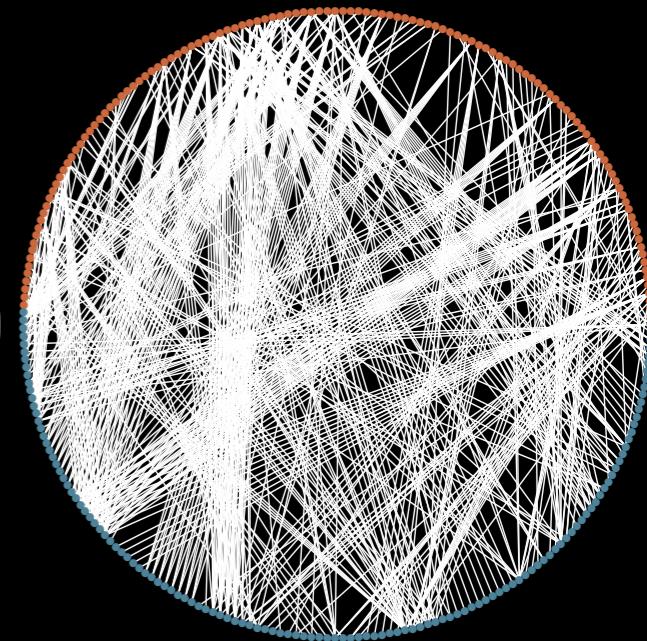
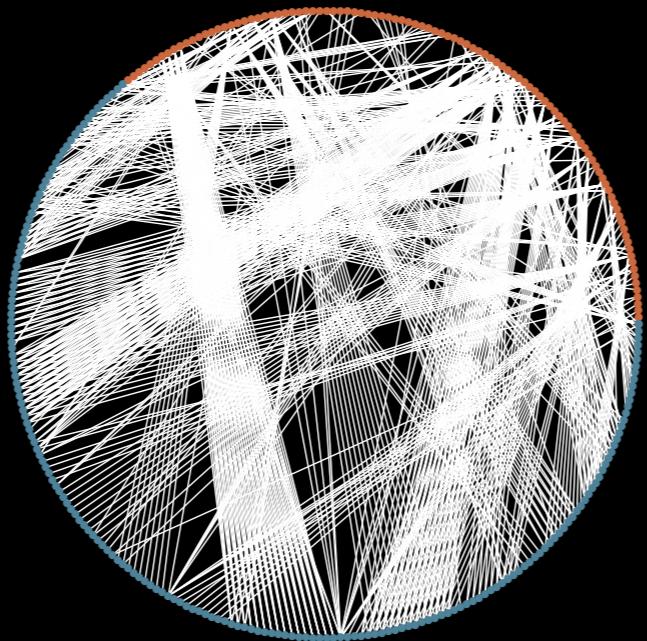
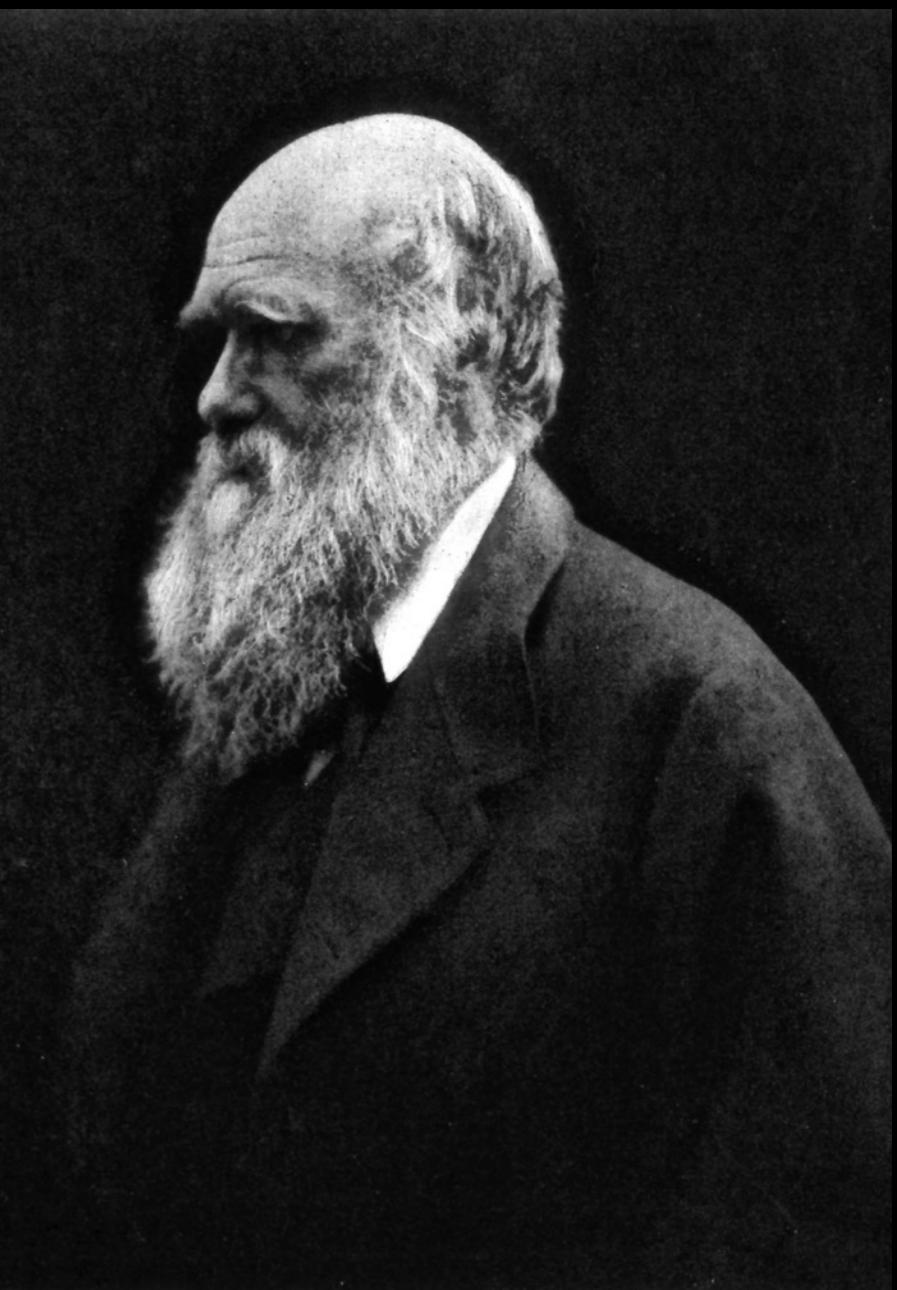


# The statistical mechanics of biodiversity in evolving island communities



Andy Rominger  
[nature.berkeley.edu/~rominger](http://nature.berkeley.edu/~rominger)  
University of Michigan • 12 March 2016

# General biodiversity laws



# General biodiversity laws





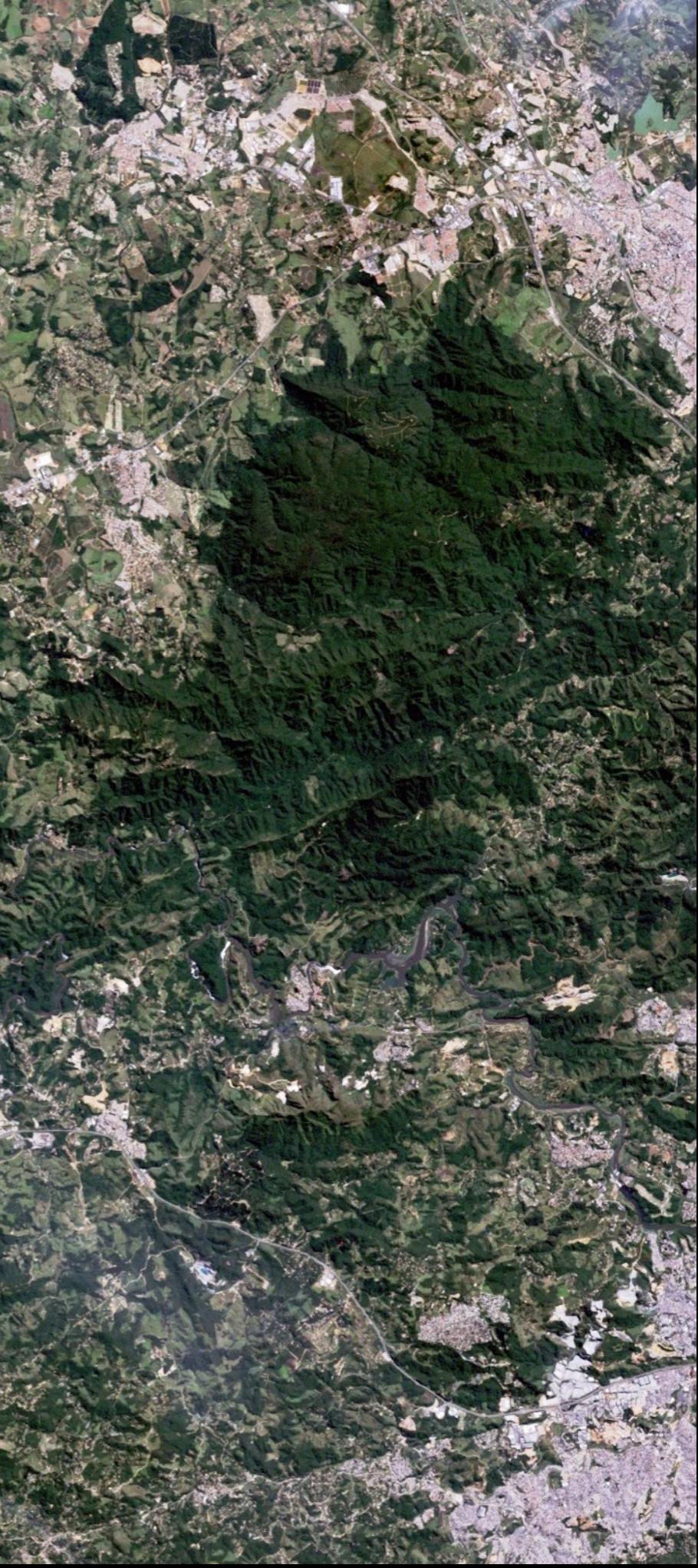
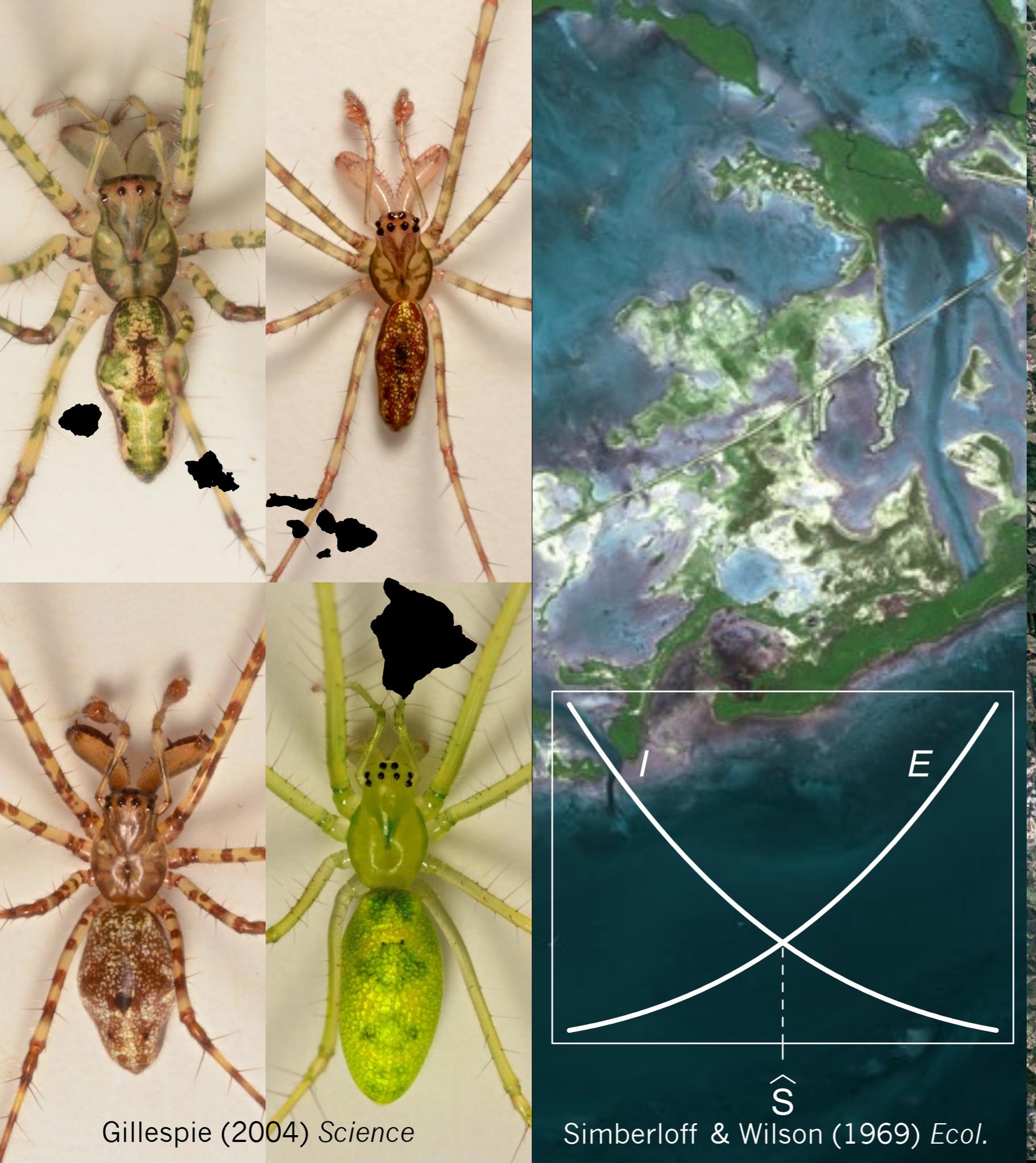
Gillespie (2004) Science



