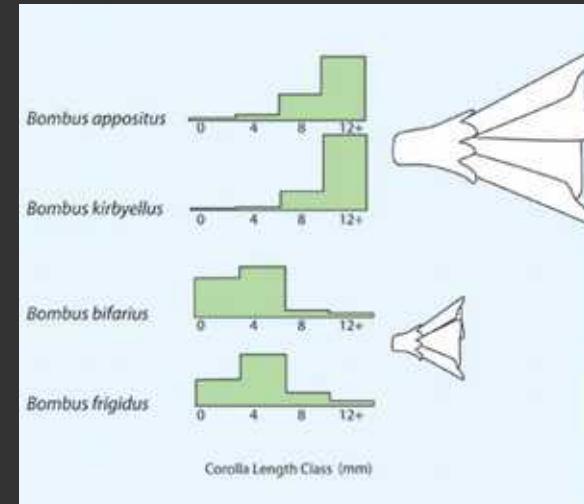
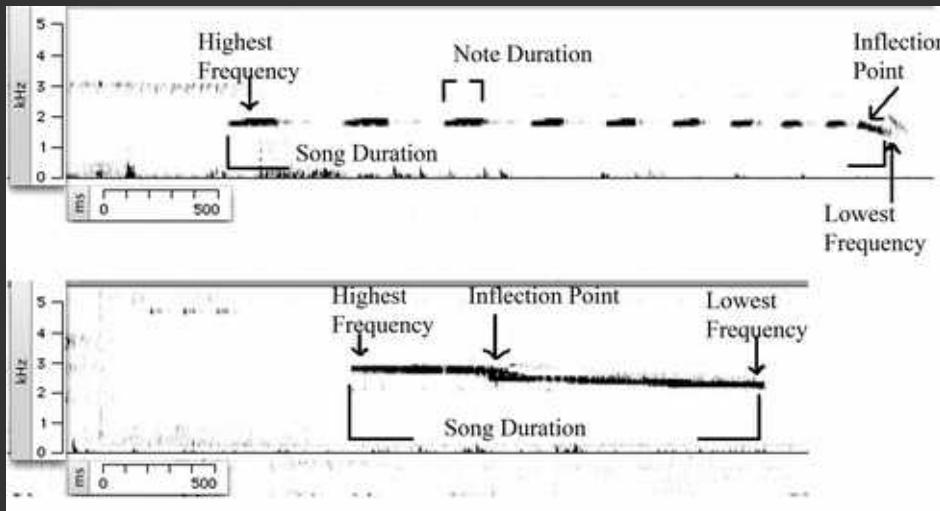
# Competitive exclusion



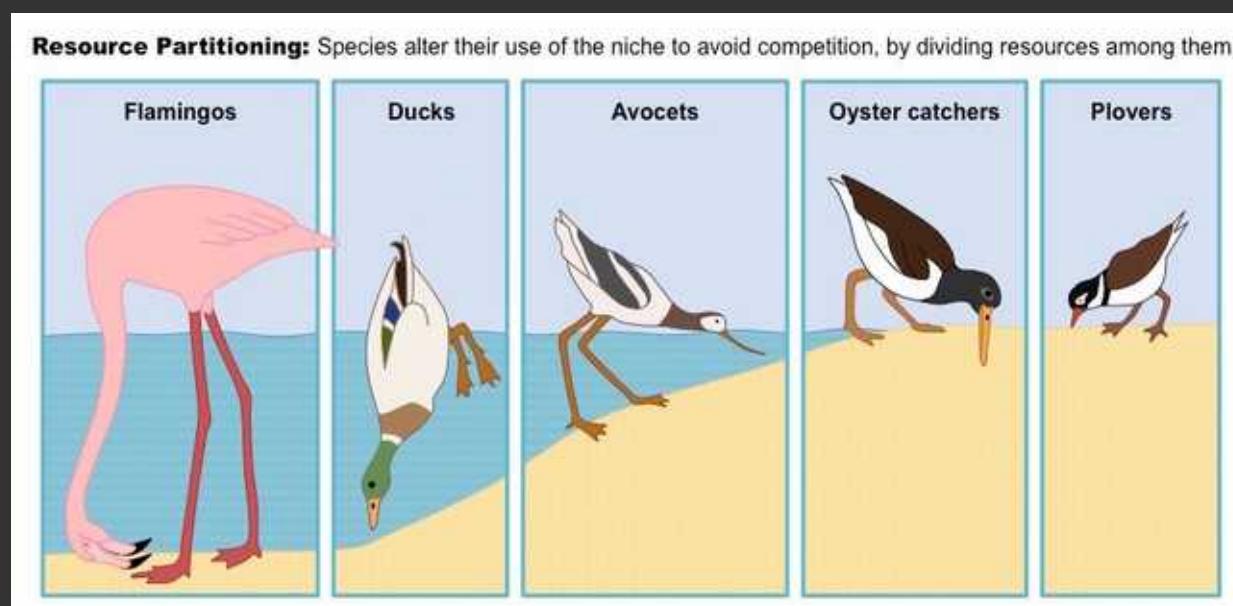
# Fundamental vs Realized niches



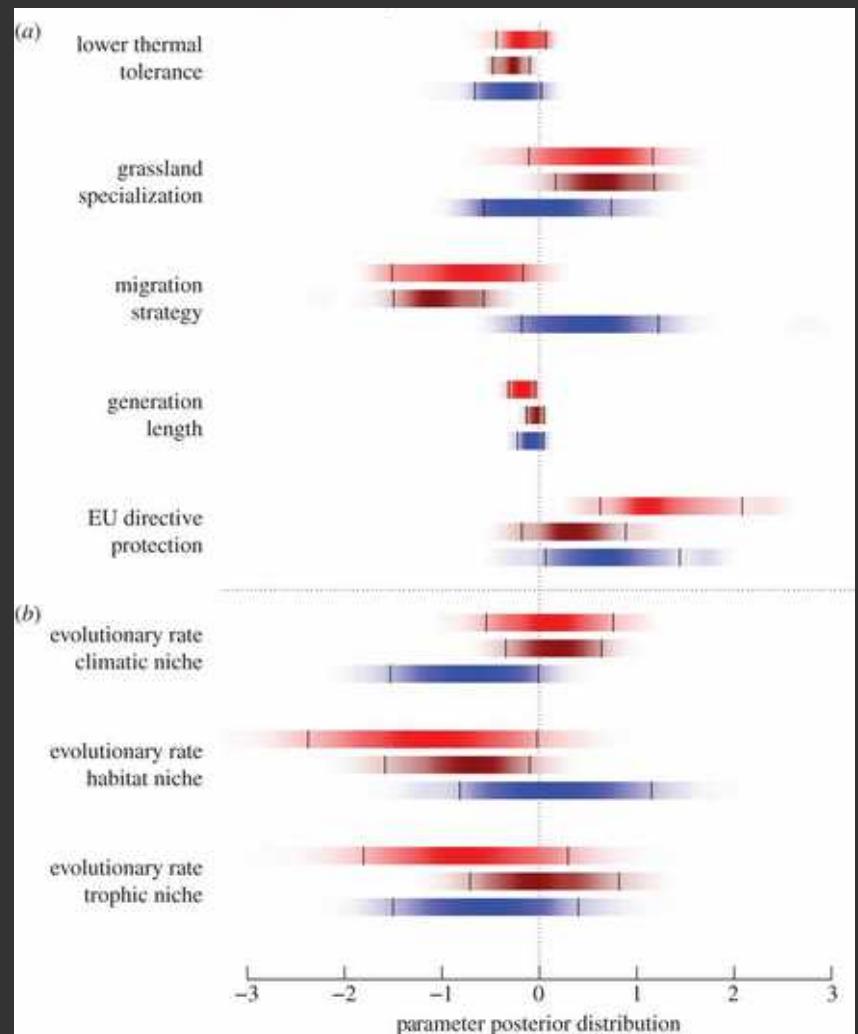
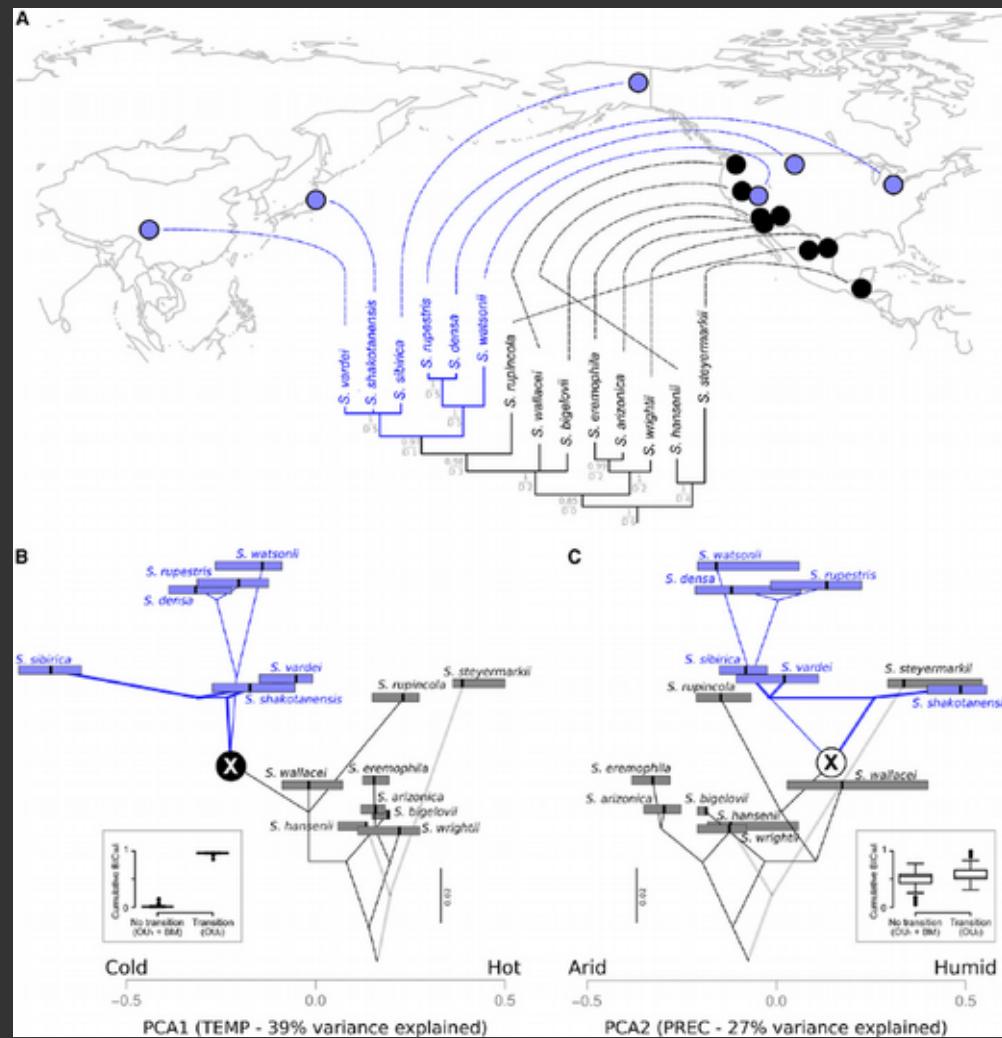
# Resource partitioning (competition avoidance)



Temporal  
Spatial  
Acoustical  
EMS  
Food source  
etc.



