

Everything is NOT everywhere: network and trait-based approaches to microbial communities

Helena Bestová, François Munoz, Pavel Svoboda, Pavel Škaloud and Cyrille Violle



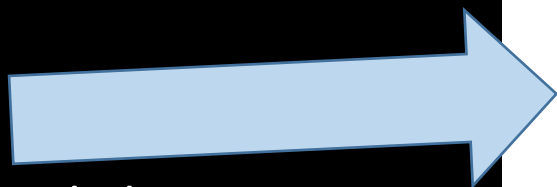
CHARLES
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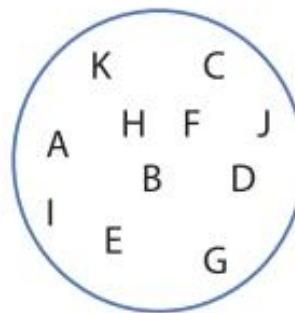
CENTRE D'ÉCOLOGIE
FONCTIONNELLE
& EVOLUTIVE

Drivers of community assembly

historical biogeography
and
large-scale environmental variation



Regional species pool



Dispersal
and chance

Feedbacks

Interactions

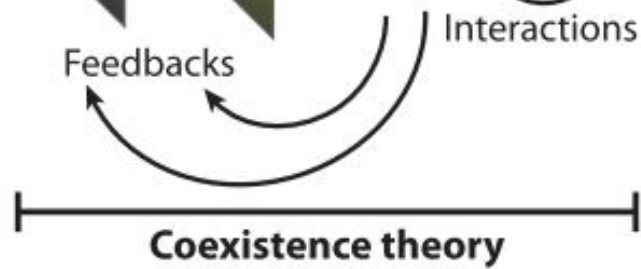
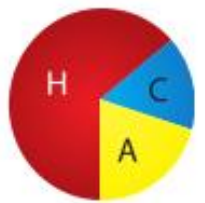
Coexistence theory

Community assembly

Environment

Biotic interactions

Local communities



Microbes

„Everything is everywhere, but, environment selects“



Baas Becking, 1934

Finlay, 2002, Science

Microbes

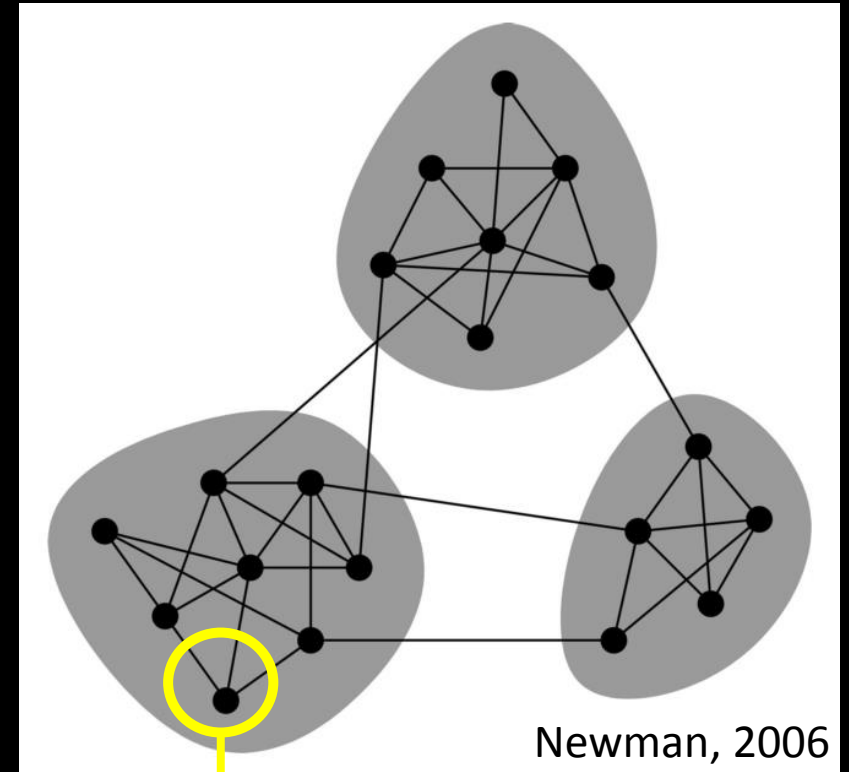
„Everything is everywhere, but, environment selects“

Baas Becking, 1934

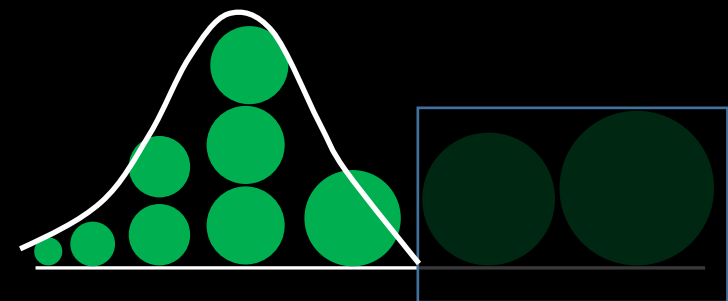
„Some things are everywhere and some things are not.
Sometimes the environment selects and sometimes it
doesn't“