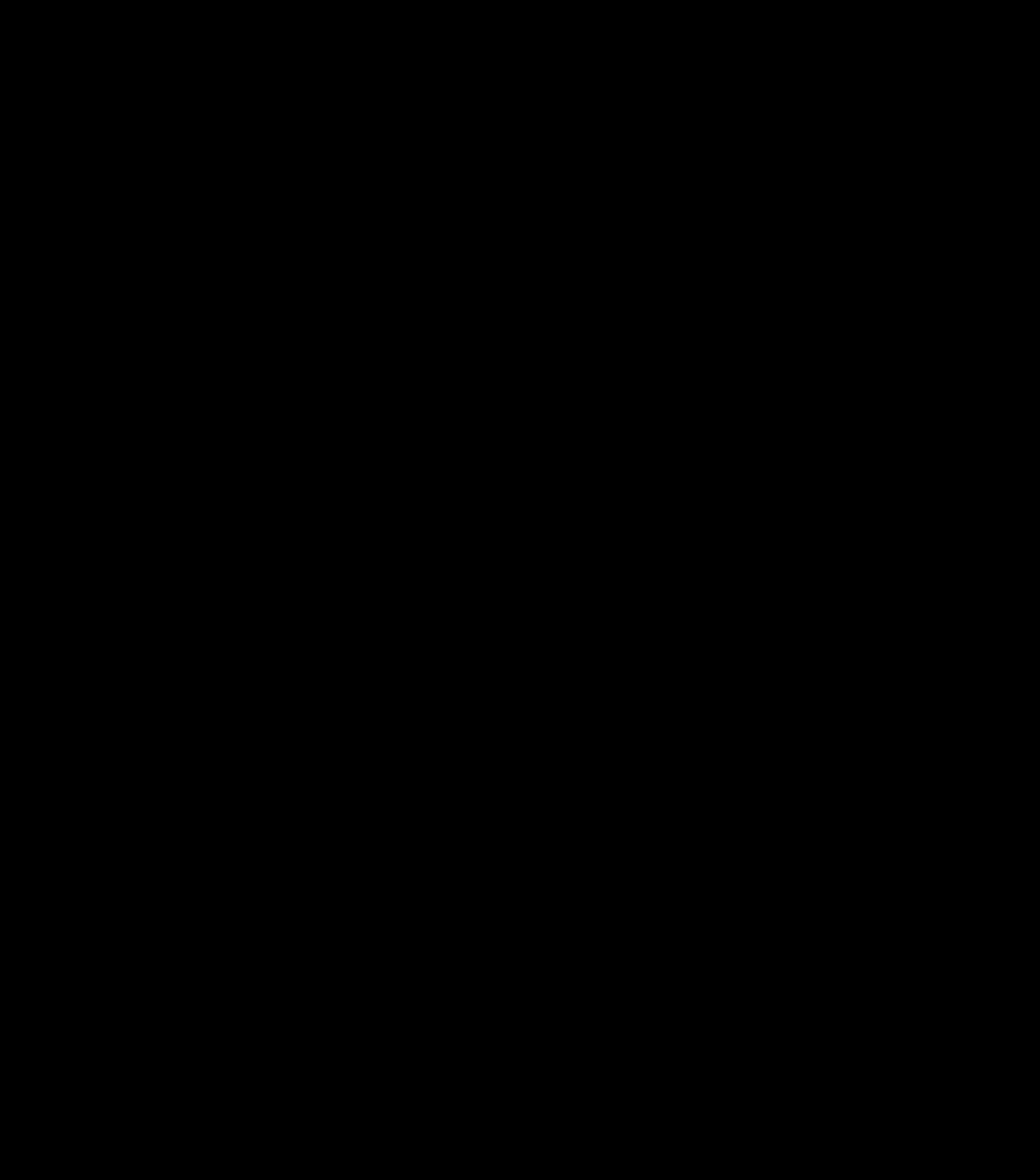
Gillespie (2004) *Science*



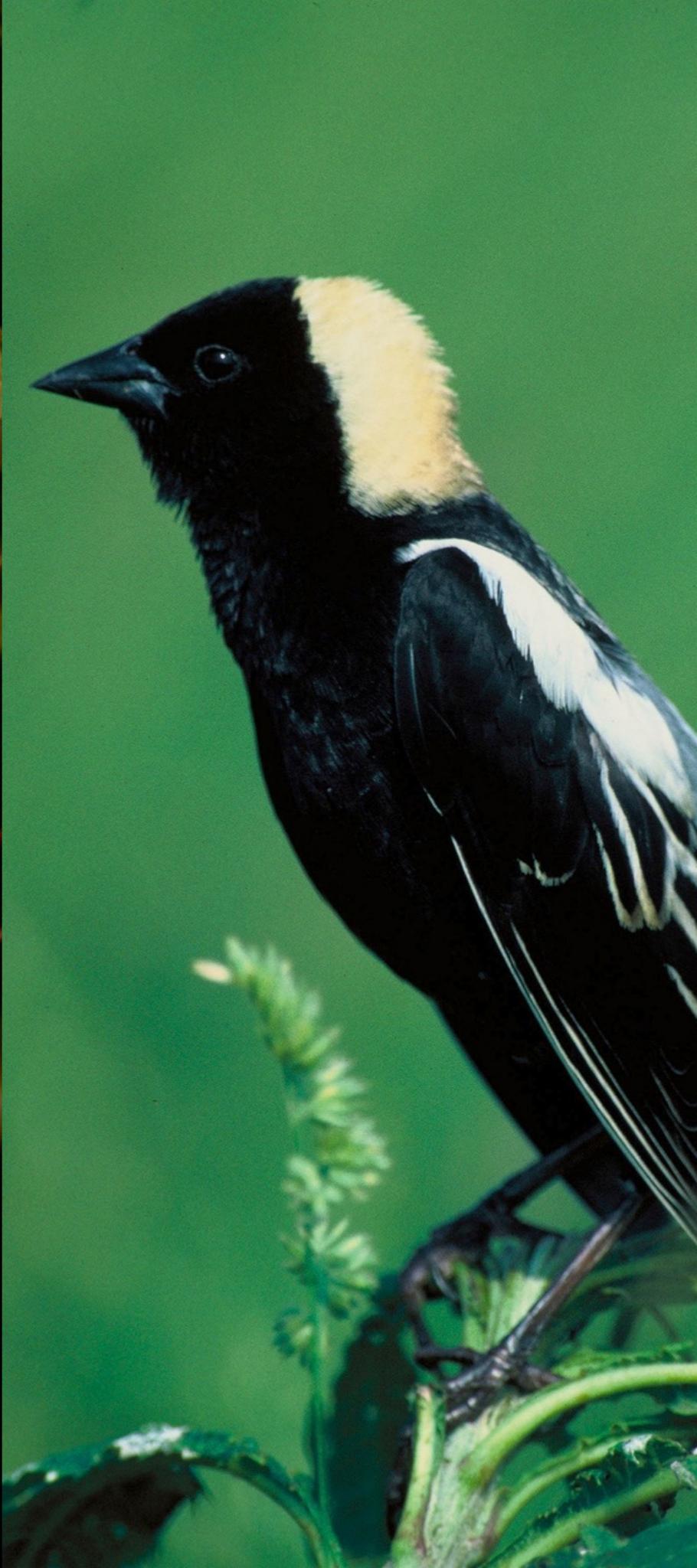
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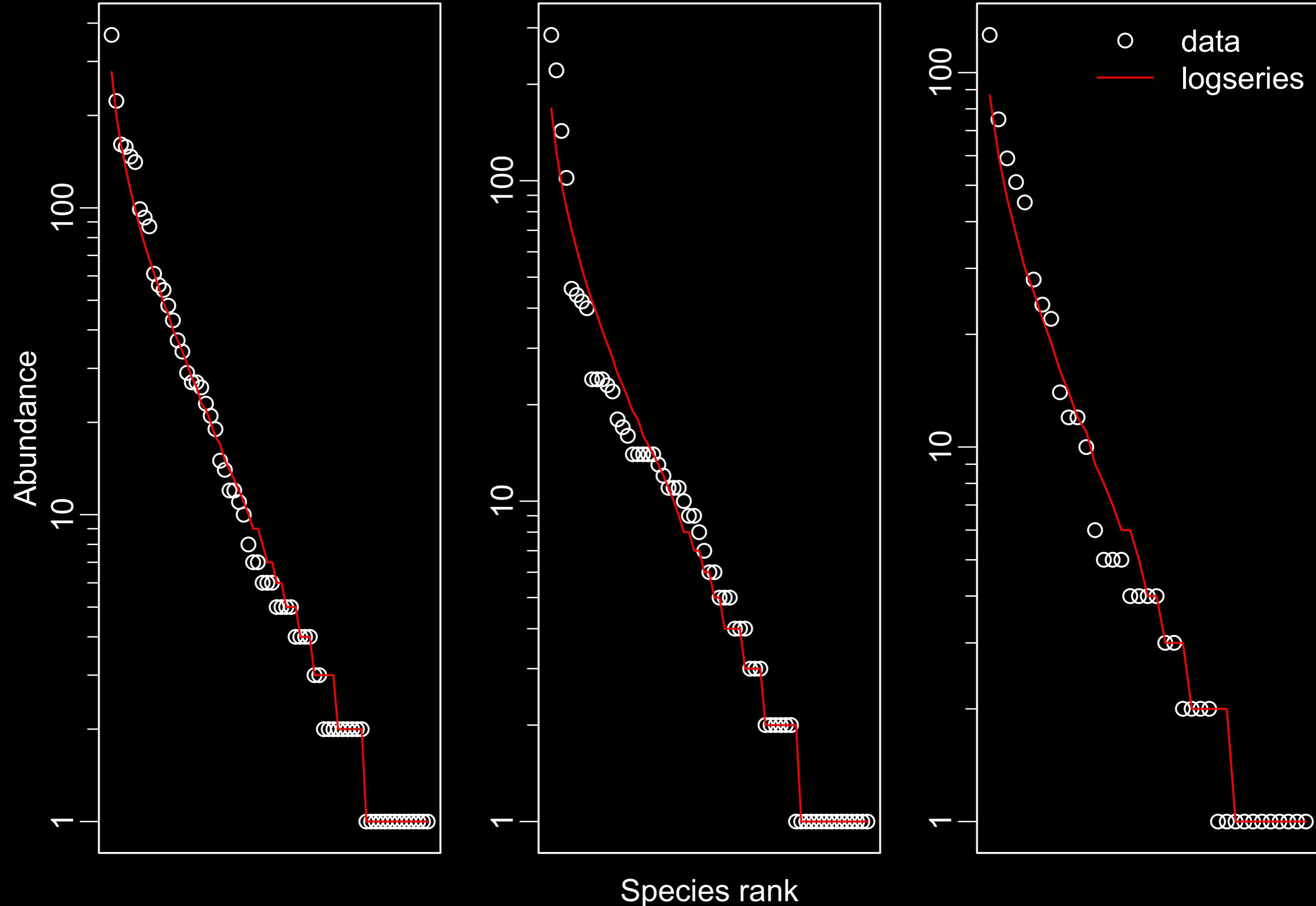


# Emergent similarity





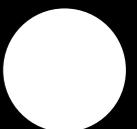
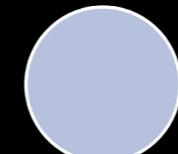


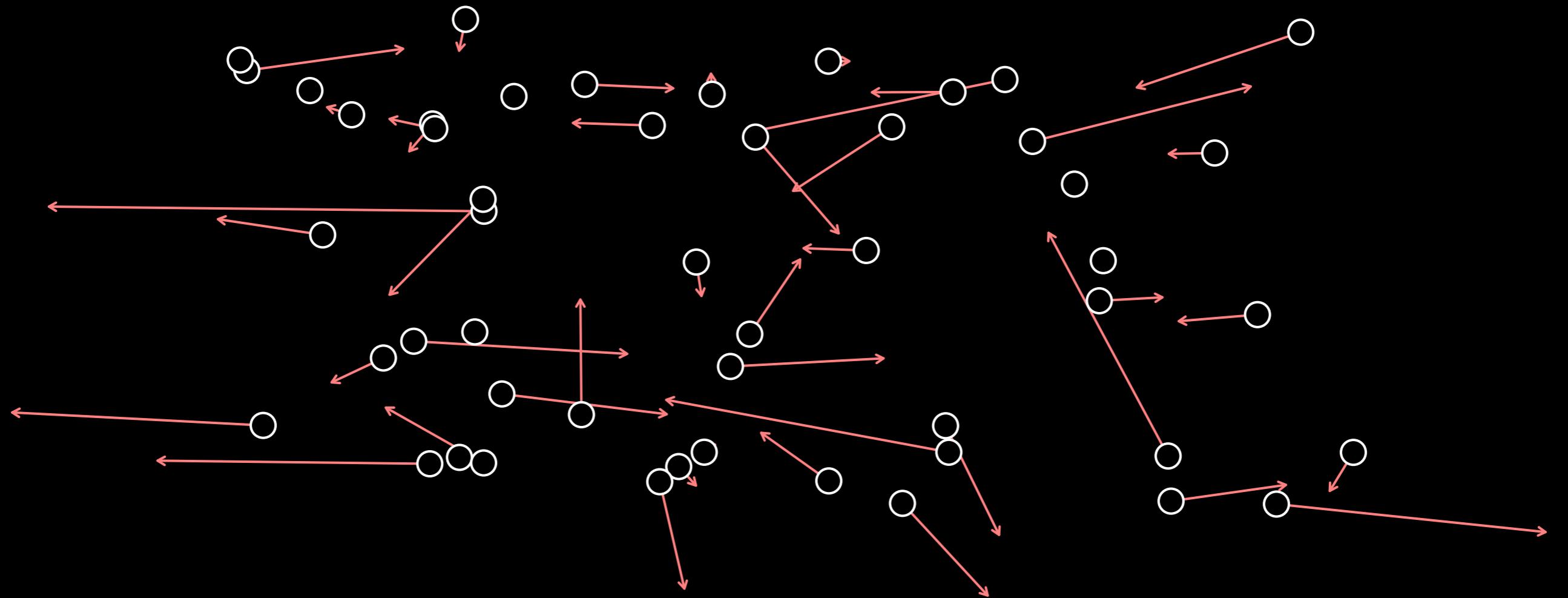


data from: [urbanforestmap.org](http://urbanforestmap.org)

