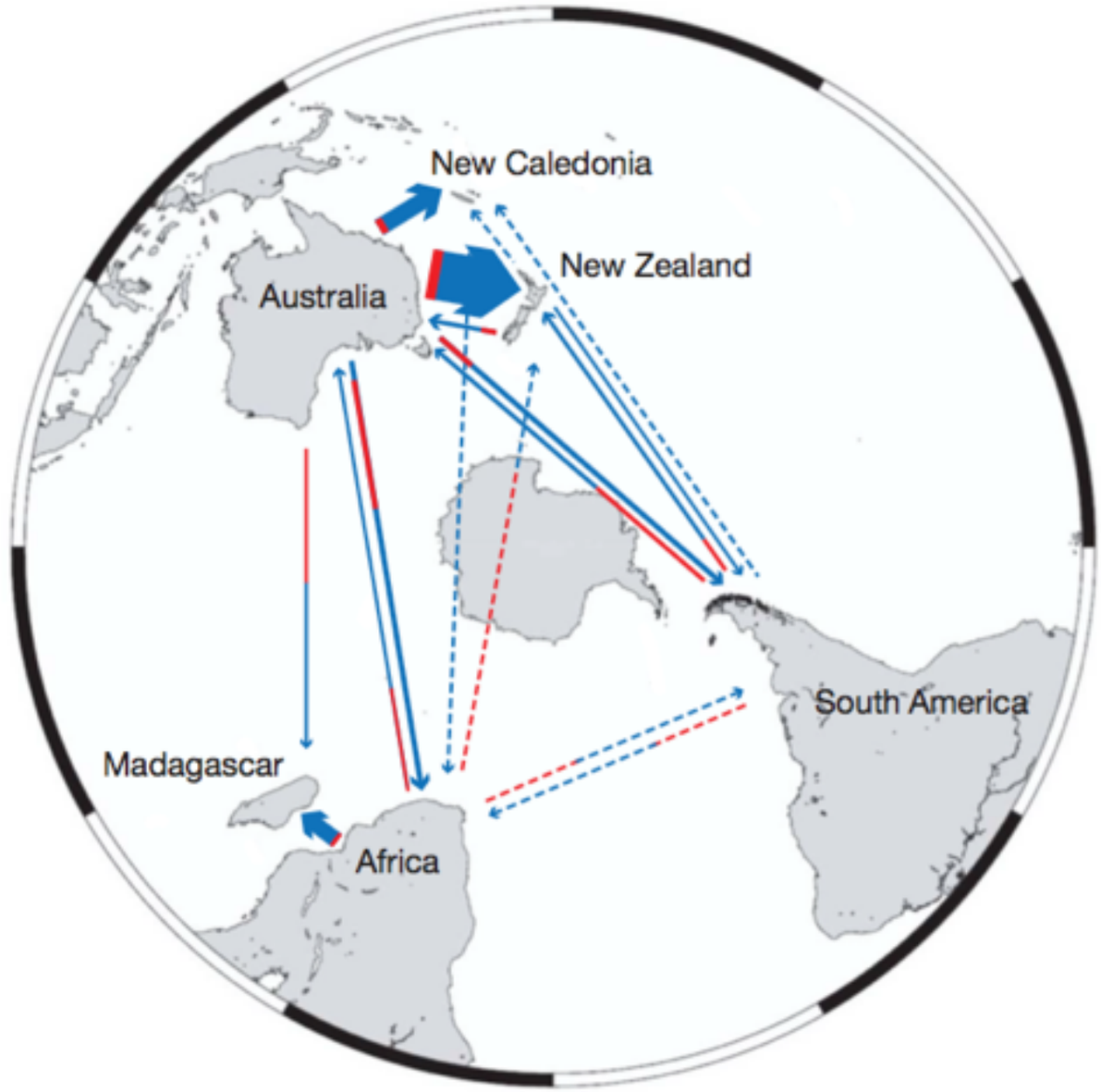
Climatic niche evolution on oceanic archipelagos

Jun Ying Lim

Island Biology, Azores, 2016

Habitat shifts and biogeography

- At biome scales considered to be highly conserved and can shape large scale biogeographic patterns
- However, niche evolution at small scales can extraordinarily rapid



Crisp et al 2009

Can we simultaneously explain patterns of climatic niche and contemporary biogeographic patterns within clades, using information on their evolutionary and biogeographic history?