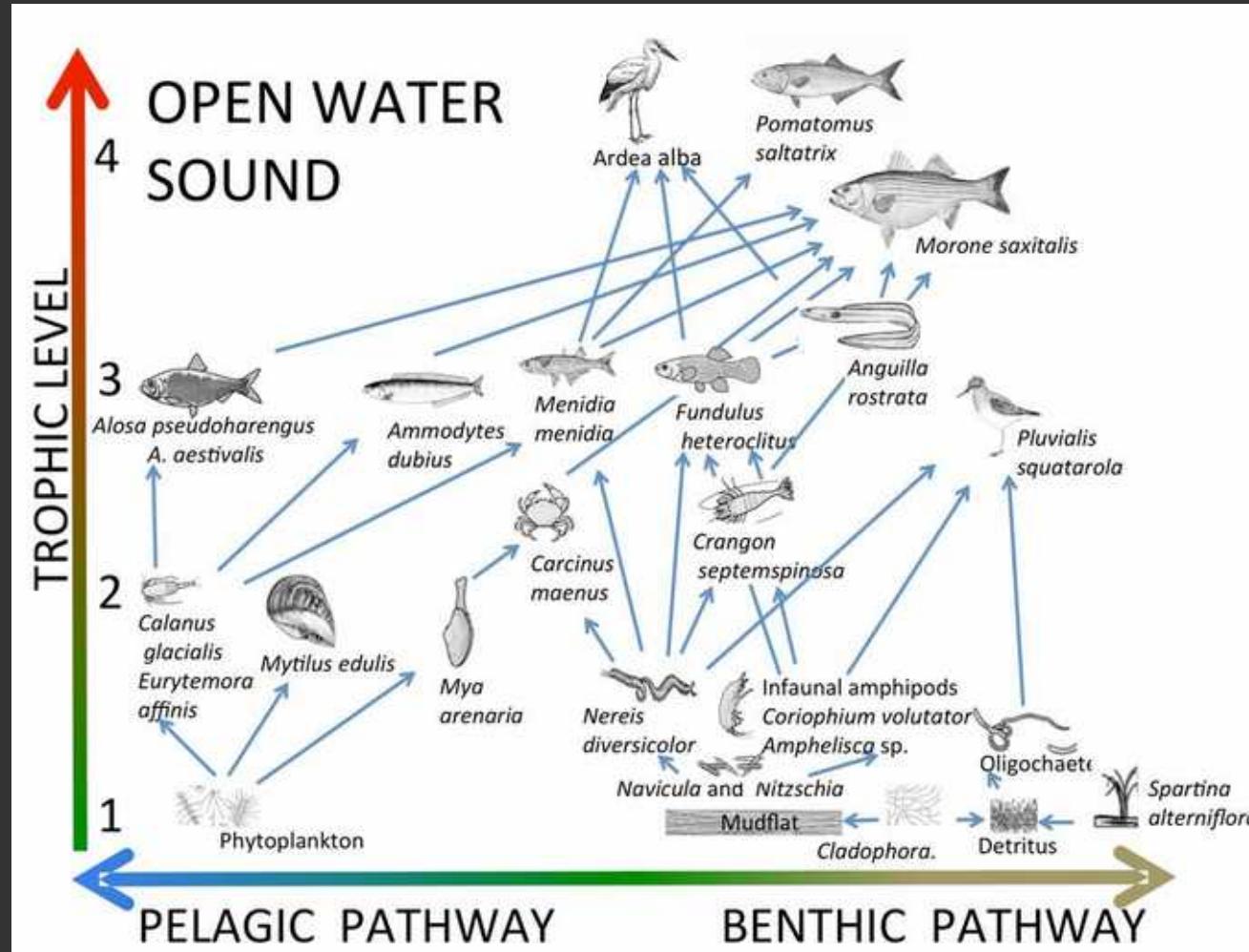




## Evolution of niches influenced by historical niche flexibility and climate change

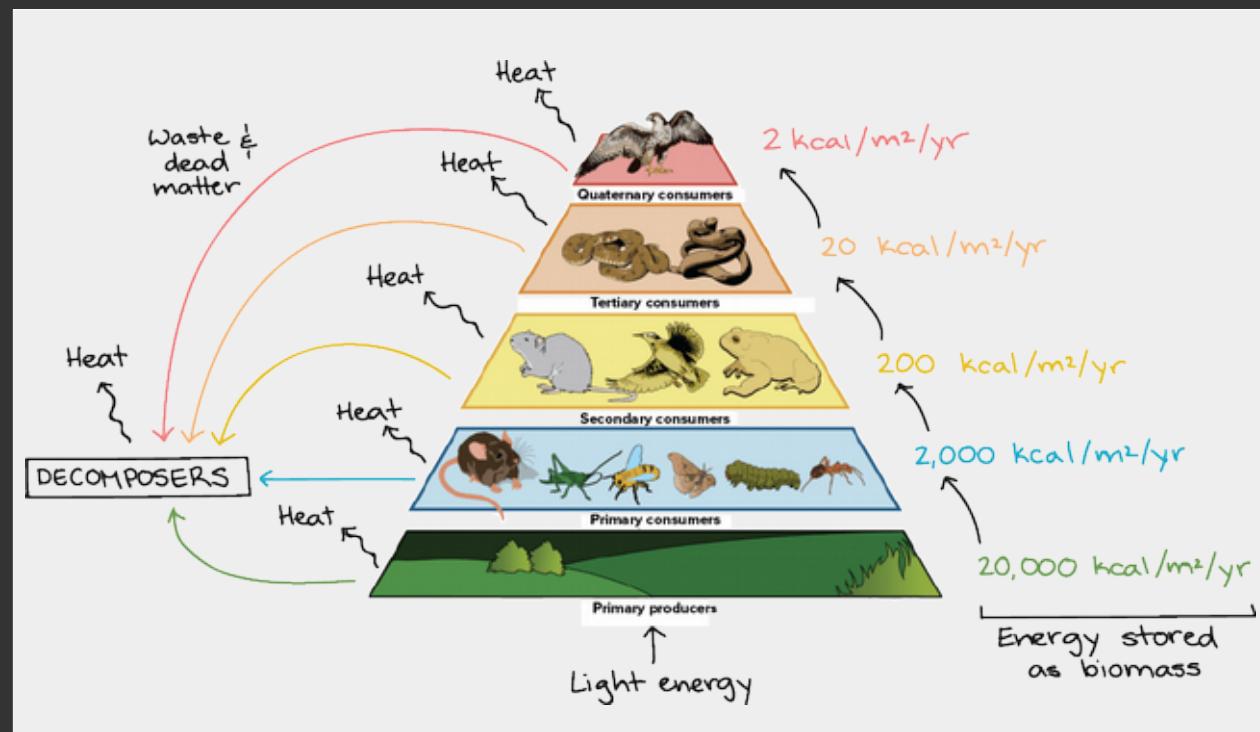
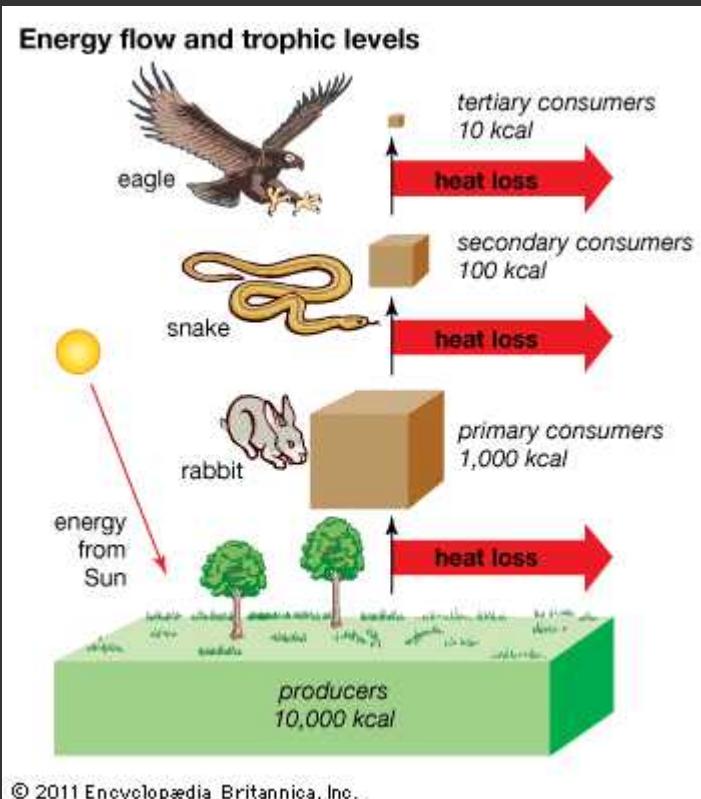
The selective pressure driving niche evolution is competition!

# Every community has a trophic structure



How many links in this food chain?

# "Why are big fierce animals rare?"



# Symbiosis = "living together"



# Communities: Shiny happy people holding hands!



"...a harmony of overwhelming and collective murder."