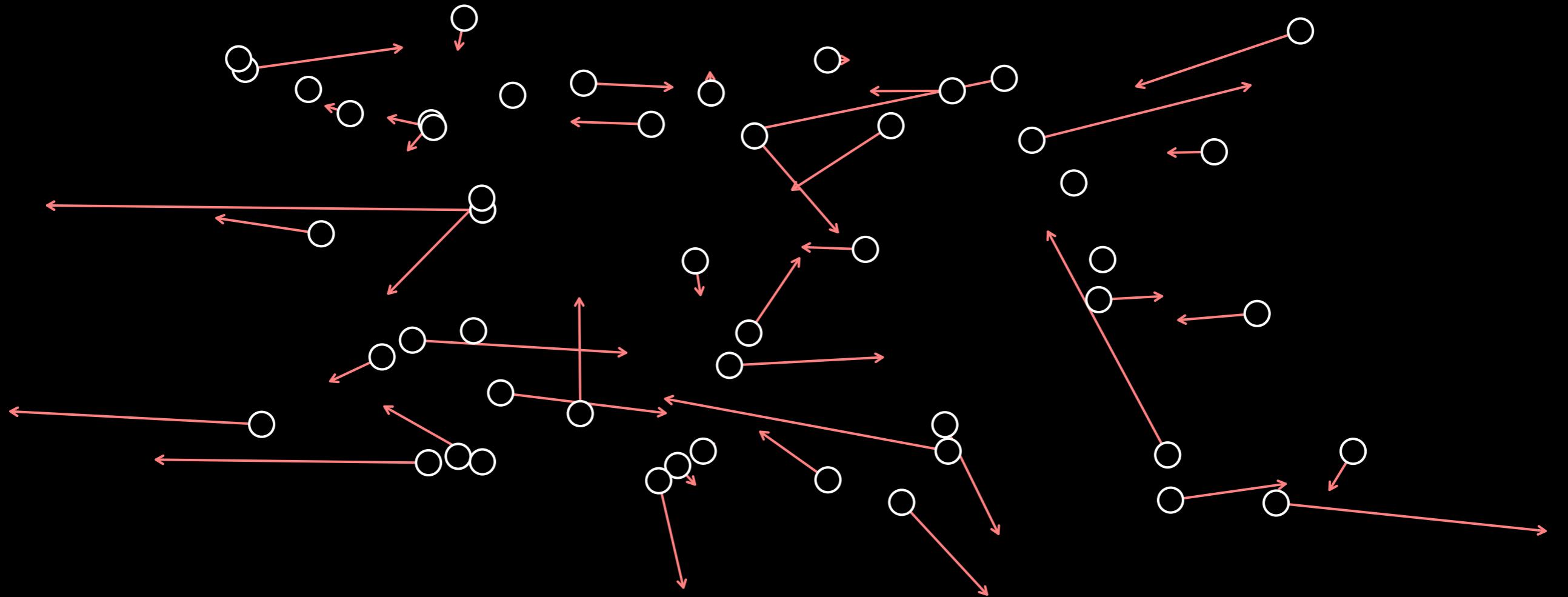
Gruner (2007) *Biol. J. Linn. Soc.*

US Breeding Bird Survey

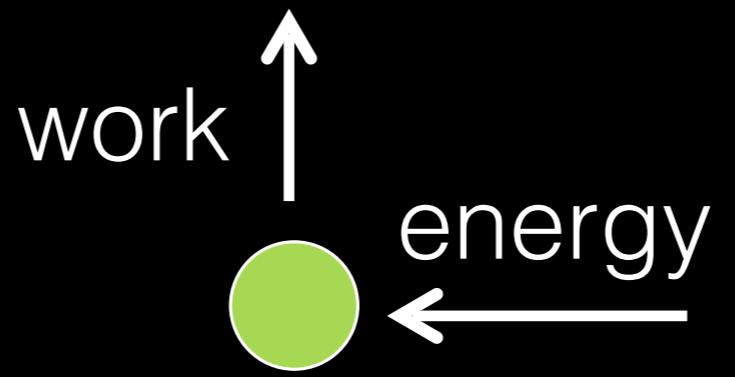


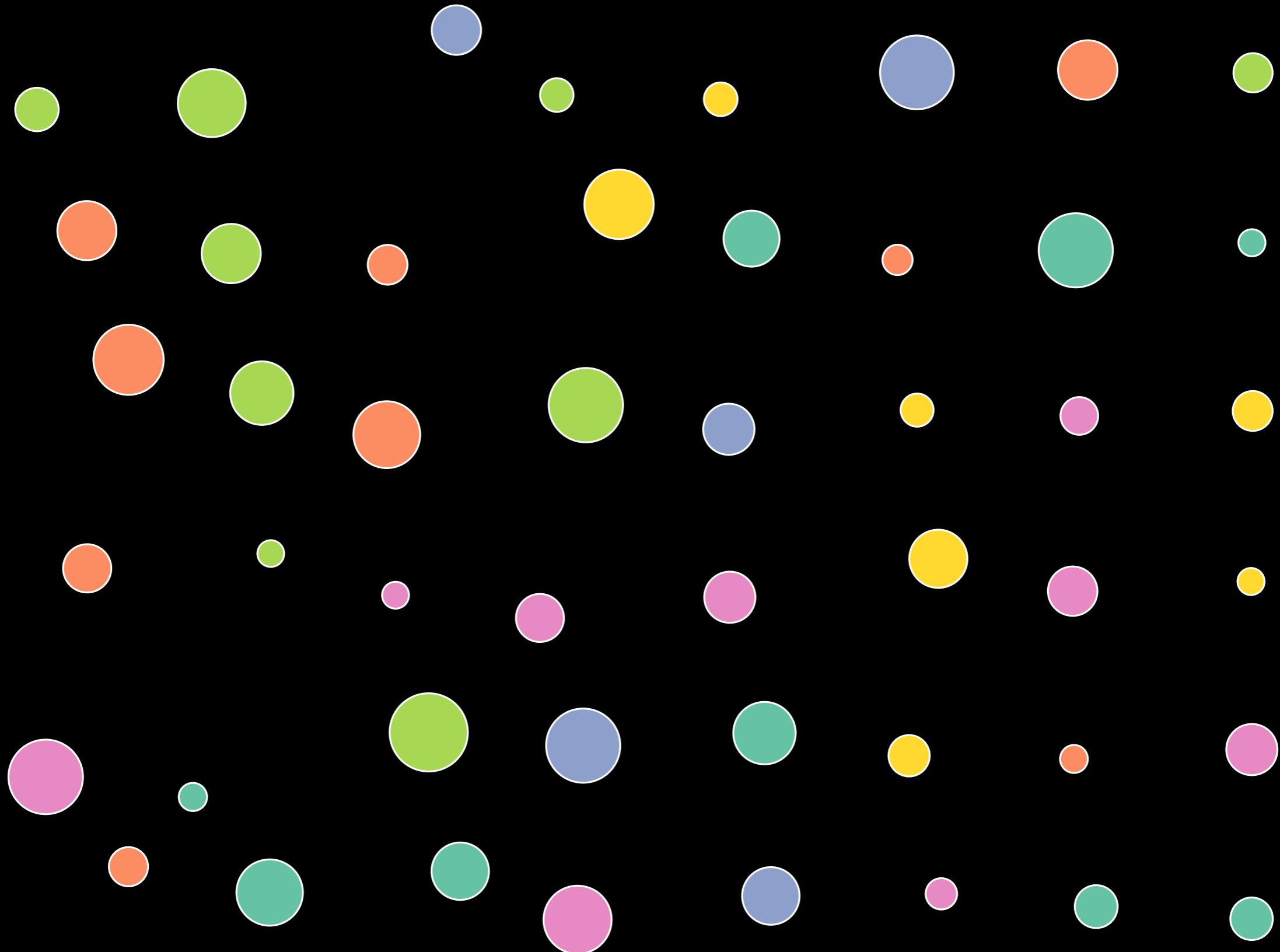


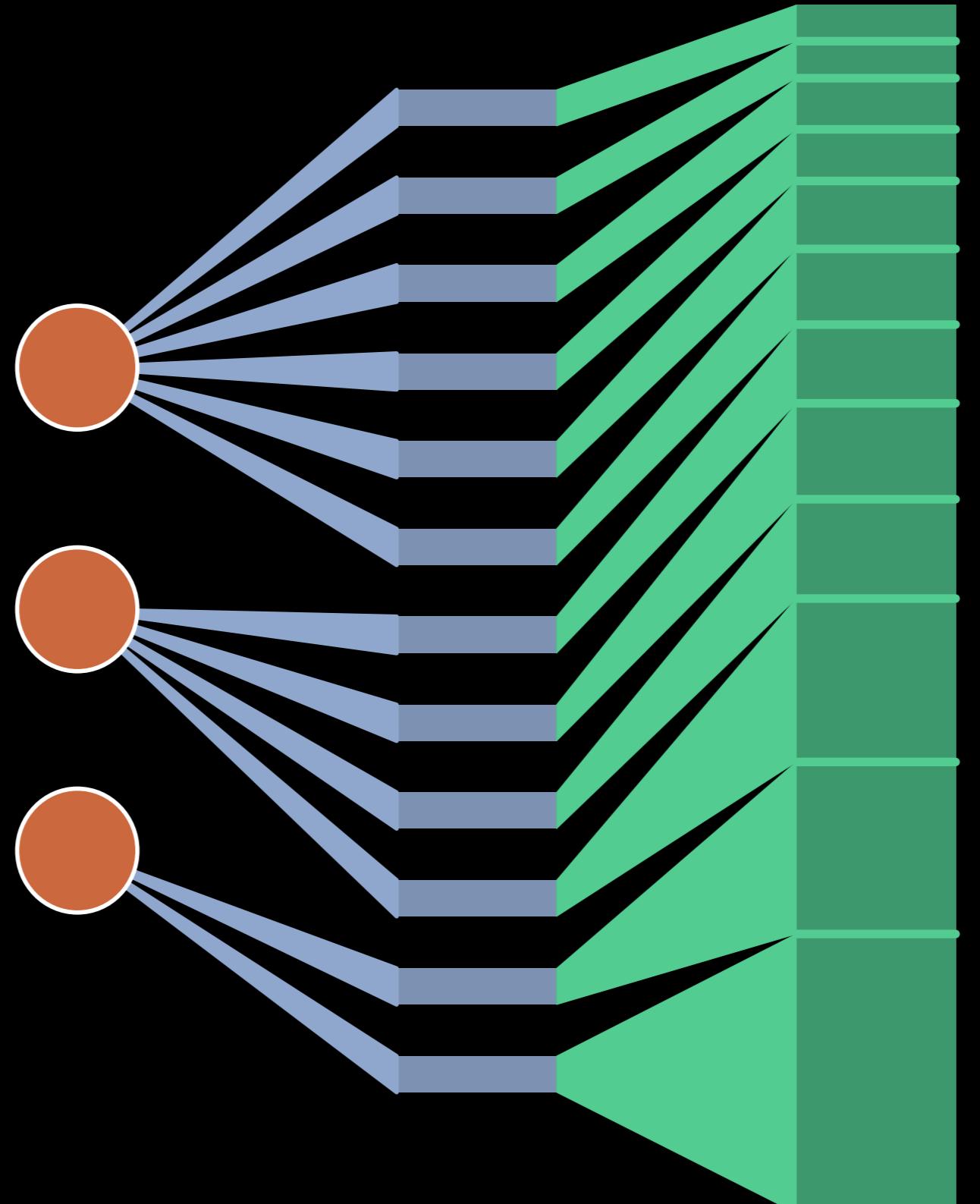
# Statistical constraint



~~t-test~~





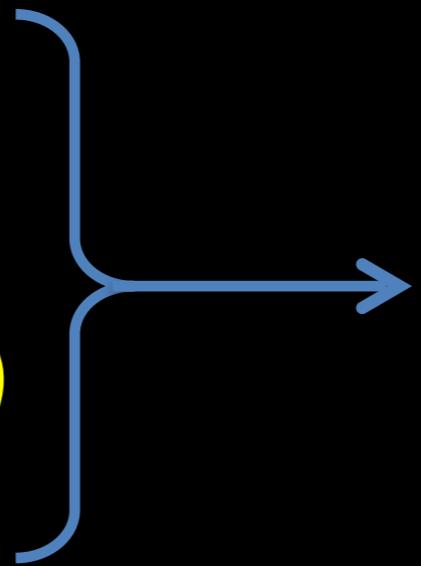


Species Individuals Energy

# Principle of Maximum Information Entropy

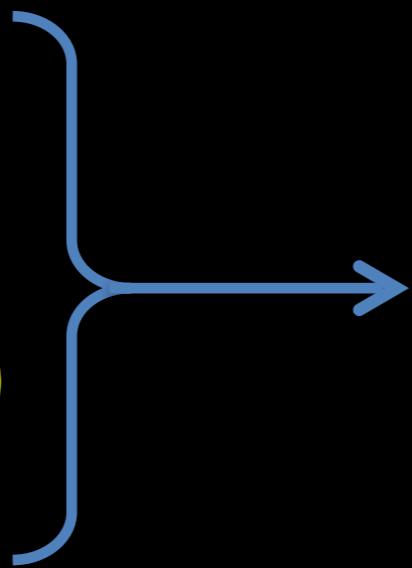
Known info  
*(‘state variables’)*

Known info  
(‘*state variables*’)



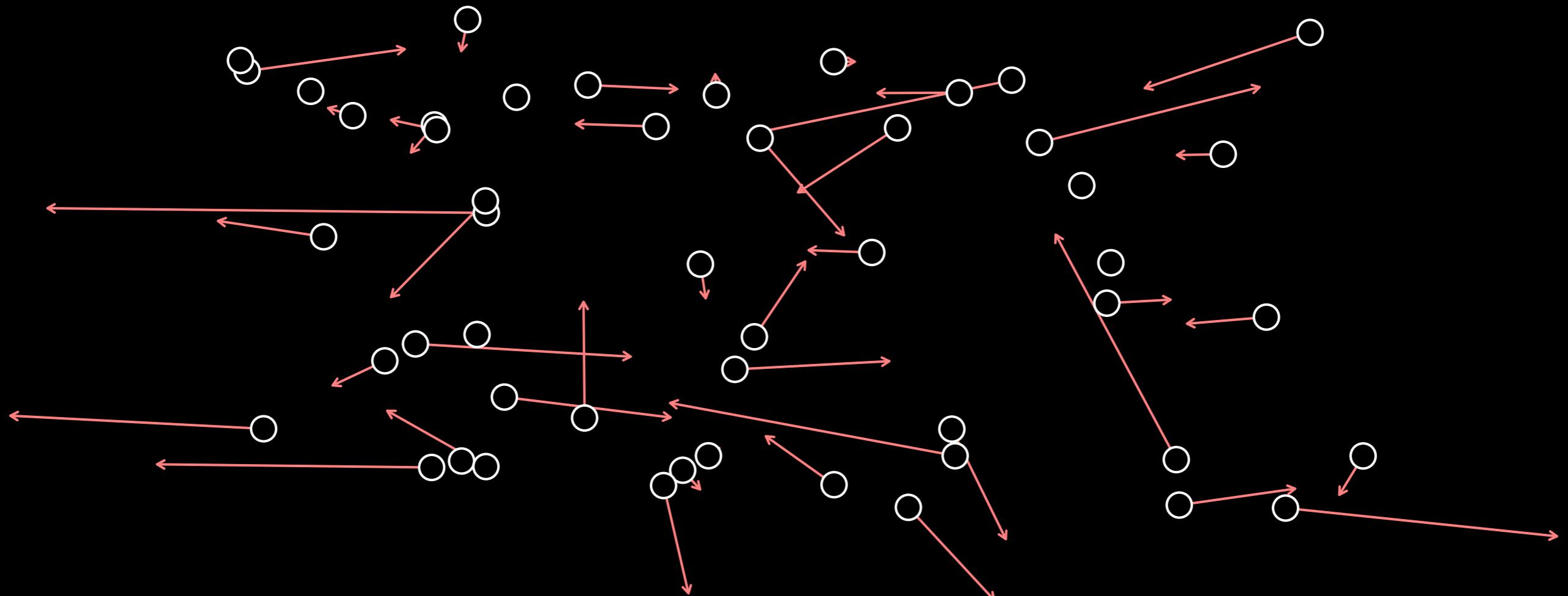
System  
probability  
distributions

Known info  
(‘*state variables*’)