van der Gast, 2013

1. large scale, **modularity analysis**

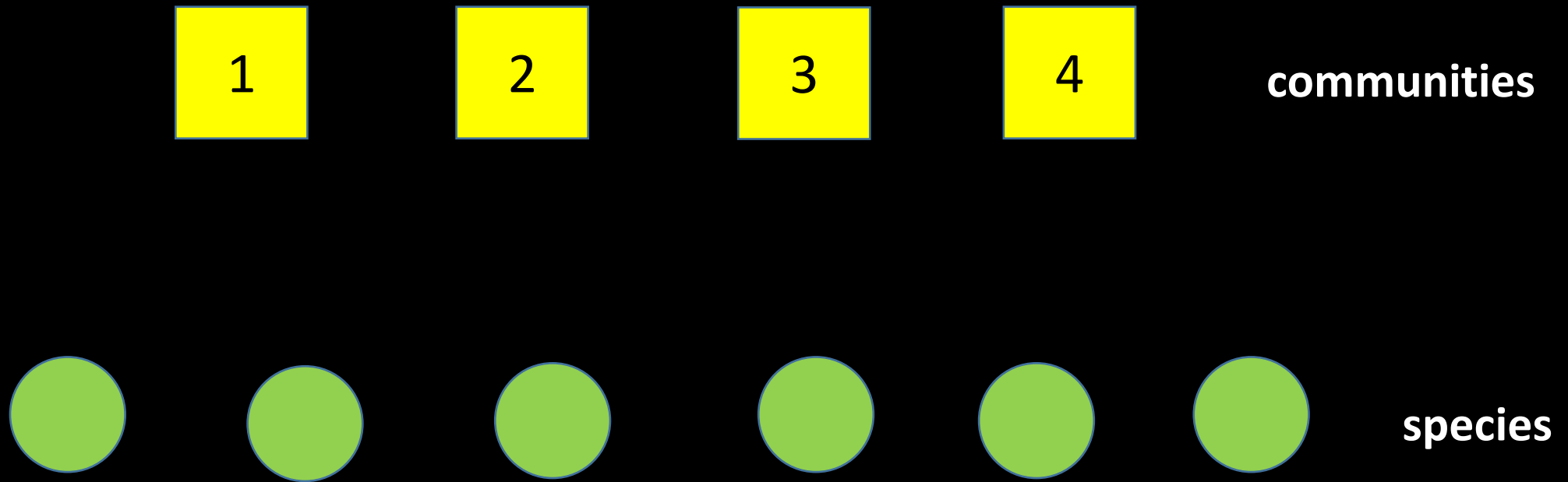


2. local scale, **trait-based analysis**

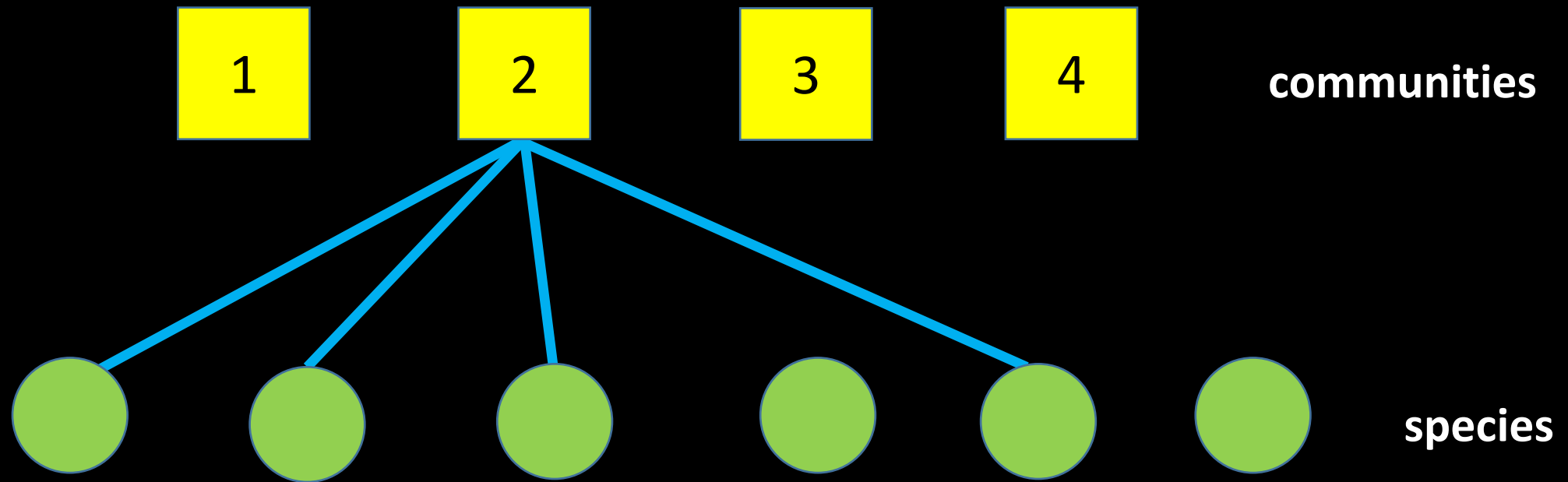