Islands

http://static.thousandwonders.net/Hundred.Islands.National.Park.original.327.jpg

Hawaiian lineages

Viola

Silverswords

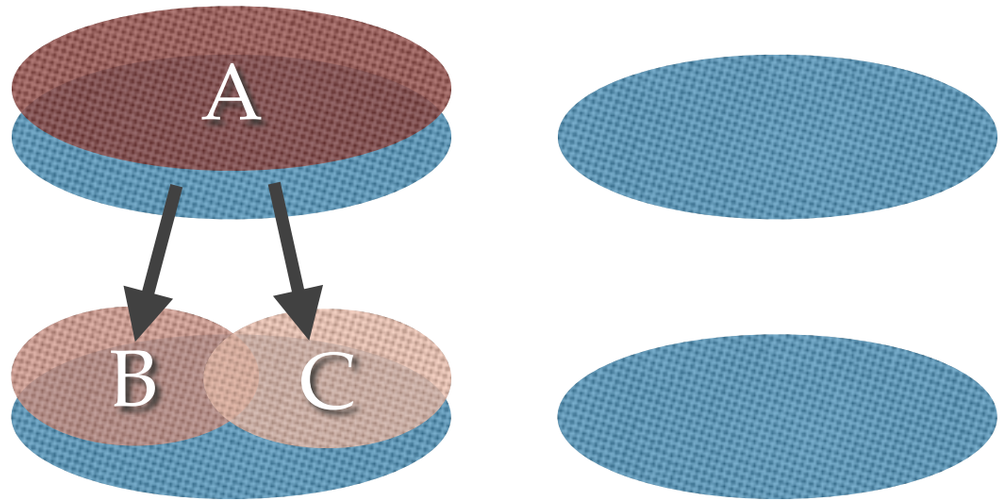
Psychotria

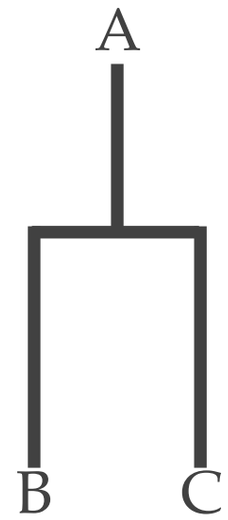
https://pbs.twimg.com/media/CZQjtwnWwAA1dM4.jpg

http://farm4.staticflickr.com/3064/2861293683_7071b04703.jpg

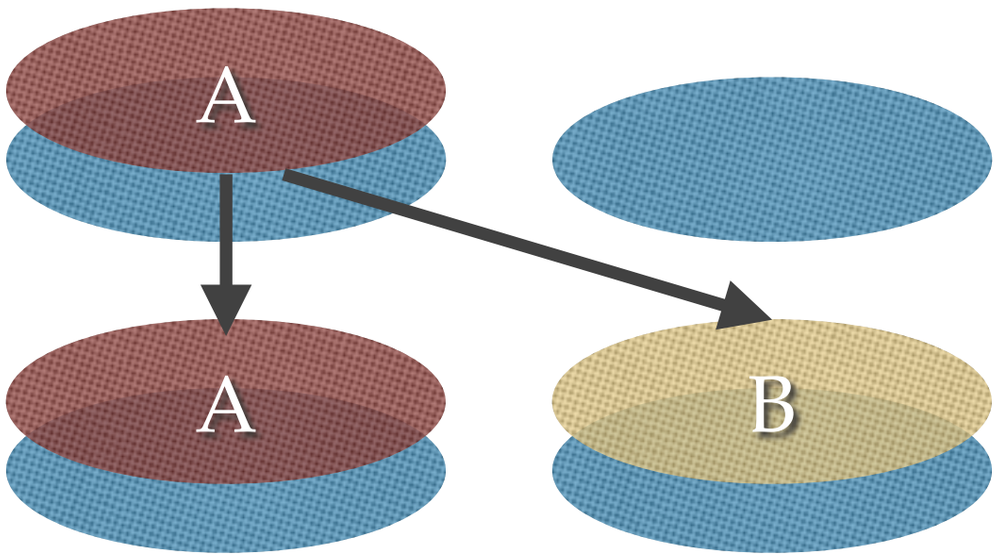
https://upload.wikimedia.org/wikipedia/commons/thumb/b/bb/Starr_020925-0087_Psychotria_mariniana.jpg/500px-Starr_020925-0087_Psychotria_mariniana.jpg