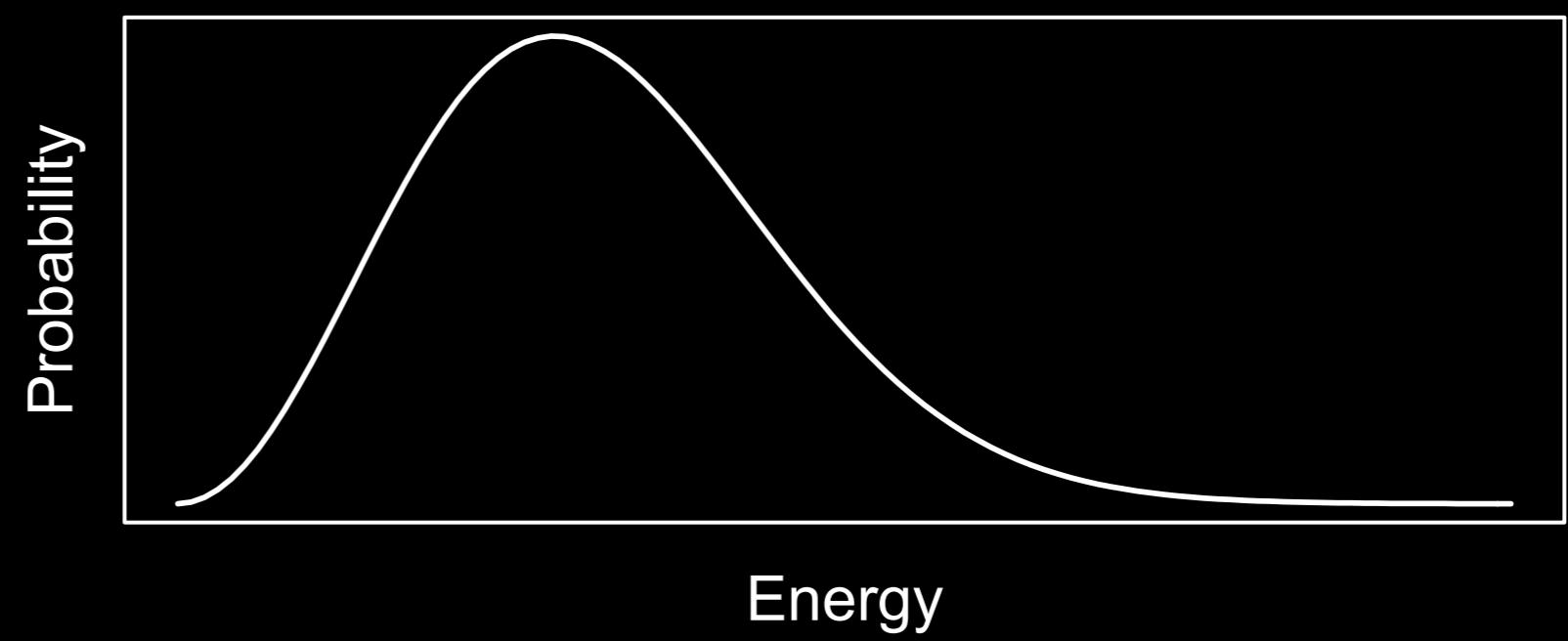


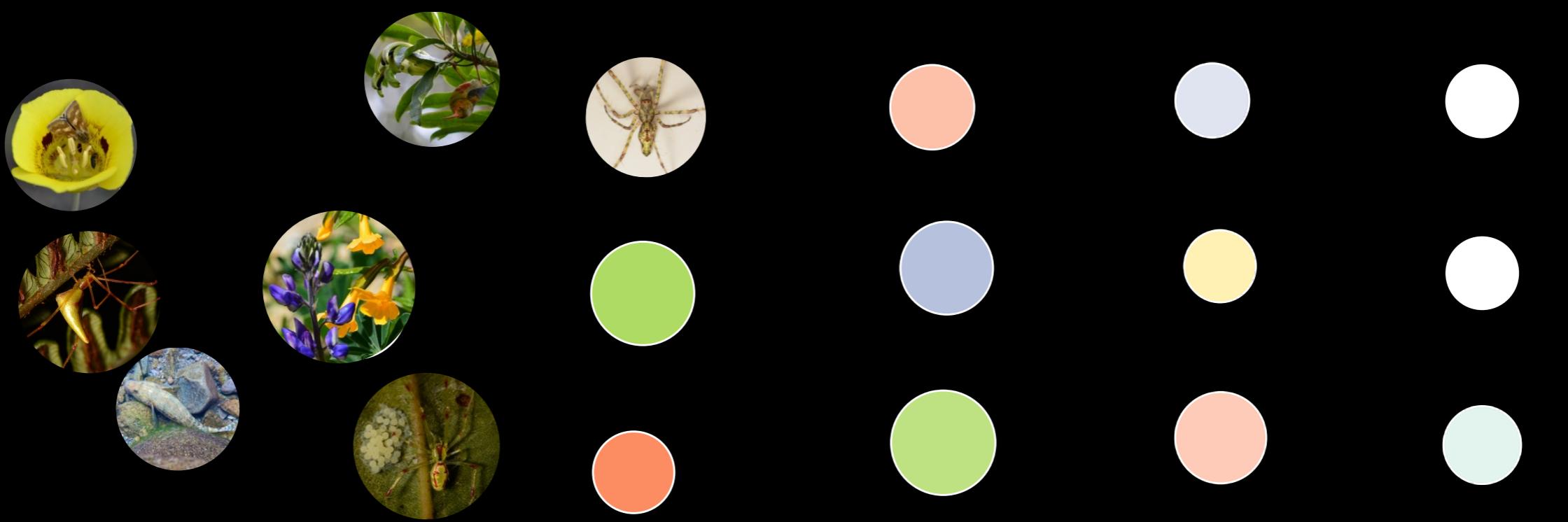
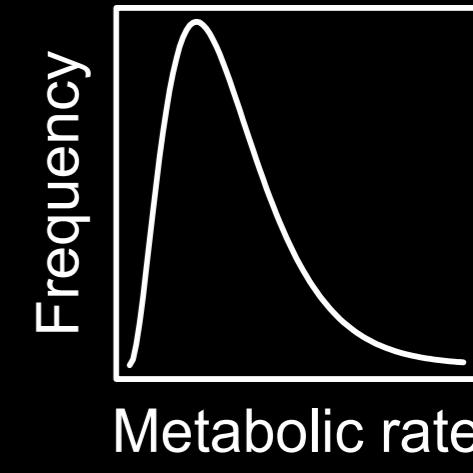
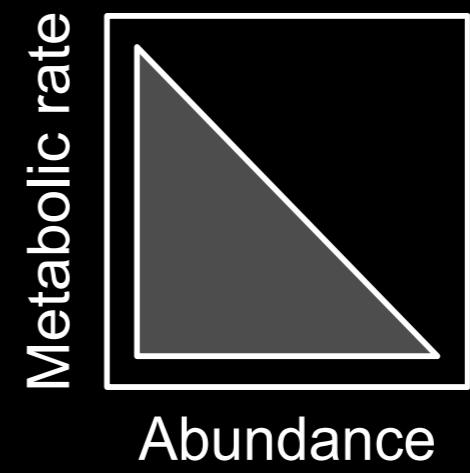
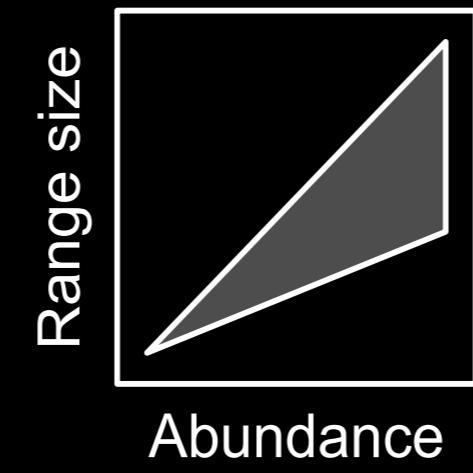
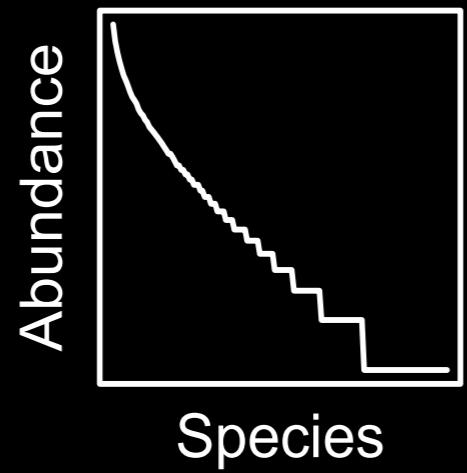
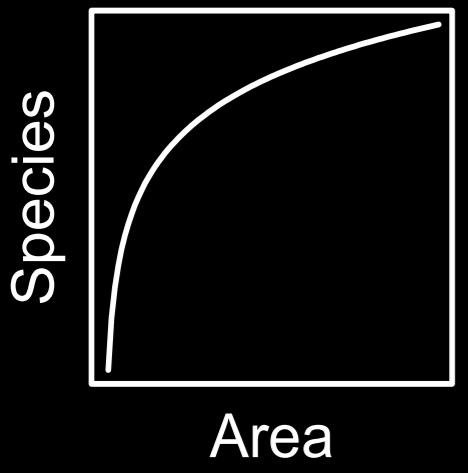
System  
probability  
distributions





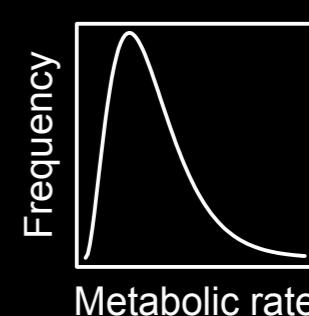
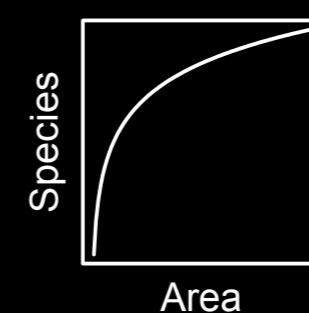
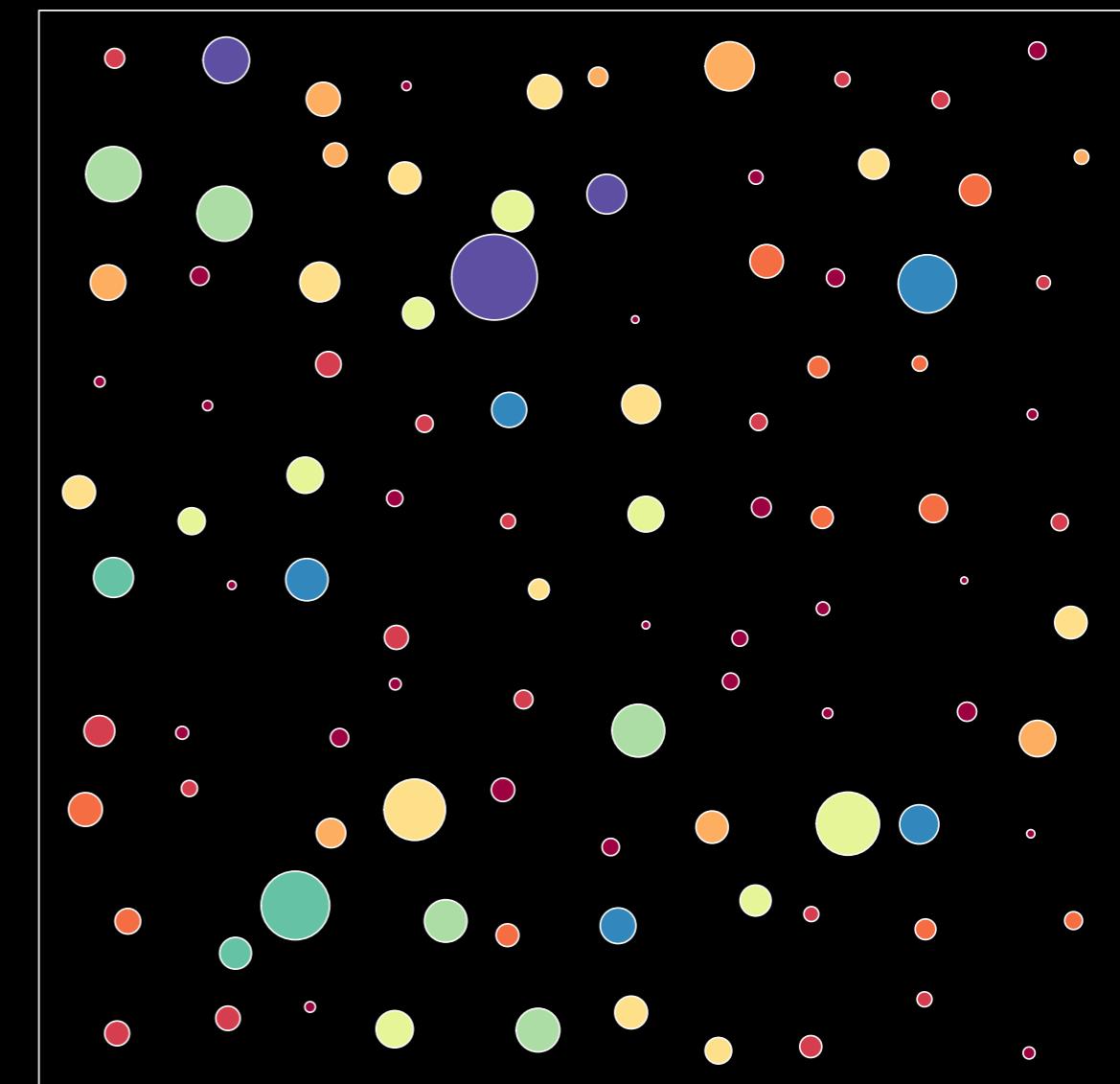
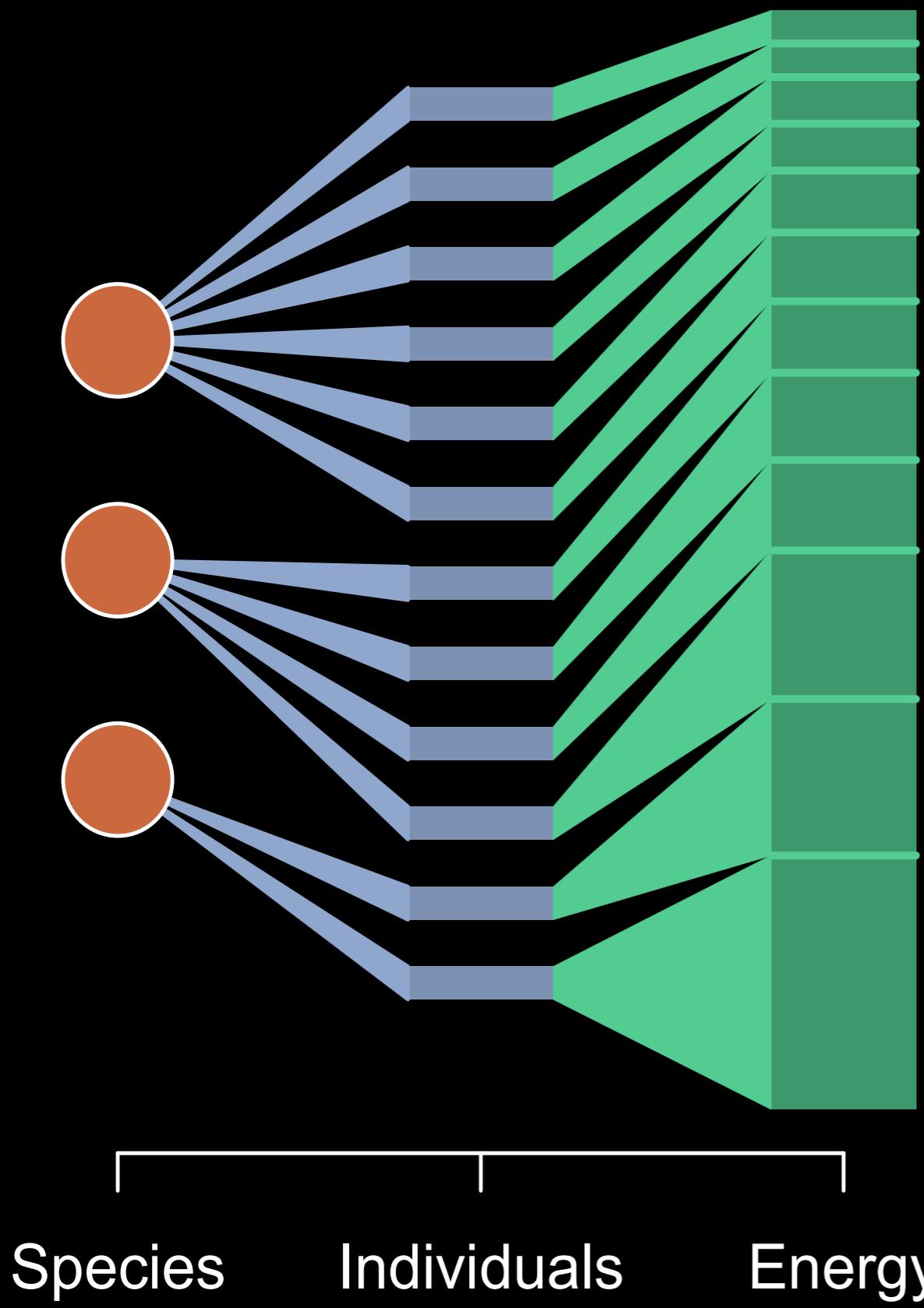
E. T. Jaynes