trait distribution

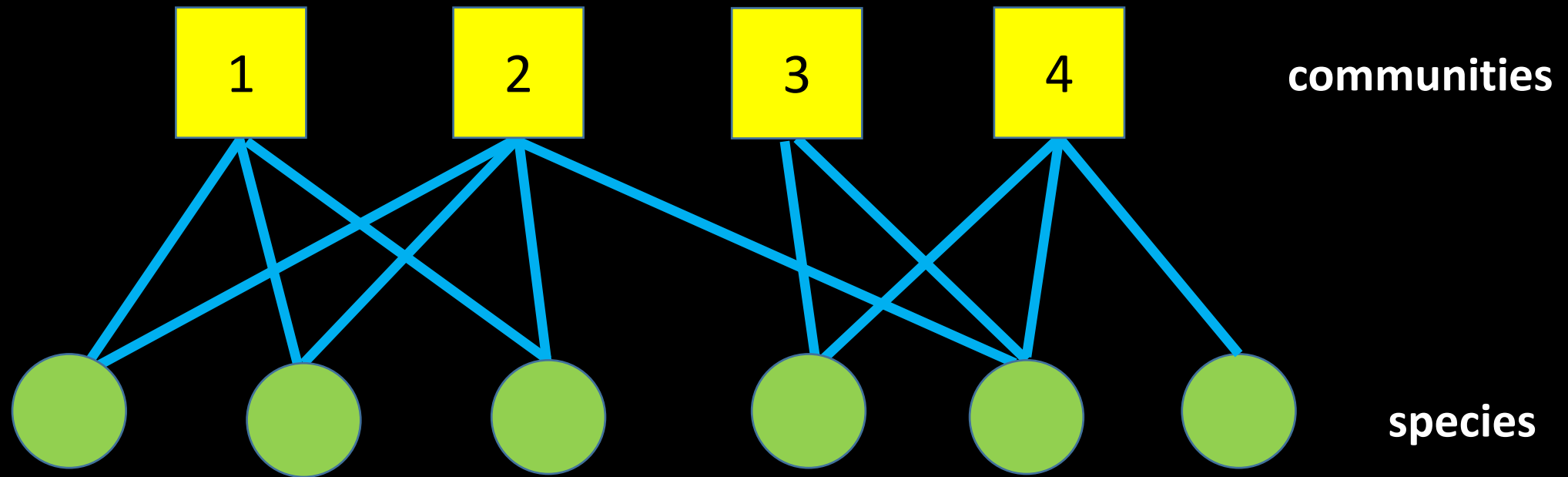
Modularity analysis



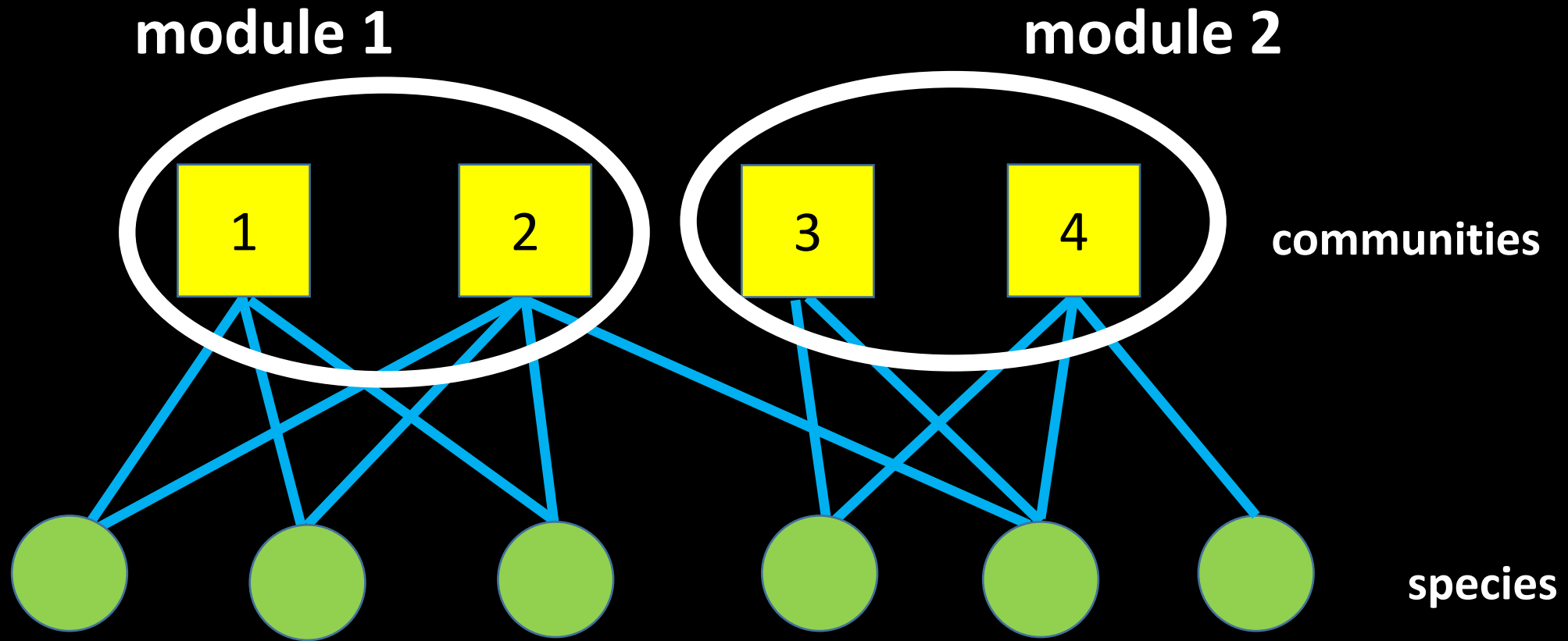
Modularity analysis

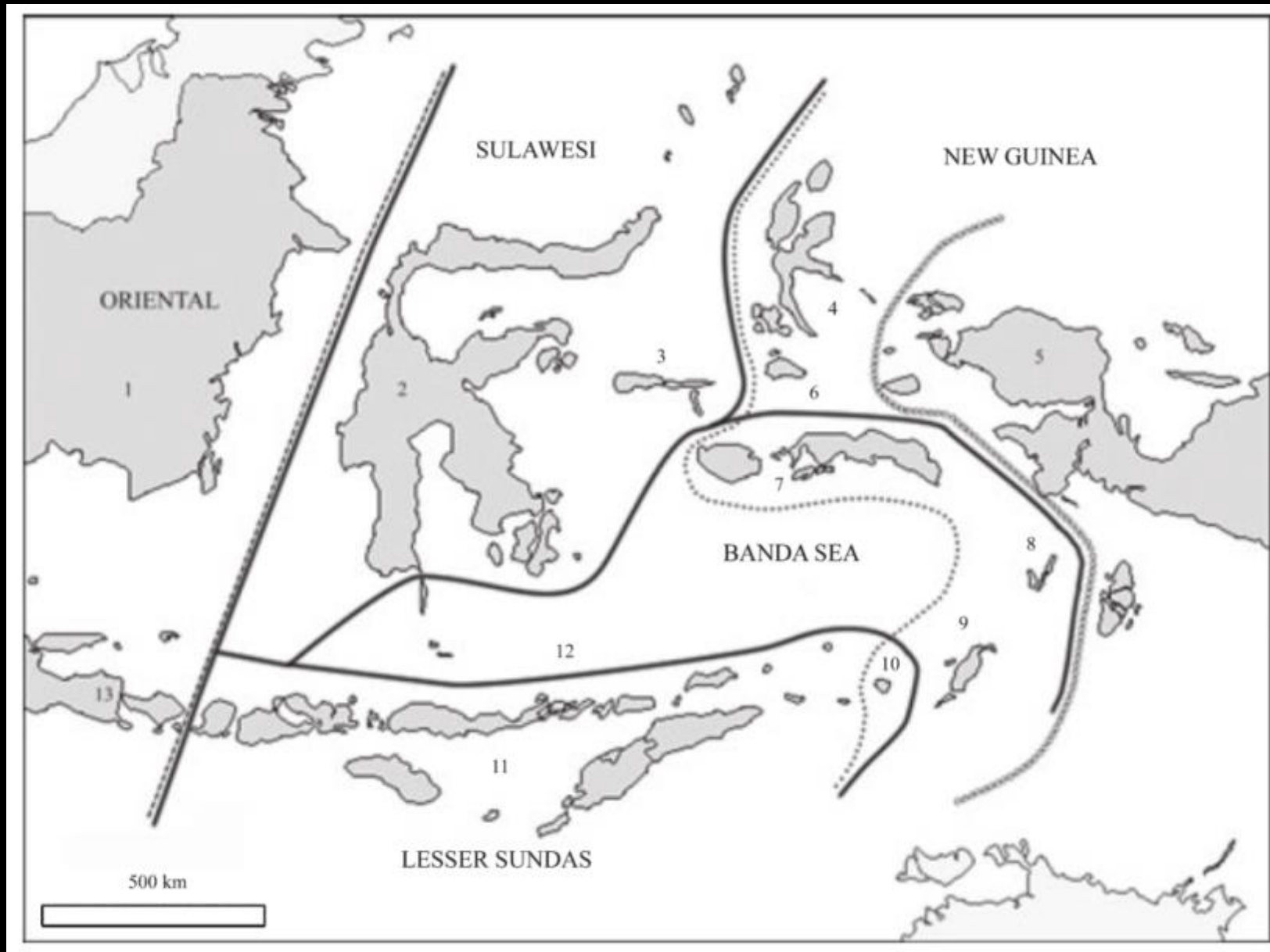


