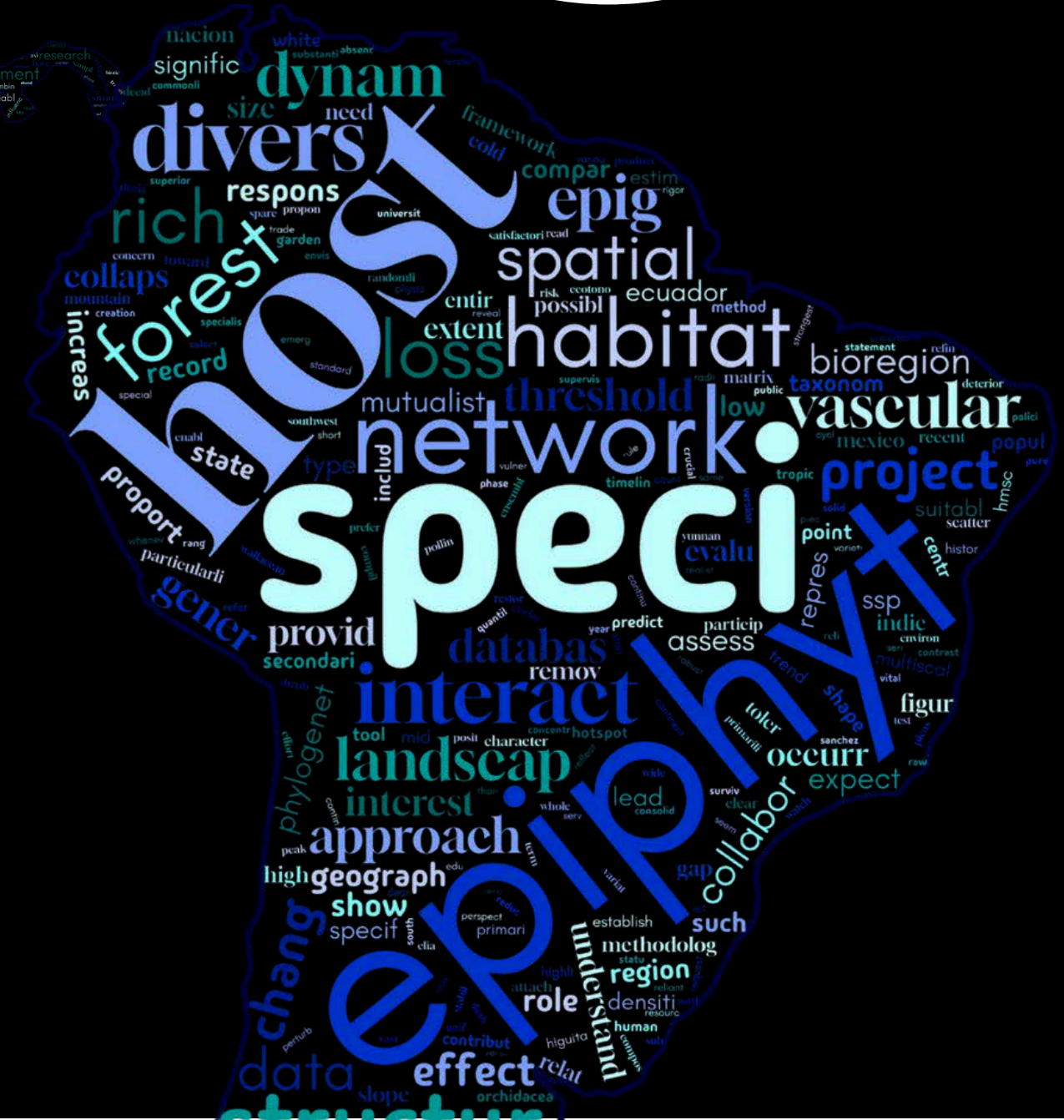




Glenda
Mendieta-Leiva
&
EpIG:
Epiphyte
Inventory Group



VASCULAR EPIPHYTES Definition



Illustration
H. Eichhorn



VASCULAR EPIPHYTES Definition



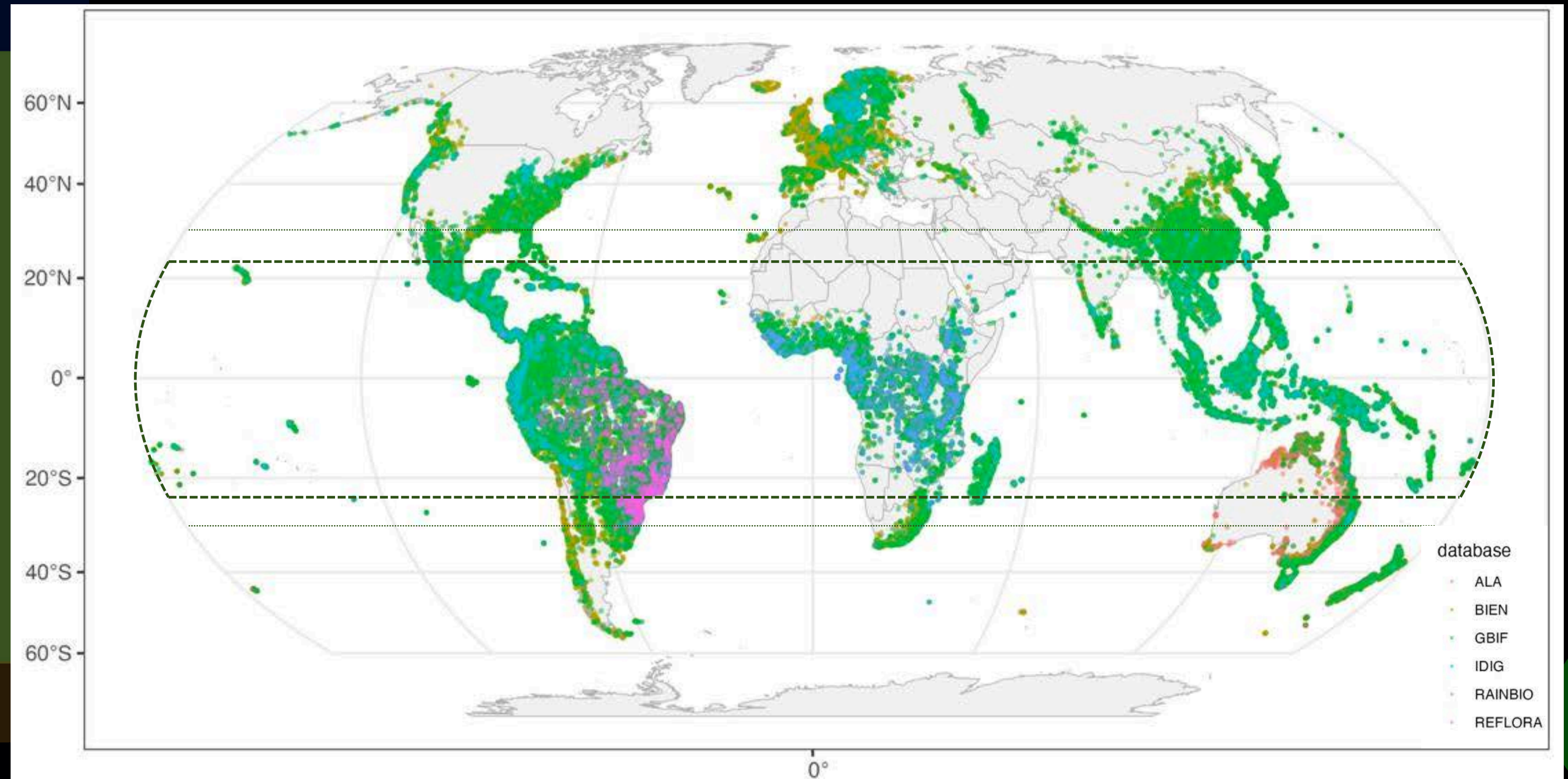
epiphúton (epí, “on top of” + phutón, “plant”)

VASCULAR EPIPHYTES Distribution

atmosphere

canopy

soil



Elaborated by Derio Jiménez-López



VASCULAR EPIPHYTES Definition



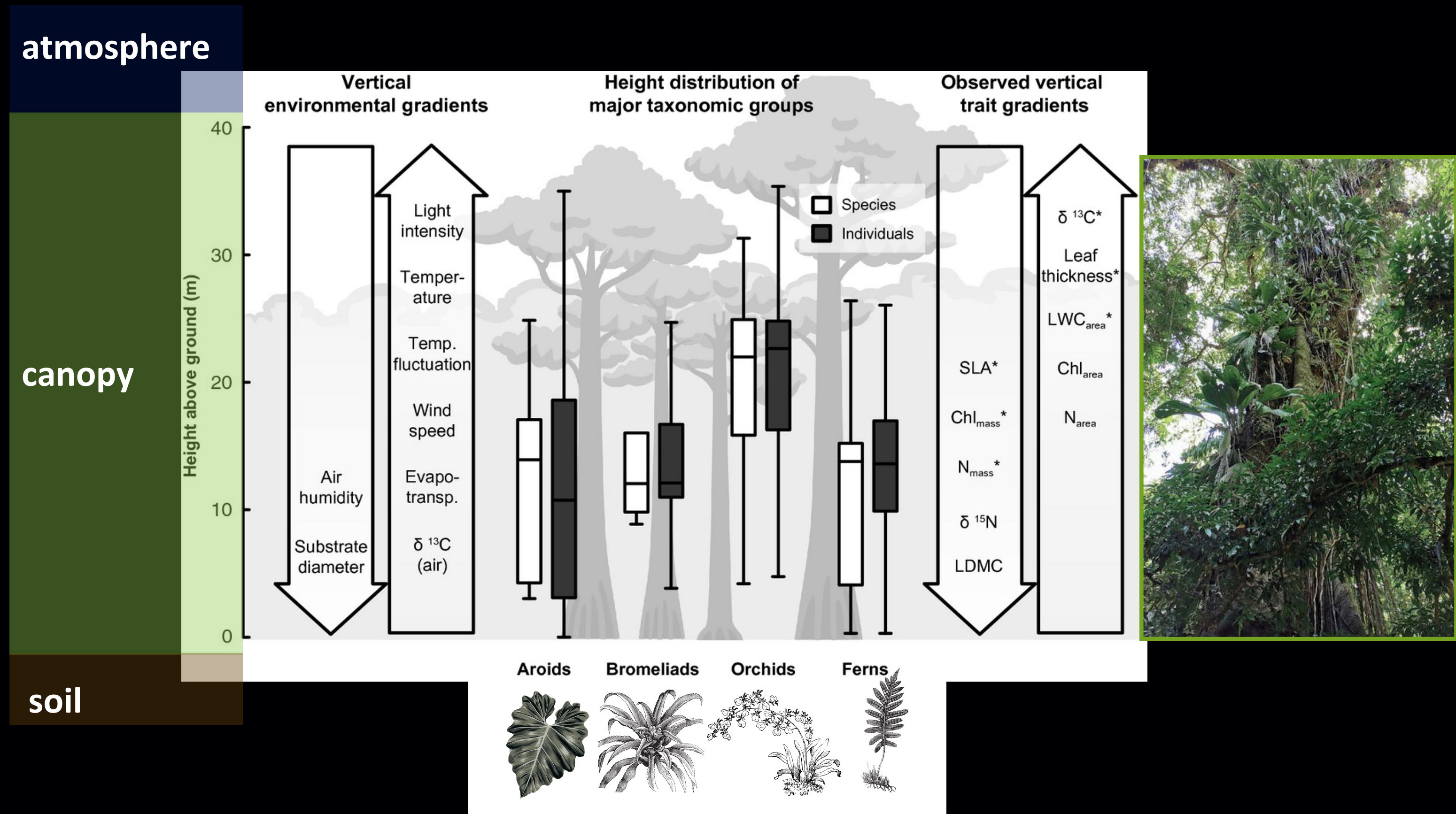
VASCULAR EPIPHYTES Definition



VASCULAR EPIPHYTES Definition



VASCULAR EPIPHYTES Definition



VASCULAR EPIPHYTES High-diversity in perspective

195 species of vascular
epiphytes (with ca. 10 000
individual plants)