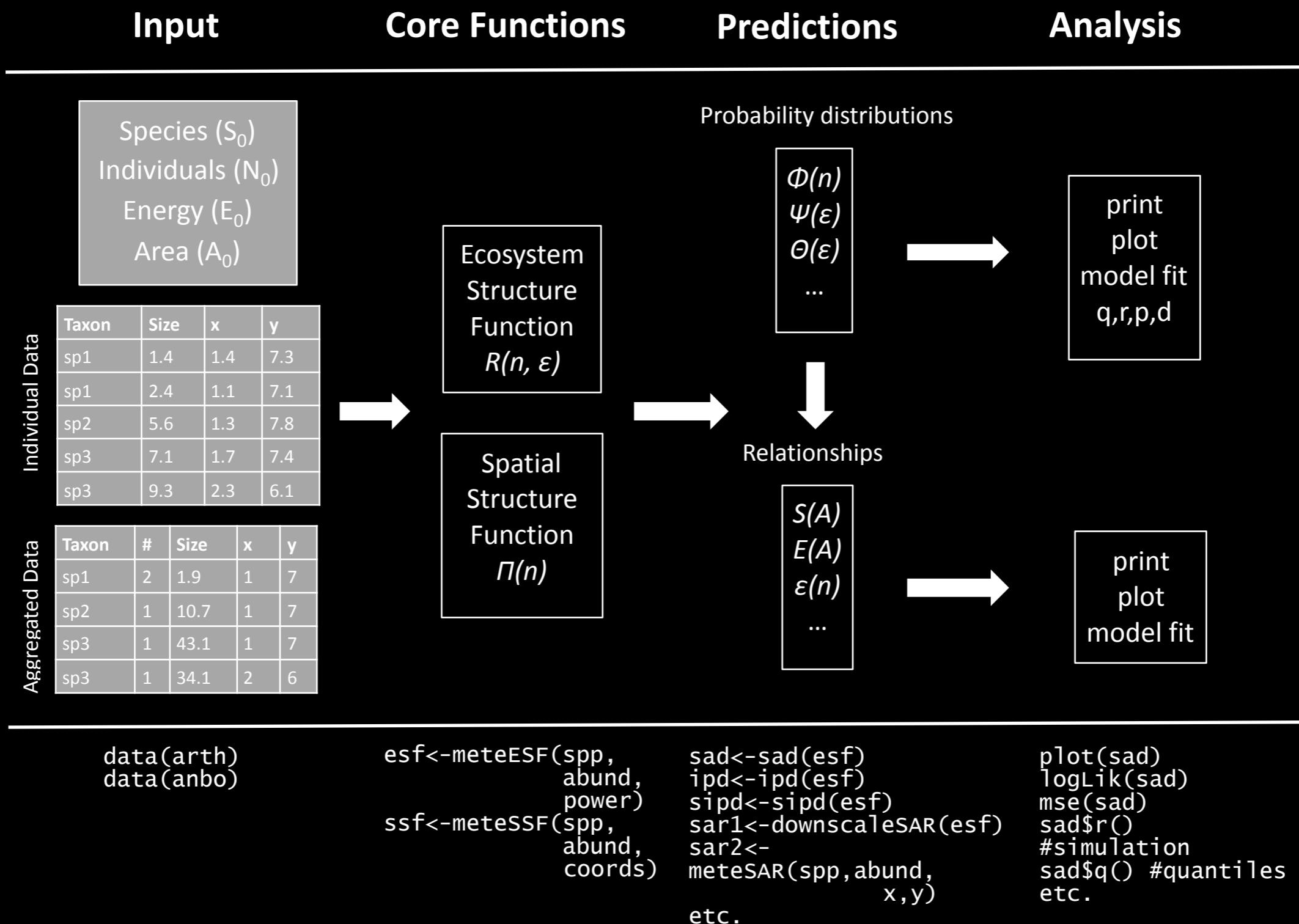
# Maximum Entropy Theory of Ecology

(Harte 2011)

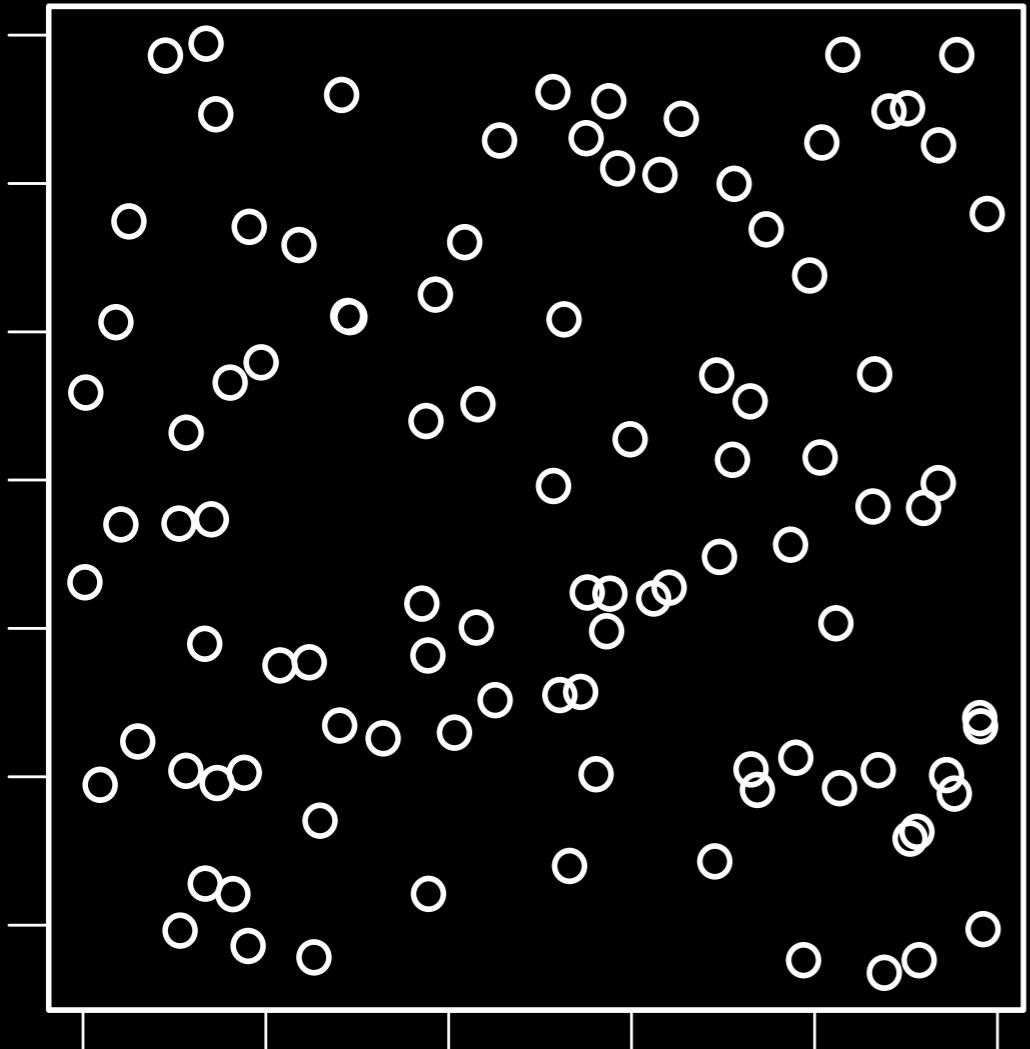




# R package: meterR

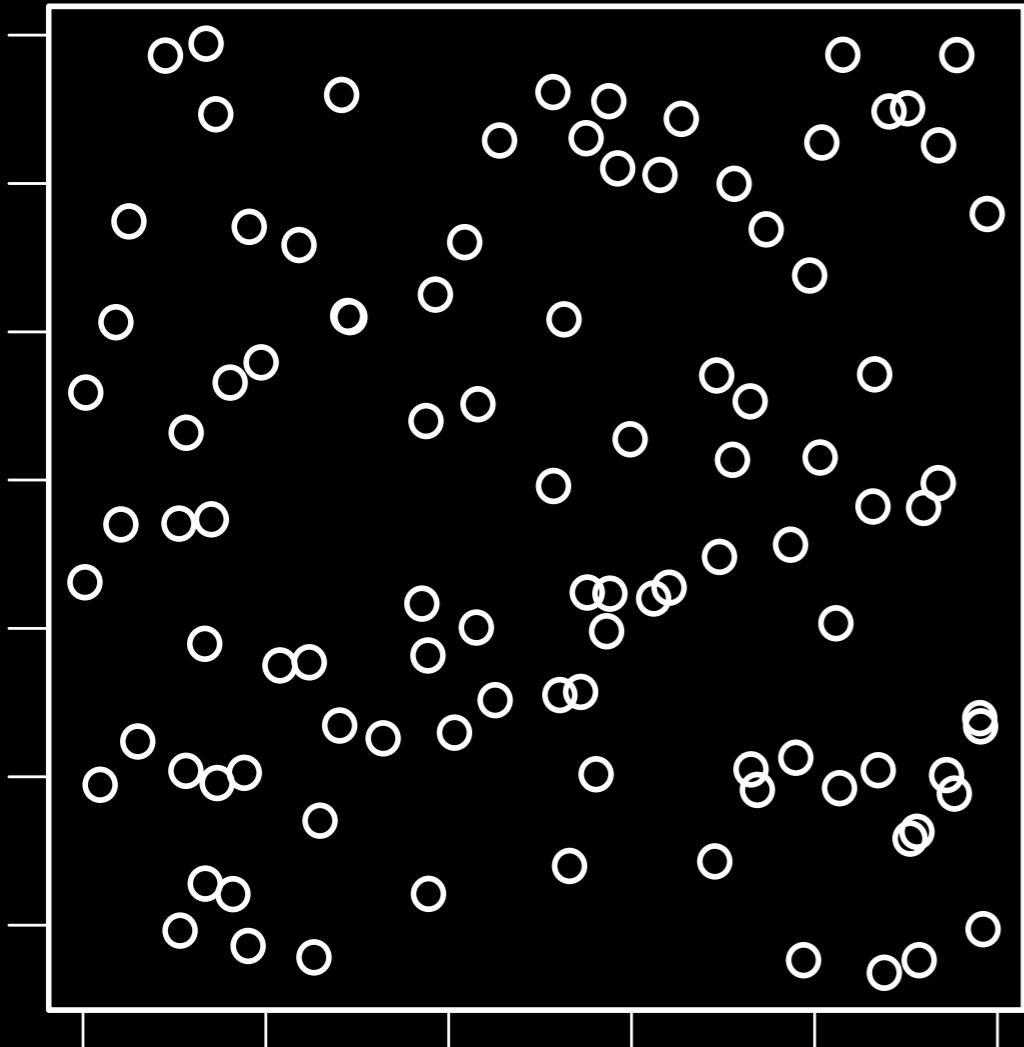


# Why test theory?

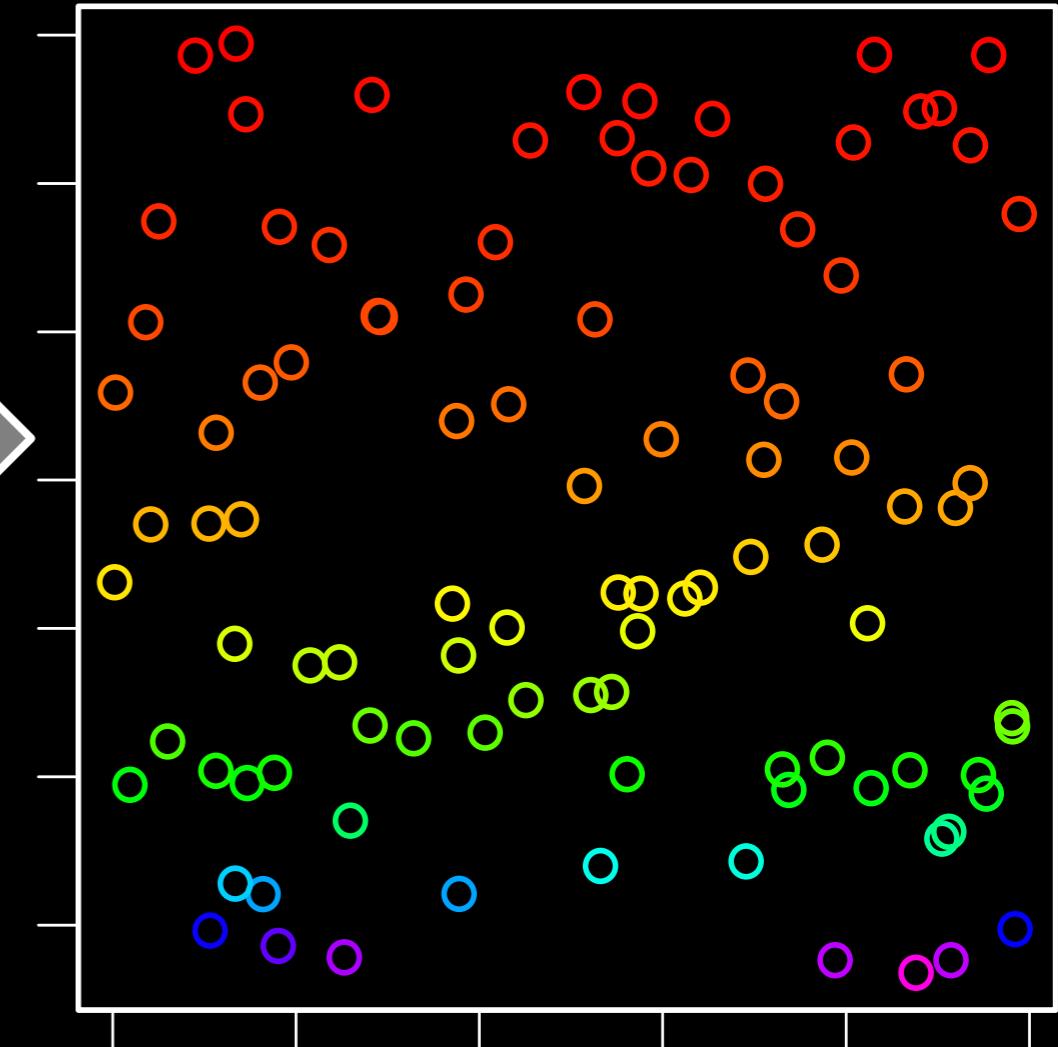
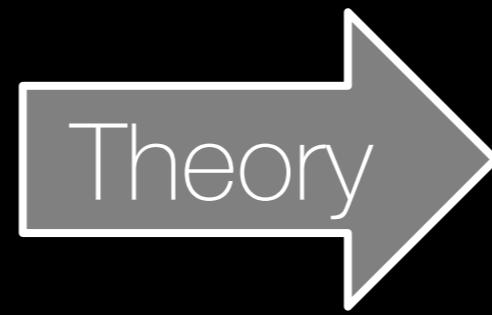