Modularity analysis

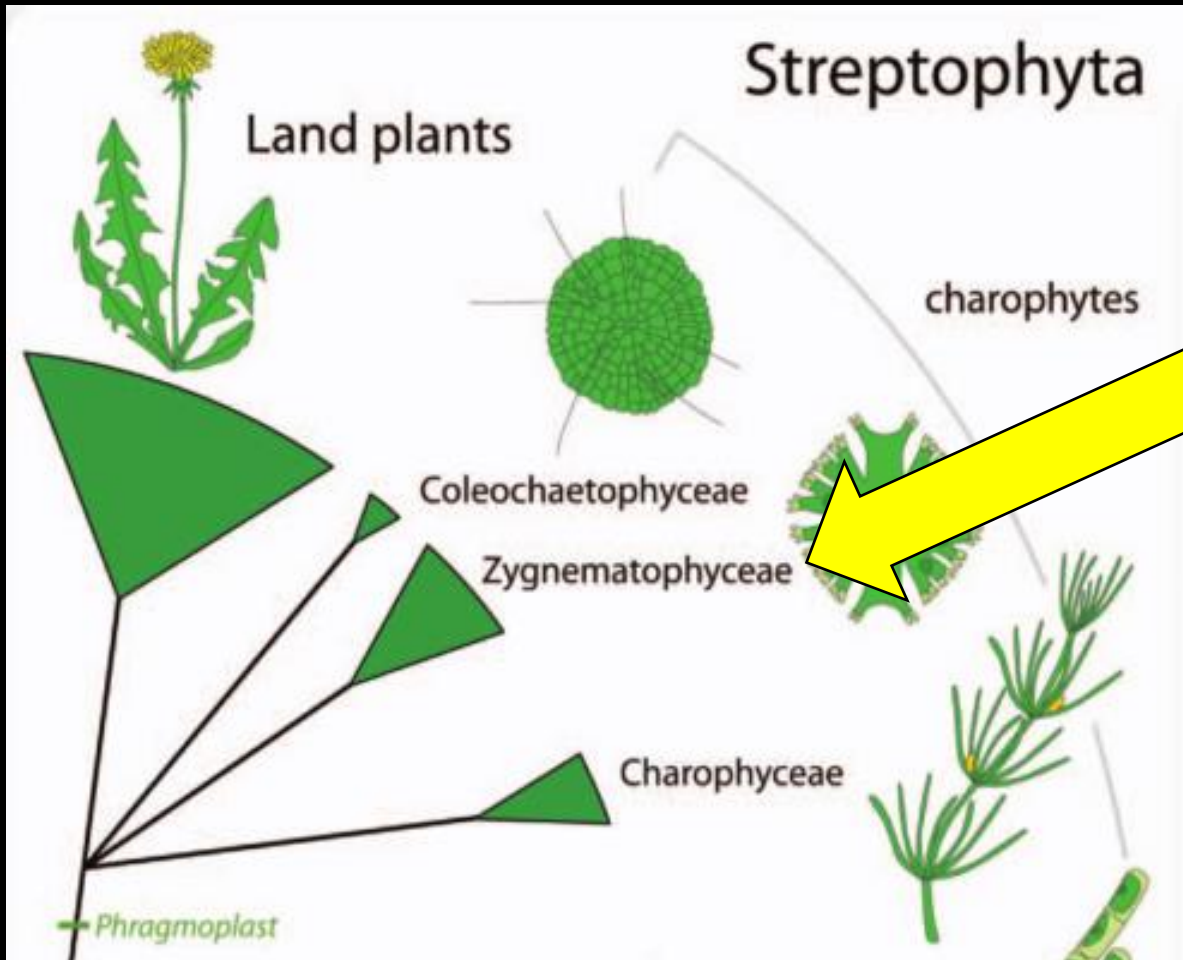


Modularity analysis





DESMIDS



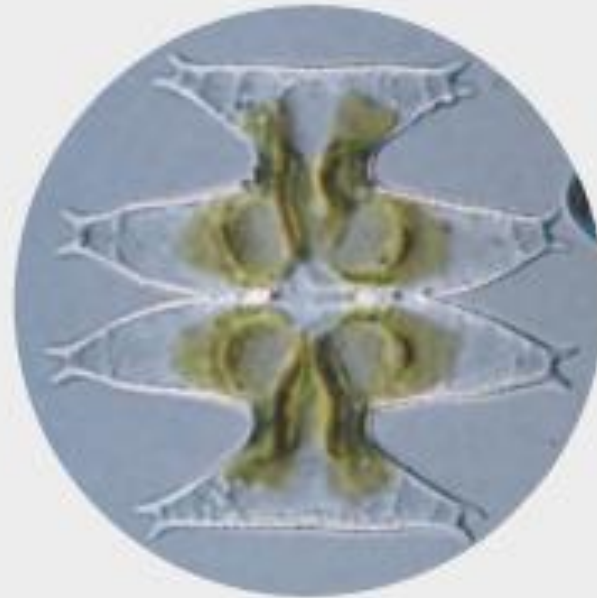
Leliaert et al. 2012, Crit. Rev. Plant Sci.



