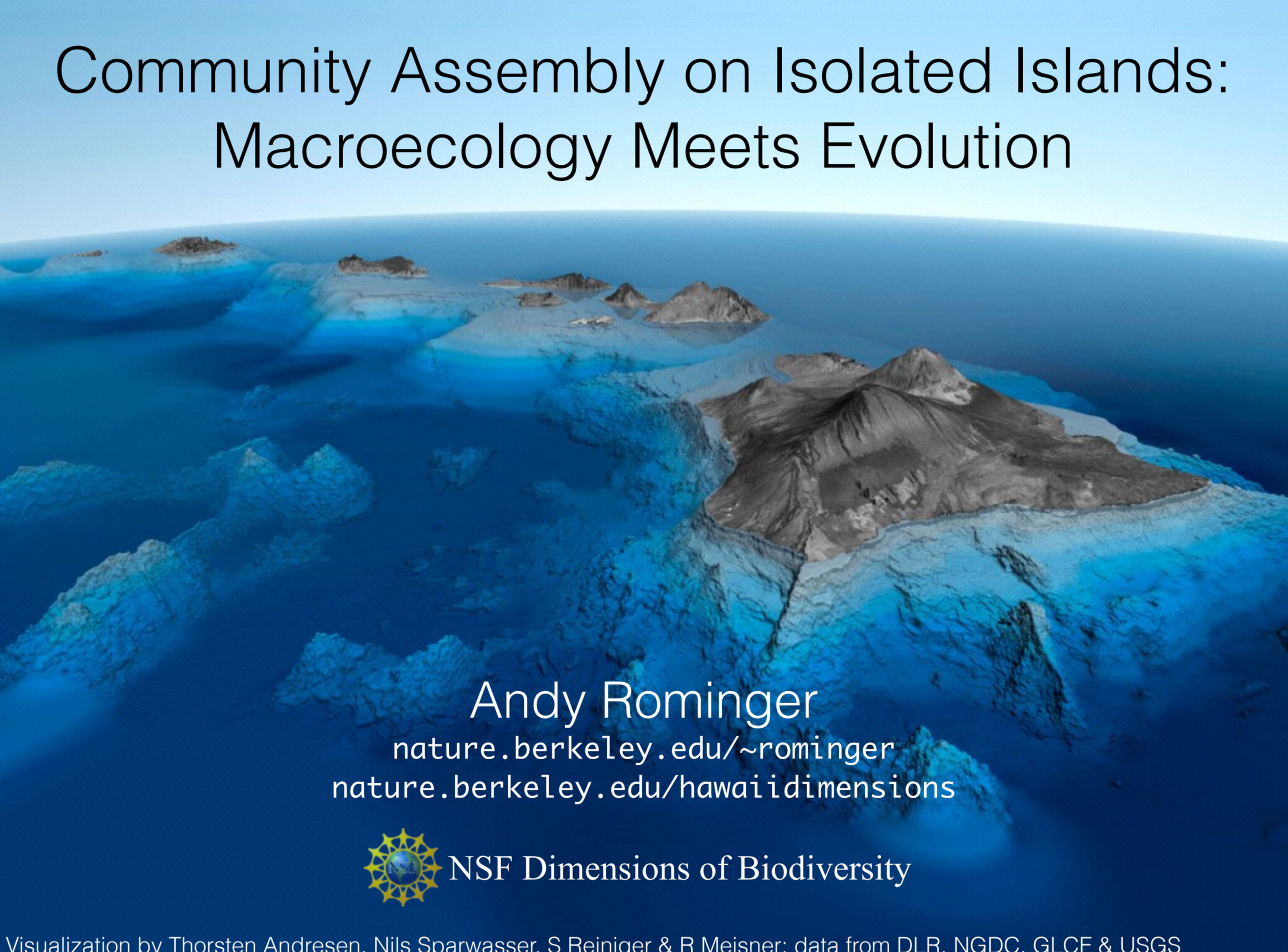
Community Assembly on Isolated Islands: Macroecology Meets Evolution