Mechanism AWOL

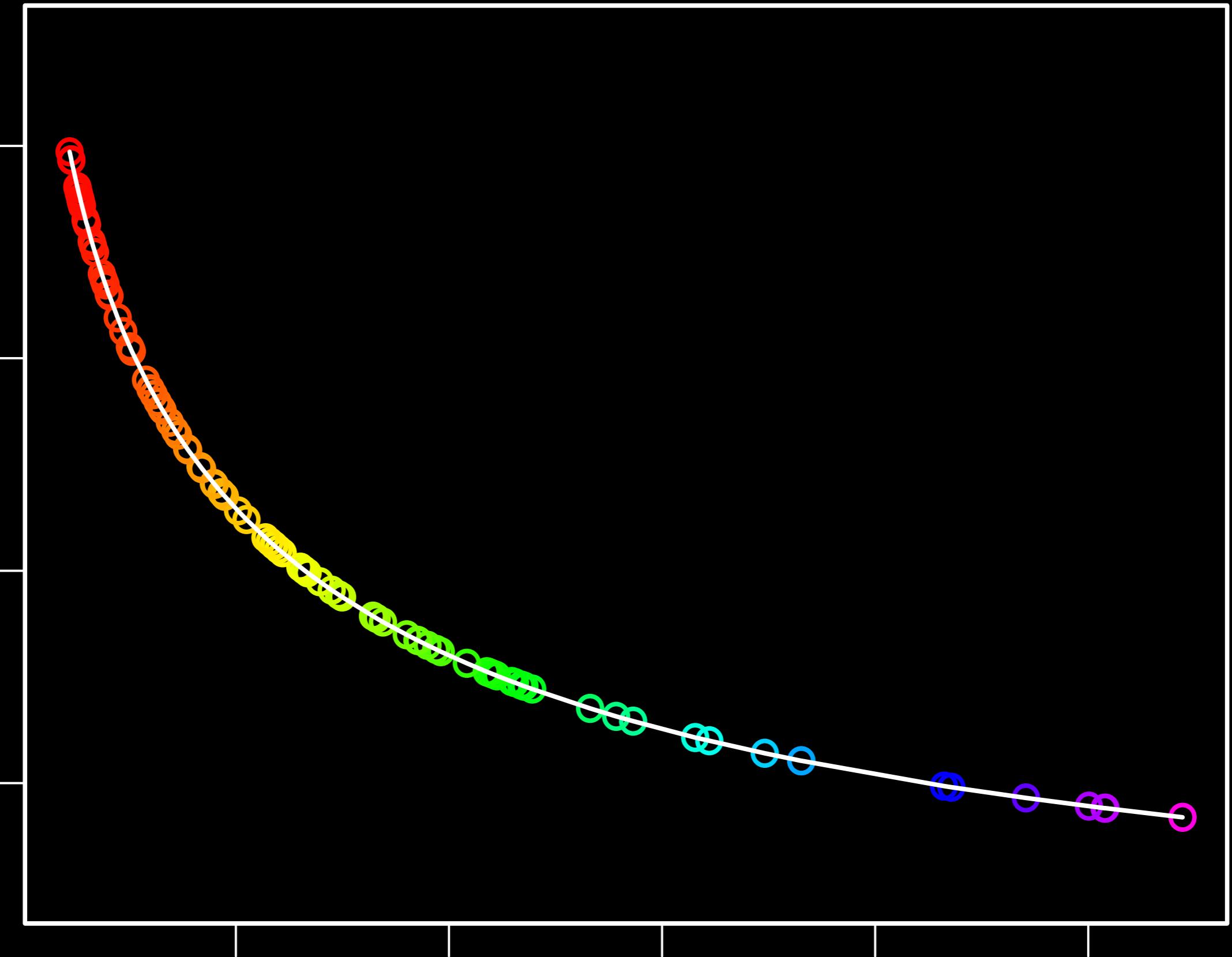
# Why test theory?

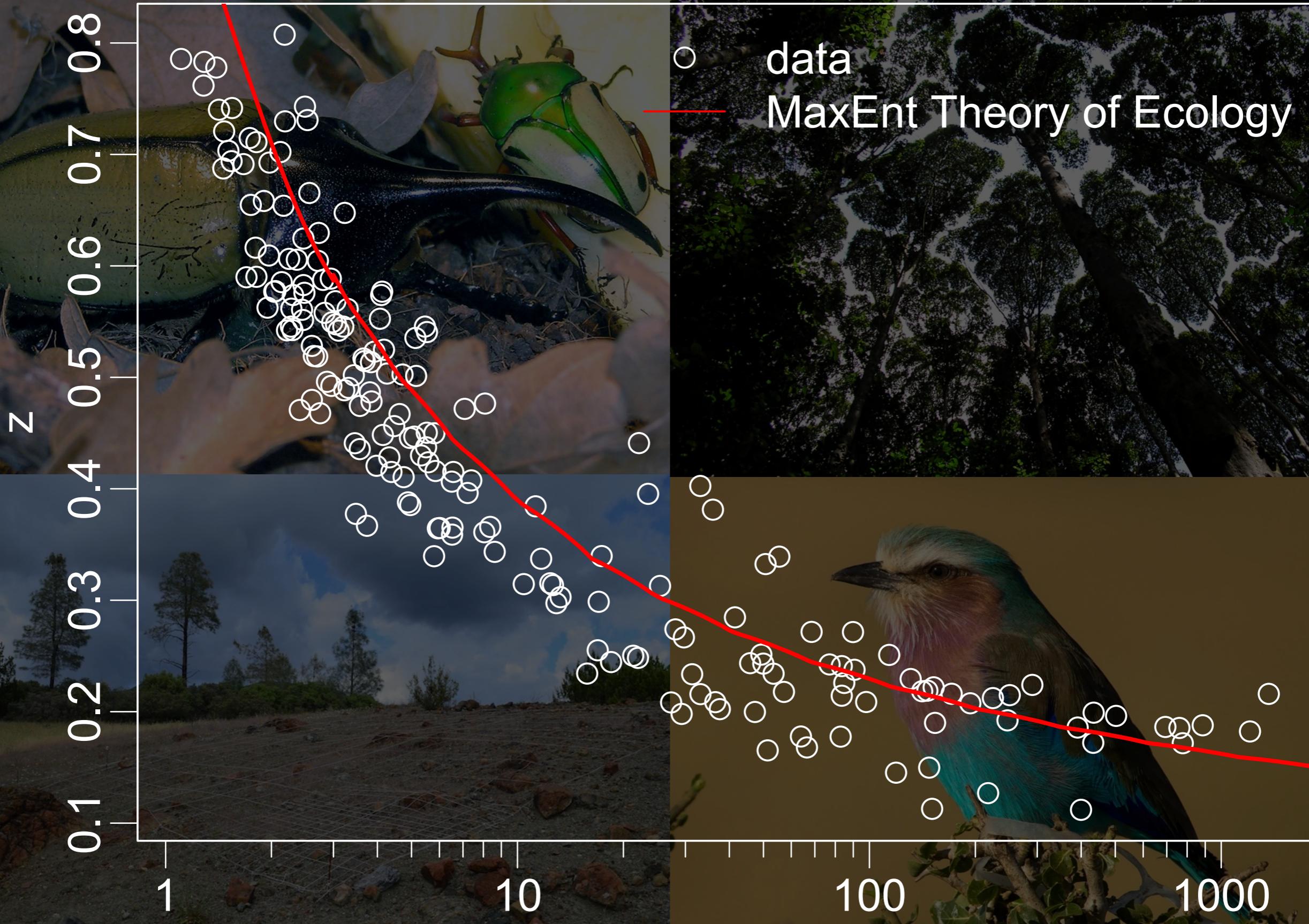


Mechanism AWOL

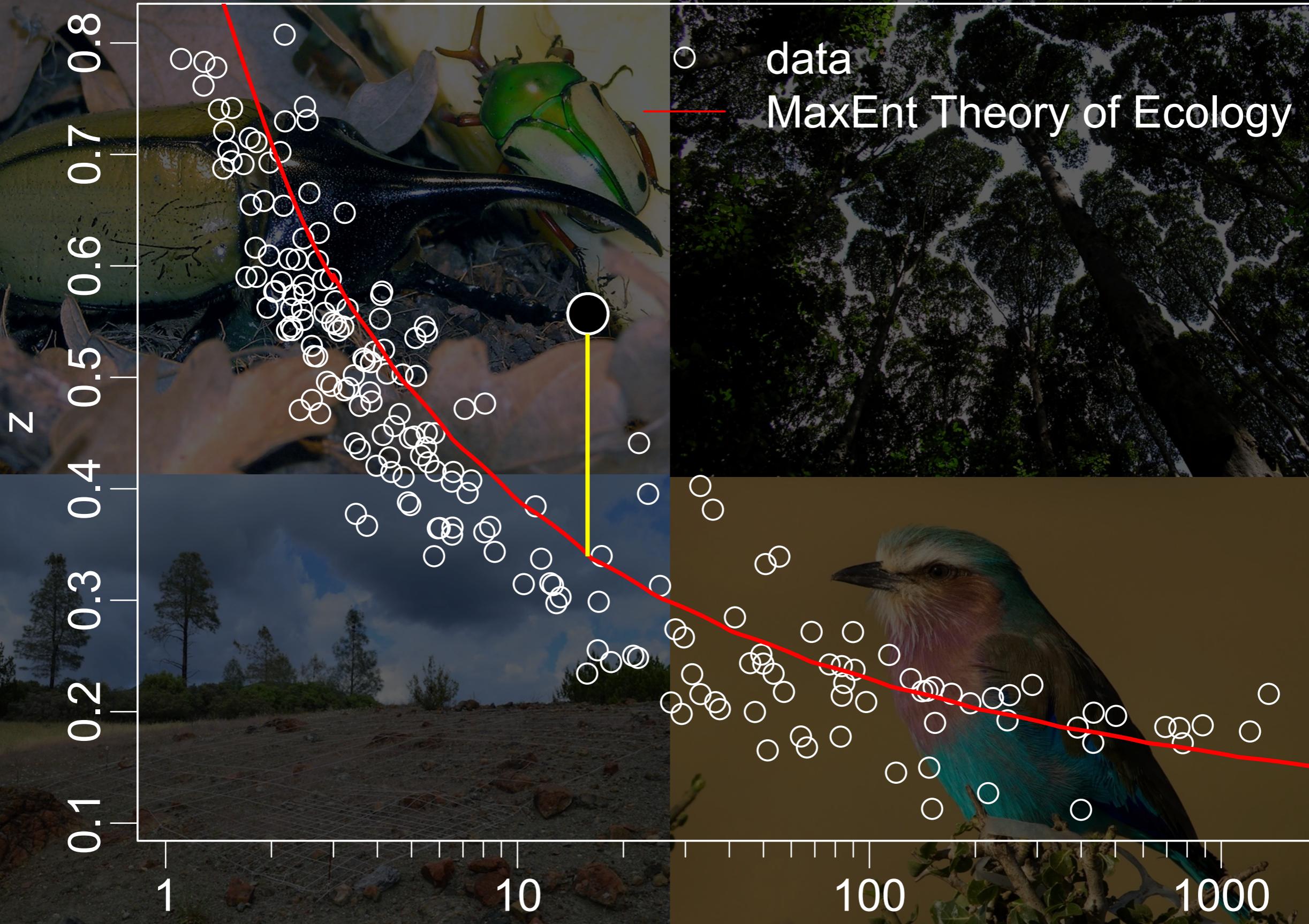


New insights

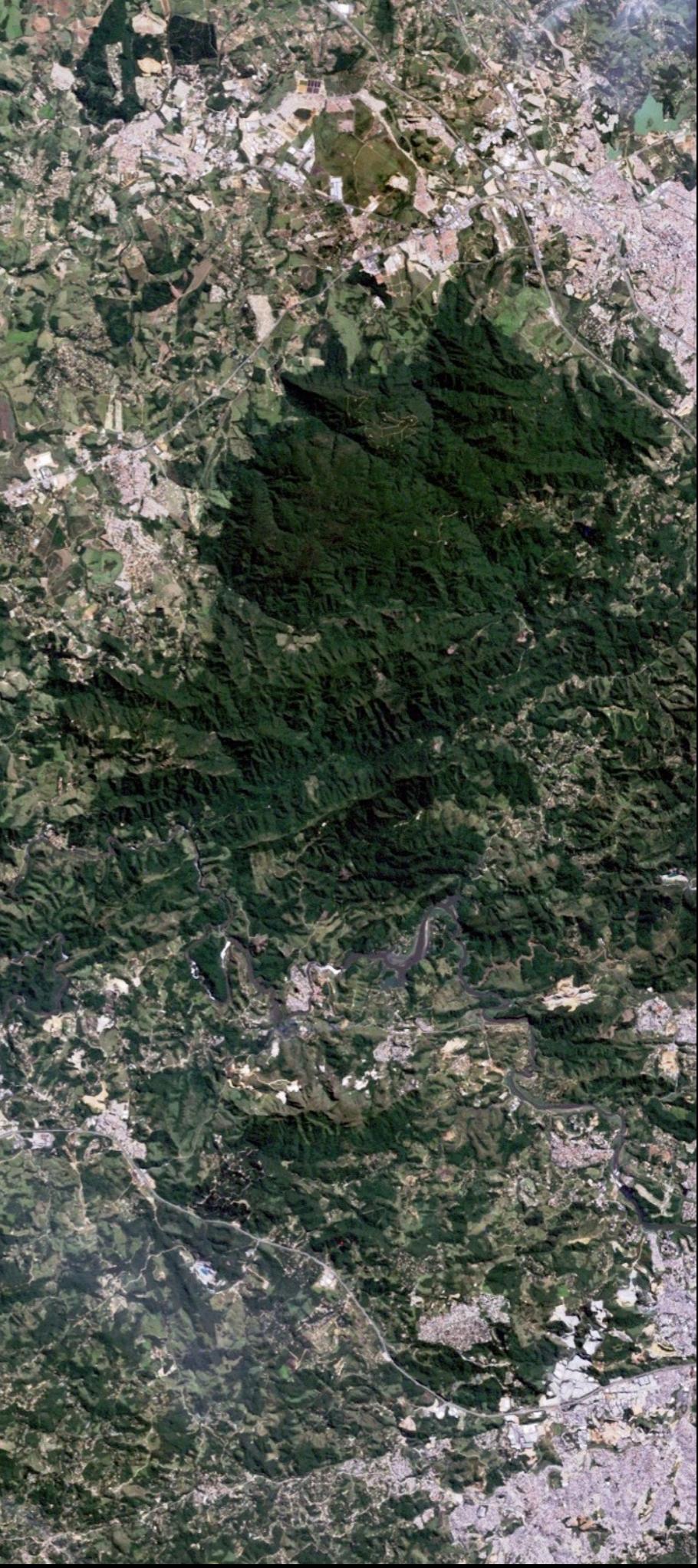
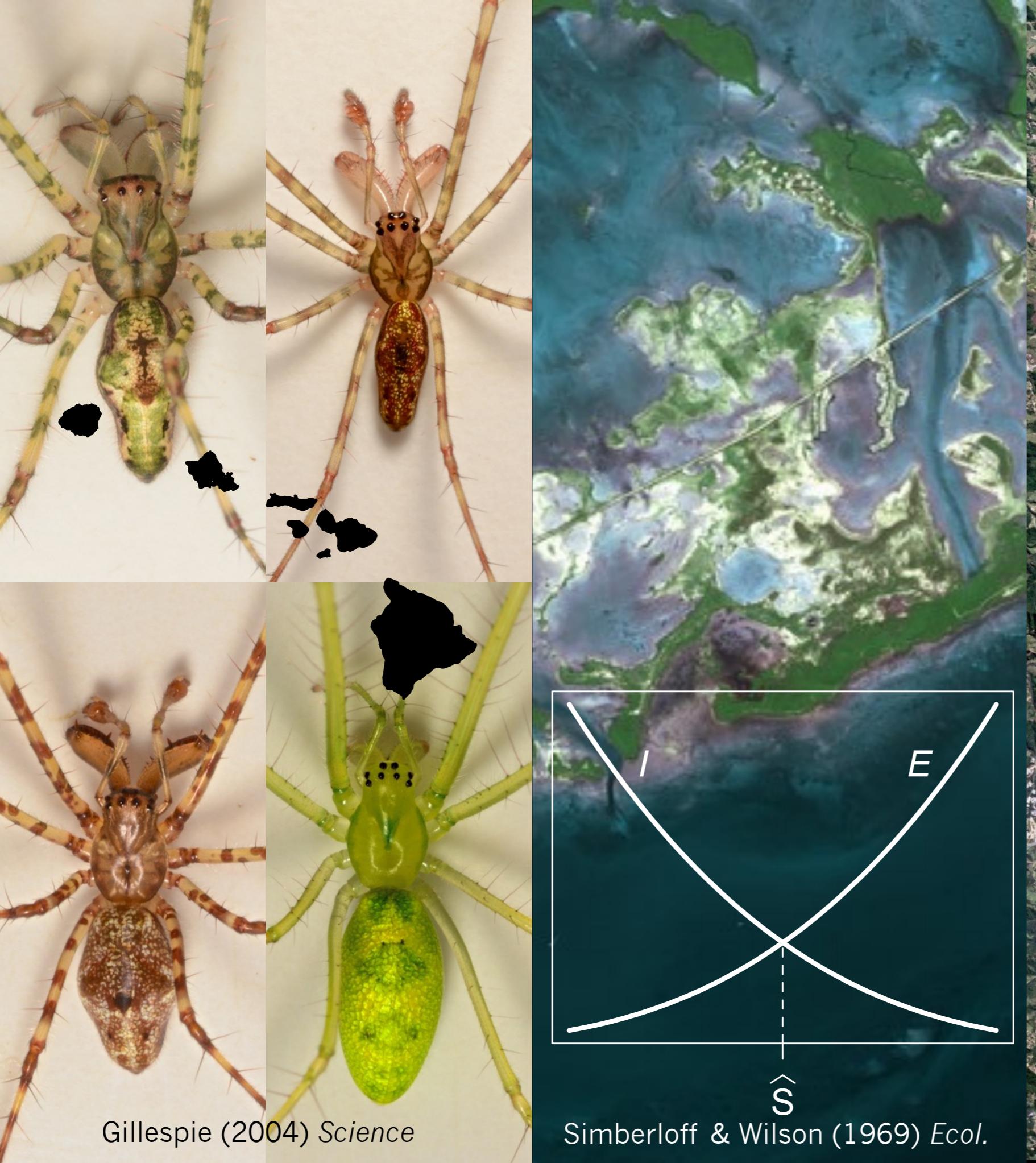