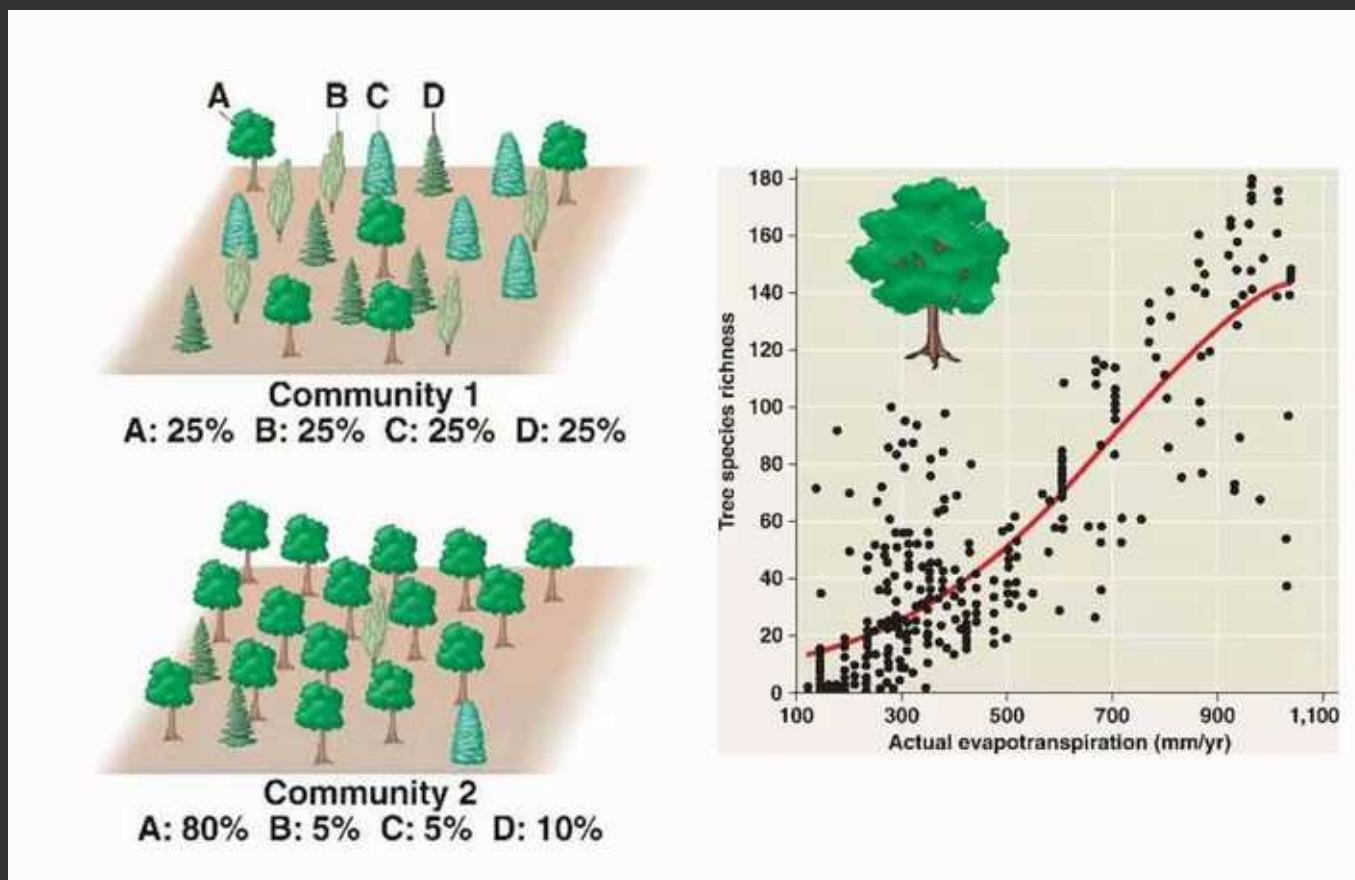


# Biodiversity

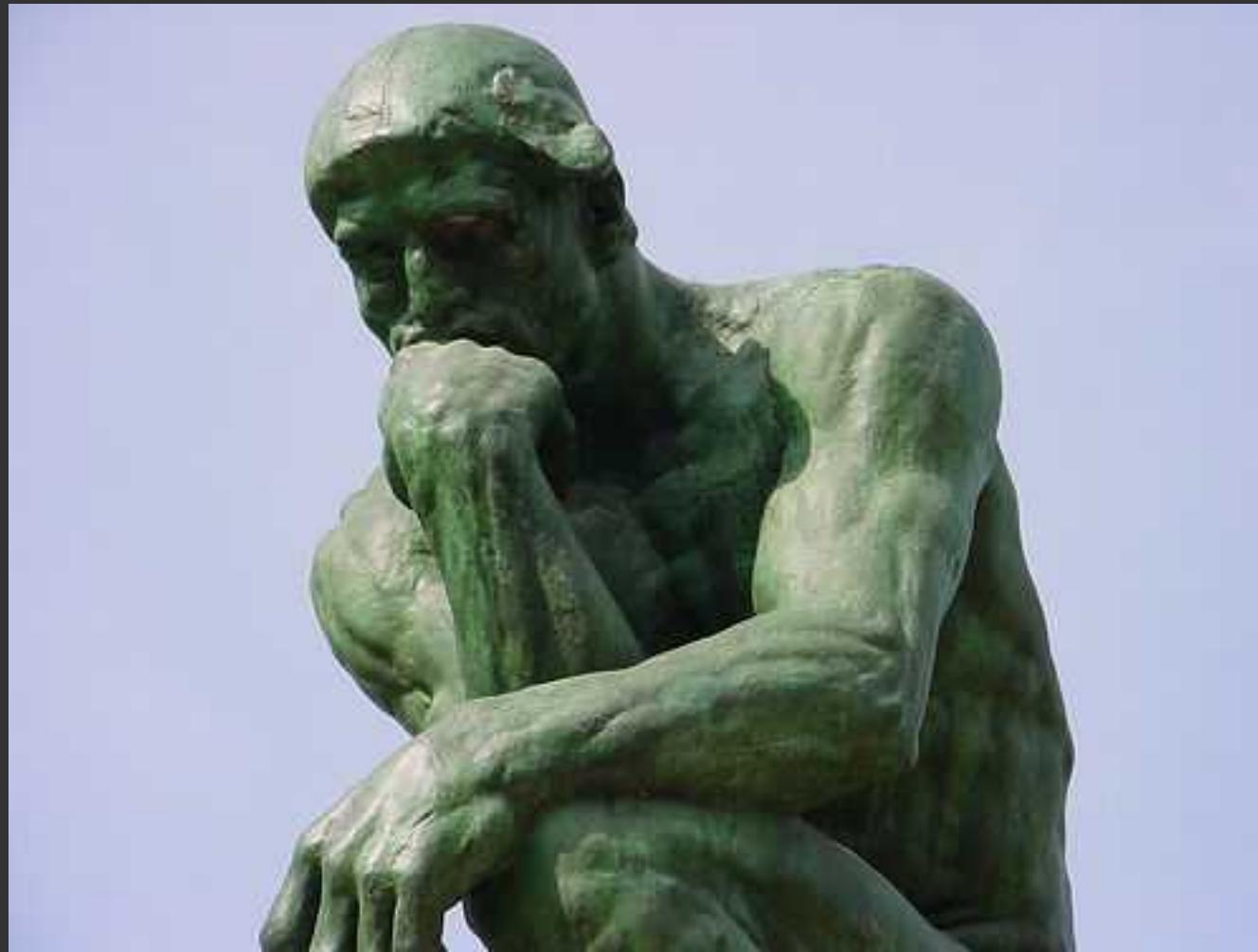


# Biodiversity

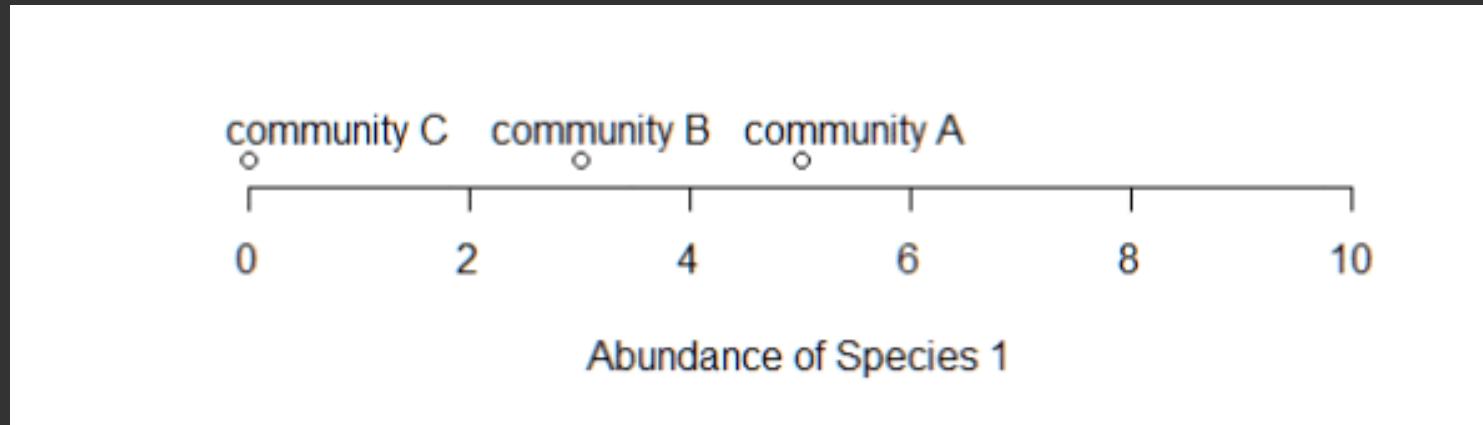
## Species Richness and Species Evenness



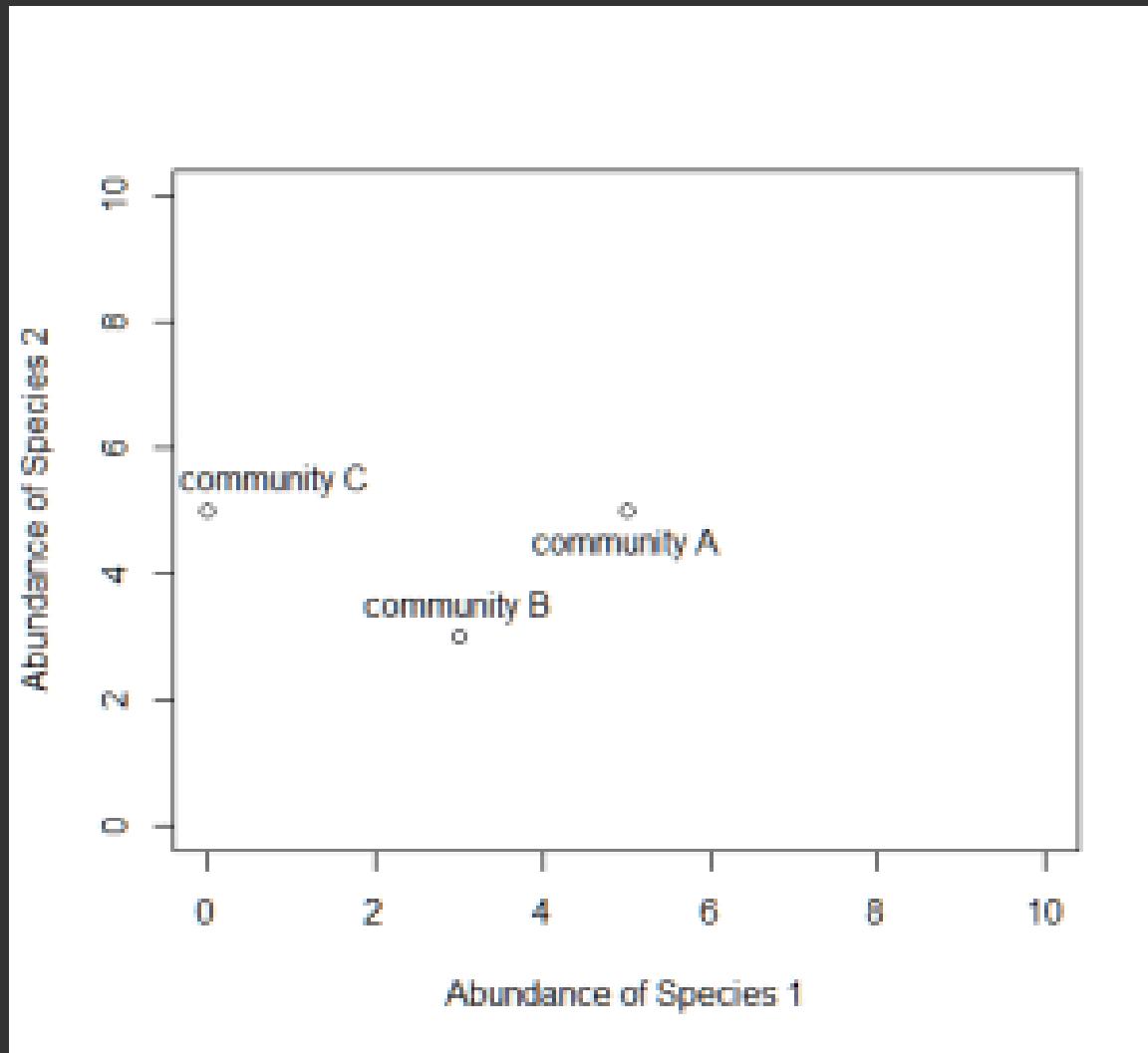
How can you compare community structure  
between two different communities?