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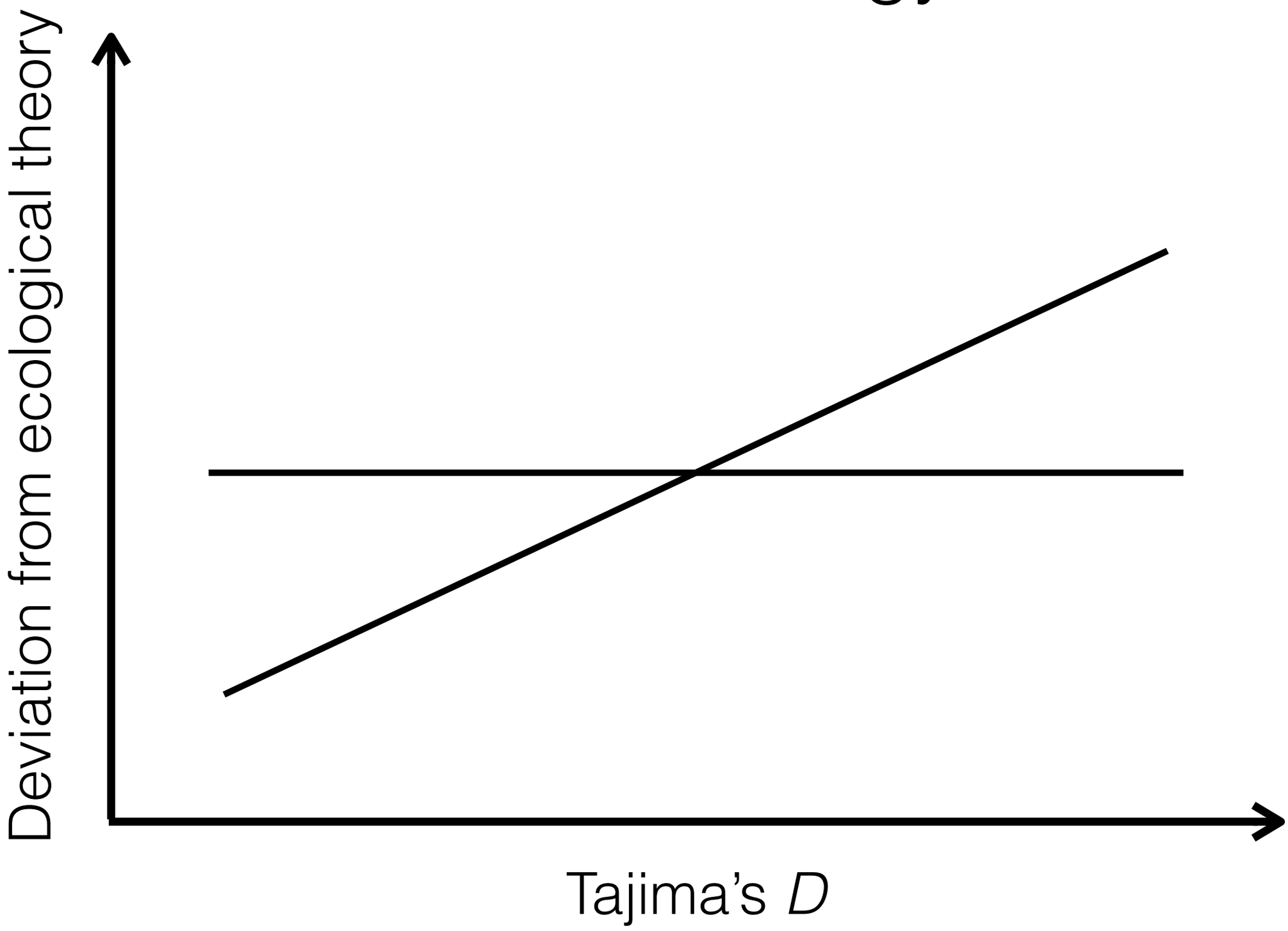
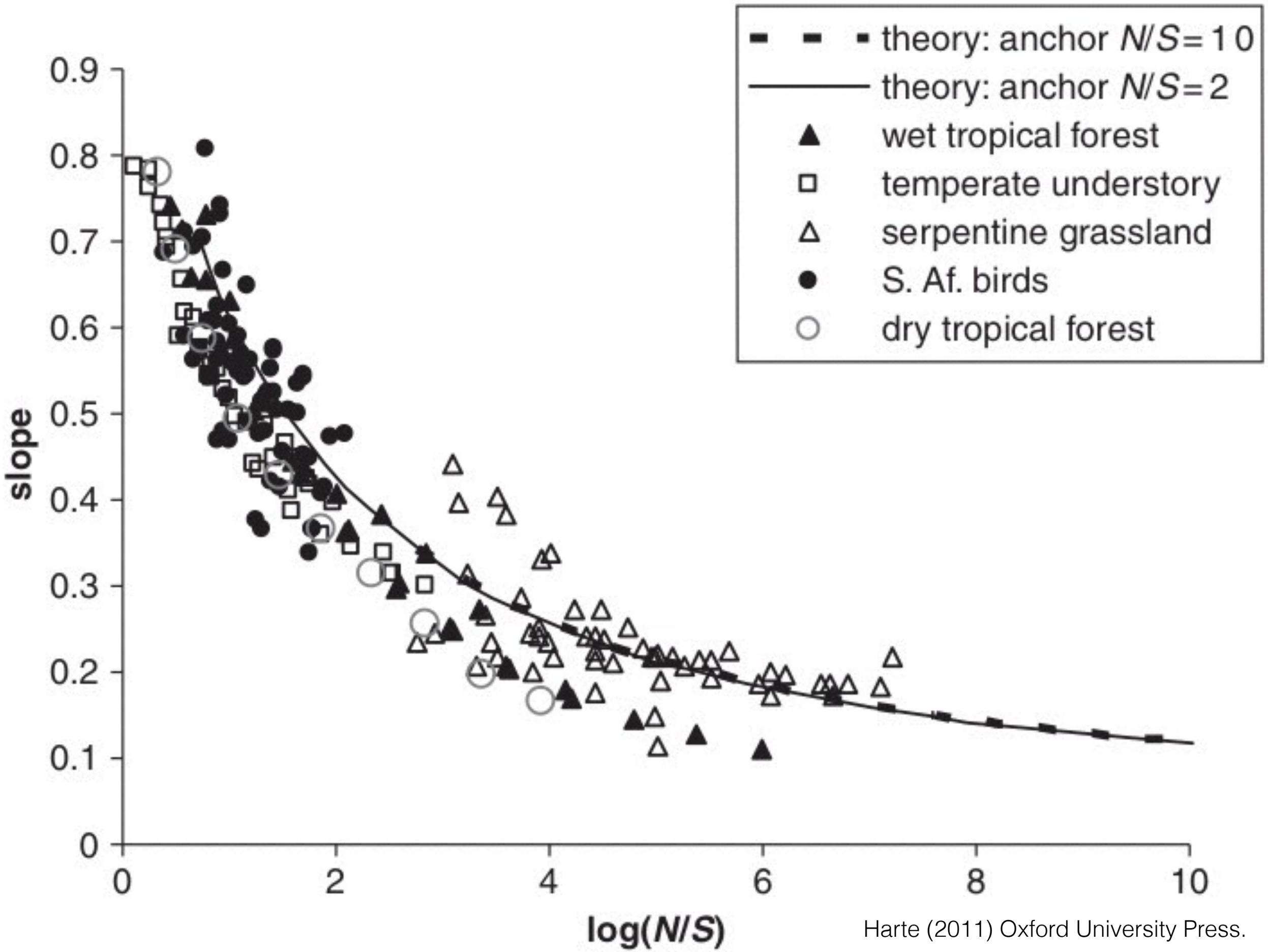
nature.berkeley.edu/hawaiidimensions