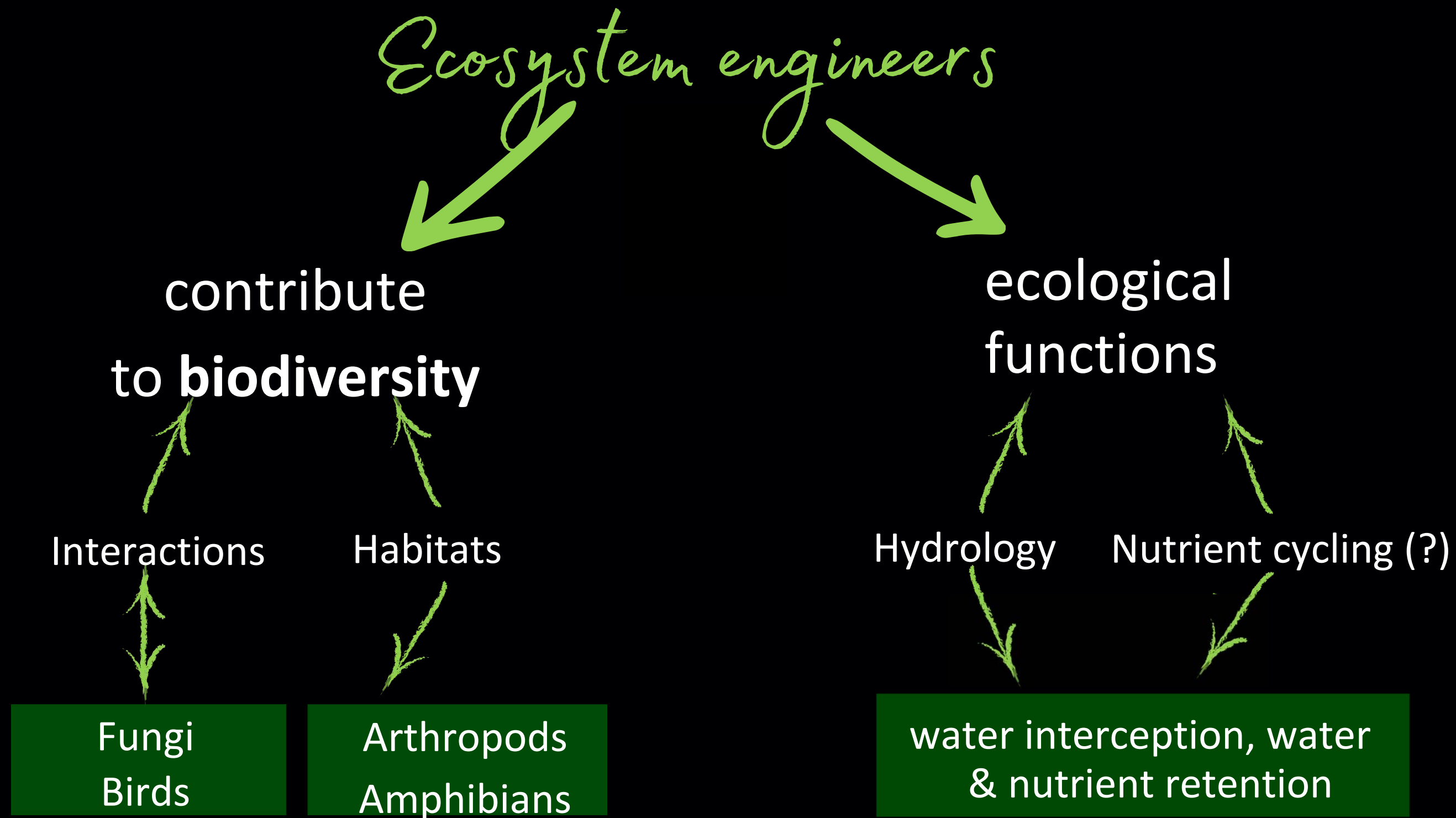
Catchpole and. Kirkpatrick 2010

Plots of 25 to 50 ha
with tenfold number of
epiphyte individuals!



Condit et al 2014

VASCULAR EPIPHYTES Ecosystem engineers



VASCULAR EPIPHYTES

Ecosystem engineers



ecological
functions

Hydrology

Nutrient cycling (?)

water interception, water
& nutrient retention

VASCULAR EPIPHYTES

Ecosystem engineers

contribute
to biodiversity

Habitats

Arthropods
Amphibians

300 islands
165 spp spiders
7500 individuals
Méndez-Castro et al. 2018.
Journal of Biogeography.

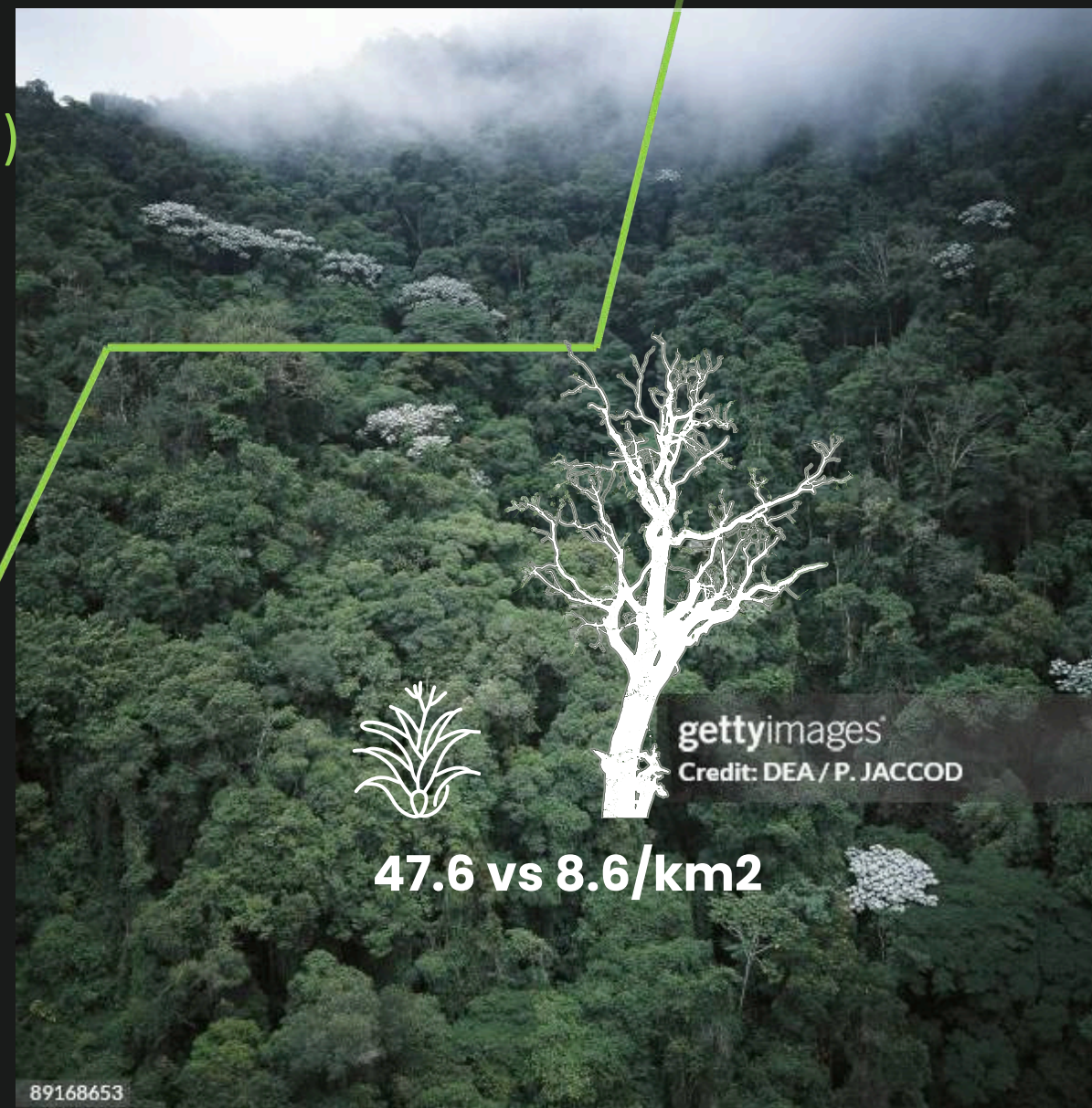


VASCULAR EPIPHYTES High-richness across scales

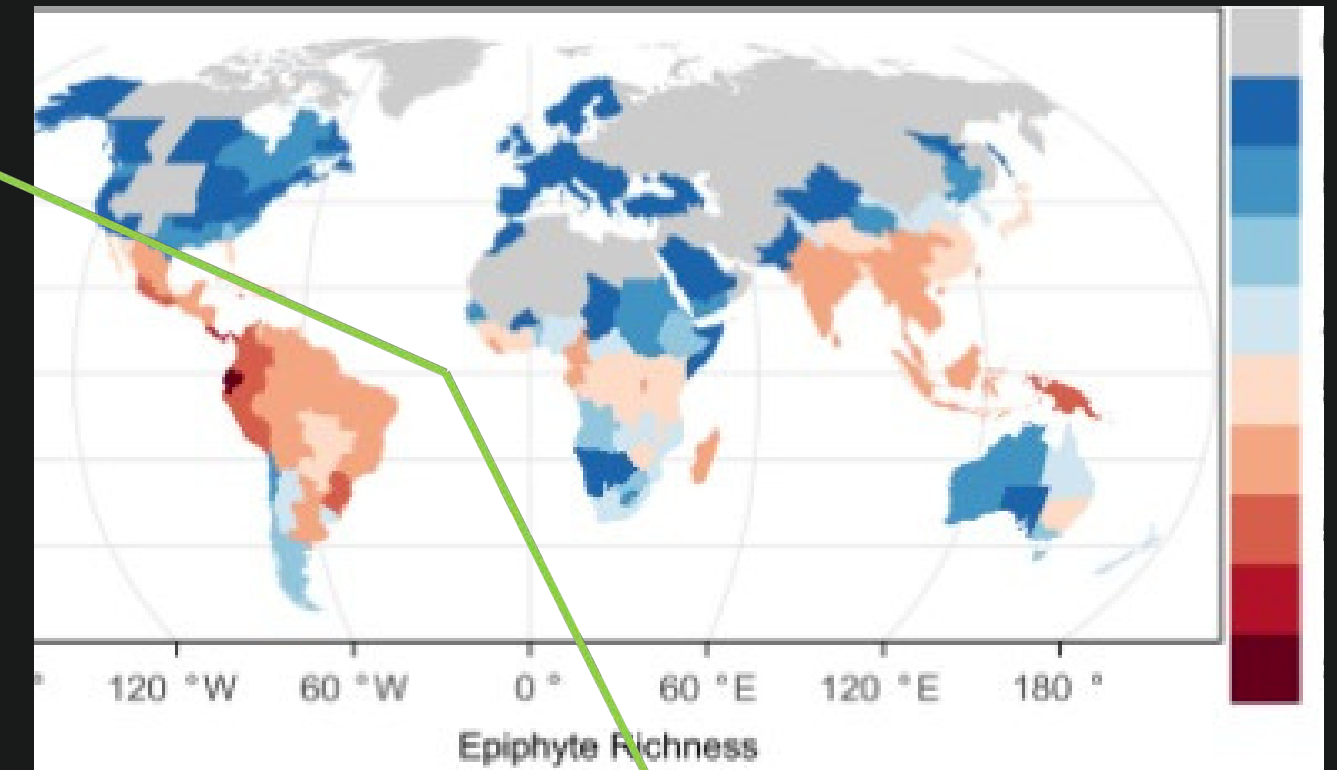
195 species (Cloud forest, Peru)
126 sp (Premontane wet forest, CR)
81 species (Ecuadorian Amazonia)



In humid tropical forests,
represent up to 50% of the vascular flora
e.g. 476 species at a Neotropical lowland forest
(Parque la Amistad)



Kelly et al., 2004, Monro et al., 2017, Wester et al. 2011



Taylor et al 2021

Tropical realm they are the most rich
in the Neotropics.