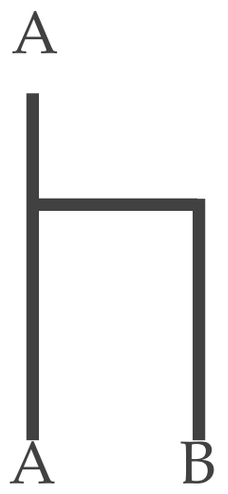
Biogeography of speciation



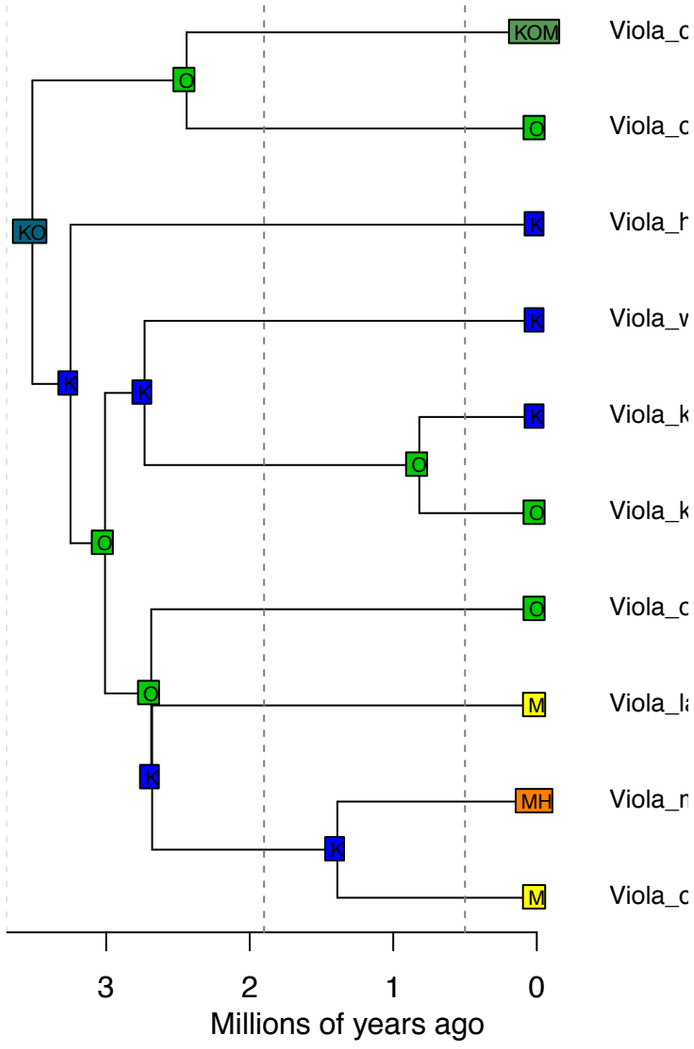


In-situ

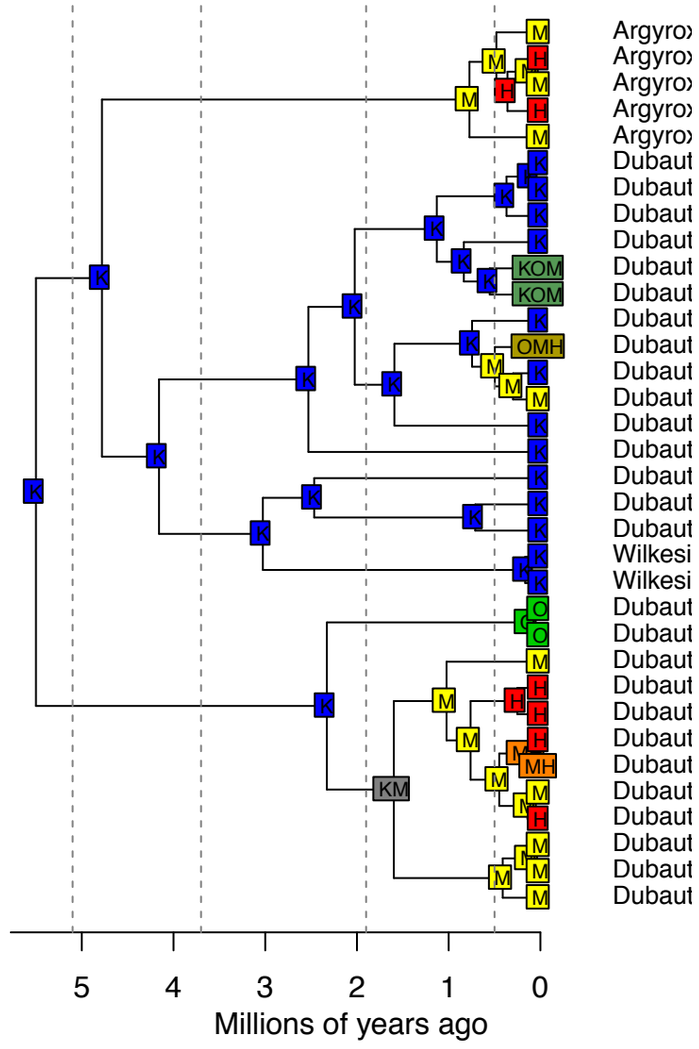




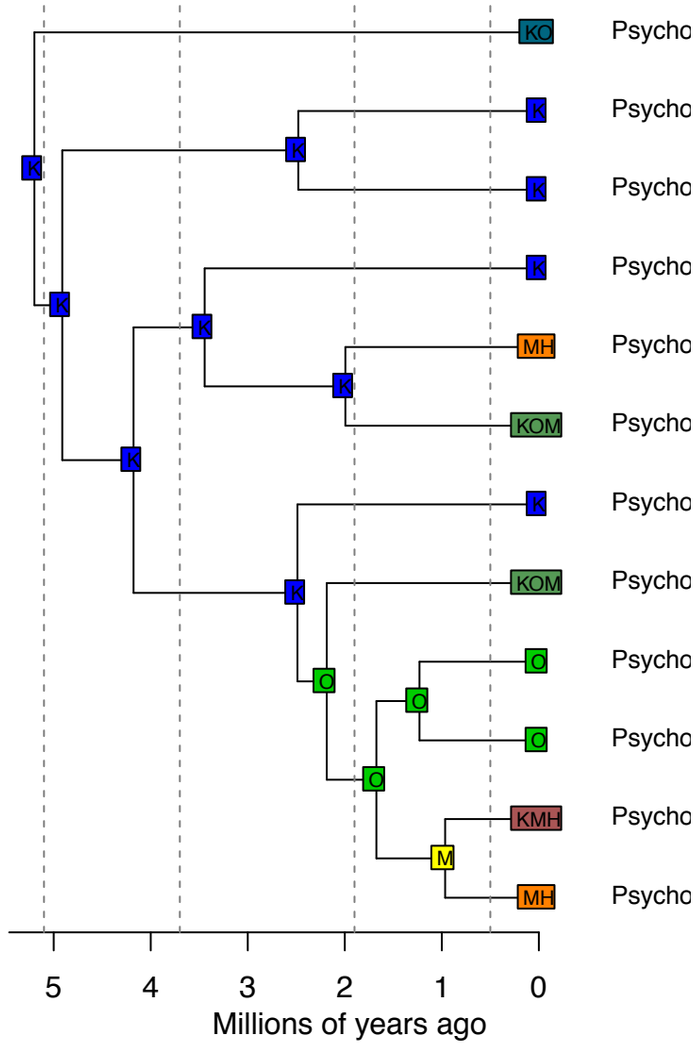
Dispersal



Viola



Silverswords



Psychotria

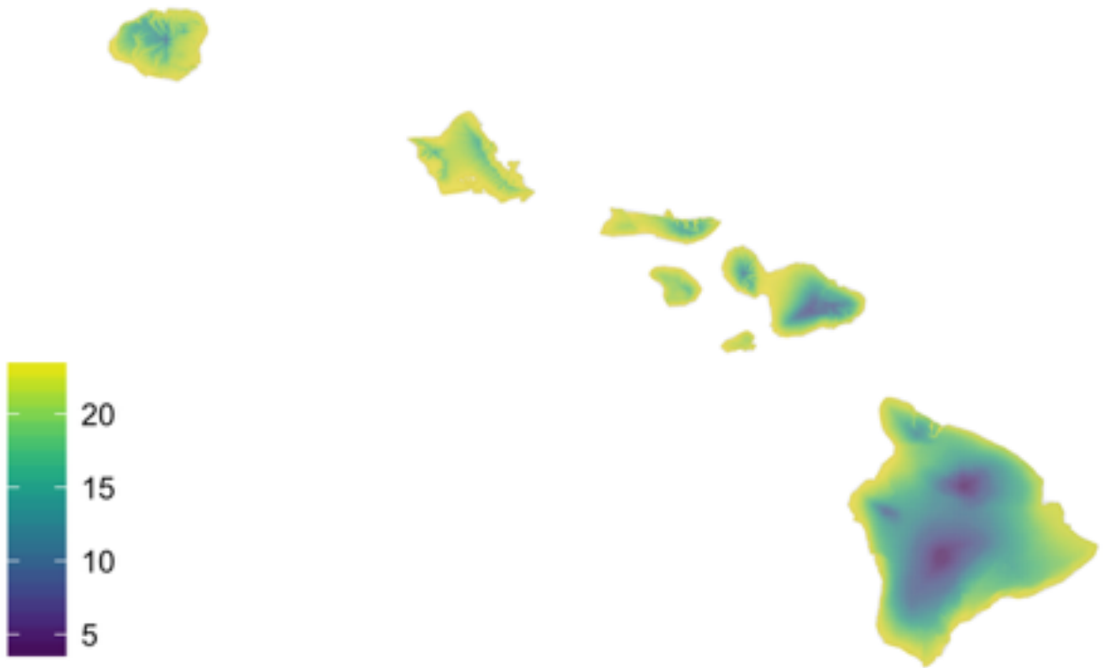
Viola

Silverswords