NSF Dimensions of Biodiversity

Visualization by Thorsten Andresen, Nils Sparwasser, S Reiniger & R Meisner; data from DLR, NGDC, GLCF & USGS

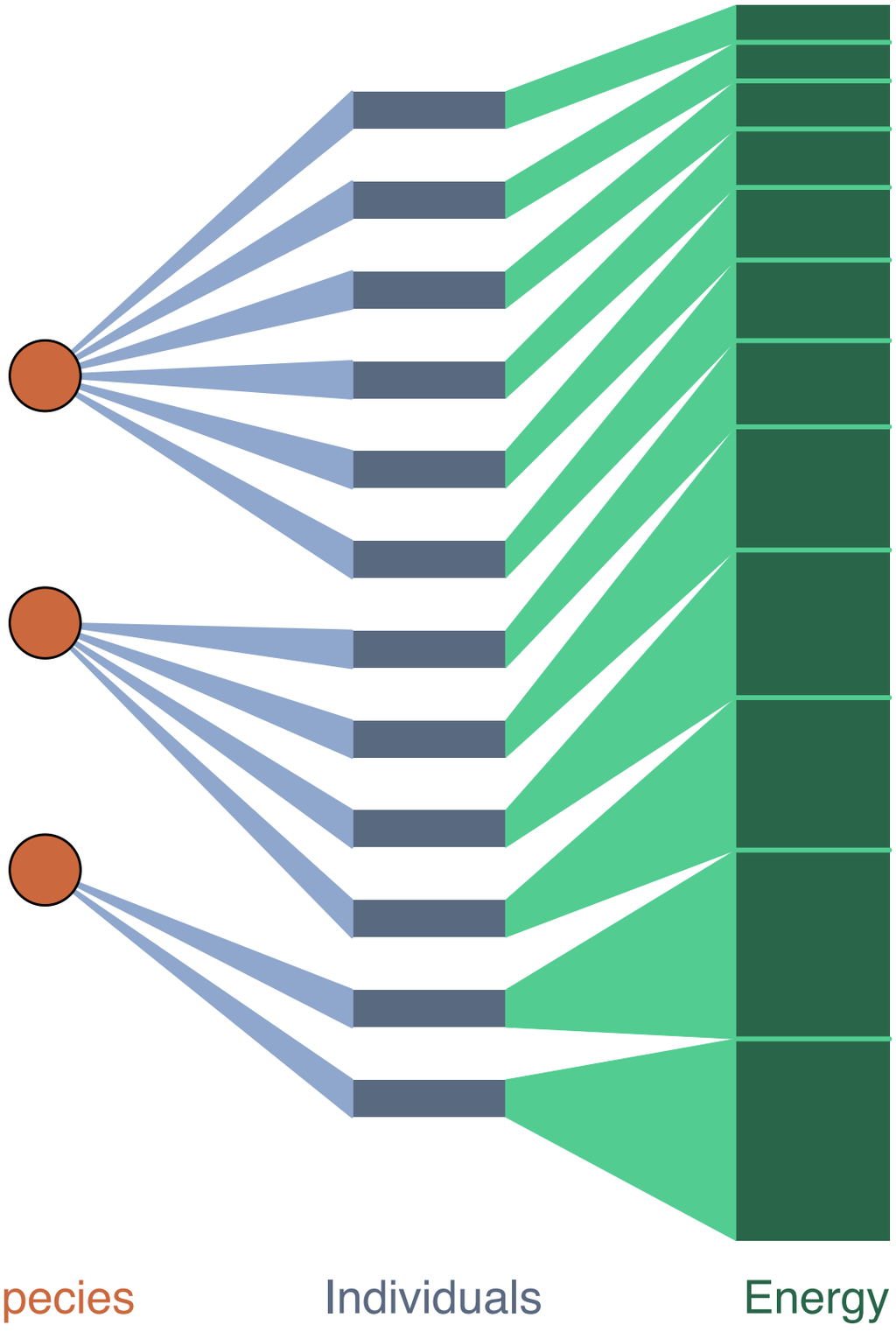
Connection microevolution and macroecology