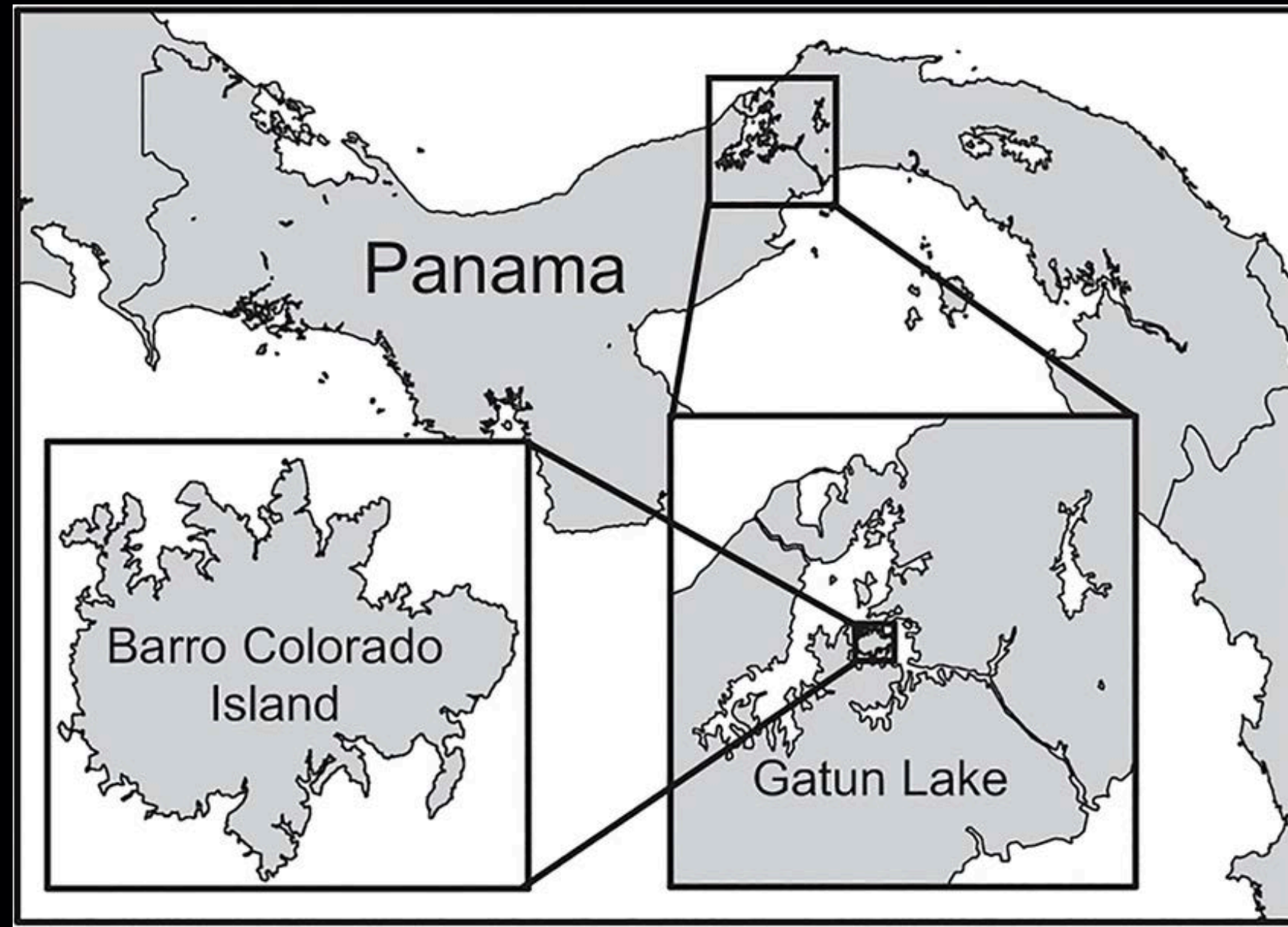
Globally they constitute roughly **10%**
of the world's higher plant
biodiversity.

Zotz et al 2021





VAMOS A VISITAR EL DOSEL DEL BOSQUE DE TIERRAS BAJAS DE BCI (BARRO COLORADO ISLAND)



1 EPIG-DB 1.0 HOW TO INTEGRATE IT?

Turboveg 3

Management tool for vegetation plot data



Gerhard Zotz



Ecology / Volume 102, Issue 6 / e03326

Data Papers | [Free Access](#)

EpiList 1.0: a global checklist of vascular epiphytes

Gerhard Zotz ✉, Patrick Weigelt, Michael Kessler, Holger Kreft, Amanda Taylor

123 Work_ID	ABC Family	ABC ScientificName	ABC Genus	ABC Epithet	ABC Author(s)	ABC Status	ABC UsagelD	ABC Tax_sc
3,406	Cactaceae	Selenicereus tricae	Selenicereus	tricae	D.R.Hunt	accepted	wfo-0000438958	wfo
3,407	Cactaceae	Selenicereus vagans	Selenicereus	vagans	(K.Brandegee) Britton & Rose	accepted	wfo-0000438967	wfo
3,408	Cactaceae	Selenicereus validus	Selenicereus	validus	S.Arias & U.Guzmán	accepted	wfo-0000438991	wfo
3,409	Cactaceae	Selenicereus wittii	Selenicereus	wittii	(K.Schum.) G.D.Rowley	accepted	wfo-0000438988	wfo
3,410	Cactaceae	Trichocereus arboricola	Trichocereus	arboricola	Kimnach	accepted	wfo-0001288622	wfo
3,411	Cactaceae	Weberocereus bradei	Weberocereus	bradei	(Britton & Rose) G.D.Rowley	accepted	wfo-0001289656	wfo
3,412	Cactaceae	Weberocereus frohningiorum	Weberocereus	frohningiorum	Ralf Bauer	ambiguous	wfo-0000427548	wfo
3,413	Cactaceae	Weberocereus glaber	Weberocereus	glaber	(Eichlam) G.D.Rowley	accepted	wfo-0000427534	wfo
3,414	Cactaceae	Weberocereus imitans	Weberocereus	imitans	(Kimnach & Hutchison) Buxb.	accepted	wfo-0000427536	wfo
3,415	Cactaceae	Weberocereus rosei	Weberocereus	rosei	(Kimnach) Buxb.	accepted	wfo-0001289378	wfo
3,416	Cactaceae	Weberocereus tonduzii	Weberocereus	tonduzii	(F.A.C.Weber) G.D.Rowley	accepted	wfo-0001289655	wfo
3,417	Cactaceae	Weberocereus trichophorus	Weberocereus	trichophorus	H.Johnson & Kimnach	accepted	wfo-0001289107	wfo
3,418	Cactaceae	Weberocereus tunilla	Weberocereus	tunilla	(F.A.C.Weber) Britton & Rose	accepted	wfo-0001287955	wfo
3,419	Calophyllaceae	Clusiella albiflora	Clusiella	albiflora	Cuatrec.	accepted	wfo-0000612525	wfo
3,420	Calophyllaceae	Clusiella amplexicaulis	Clusiella	amplexicaulis	Cuatrec.	accepted	wfo-0000612526	wfo
3,421	Calophyllaceae	Clusiella axillaris	Clusiella	axillaris	(Engl.) Cuatrec.	accepted	wfo-0000612527	wfo
3,422	Calophyllaceae	Clusiella cordifolia	Clusiella	cordifolia	Cuatrec.	accepted	wfo-0000612528	wfo
3,423	Calophyllaceae	Clusiella elegans	Clusiella	elegans	Planch. & Triana	accepted	wfo-0000612529	wfo
3,424	Calophyllaceae	Clusiella impressinervis	Clusiella	impressinervis	Hammel	accepted	wfo-0000612530	wfo
3,425	Calophyllaceae	Clusiella isthmensis	Clusiella	isthmensis	Hammel	accepted	wfo-0000612531	wfo
3,426	Calophyllaceae	Clusiella macropetala	Clusiella	macropetala	Cuatrec.	accepted	wfo-0000612533	wfo