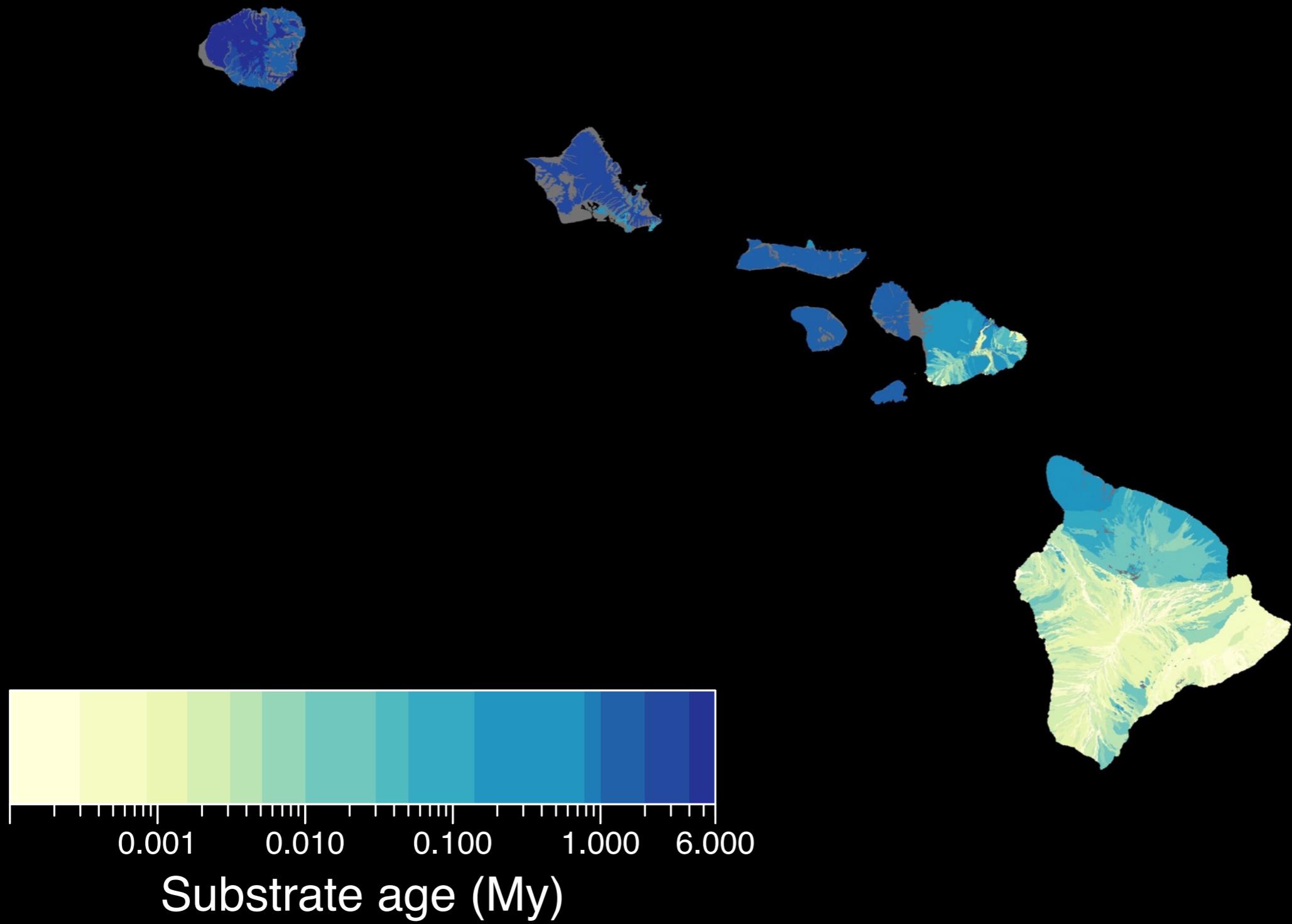


Harte *et al.* (2009) *Ecol. Lett.*; Harte (2011) Oxford Press



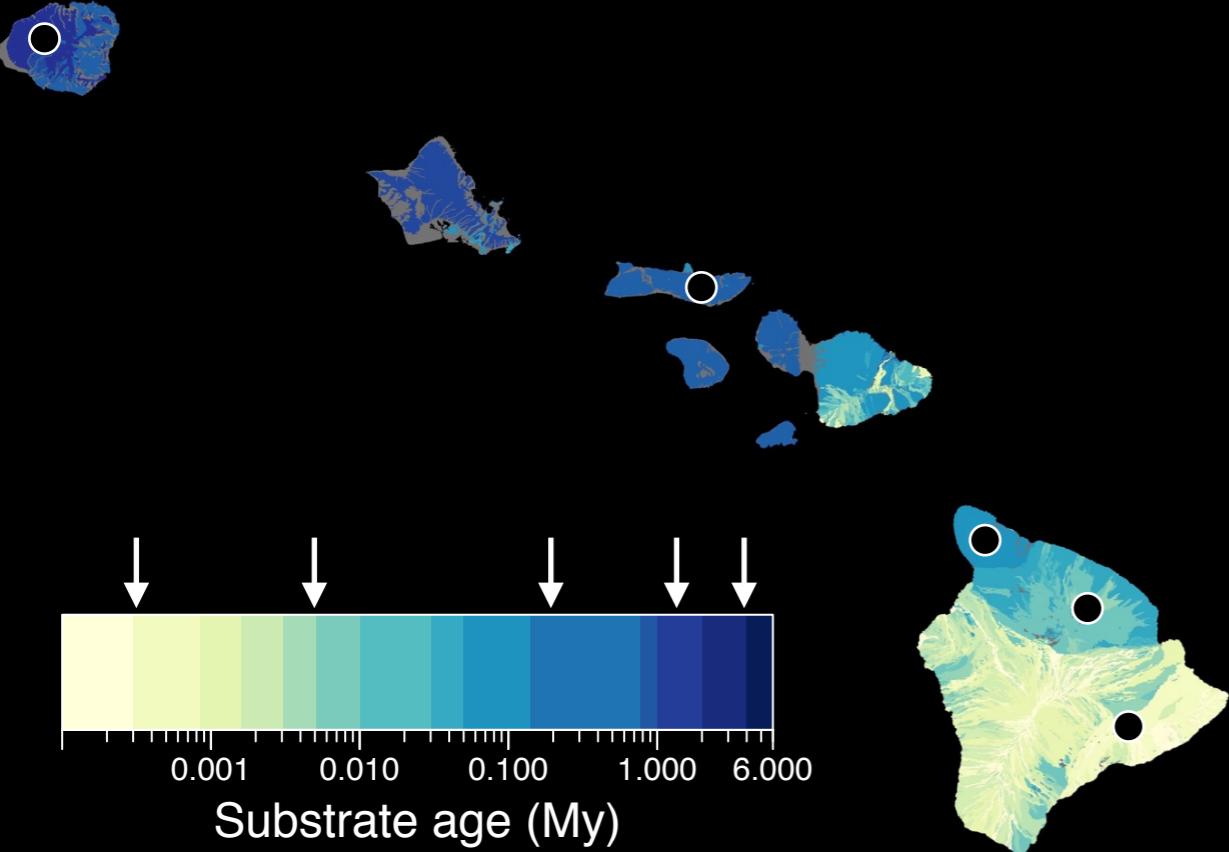
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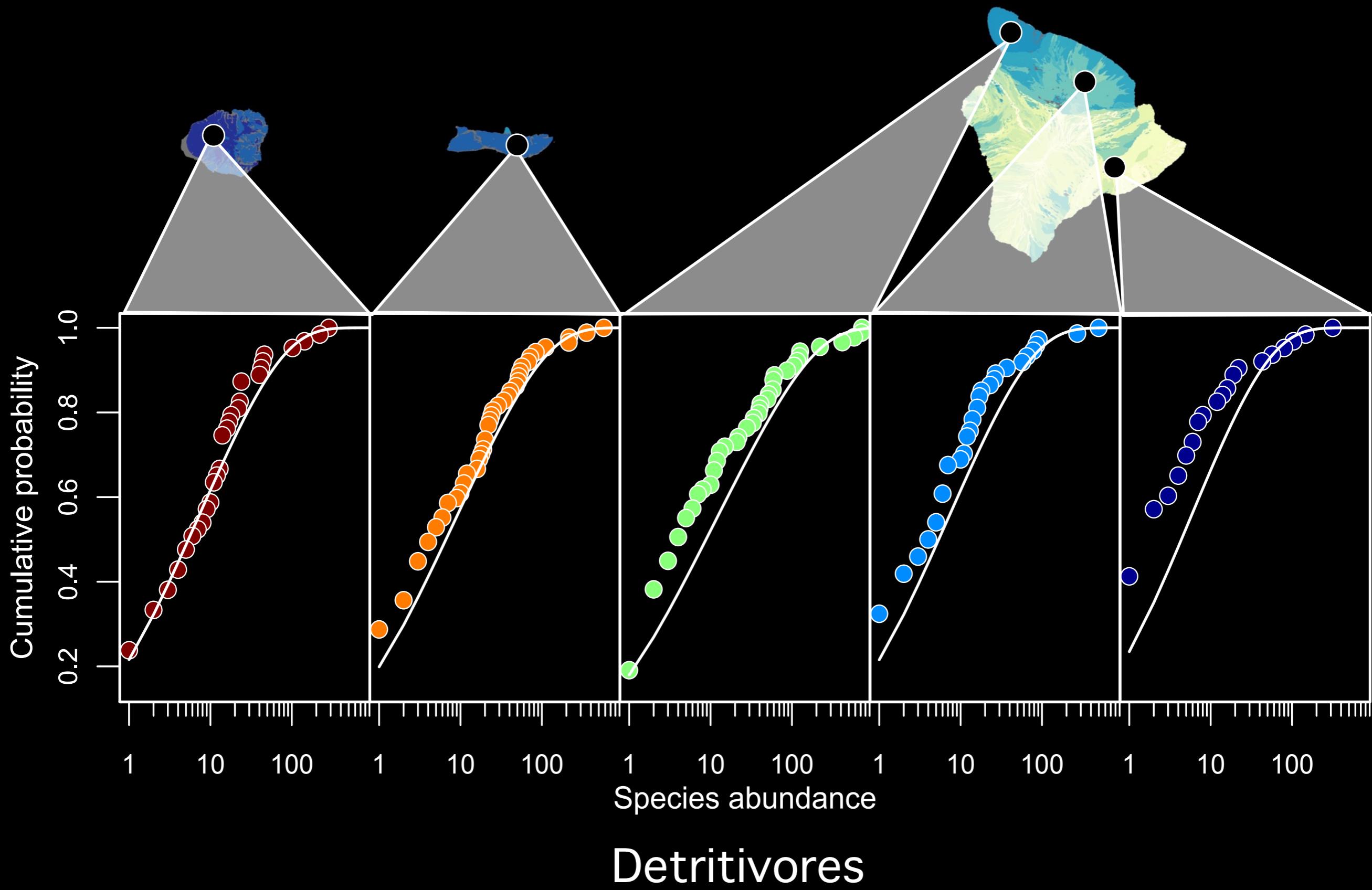