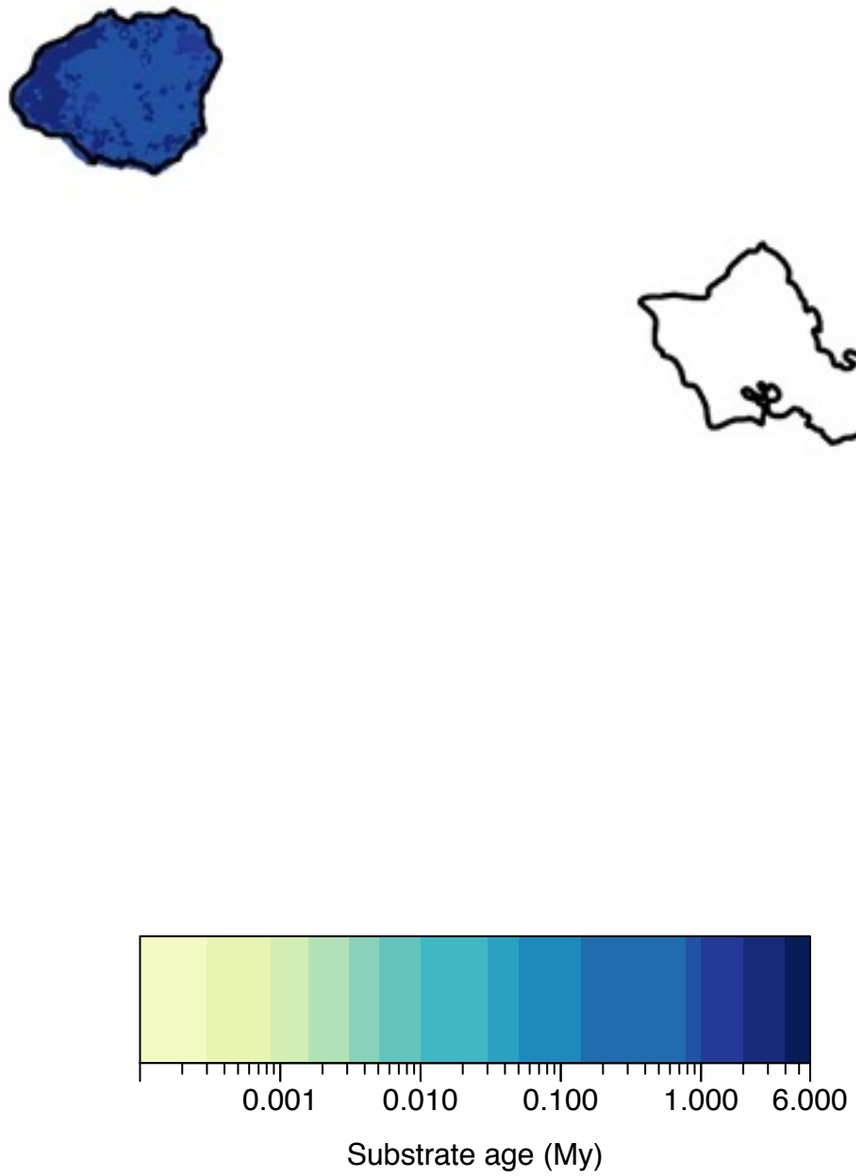


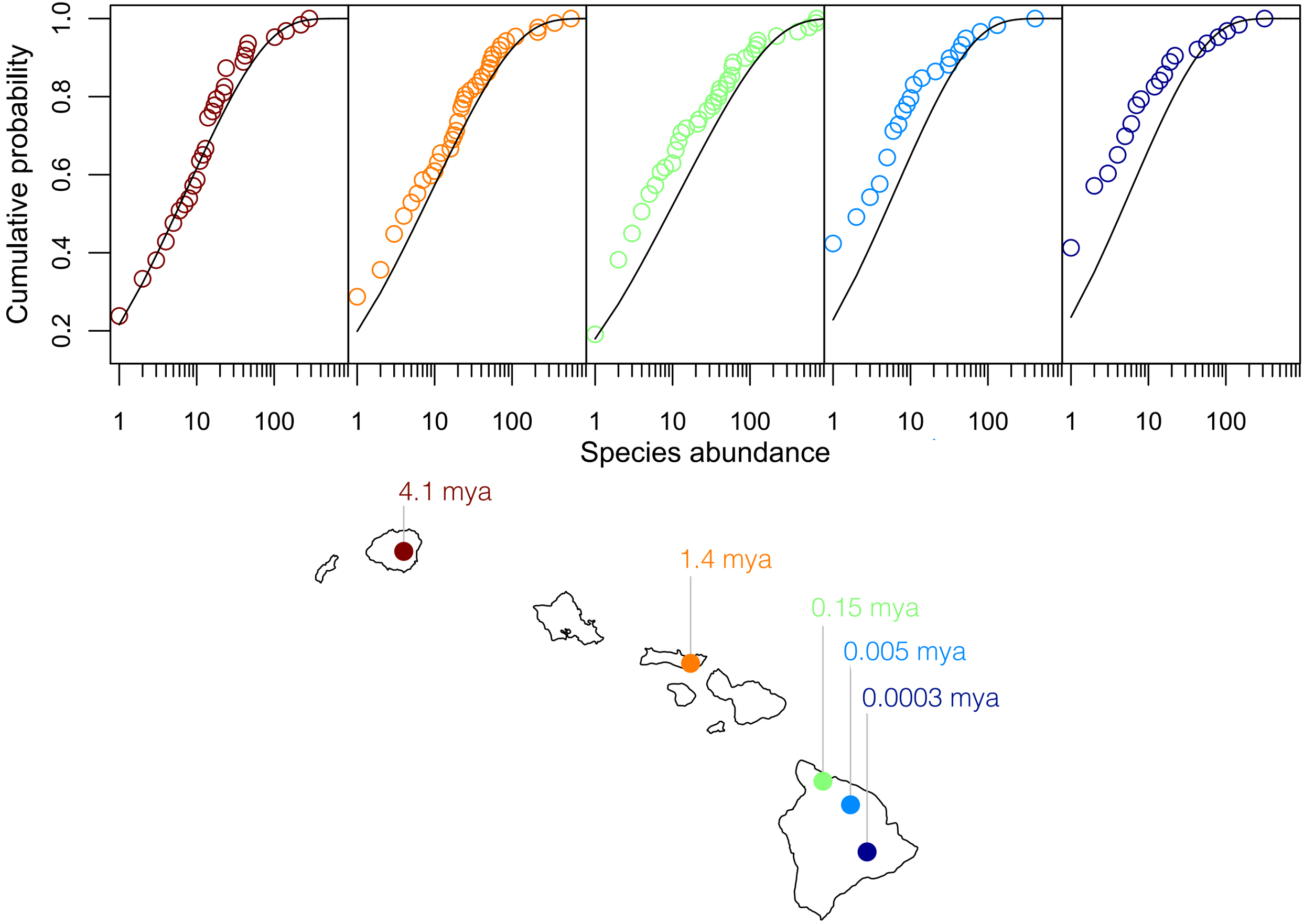
Harte (2011) Oxford University Press.

Maximum Entropy Theory of Ecology



Harte (2011) Oxford University Press.