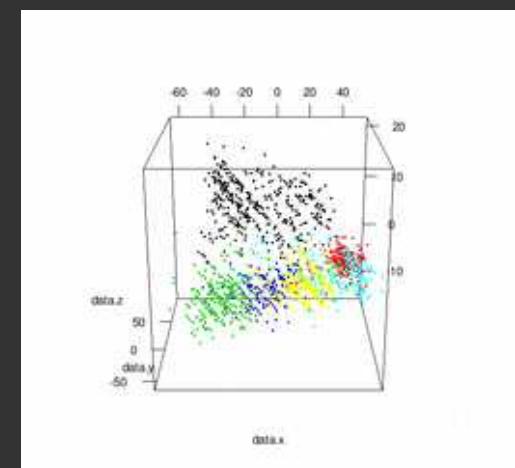
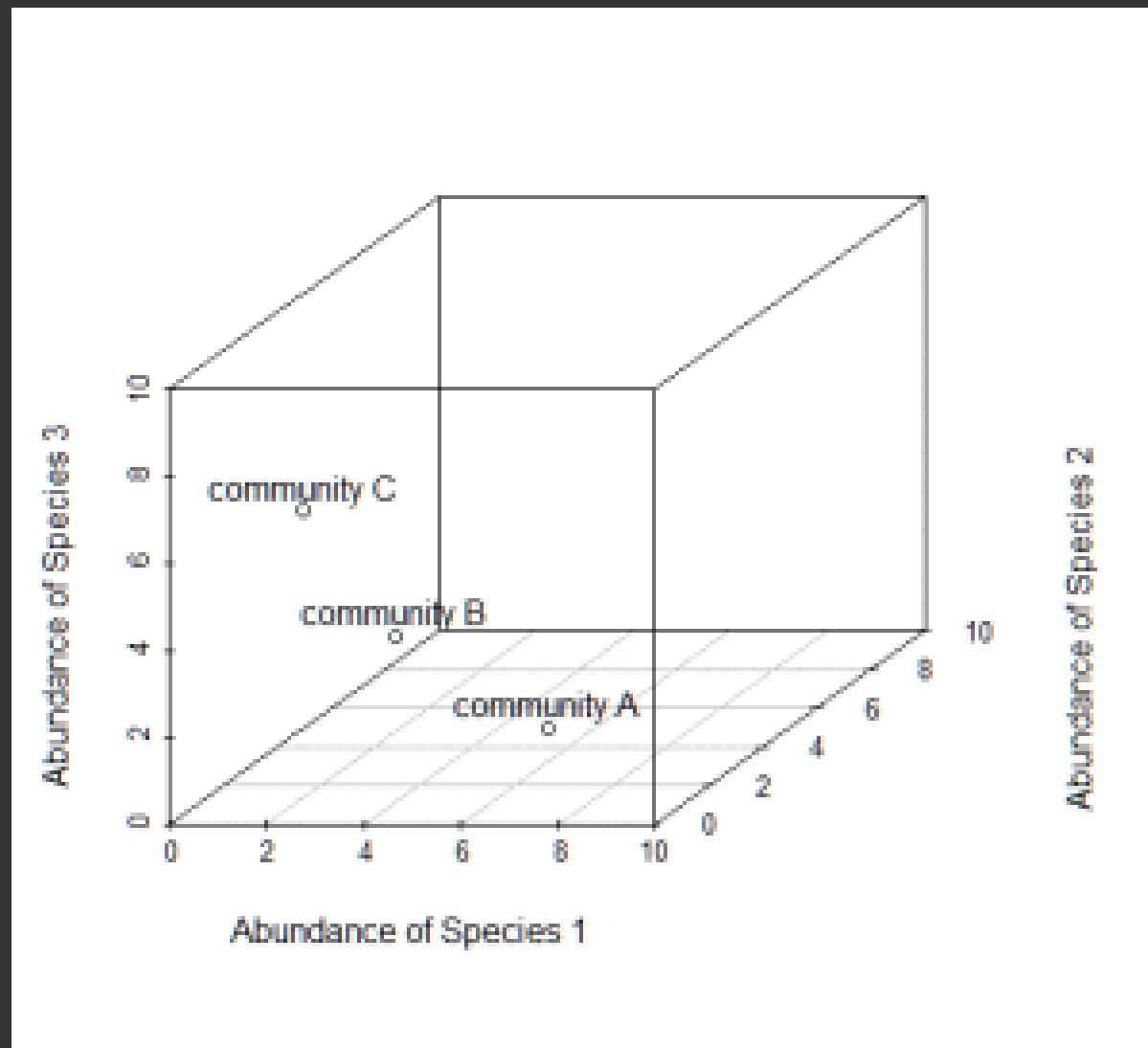
Consider 3 communities that contain only the same single species...