# Capturing evolving communities

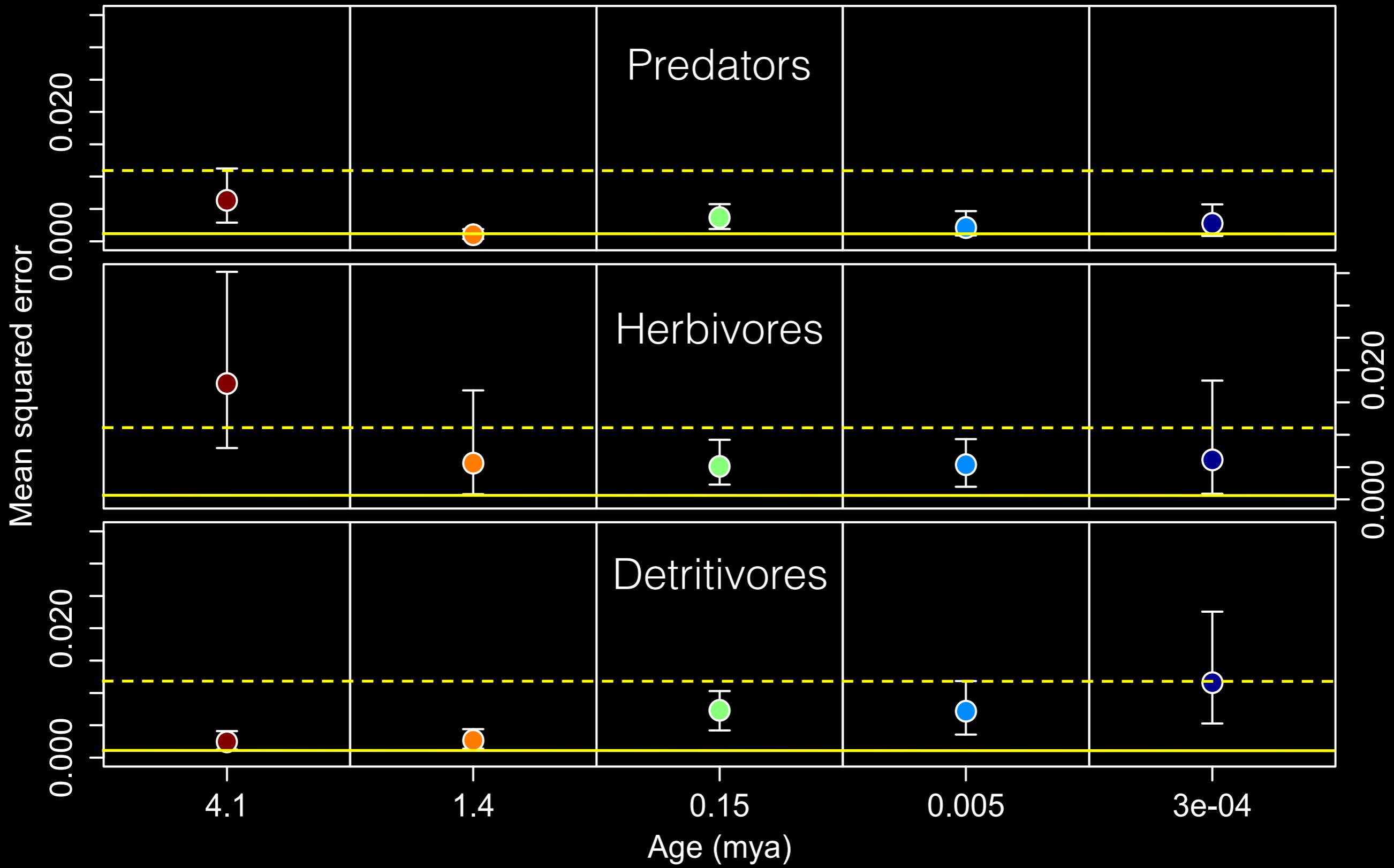


15,997 arthropods collected

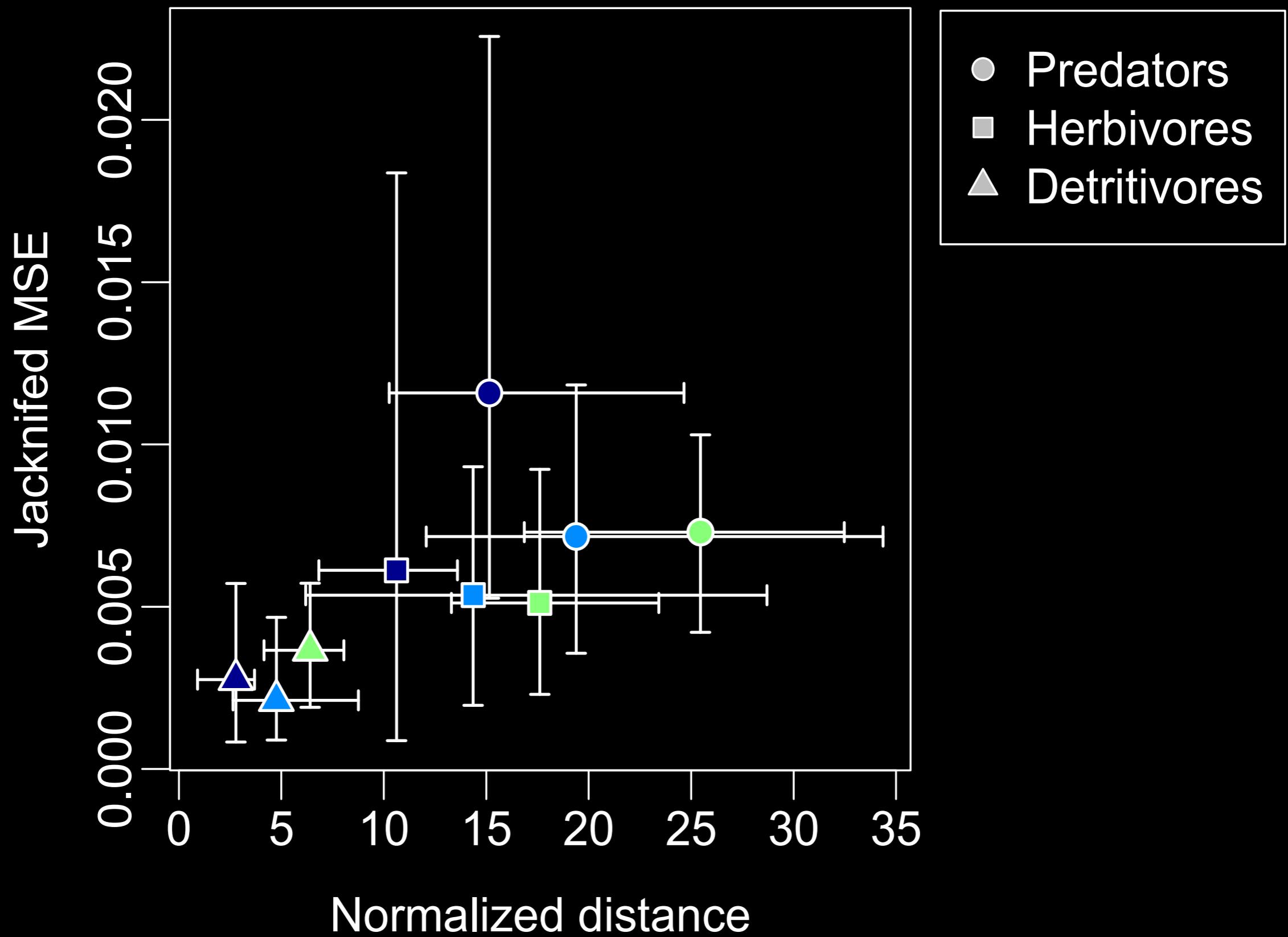


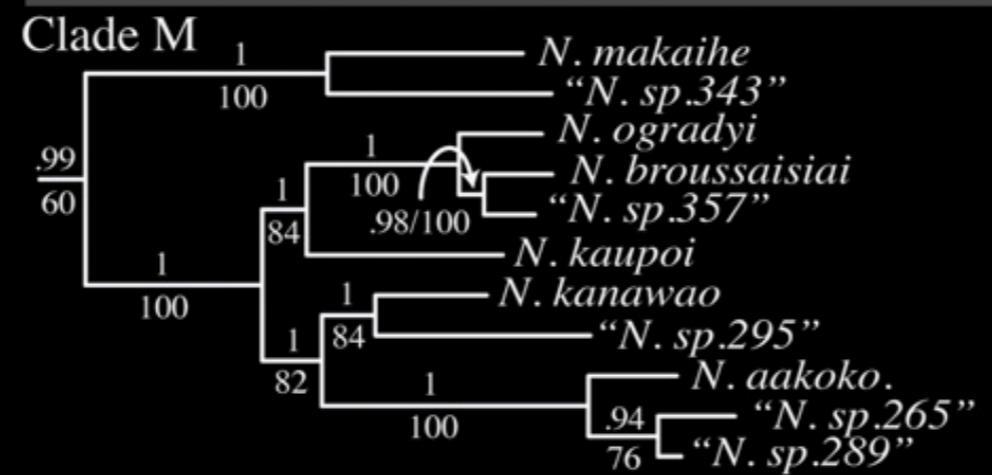
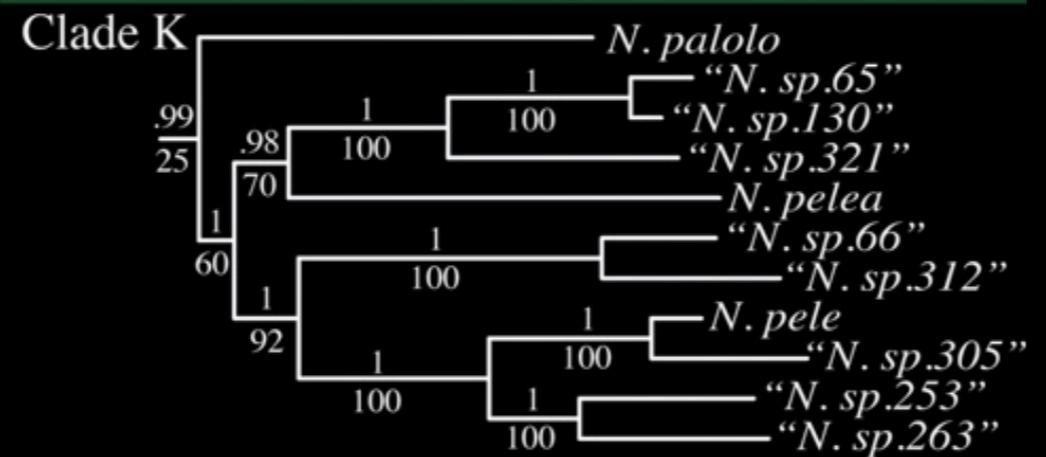
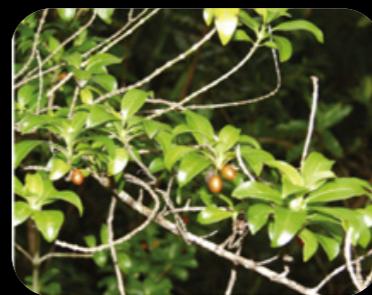
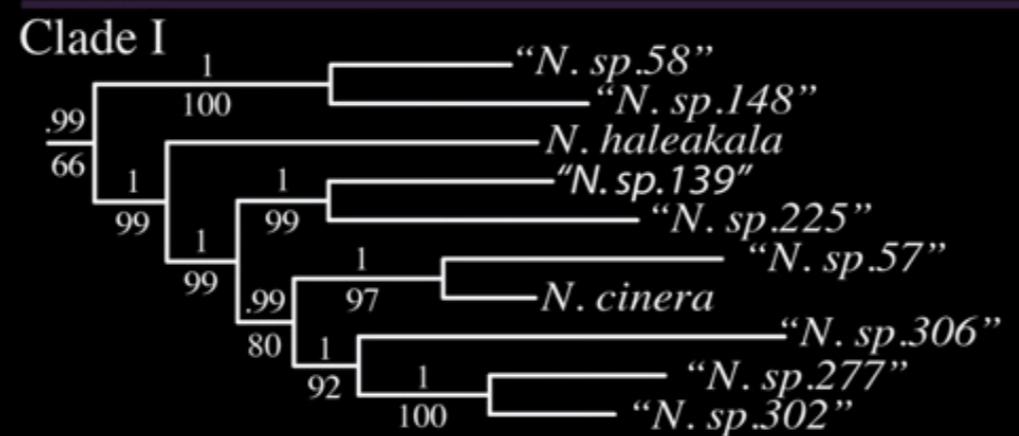
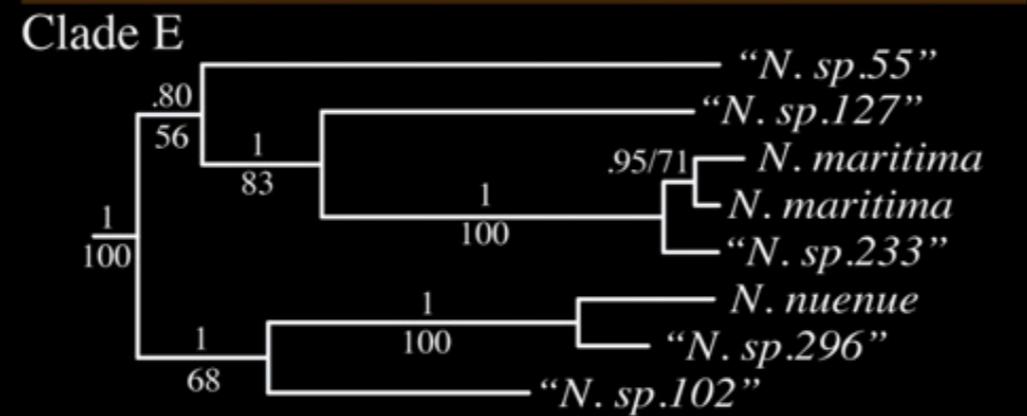


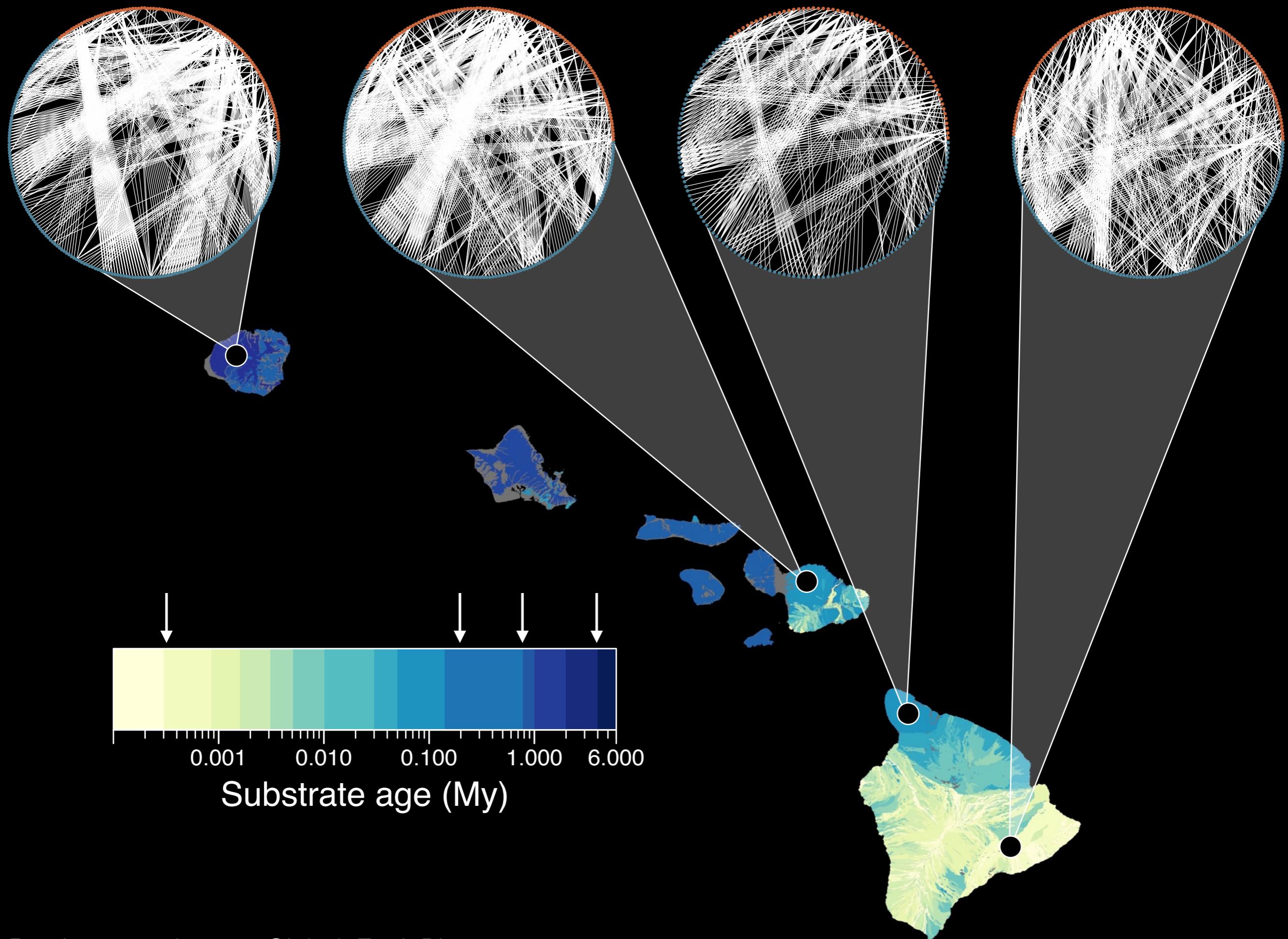
# Species abundance



# Incomplete assembly







# Thank you!



J. Harte



R. G. Gillespie



J. Y. Lim



K. R. Goodman



D. S. Gruner