0.001
0.010
0.100
1.000
6.000
Substrate age (My)


Cumulative probability
0.2
0.4
0.6
0.8
1.0
1
10
100
Species abundance
4.1 mya
1.4 mya
0.15 mya
0.005 mya
0.0003 mya

Cumulative probability

0.2
0.4
0.6
0.8
1.0

1
10
100

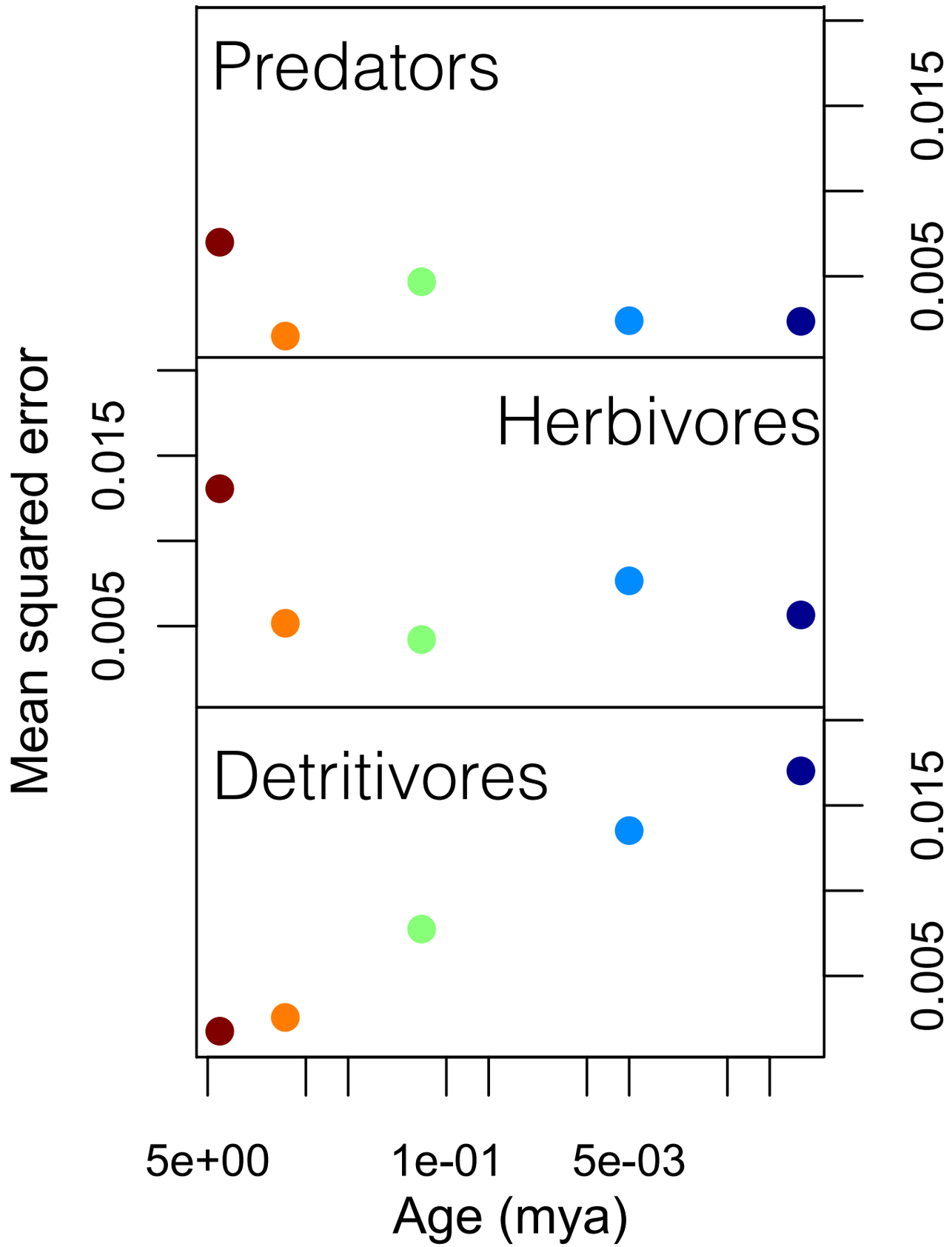
Species abundance