Now, consider a 2nd axis of abundance,  
representing another species



# Add another axis for the 3rd species

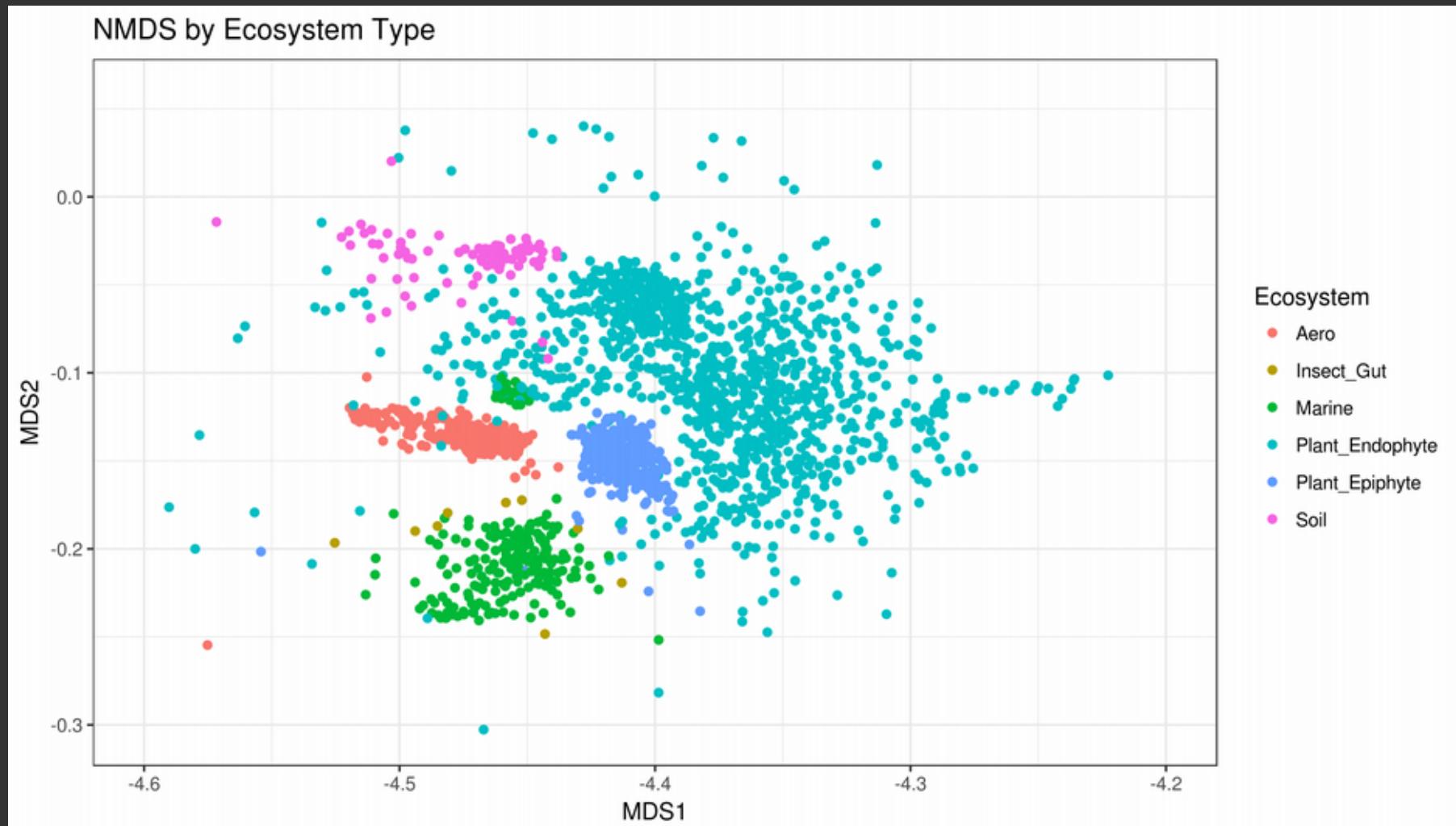


Now keep going, adding an axis for each additional species in the communities

Now keep going, adding an axis for each additional species in the communities

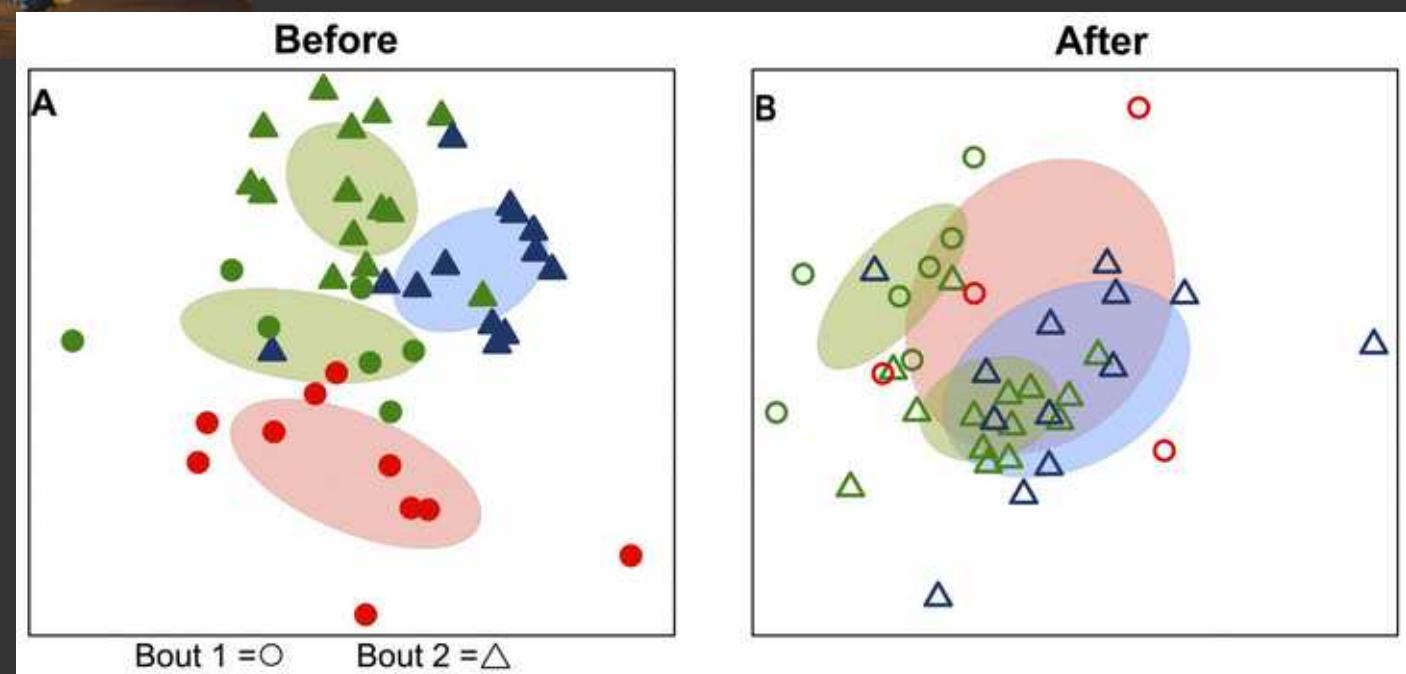


# Mathematical tools can compress thousands of axes into 2-D

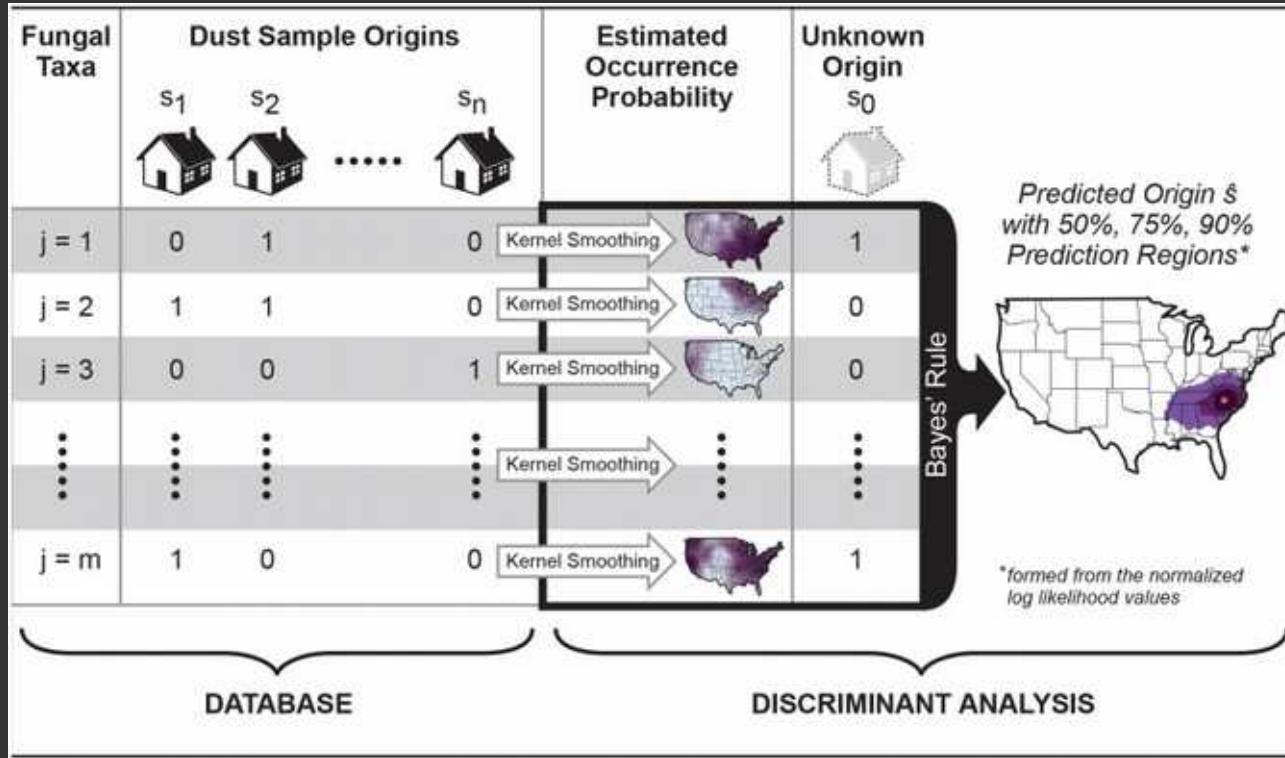




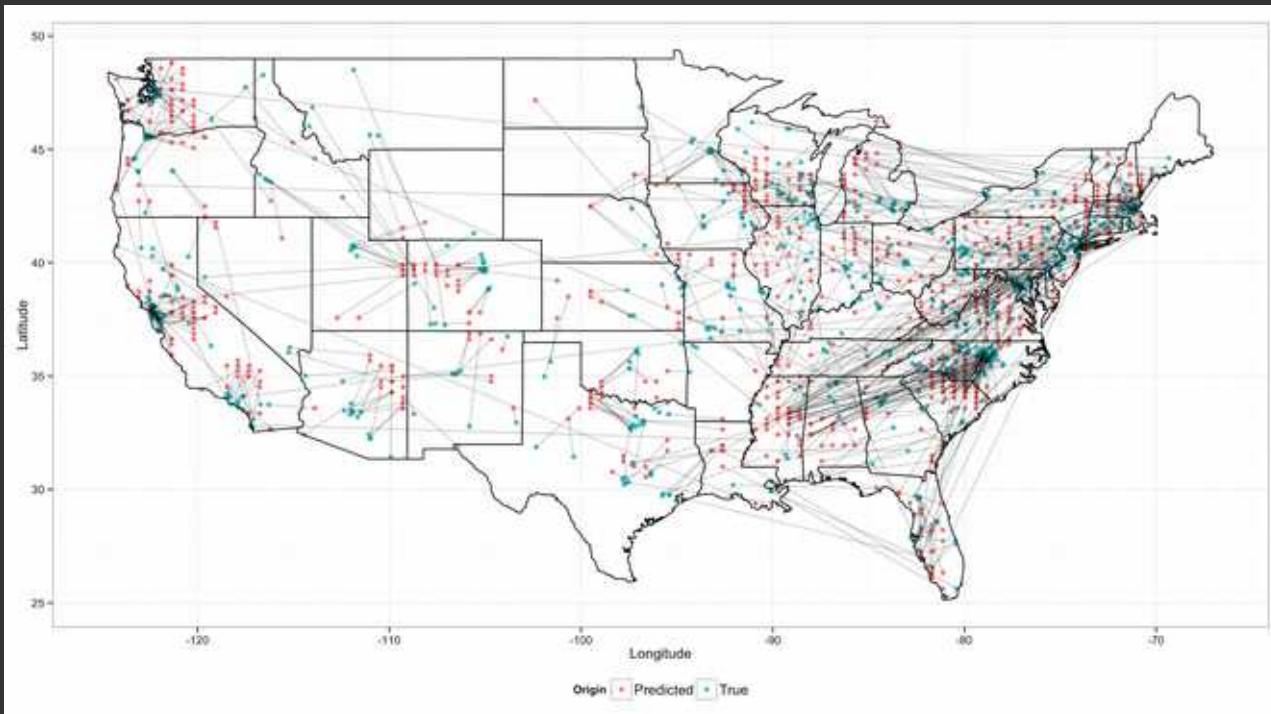
# Roller derby, at last!

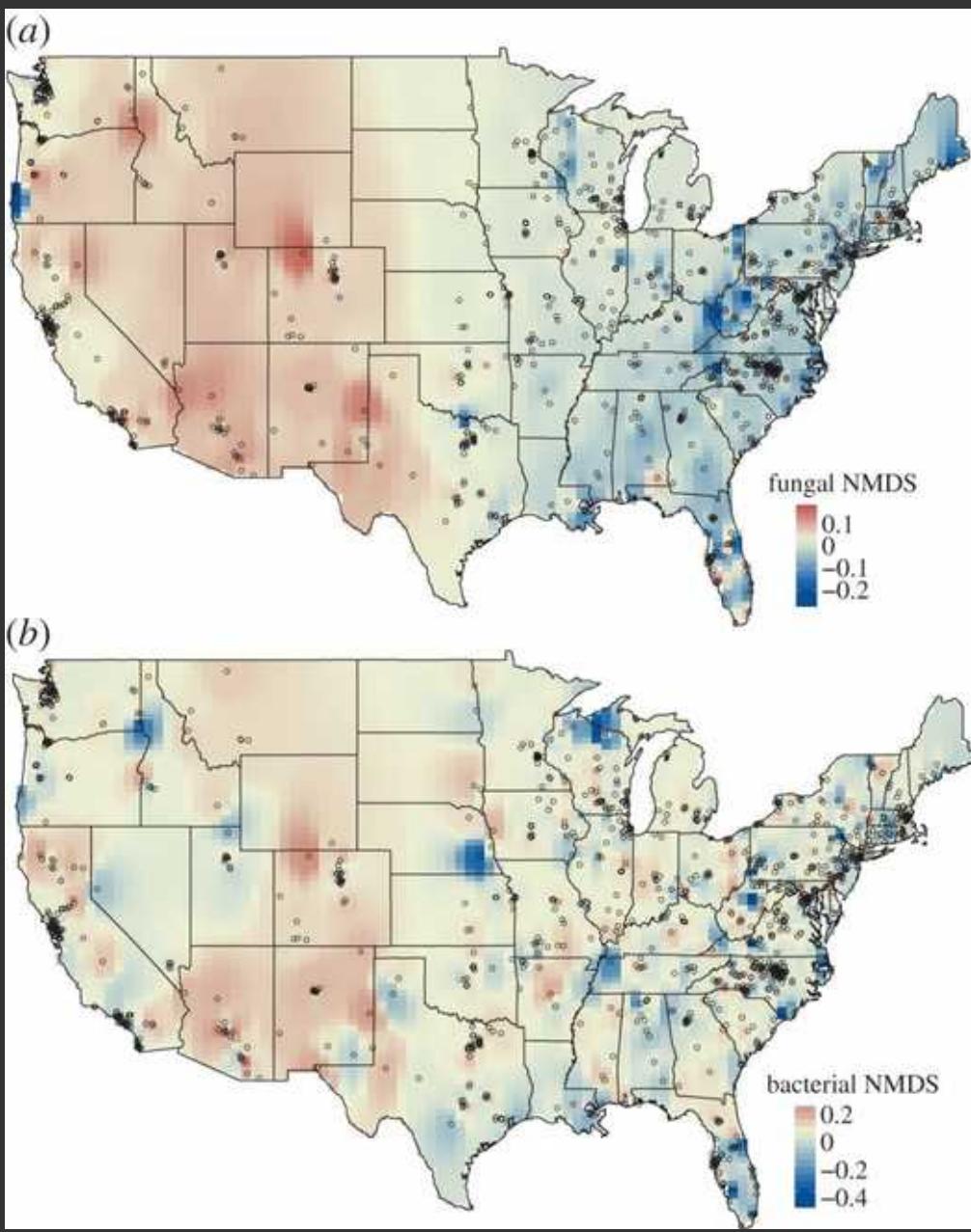
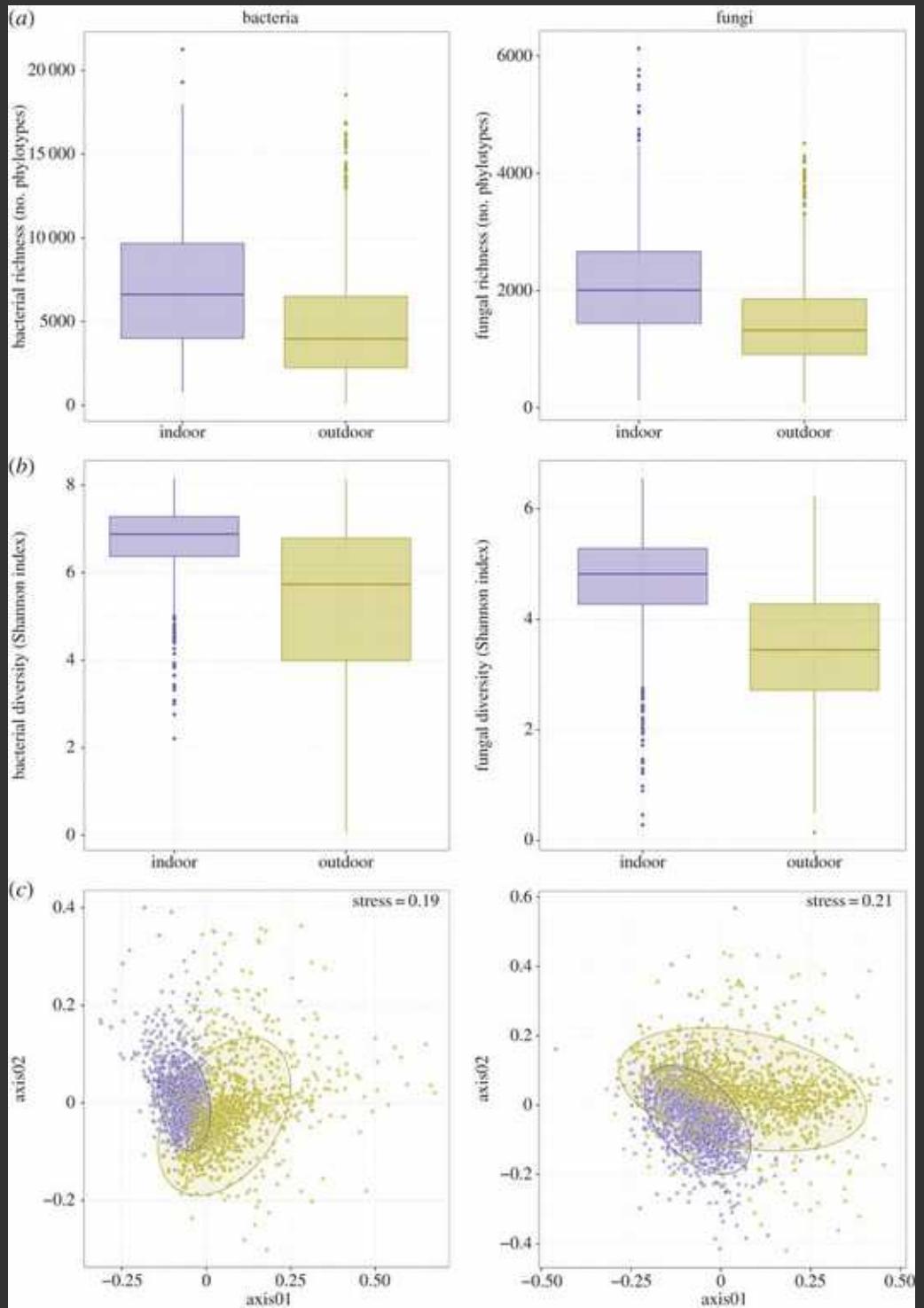