Stephan Hennekes

VASCULAR EPIPHYTES EpIG

Journal of Vegetation Science / Volume 31, Issue 3 / p. 518-528

REPORT | [Open Access](#) |   

EpIG-DB: A database of vascular epiphyte assemblages in the Neotropics



**Epiphyte
Inventory
Group**



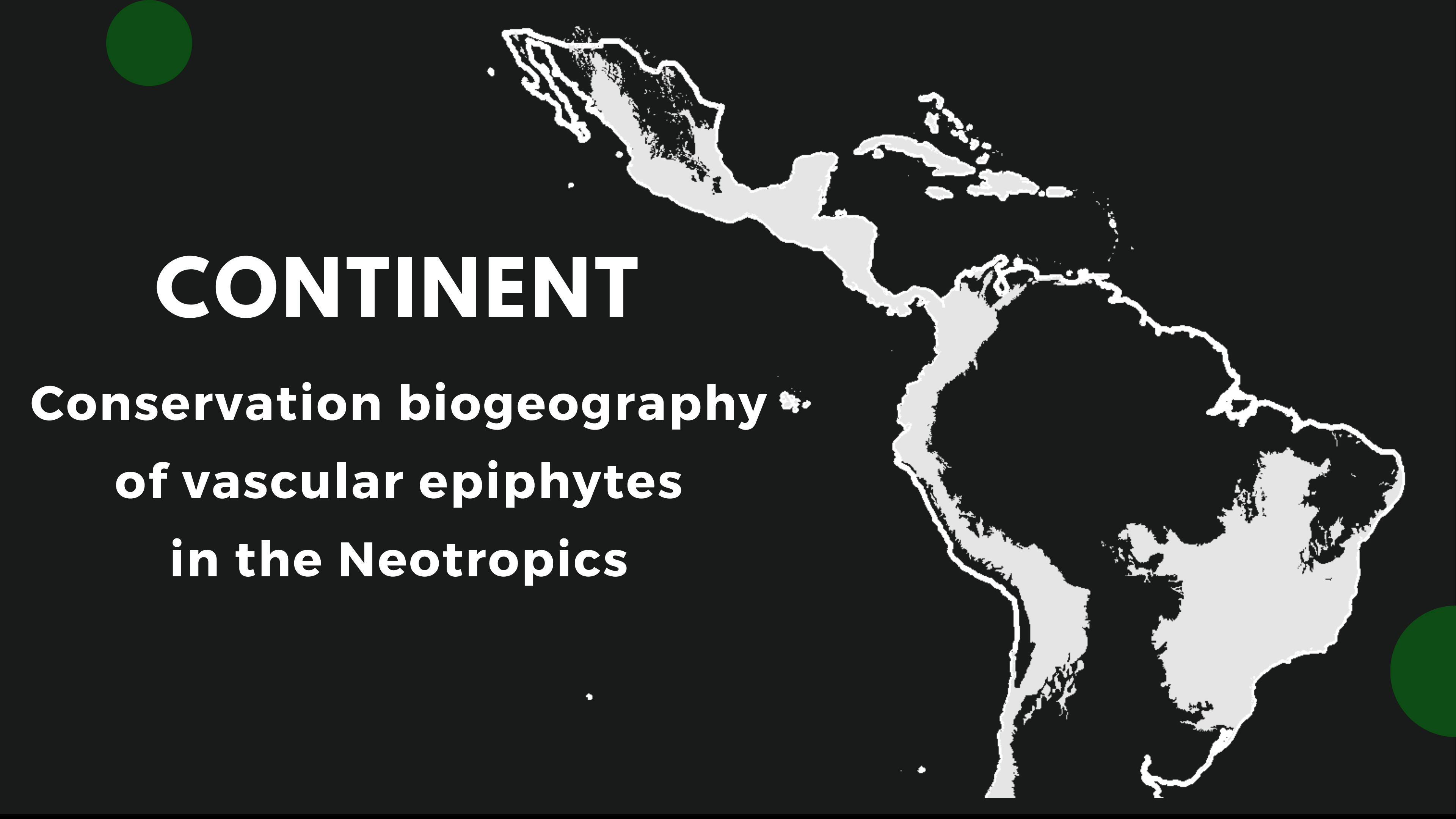
VASCULAR EPIPHYTES EpIG

Journal of Vegetation Science / Volume 31, Issue 3 / p. 518-528

REPORT | [Open Access](#) |   

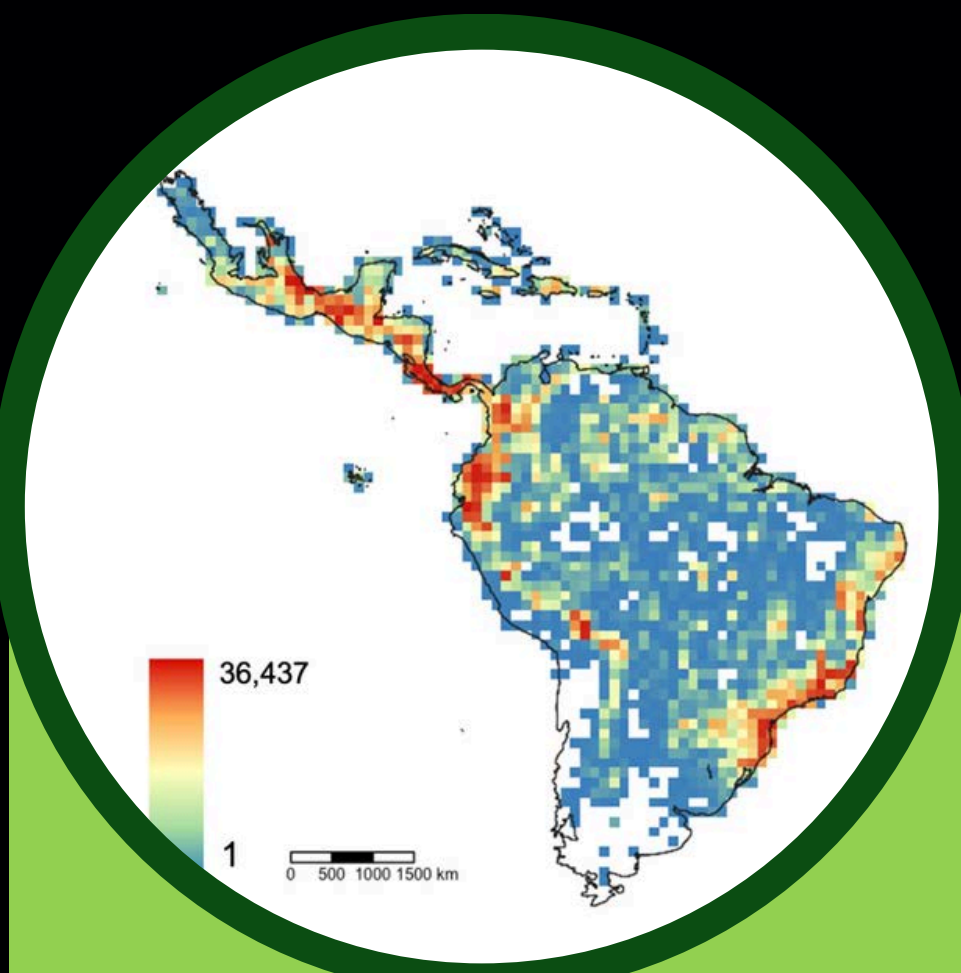
EpIG-DB: A database of vascular epiphyte assemblages in the Neotropics





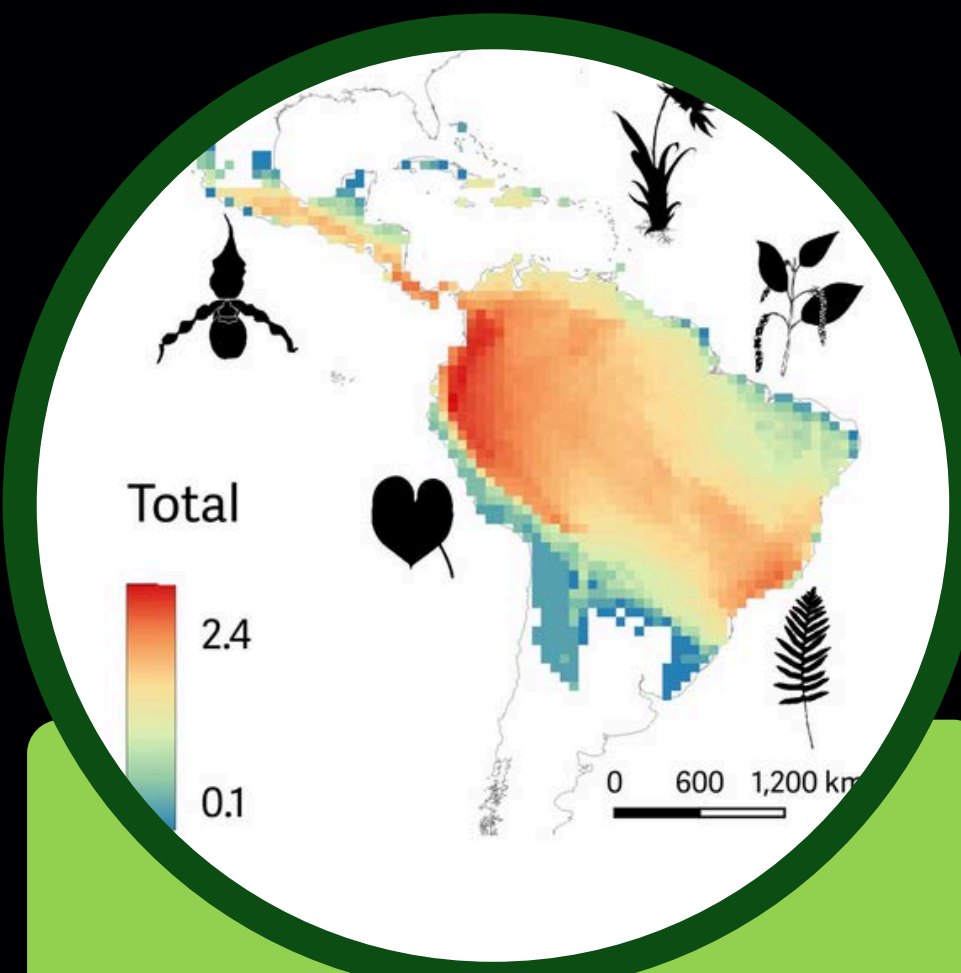
CONTINENT

**Conservation biogeography
of vascular epiphytes
in the Neotropics**



1

DATA



2

BIOGEOGRAPHY
& DIVERSITY



3

CONSERVATION
PRIORITIES



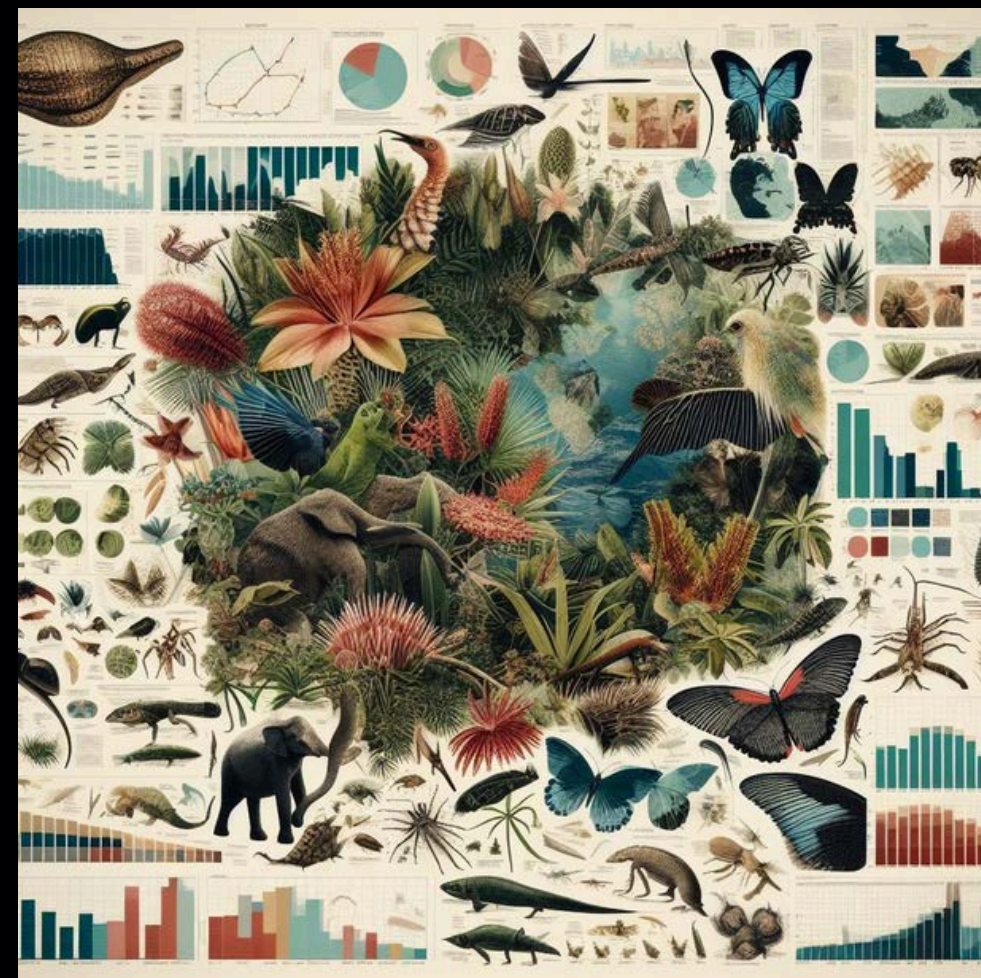
1 DATA



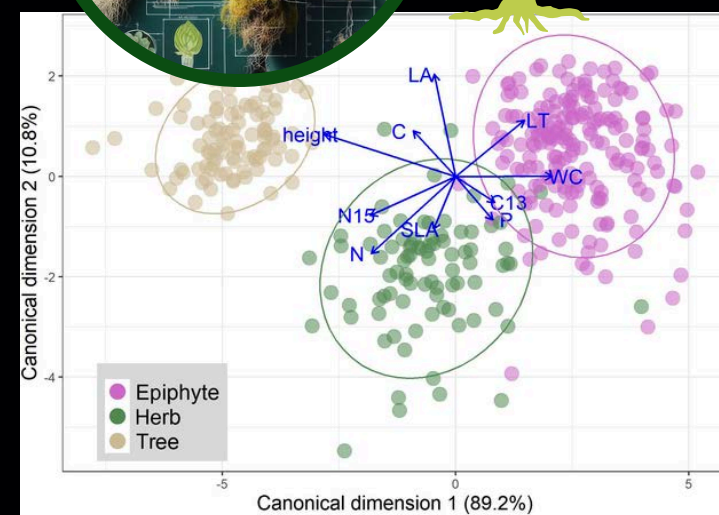
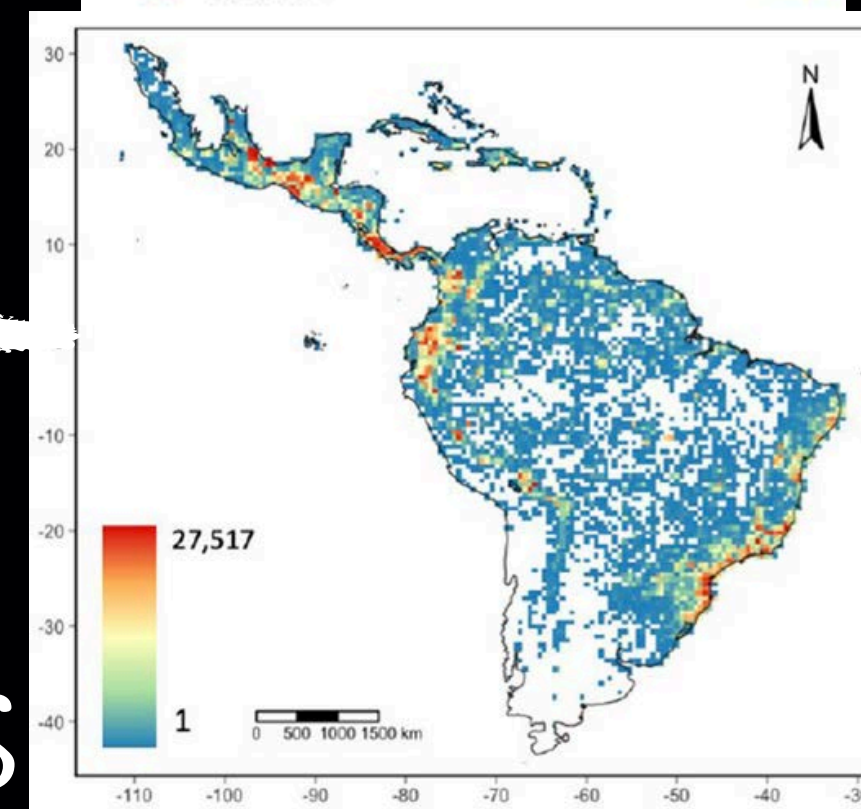
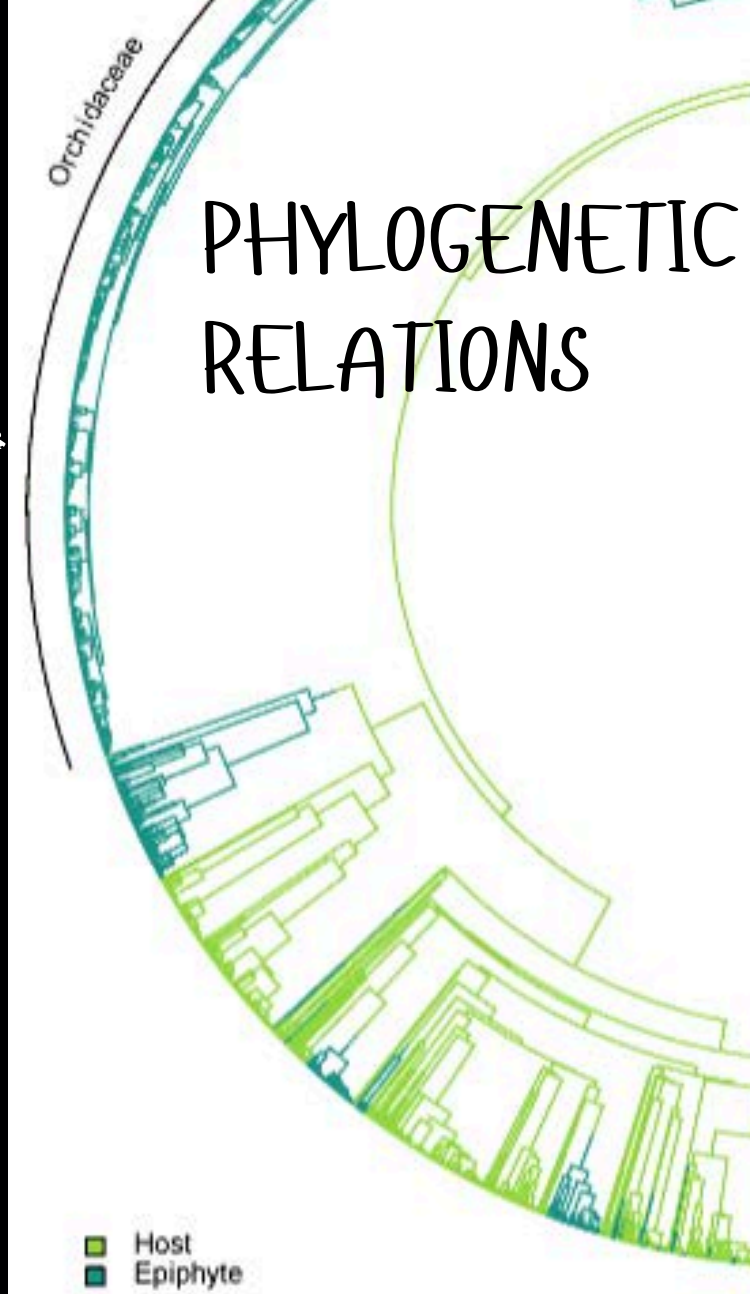
Elaborated by Gabriela García Reynaga