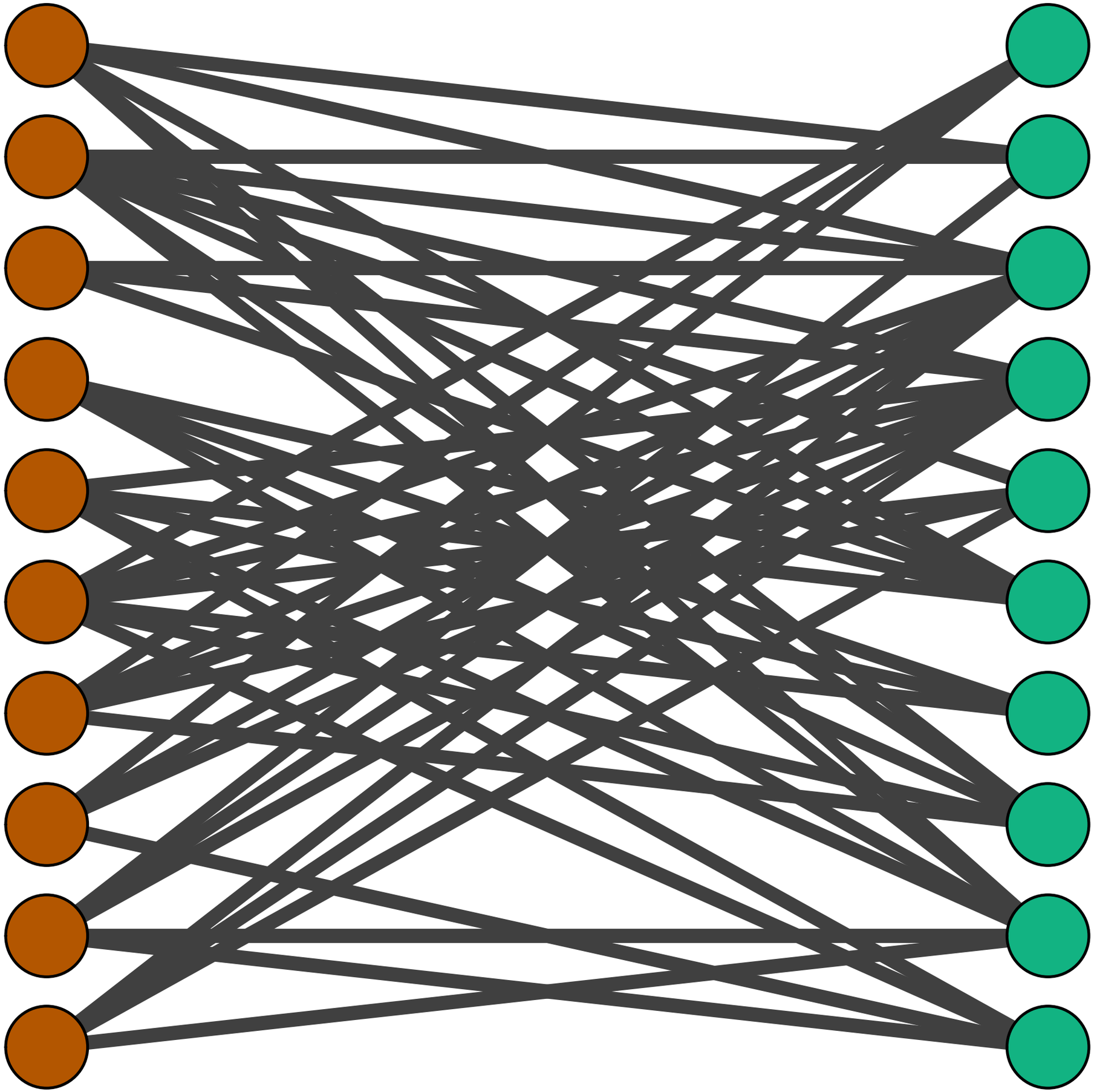
Mean squared error

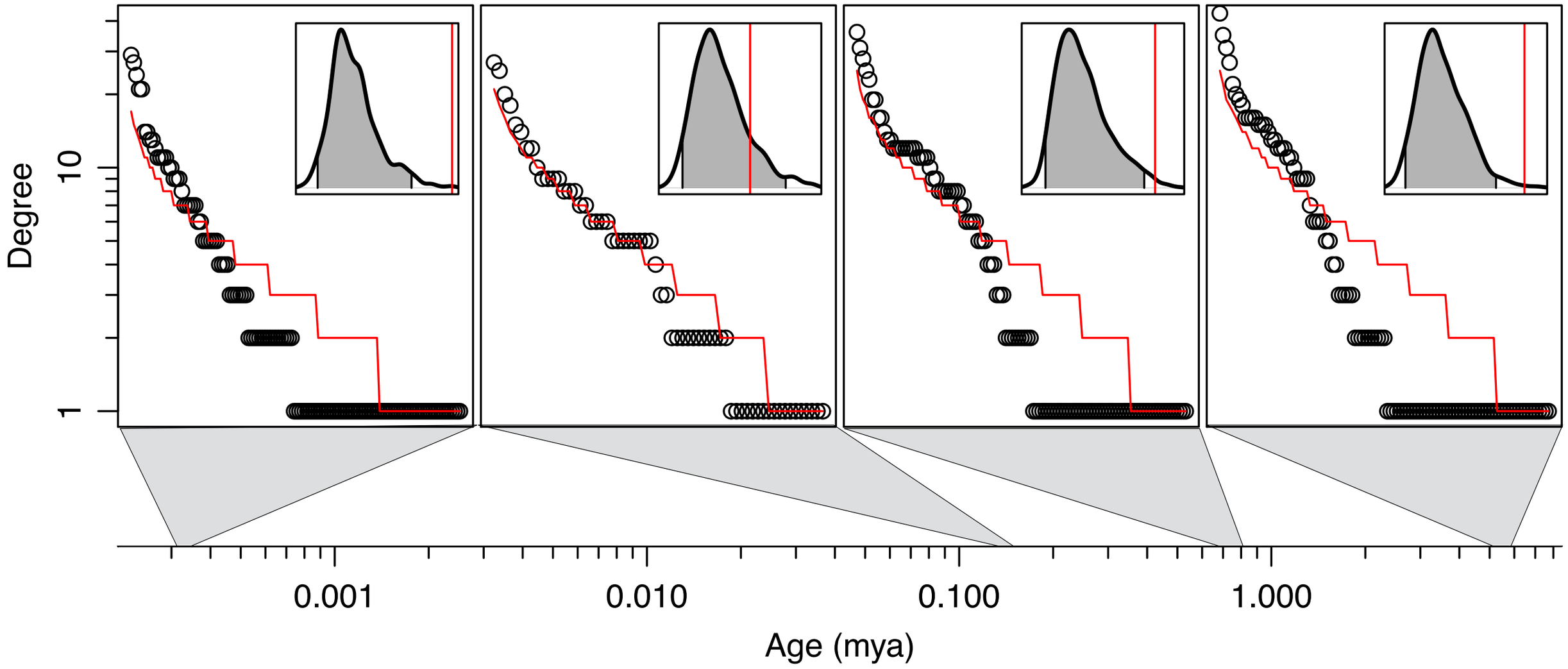
0.005
0.015

5e+00
1e-01
5e-03

Age (mya)


Predators
Herbivores
Detritivores
Mean squared error
0.015
0.005
0.015
0.005
0.015
0.005
5e+00
1e-01
5e-03
Age (mya)