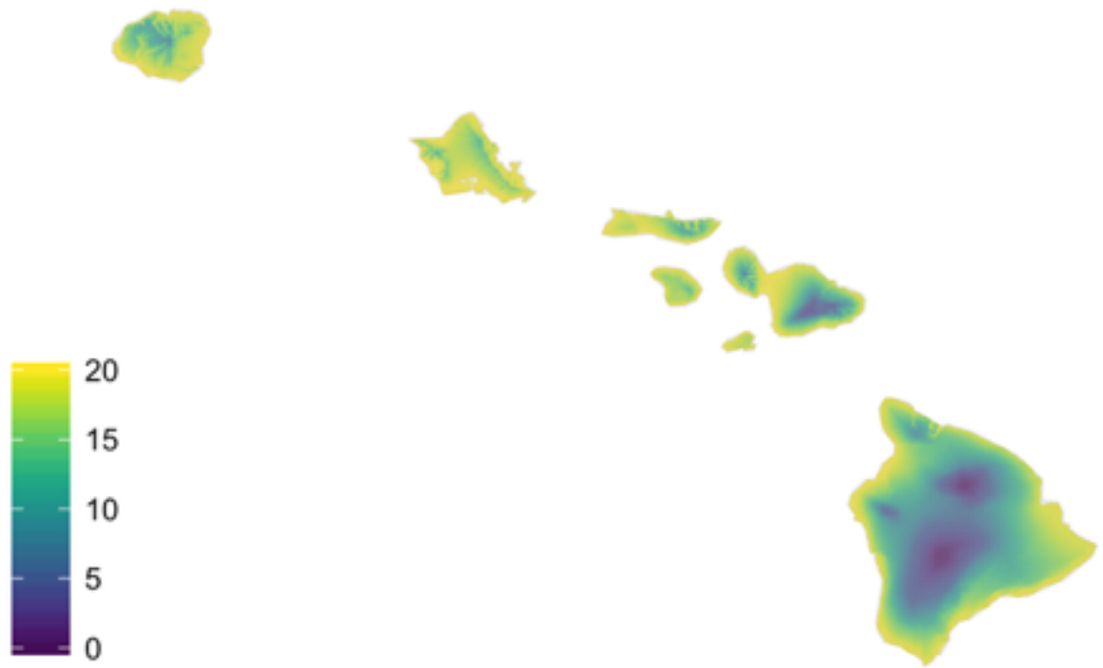
Psychotria

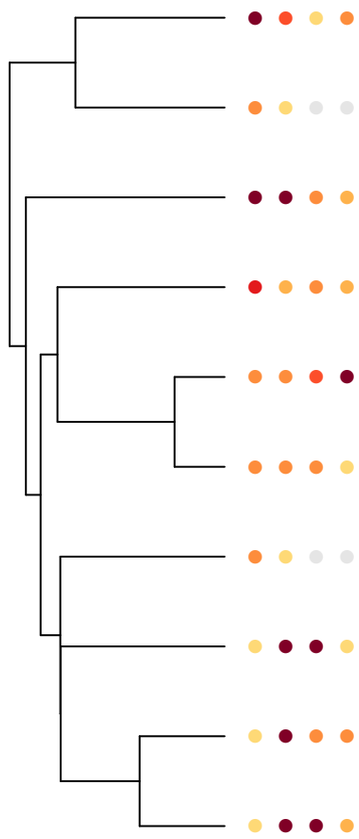
Mean annual precipitation

Mean annual temperature

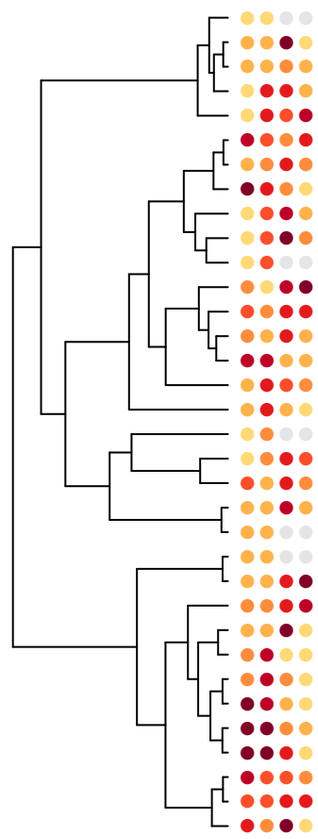


Mean minimum temperature

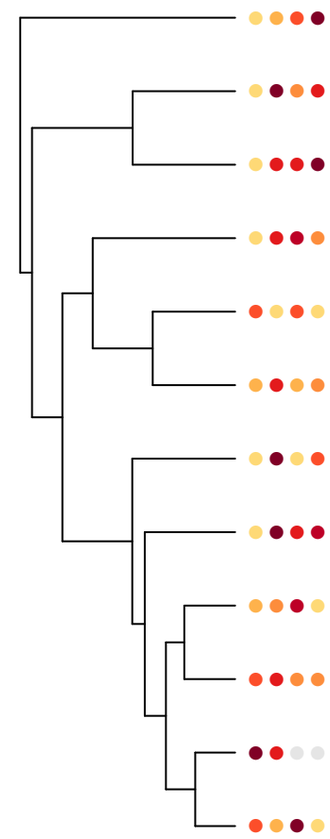




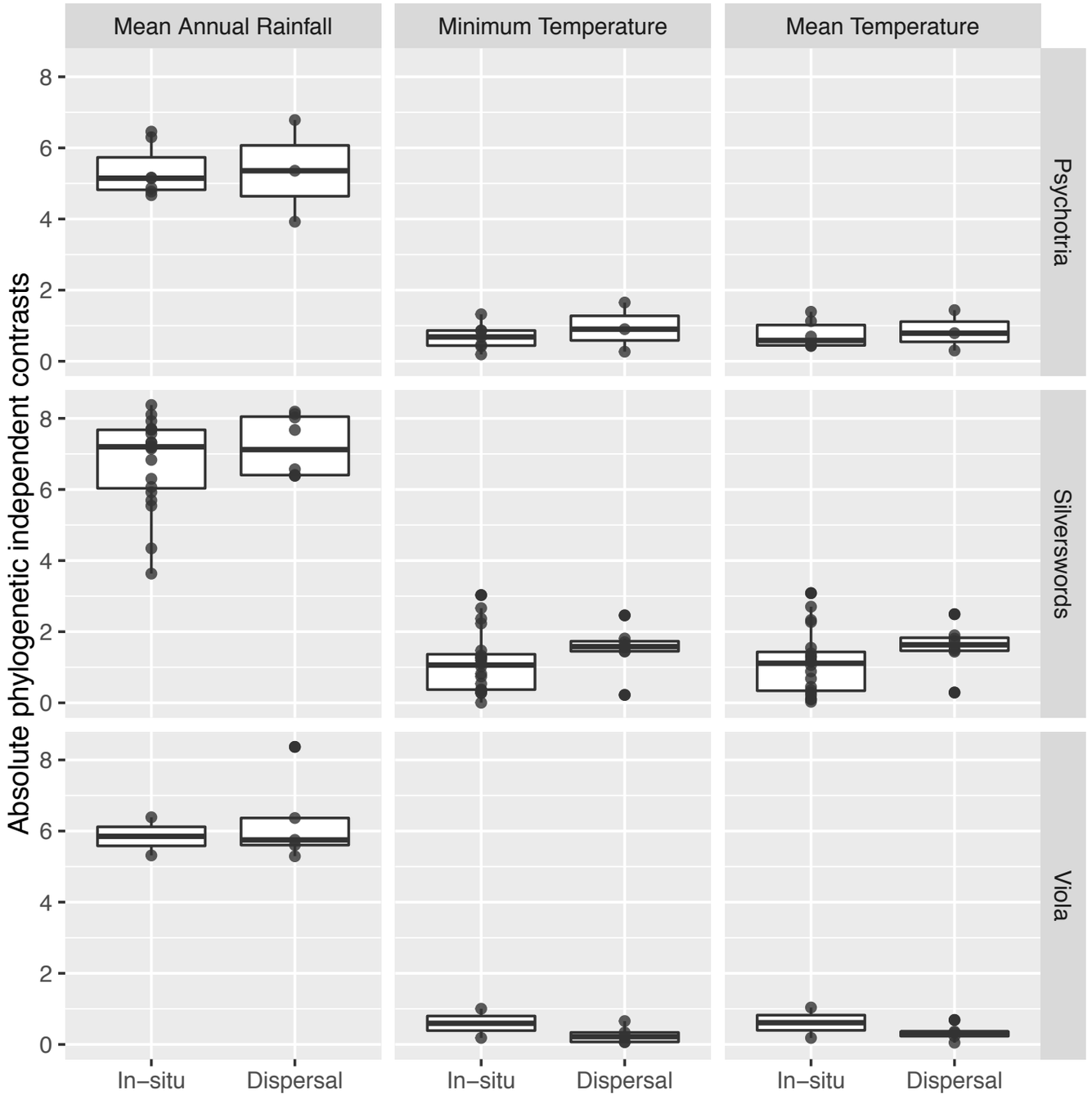
Viola



Silverswords