COMMUNITY

SPECIES LISTS



PHYLOGENETIC RELATIONS



TRAITS

POPULATION STRUCTURE

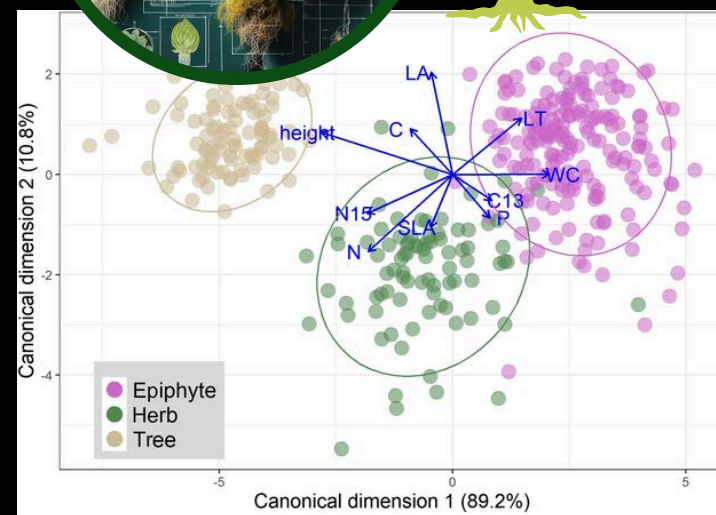
OCCURRENCES

1 DATA

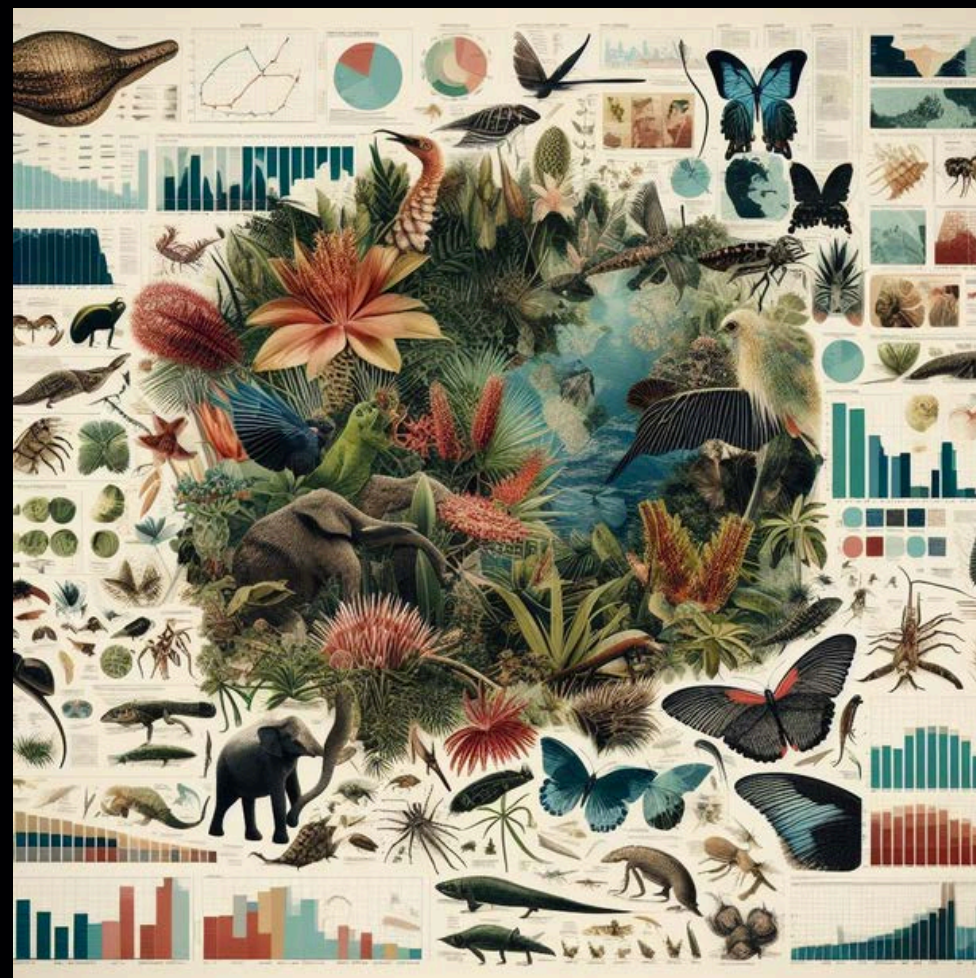


Elaborated by Gabriela García Reynaga

COMMUNITY ✓



SPECIES
LISTS ✓



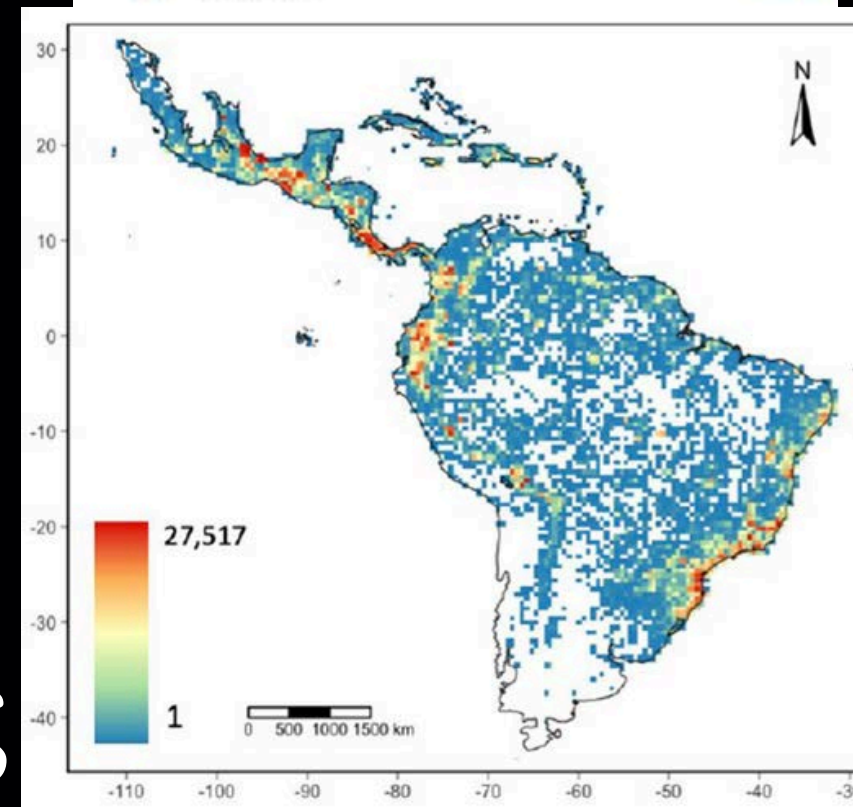
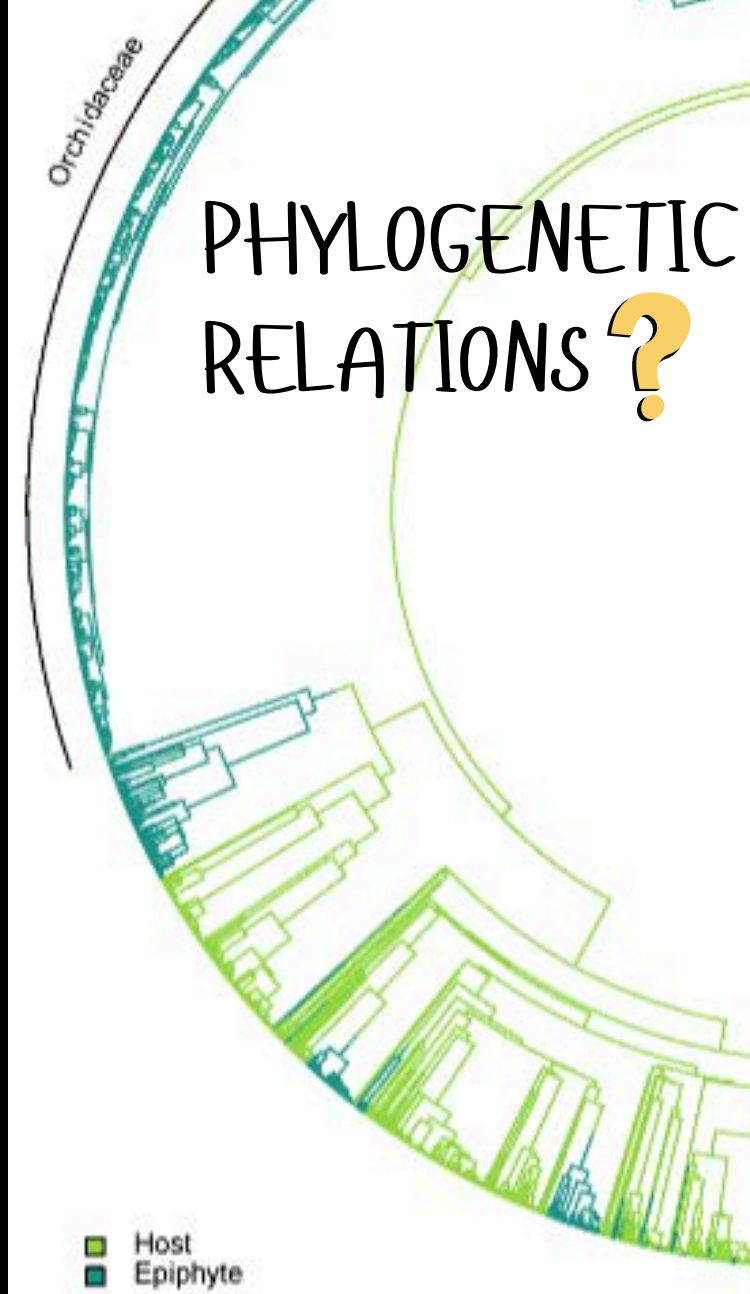
✗ POPULATION
STRUCTURE



TRAITS ?