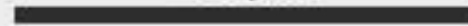
Trait analysis

volume
surface-to-volume ratio

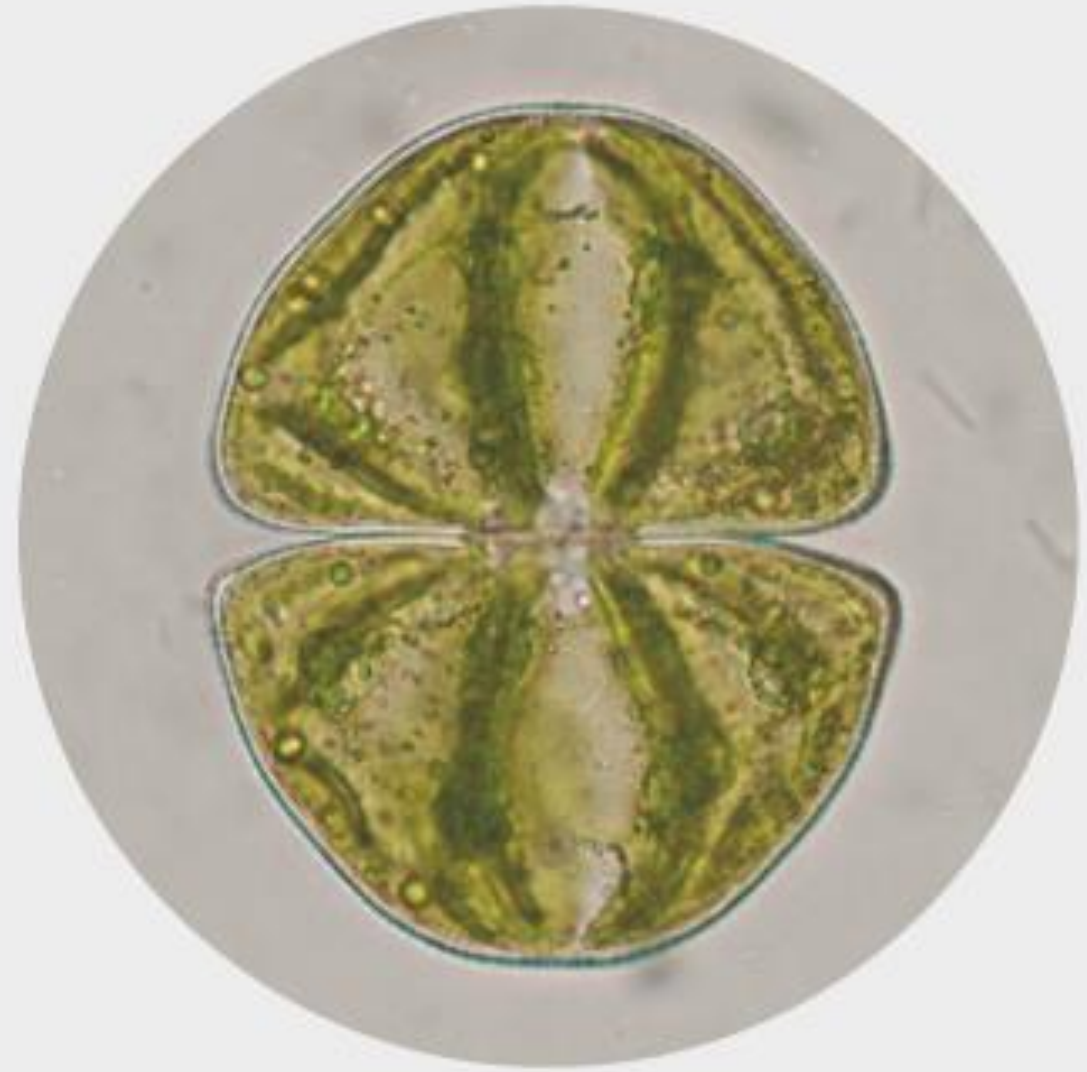
Micrasterias pinnatifida S:V = 0.71

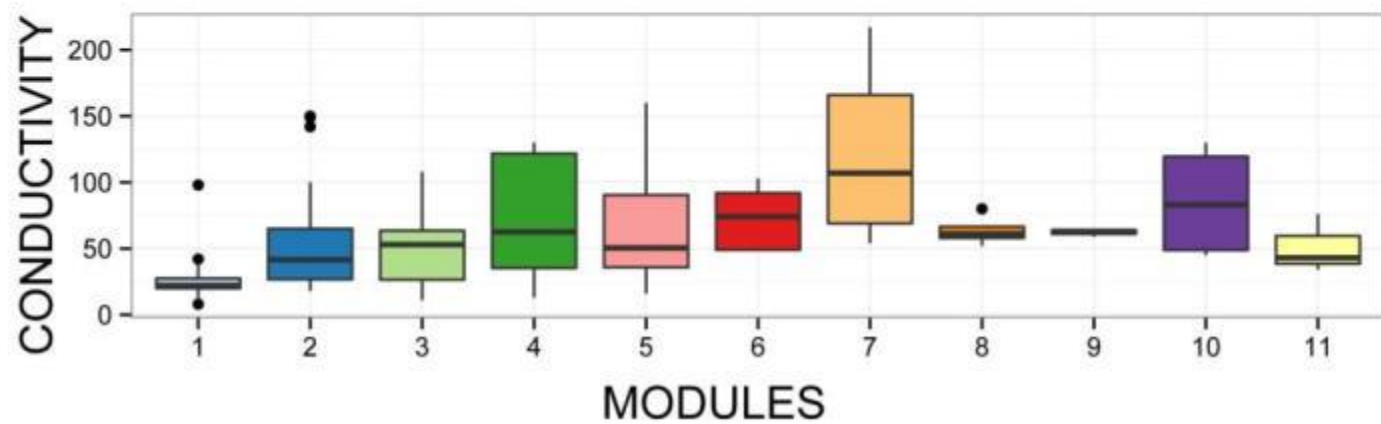
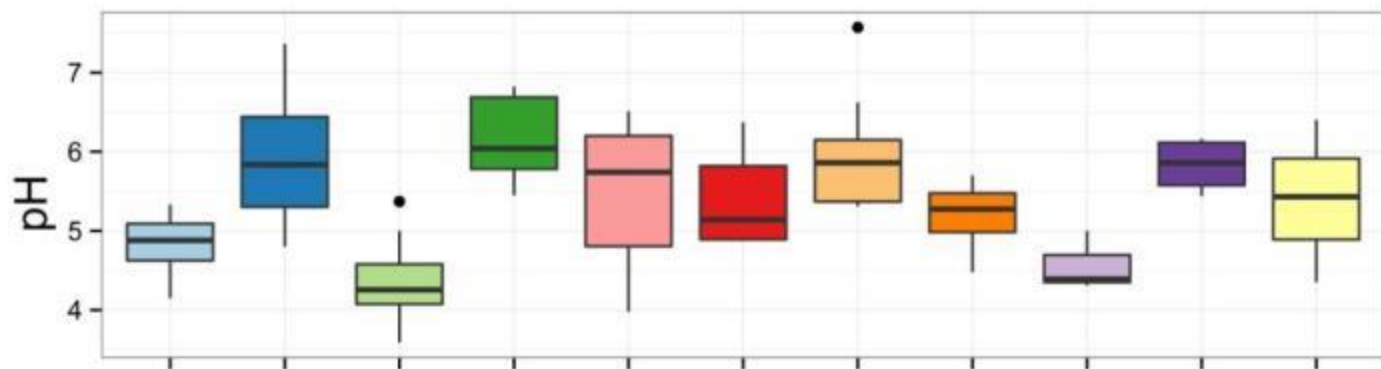
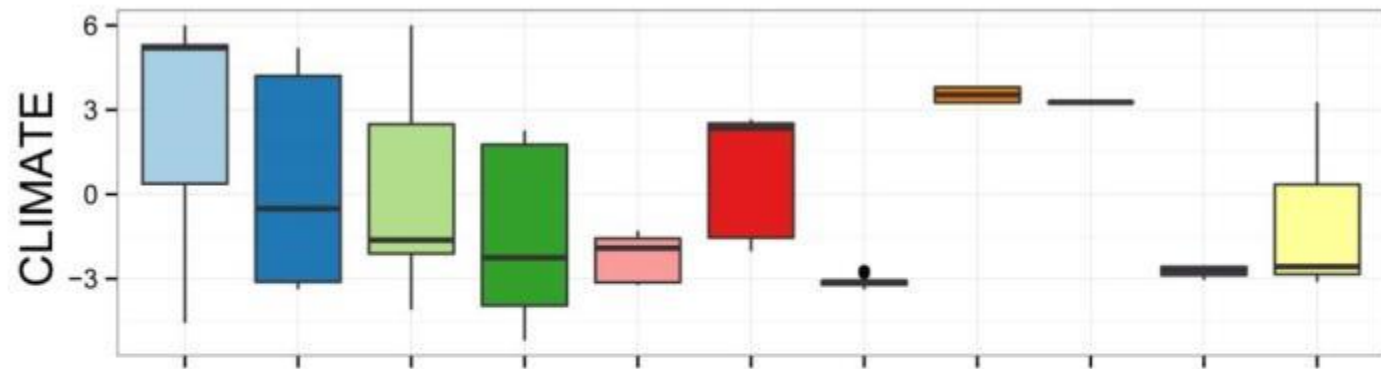