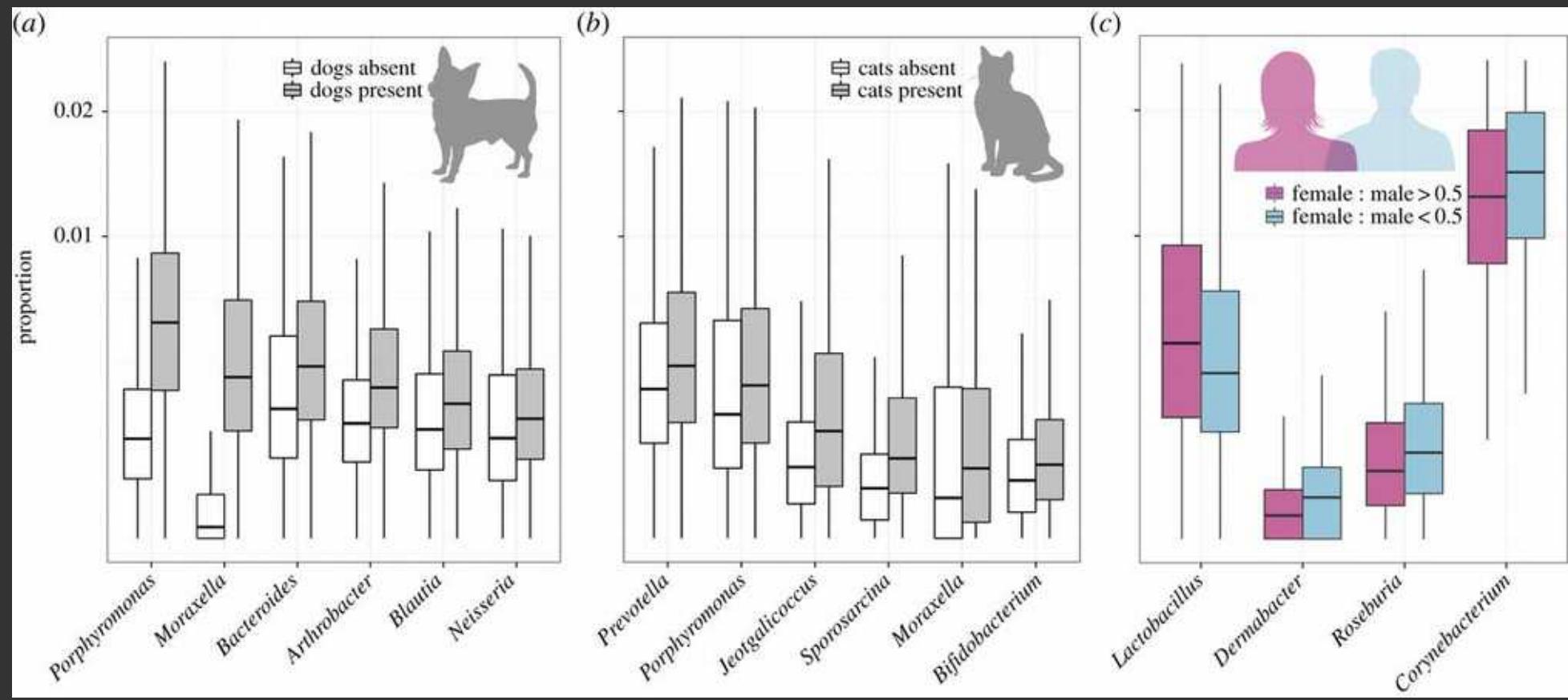
Skin bacterial community composition  
Colored by team, before and after a bout



Community analysis of fungi in dust samples can predict where the sample came from (within ~125 miles)







# A short digression about ants



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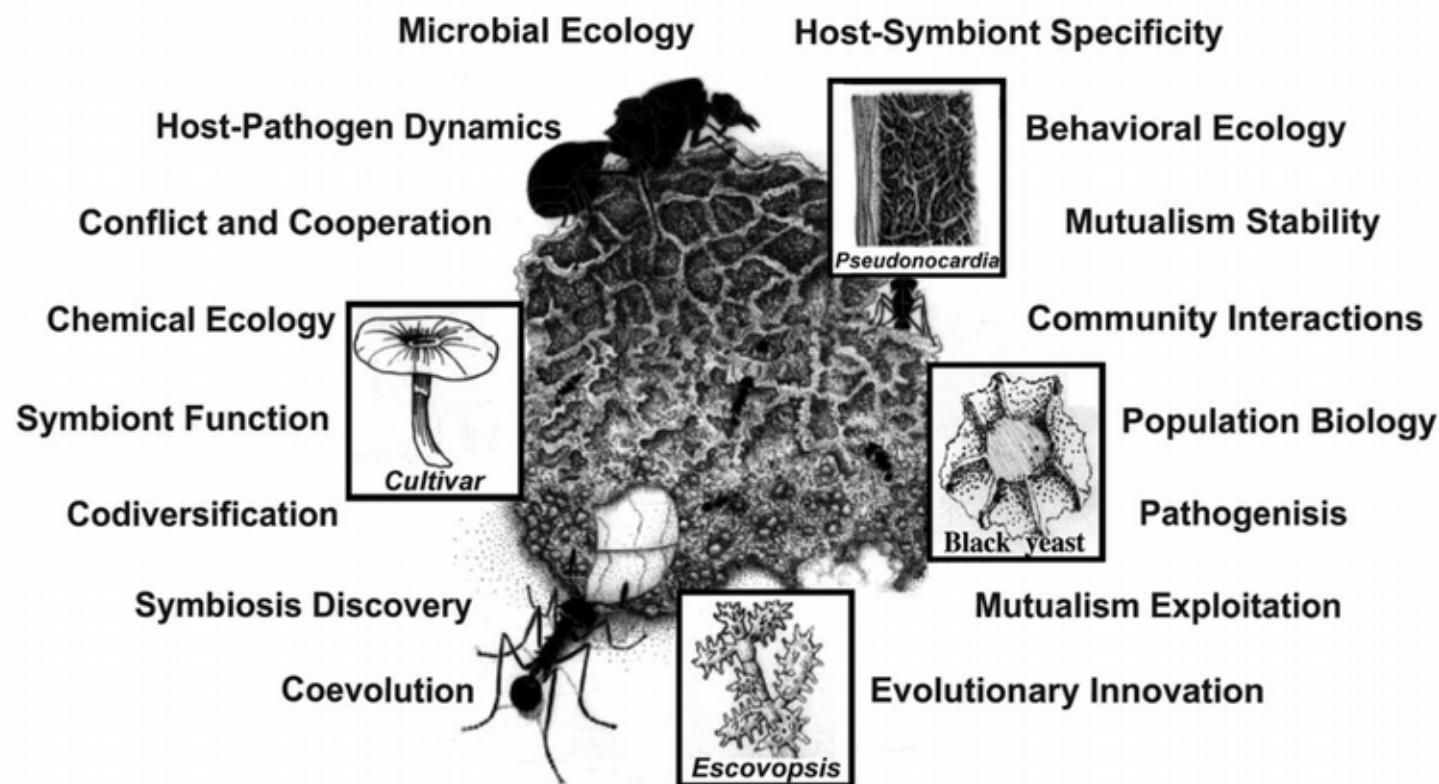