✓ OCCURRENCES

PHYLOGENETIC
RELATIONS ?



1 DATA



Elaborated by Gabriela García Reynaga

COMMUNITY ☒

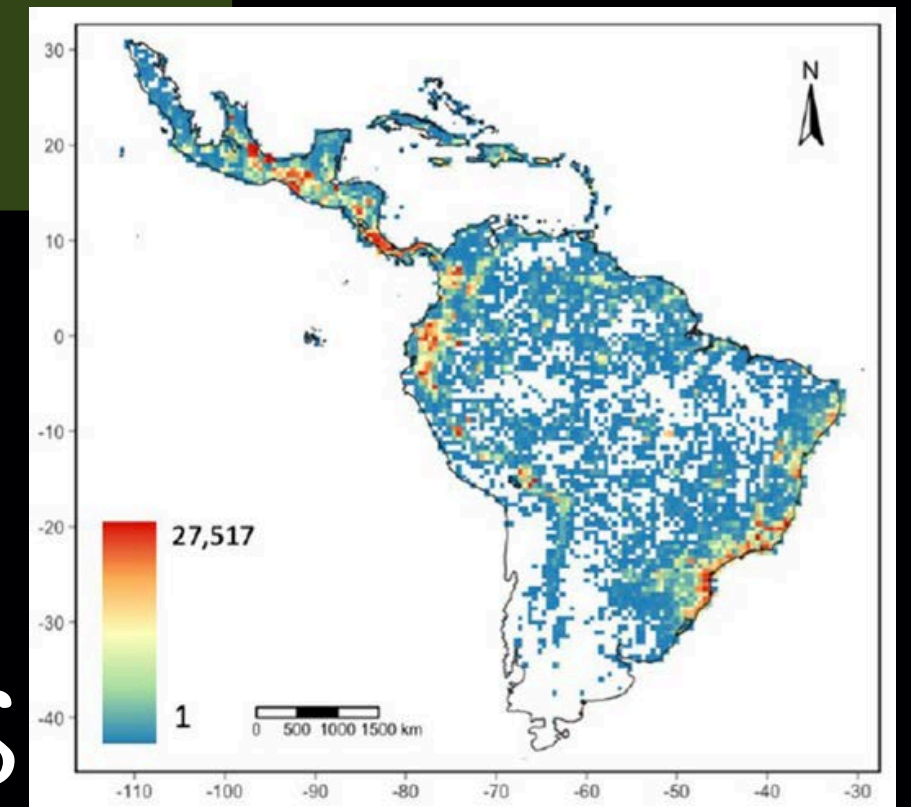
SPECIES

LISTS ☒

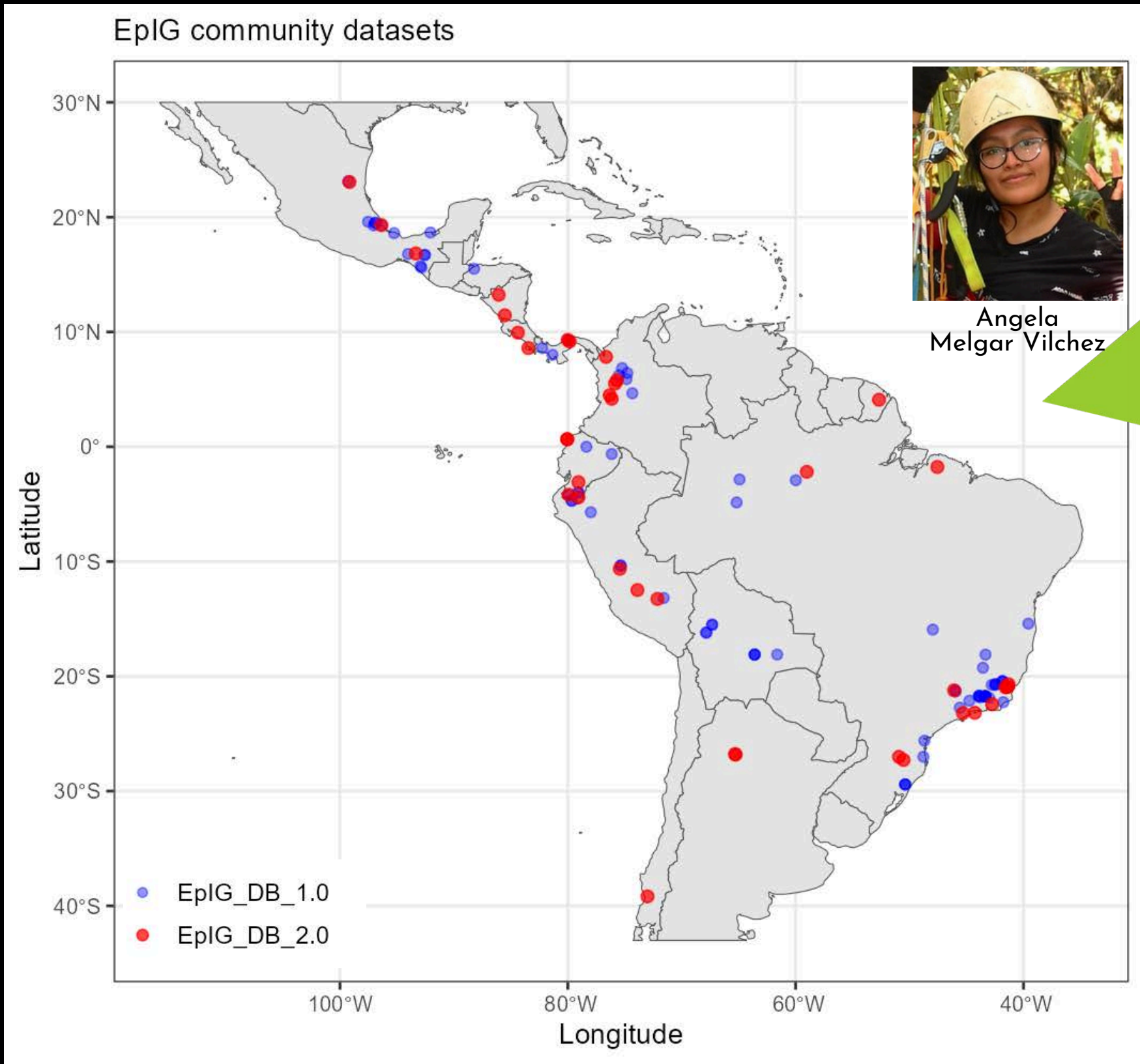


EpiG-DB v2.0. a
continental-scale platform
of synthetic epiphyte
biodiversity data

☒ OCCURRENCES



A COMMUNITY DATA



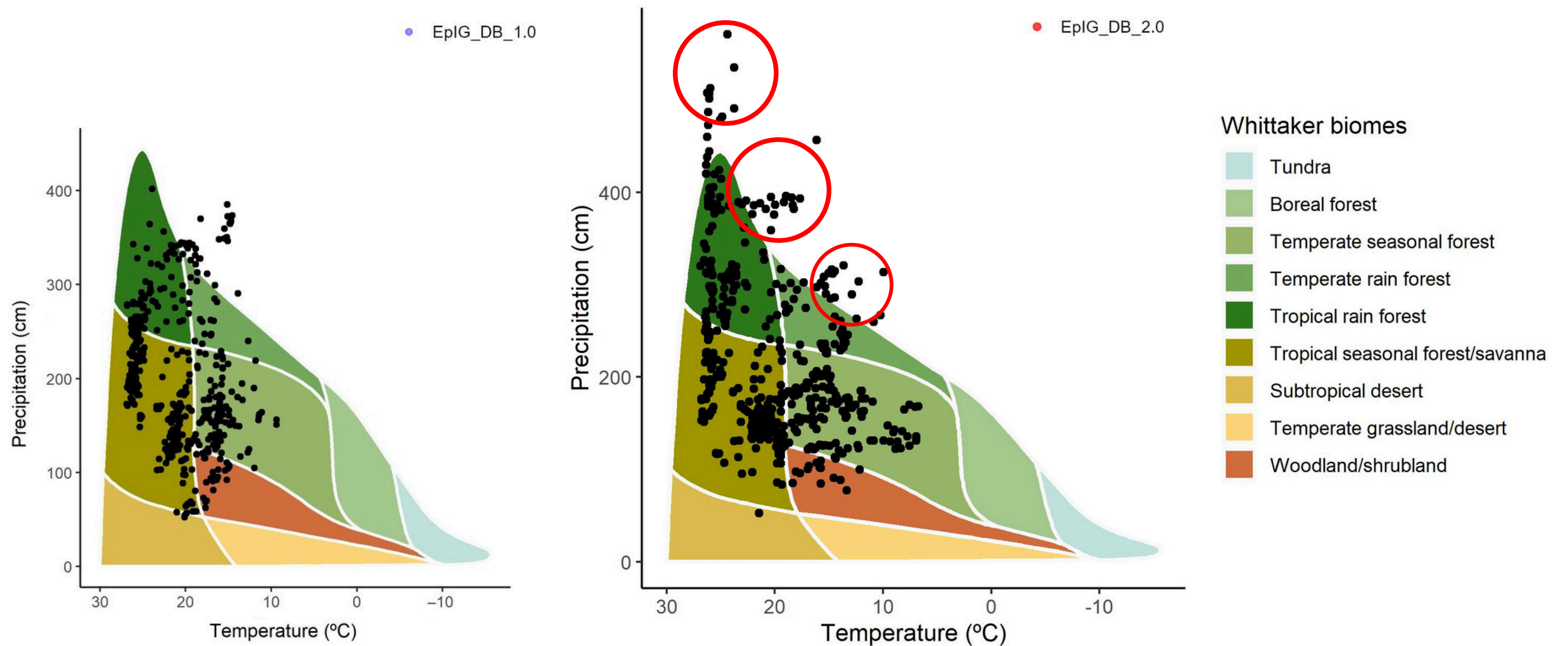
Elaborated by Gabriela García Reynaga

version	v 1.0	v 2.0	+%
databases #	76	43	57
tree #	17,782	10,024	56
spp	3,005	3,332	11
abundance	464,871	209,552	55