Psychotria


Mean Annual Rainfall
Minimum Temperature
Mean Temperature
Psychotria
Silverswords
Viola
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Absolut
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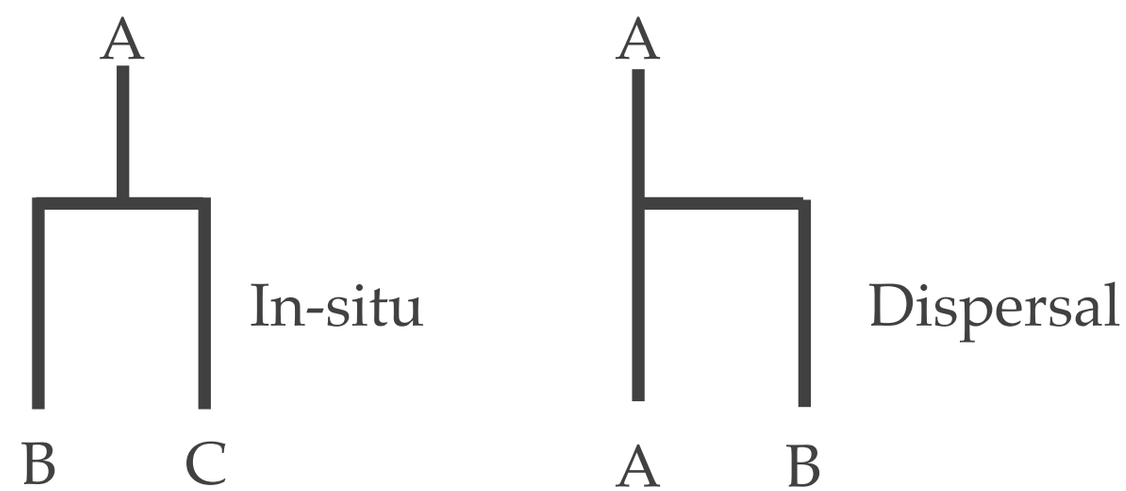
2
4
6
8
In–situ
Dispersal


A
B
C
In-situ
A
A
B
Dispersal

Conclusions

- Founder-event dispersal mediated cladogenesis is not associated with higher magnitude of niche change
  - but statistical power limited for some clades!
- Other considerations
  - island ontogeny; climatic profile; extinction; life history traits?

Thank you!

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- Berkeley Institute of International Studies (Portugal Studies Program)
- iDigBio

Future directions and caveats

- **More fine-scale climatic data** (but ideally requires high-quality geo-referenced collections locality data)
- **Extinction**
- **Different colonisation histories**
  - Inter-clade interactions
  - Island ontogenetic differences
- **Phylogenetic uncertainty**

Habitat shifts and biogeography

- Biogeography and niche evolution are intricately linked
- Probability of niche / habitat shift
  - Relative geographic opportunity
  - Relative intrinsic evolutionary lability
  - Ecological interactions with incumbent species