# A short digression about ants

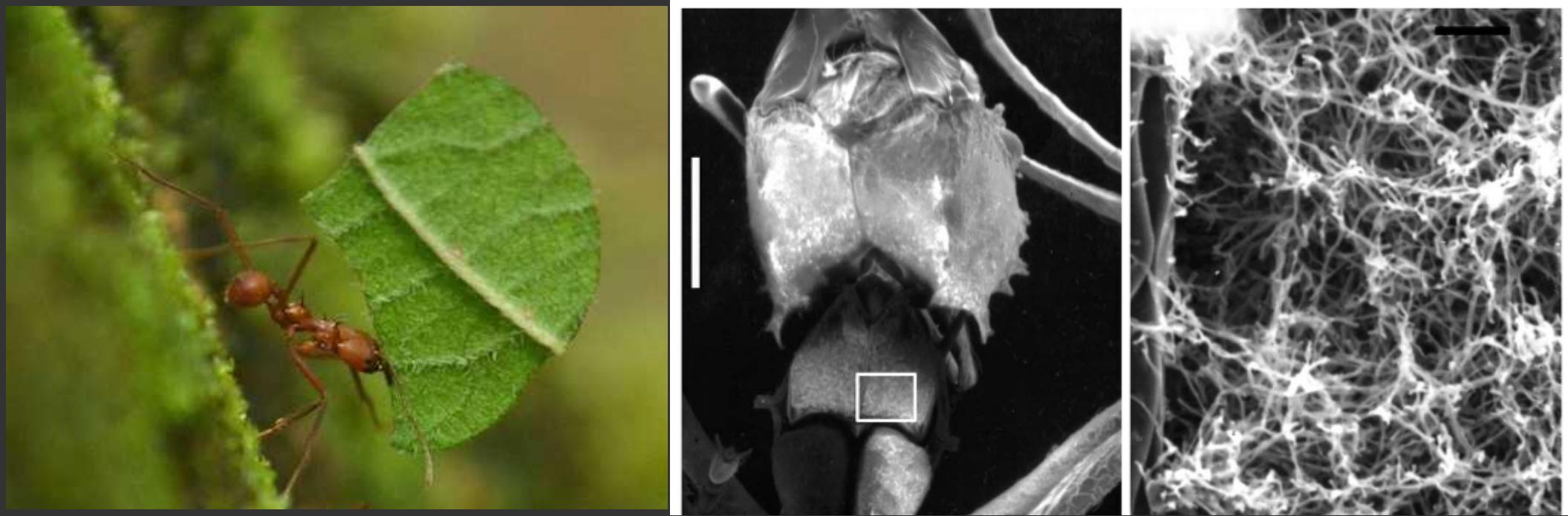
February 2009

CALDERA ET AL.: PAST, PRESENT, AND FUTURE OF FUNGUS-GROWING ANT RESEARCH

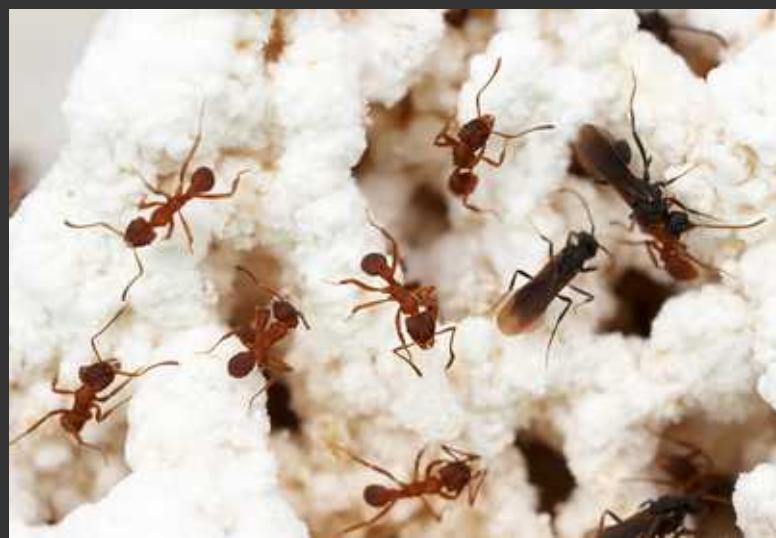
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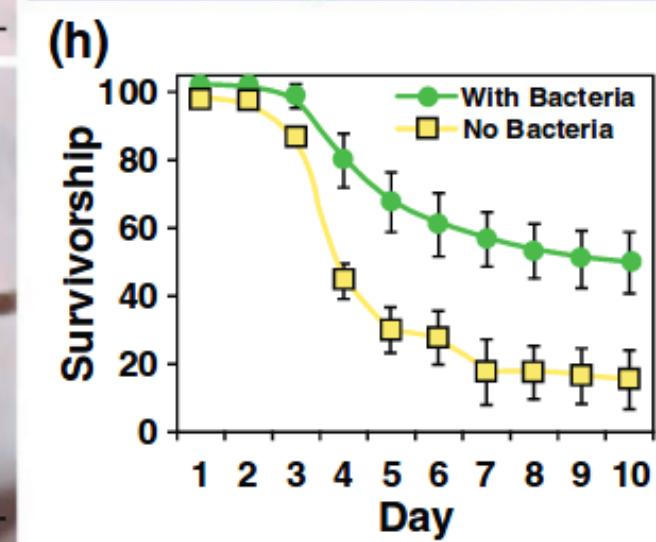
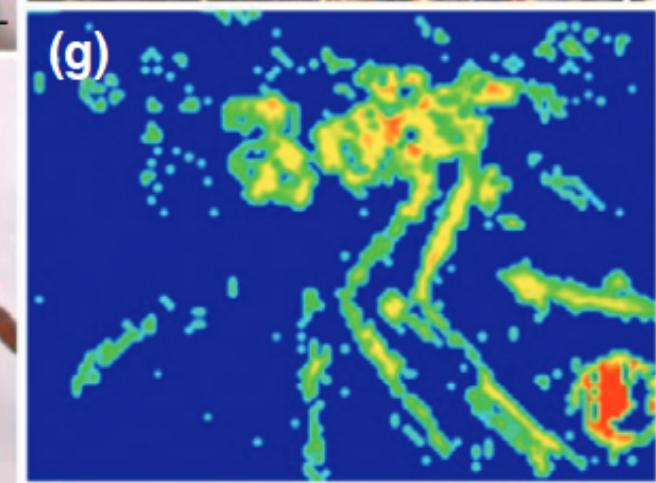
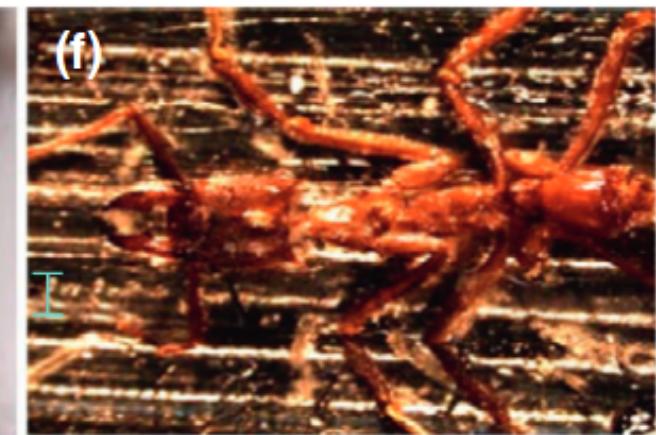
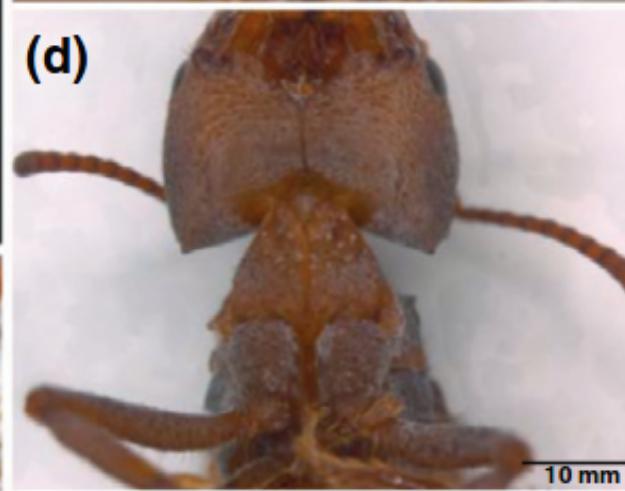
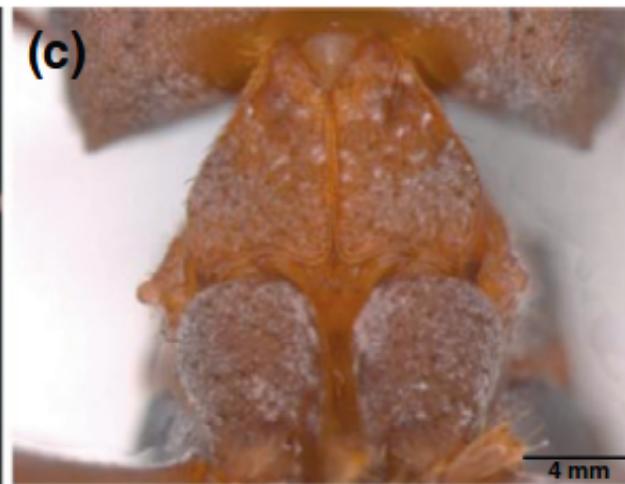
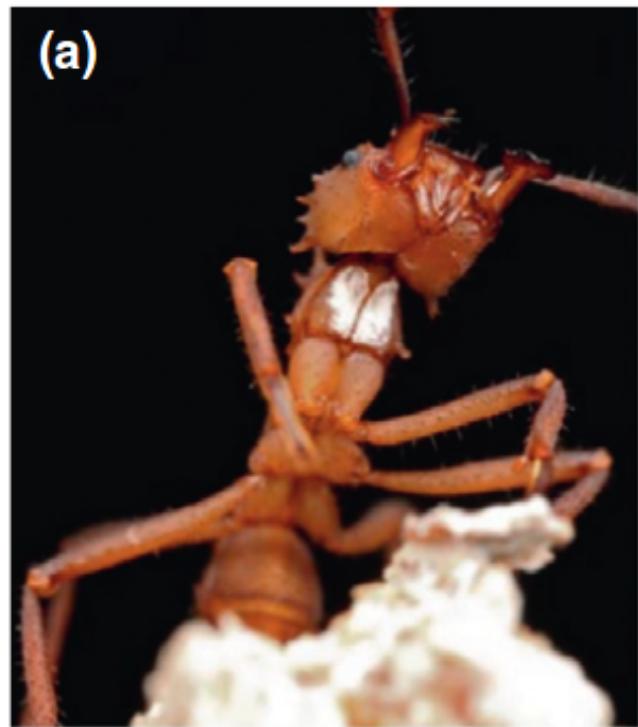


**Fig. 1.** The fungus-growing ant symbiosis is a model system for studying the ecology and evolution of symbiotic interactions. The symbiosis currently contains five identified and characterized symbionts: Attine ants, the fungi that they cultivate for food, cultivar-attacking microfungi in the genus *Escovopsis*, antibiotic-producing bacteria in the genus *Pseudonocardia*, and a black yeast parasitizing the ant-*Pseudonocardia* mutualism. The diversity of interactions in this model system provides a wealth of opportunity for scientific inquiry, particularly beyond bipartite interactions.