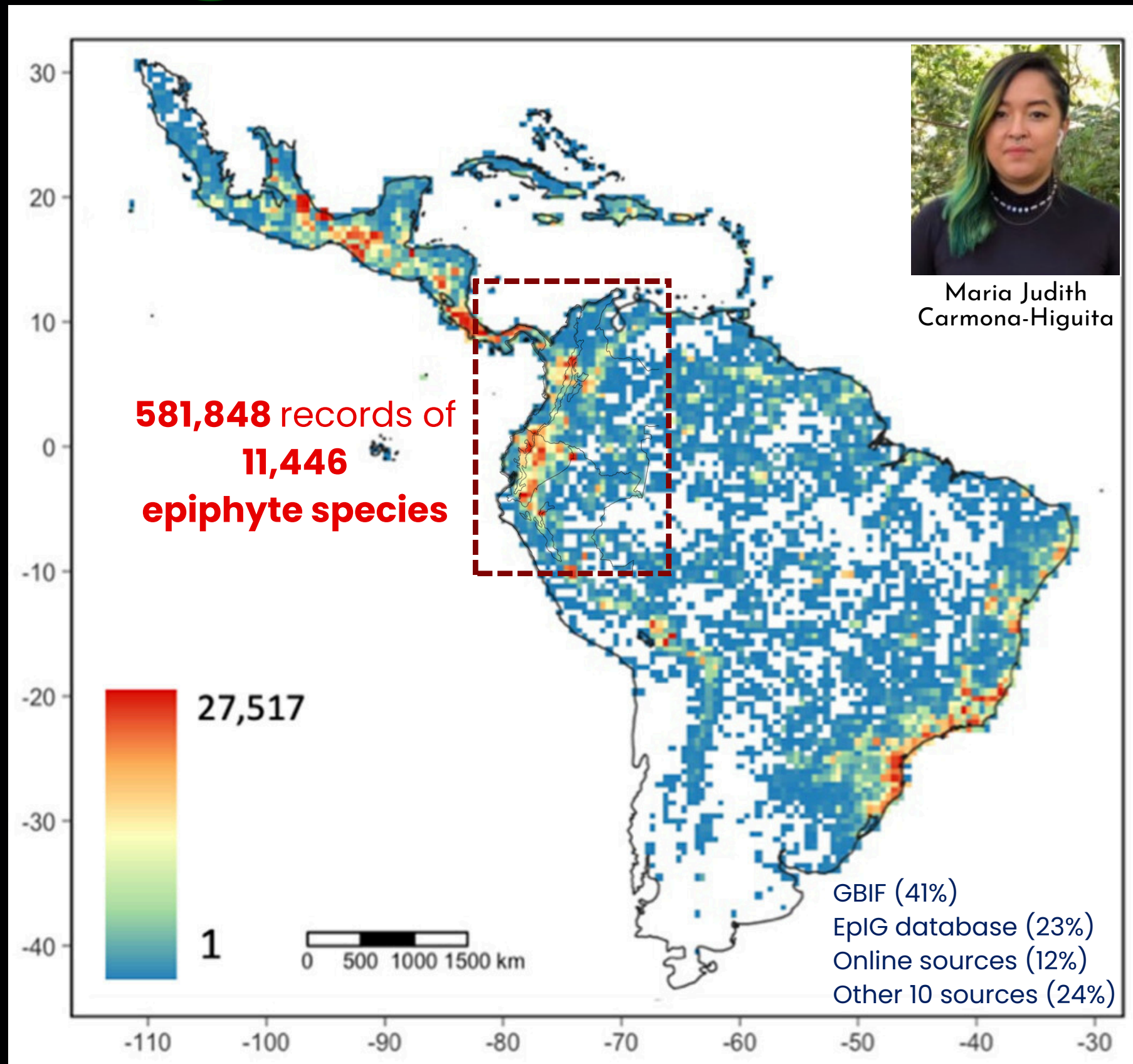
1992 2019 2020 2025

3,005 → 3,849 epiphyte spp
21% morphospecies (89 families)

A COMMUNITY DATA



B OCURRENCE DATA



Orchidaceae

8,097 (71%)

Bromeliaceae

1,617 (14%)

Polypodiaceae

606 (5%)

Araceae

675 (6%)

Peperomia

451 (4%)

Conservation status of vascular epiphytes in the neotropics

Original Research | Published: 25 October 2023
Volume 33, pages 51–71, (2024) [Cite this article](#)

Biodiversity and Conservation

[Aims and scope](#) →
[Submit manuscript](#) →

Red List IUCN

CR Critically Endangered	26% (1,766)
EN Endangered	53% (3,537)
VU Vulnerable	21% (1,418)

Journal of Biogeography

RESEARCH ARTICLE | [Open Access](#) | [CC](#) [BY](#) [NC](#) [ND](#)

Endemism Centres of the Five Richest Vascular Epiphyte Families in the Neotropics

Maria Judith Carmona-Higuita ✉, Glenda Mendieta-Leiva, Jorge Antonio Gómez-Díaz, Fabricio Villalobos, Flavio Nunes Ramos, João Pedro Costa Elias ... [See all authors](#)

Paramo province (21%)

71% of endemics were Orchids

Maria Judith Carmona-Higuita ✉, Glenda Mendieta-Leiva, ... Thorsten Krömer [Show authors](#)

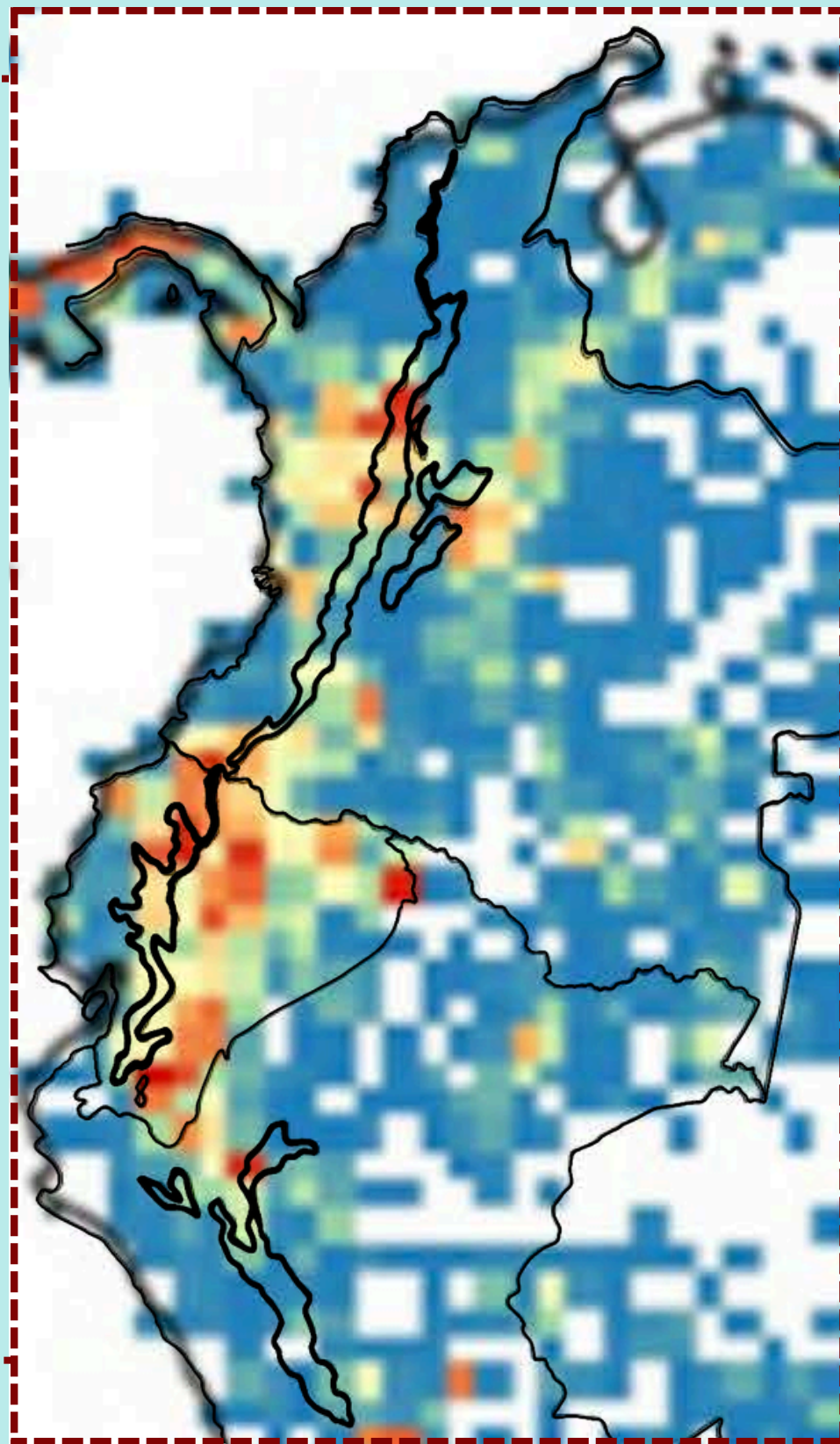
~ 60% of the species **possibly threatened**

B OCURRENCE DATA

Paramo
province

581,848 records of
11,446
epiphyte species

4% (481)
assessments
IUCN
Red List



Orchidaceae



8,097
(71%)

Bromeliaceae



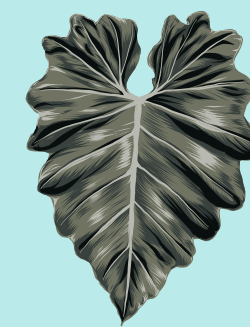
1,617
(14%)

Polypodiaceae



606
(5%)

Araceae



675
(6%)

Peperomia



451
(4%)

Conservation status of vascular epiphytes in the neotropics

Original Research | Published: 25 October 2023

Volume 33, pages 51–71, (2024) [Cite this article](#)



Biodiversity and Conservation

[Aims and scope](#) →

[Submit manuscript](#) →

[Maria Judith Carmona-Higuita](#) ✉, [Glenda](#)

[Mendieta-Leiva](#), ... [Thorsten](#)

[Krömer](#)

▼ Show authors

Red List IUCN



Critically Endangered

26% (1,766)



Endangered

53% (3,537)



Vulnerable

21% (1,418)

Journal of Biogeography

RESEARCH ARTICLE | [Open Access](#) | [CC](#) [BY](#) [NC](#) [ND](#)

Endemism Centres of the Five Richest Vascular Epiphyte Families
in the Neotropics

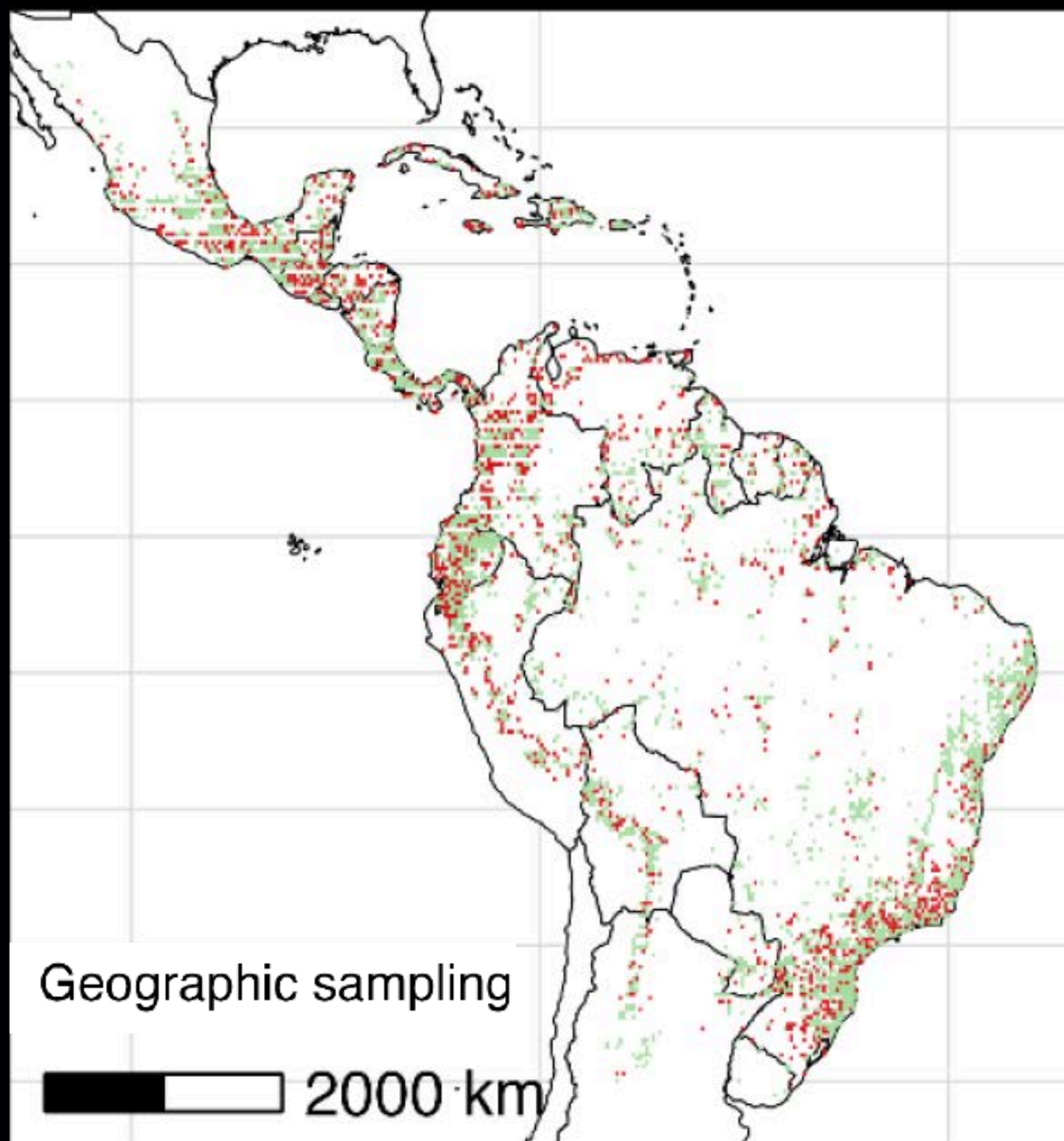
[Maria Judith Carmona-Higuita](#) ✉, [Glenda Mendieta-Leiva](#), [Jorge Antonio Gómez-Díaz](#),
[Fabricio Villalobos](#), [Flavio Nunes Ramos](#), [João Pedro Costa Elias](#) ... [See all authors](#) ▼