Rominger *et al.* 2015 *Global Ecology and Biogeography*

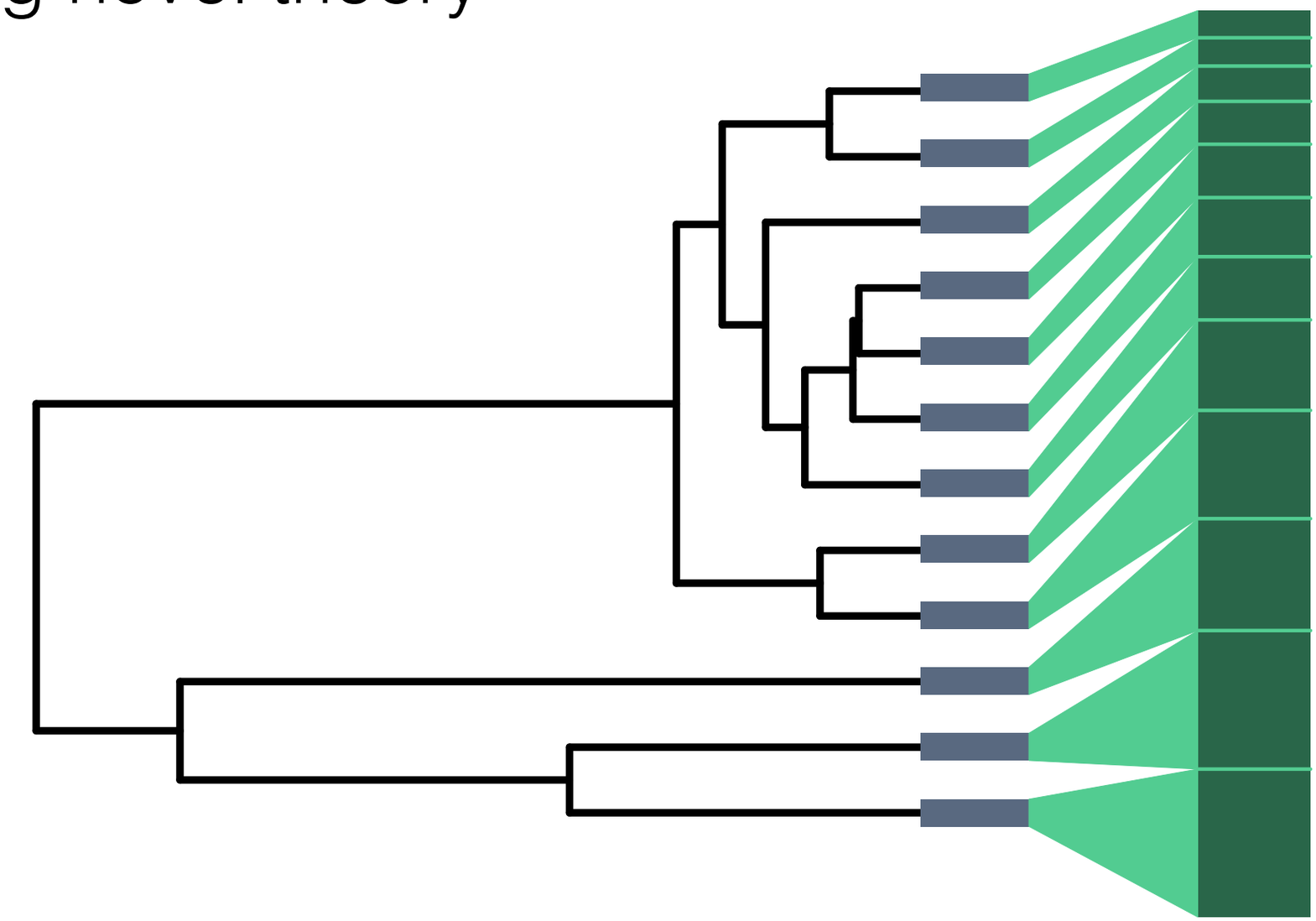
Across the chronosequence we've found:

- Different arthropod groups perceive, colonize and diverge across evolving landscapes differently WHY?
- Deviation from statistical steady state varies across groups and substrate ages WHY?
- Interaction of ecological strategies and opportunity afforded by new environments likely interact to produce patterns WHICH STRATEGIES?