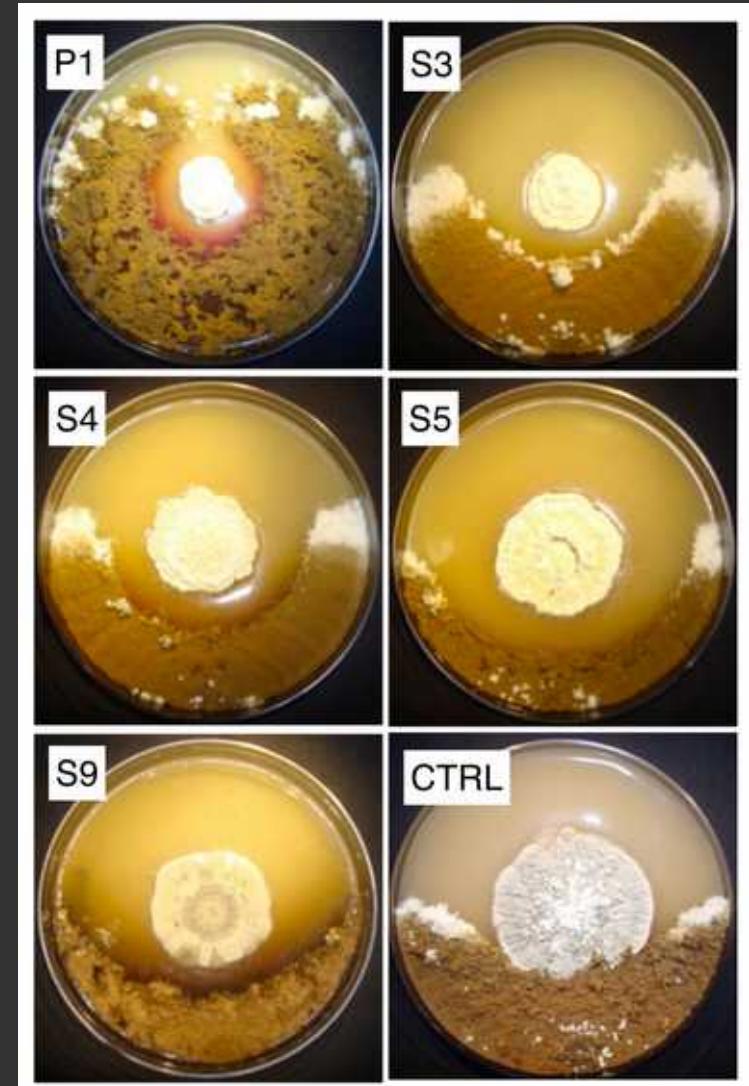
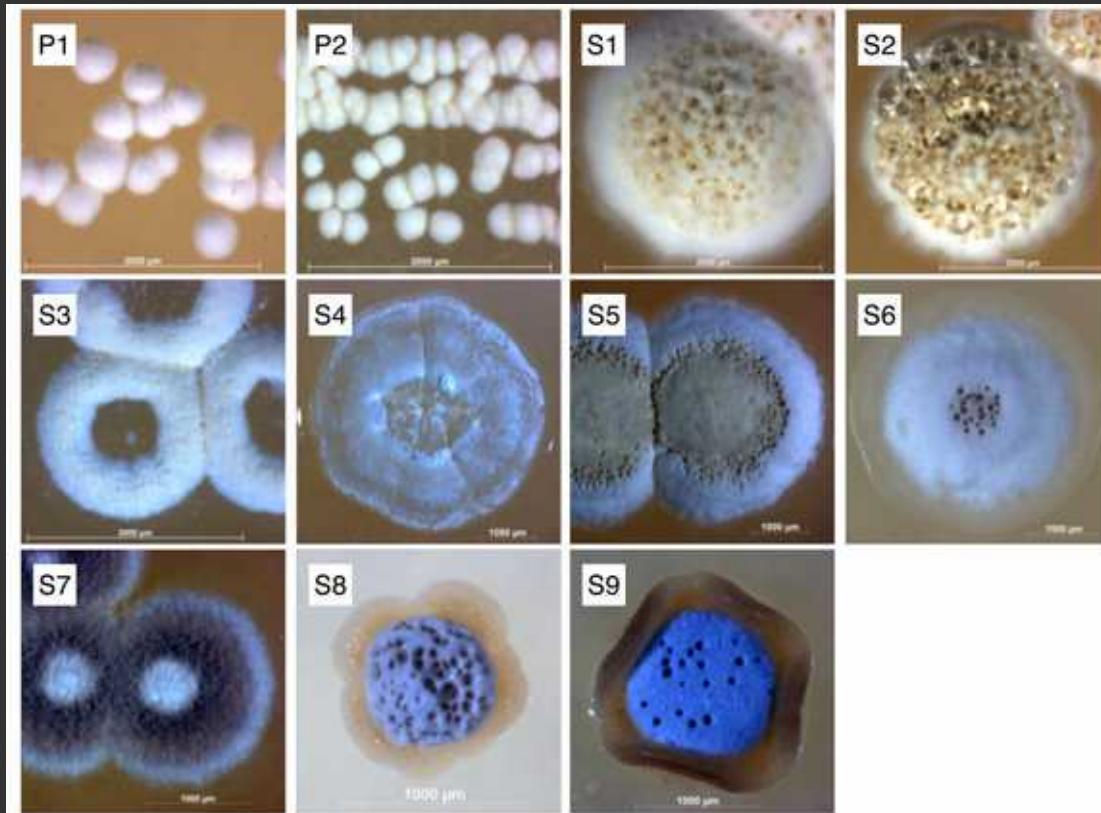


# Pure cultures of fungi are hard to maintain

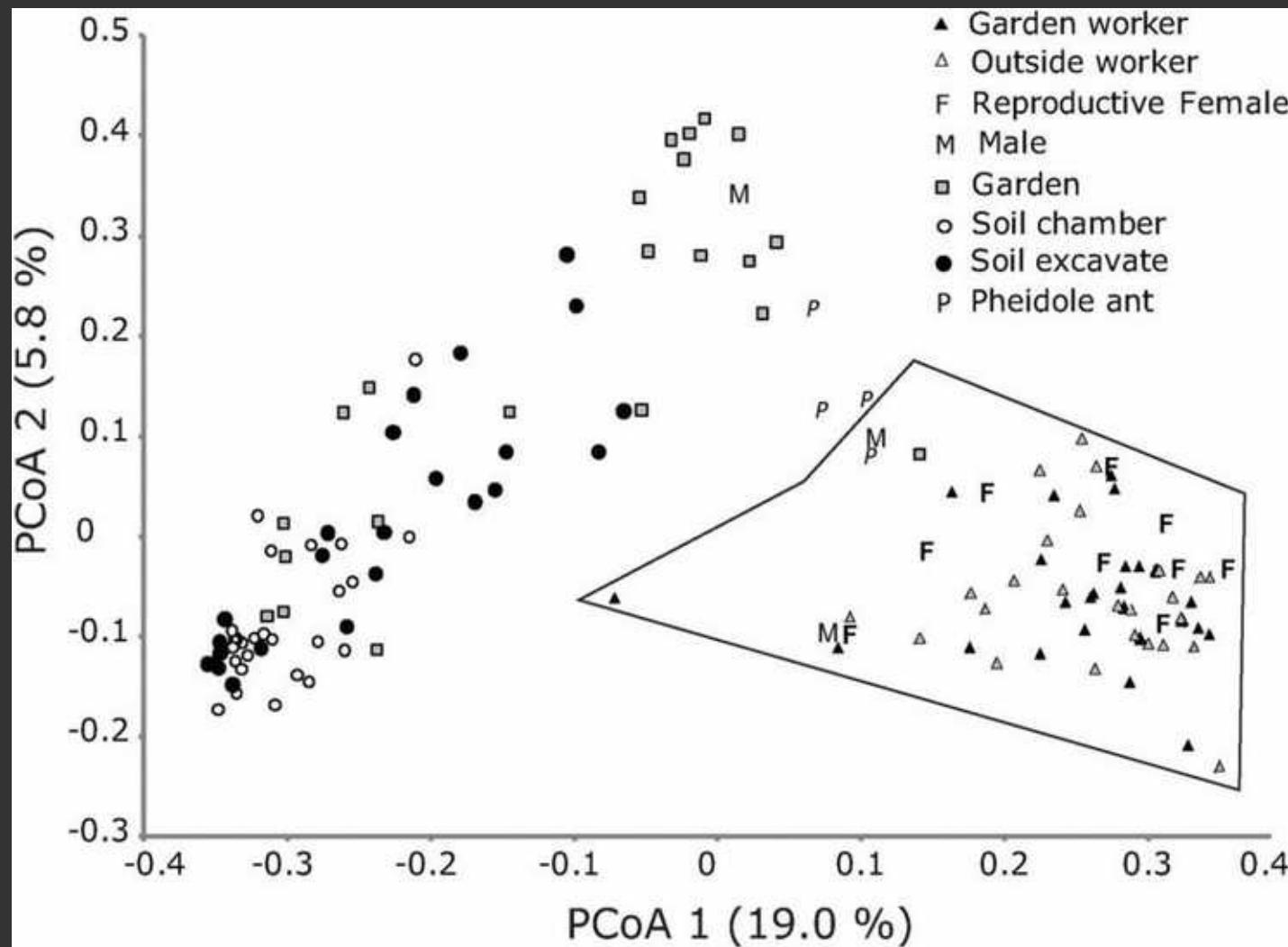




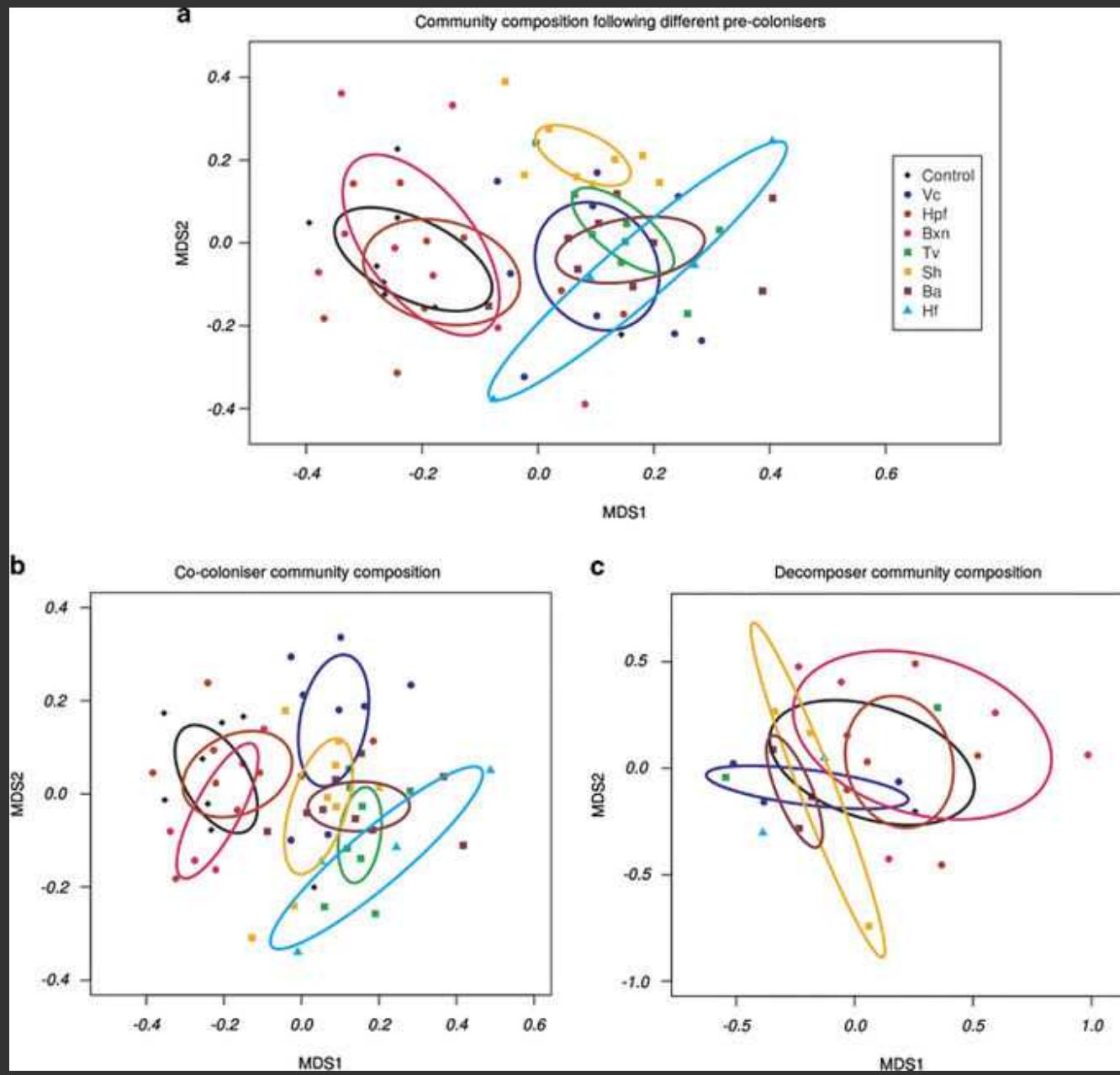
# Ants harbor helpful bacteria on their cuticles



# Where are they getting this good bacteria?



# Why don't bad bacteria stay on ants?



# How do trees protect themselves from the ants?



# How do trees protect themselves from the ants?



# Who or what is "in charge" of this community structure?