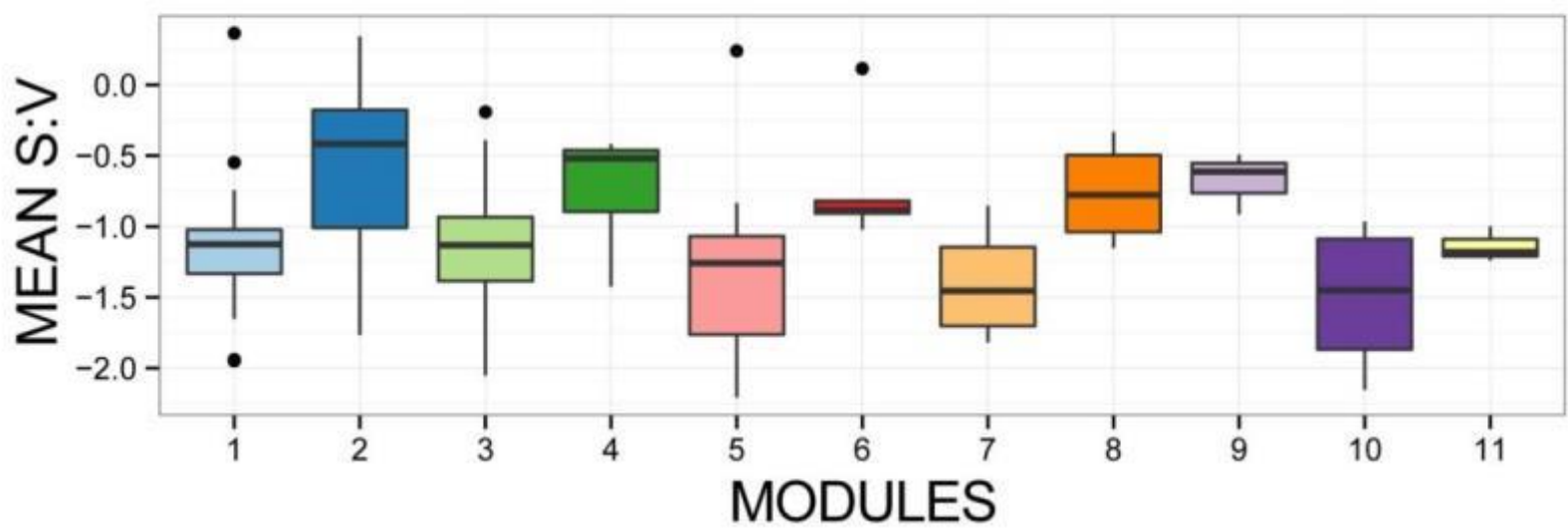
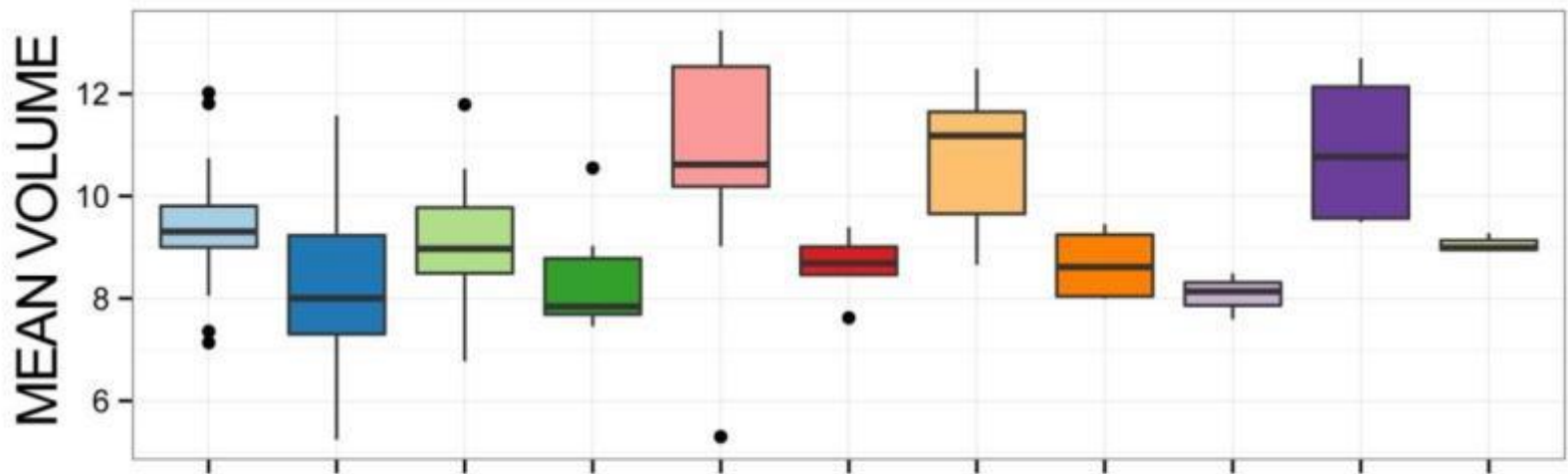
50 μm