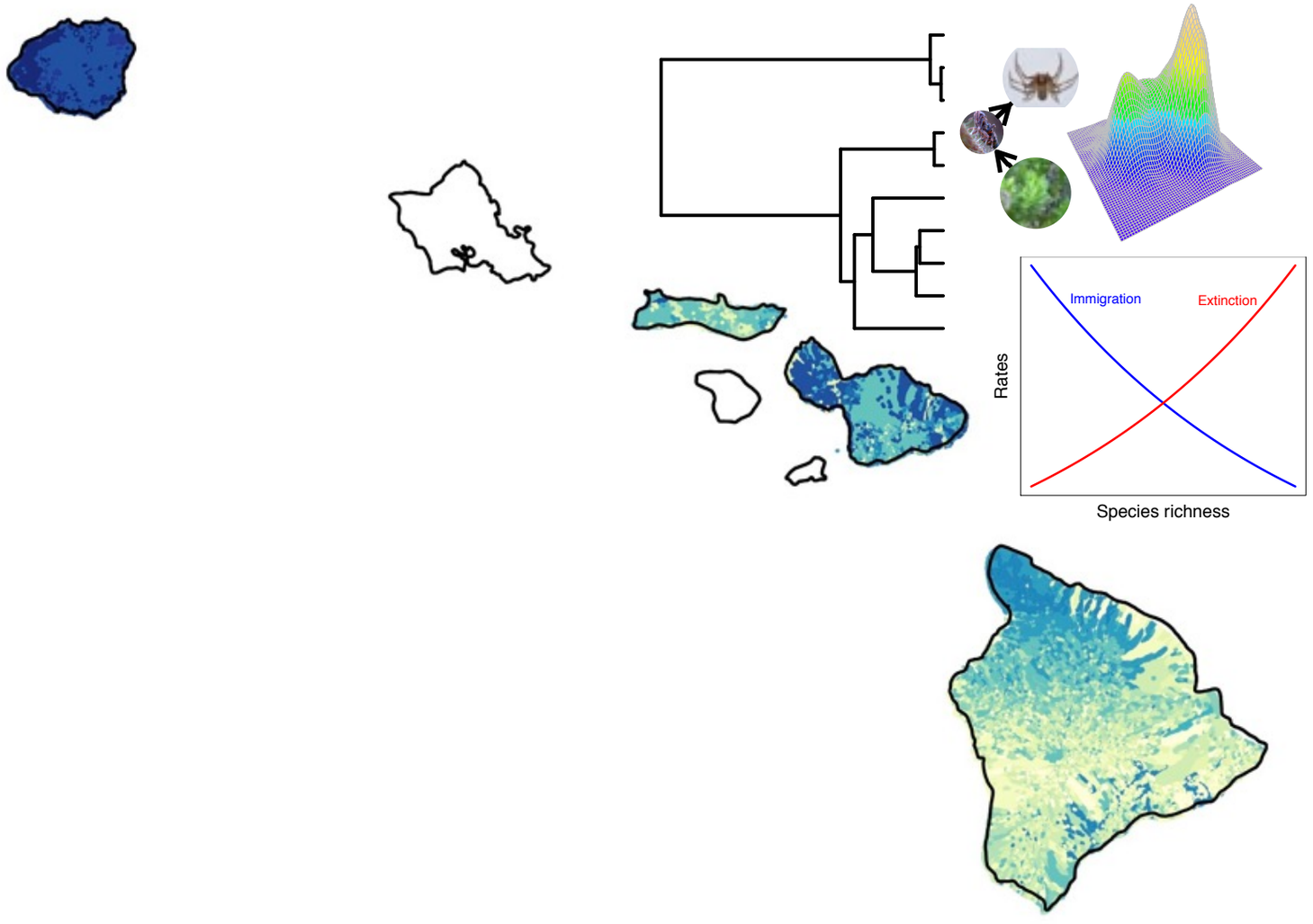
- Community-wide genetic divergence across space, environment and time (chronosequence)

- Community-wide genetic divergence across space, environment and time (chronosequence)

- Testing novel theory

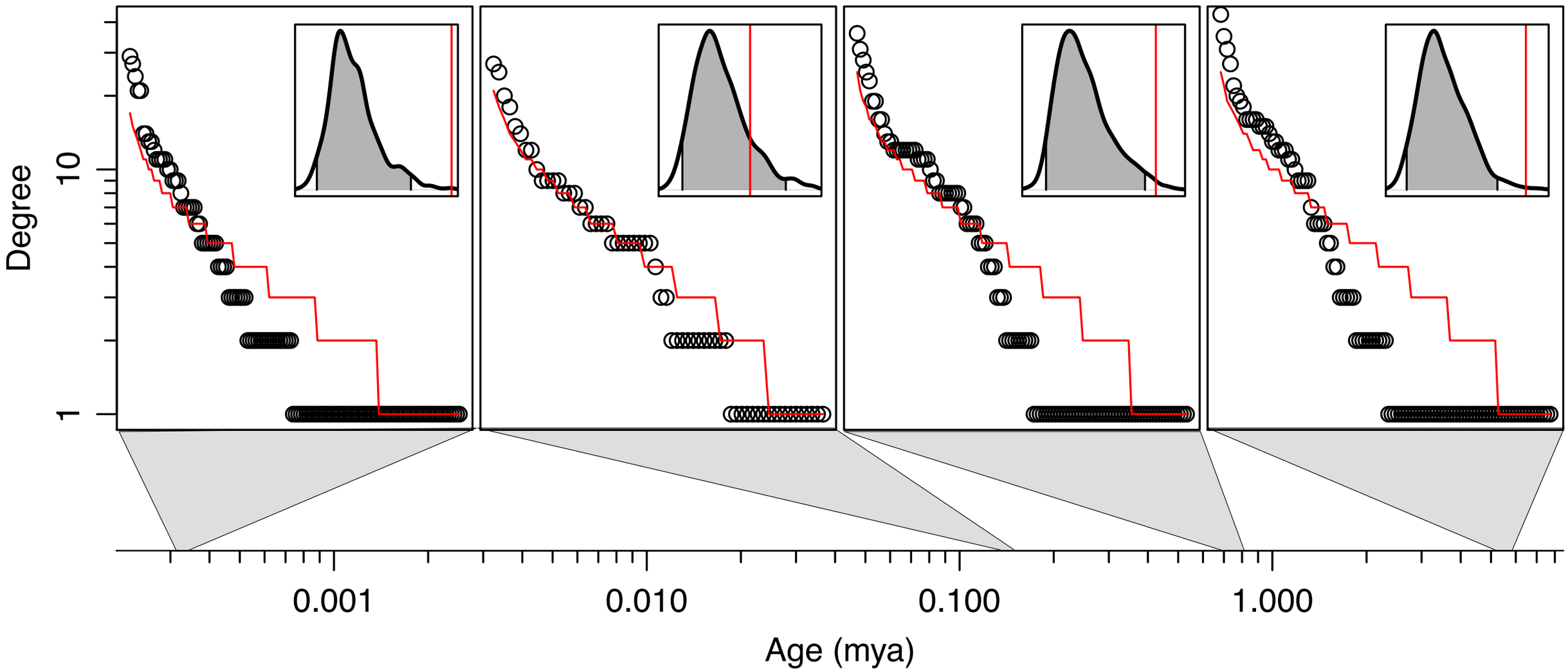


- Chronosequence offers snapshots in assembly



- chronosequence offers snapshots in assembly
- genetic methods illuminate how different groups perceive this chronosequence

- ecological theory can give us a guide as to what's novel



looking to the future:

- ecological basis of speciation and decline
- history drives divergence from theory by how specifically?
- ecology-evolution feedback is circular, how do we break the cycle to infer causation?