Micrasterias raflsii S:V = 0.08



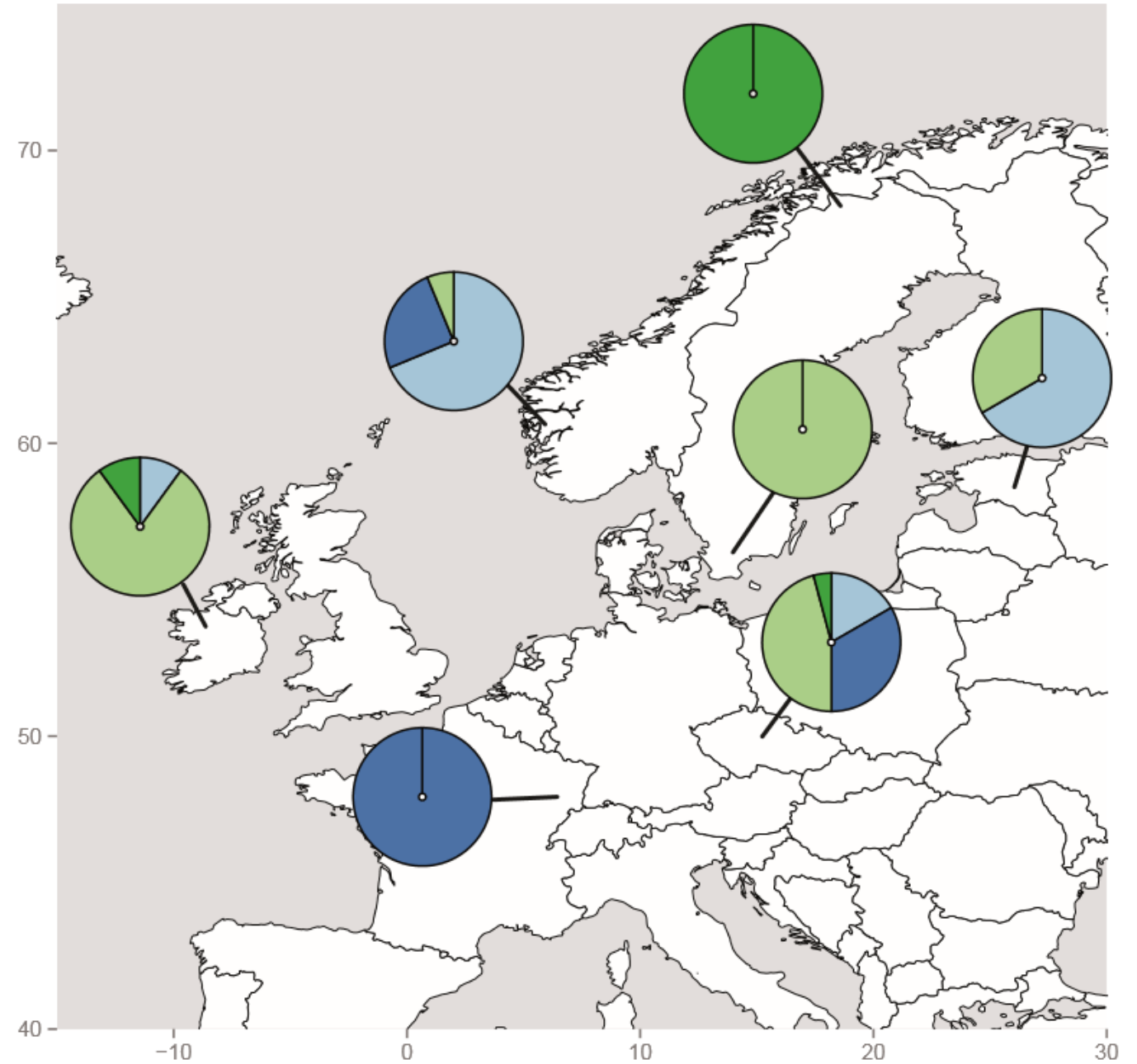




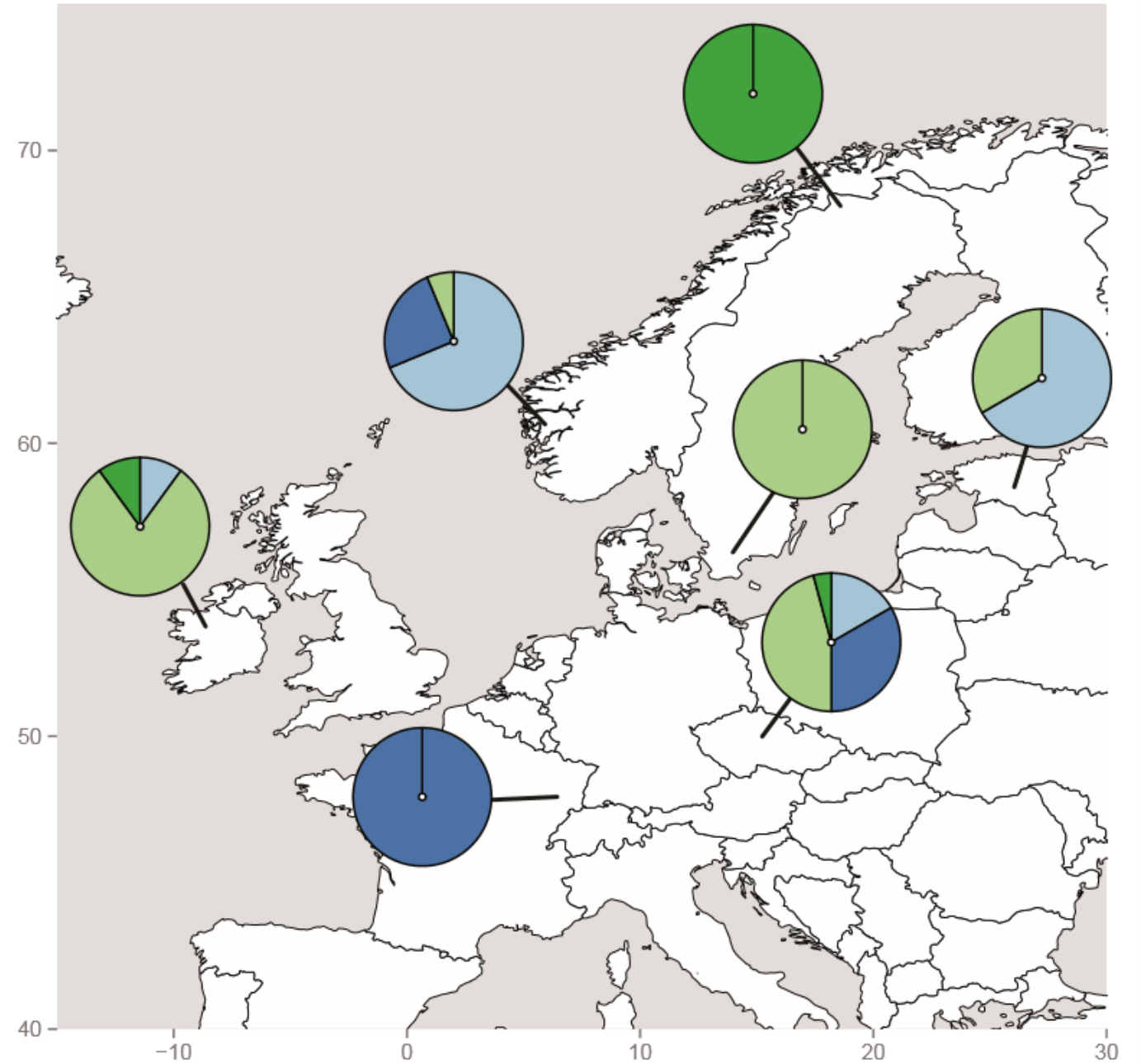
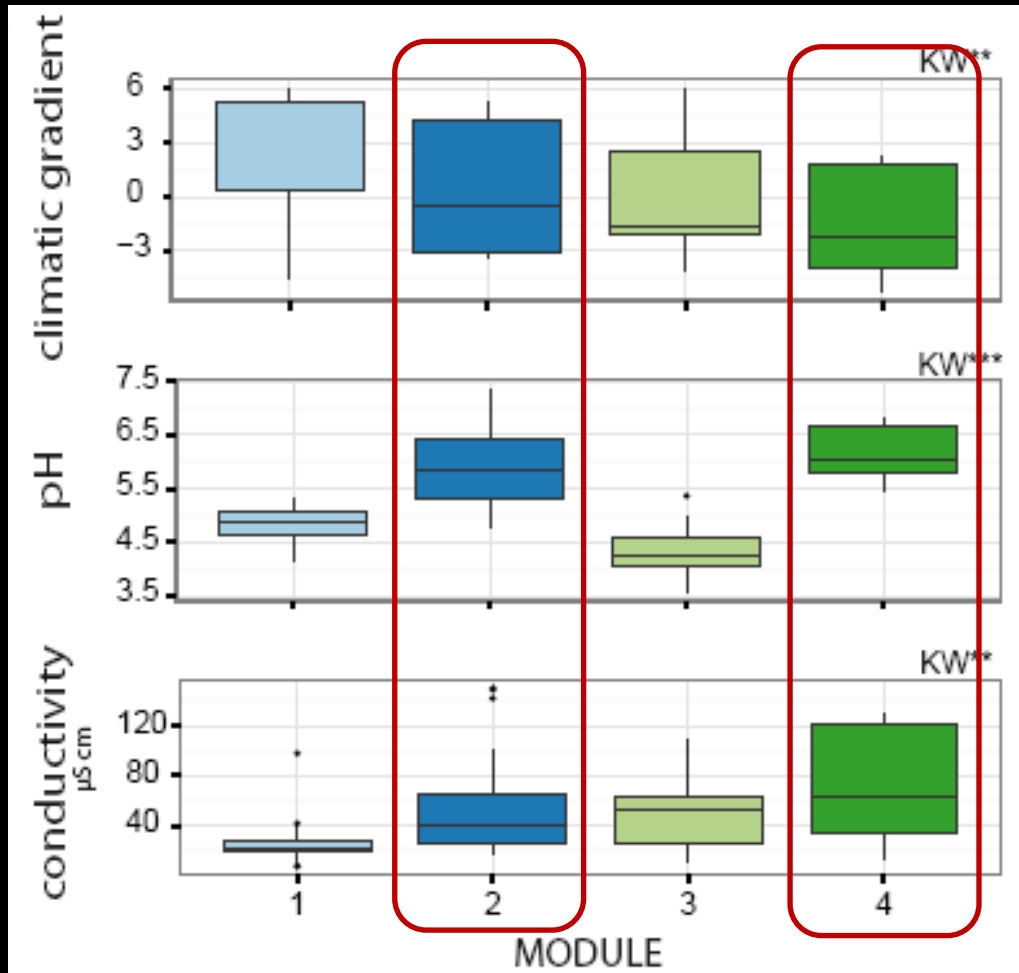
Modularity analysis

Module composition in regions

4 main modules



Modularity analysis



Processes structuring desmid communities

- large-scale environmental filtering
- biogeographical history

Everything is NOT everywhere, BOTH environment and biogeography matters

Assembly **processes** of desmids are **similar to**
those driving **macroorganism**



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