Paramo province (21%)

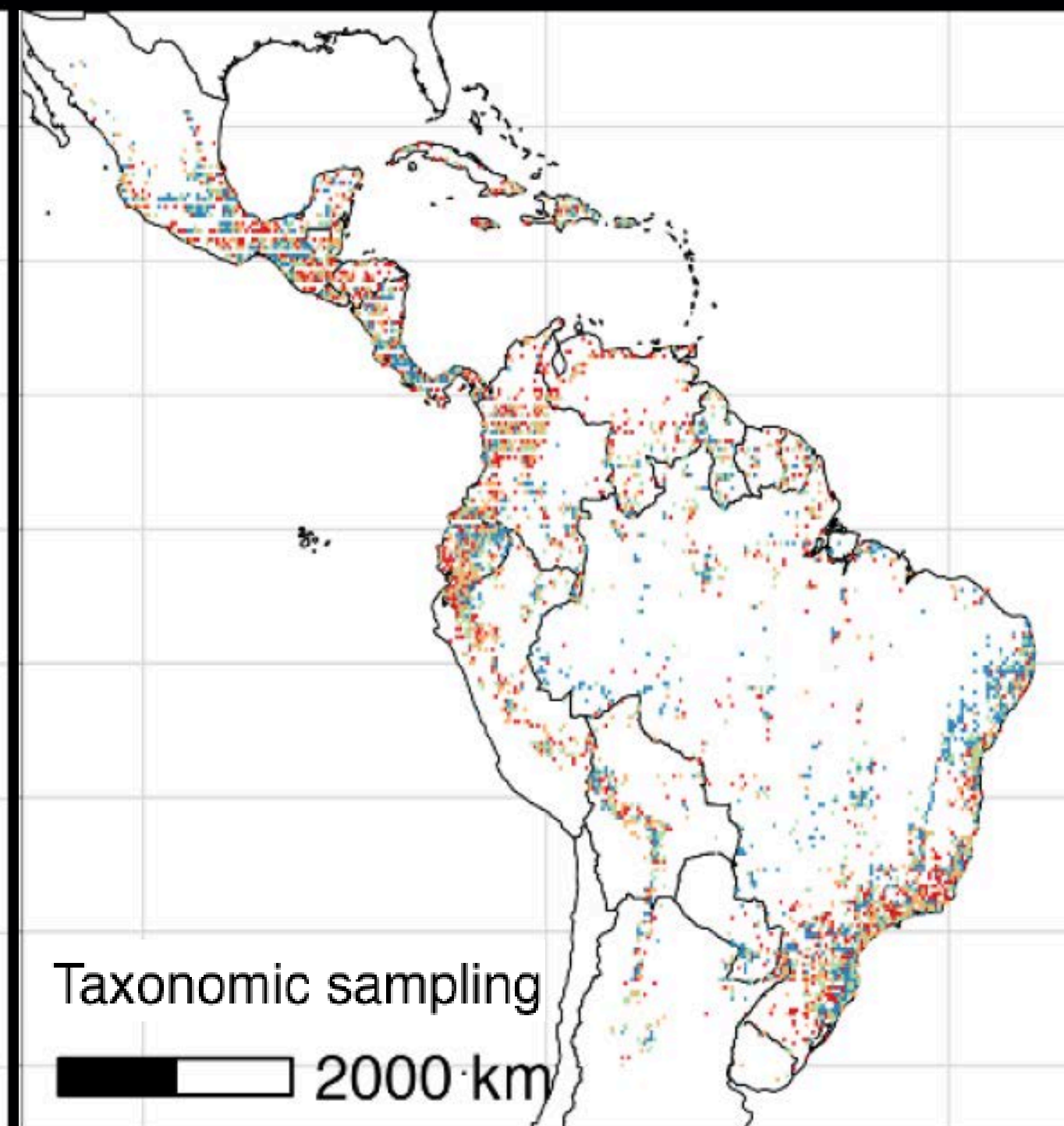
71% of endemics were Orchids

~ 60% of the species **possibly threatened**

2 SHORTFALLS



Well Fair Poorly



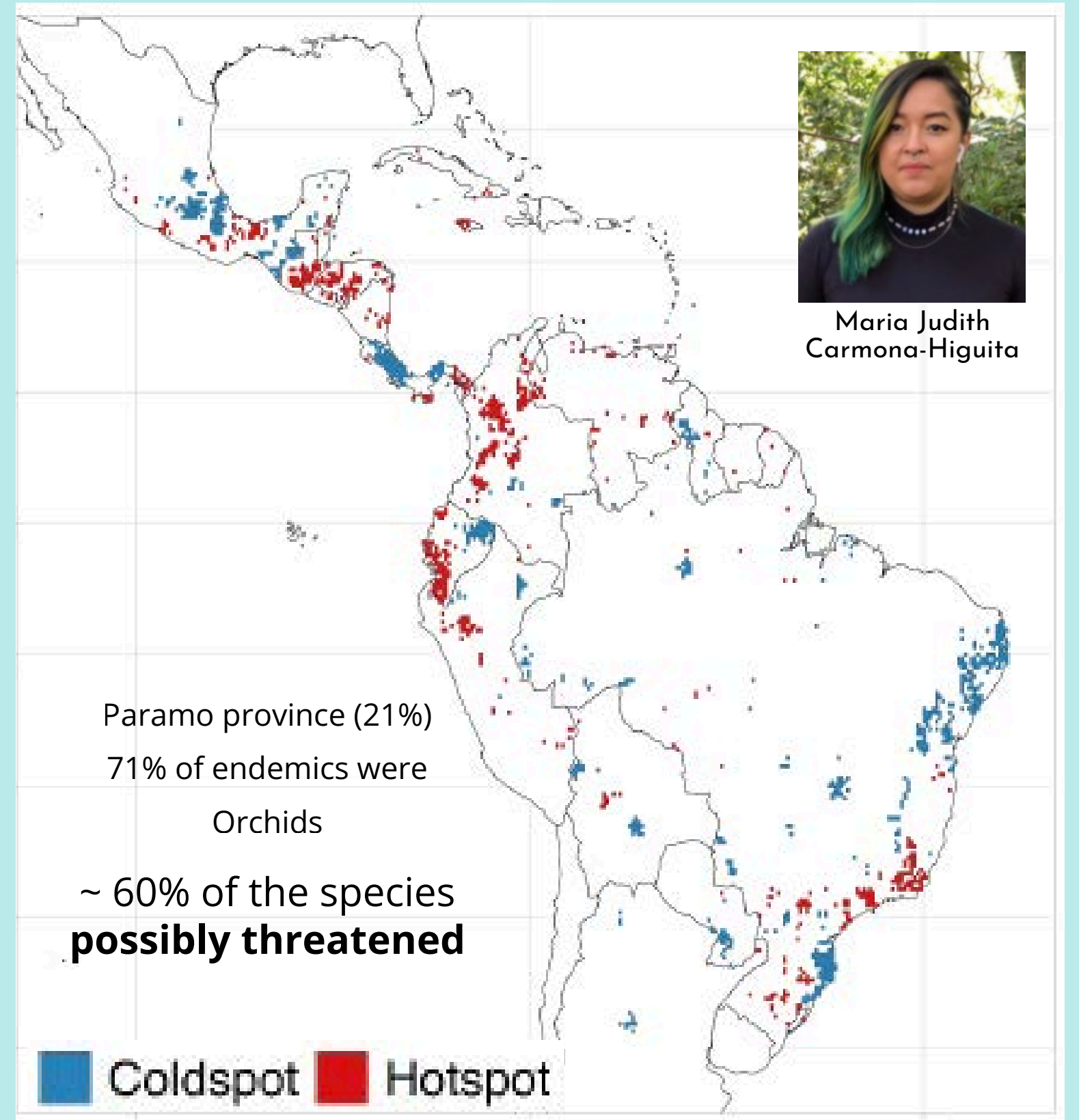
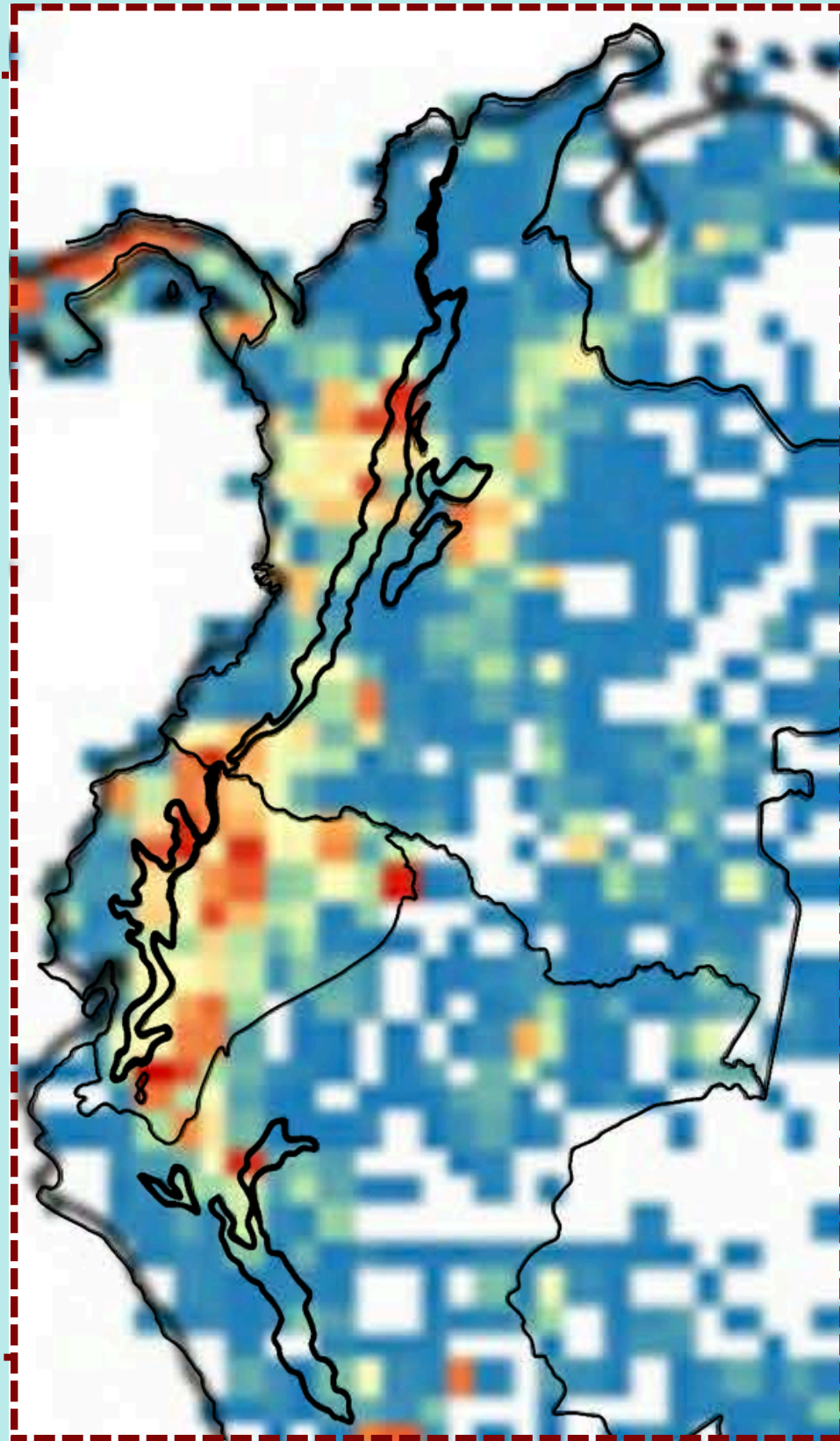
Low Middle-low Middle-high High



Maria Judith
Carmona-Higueta

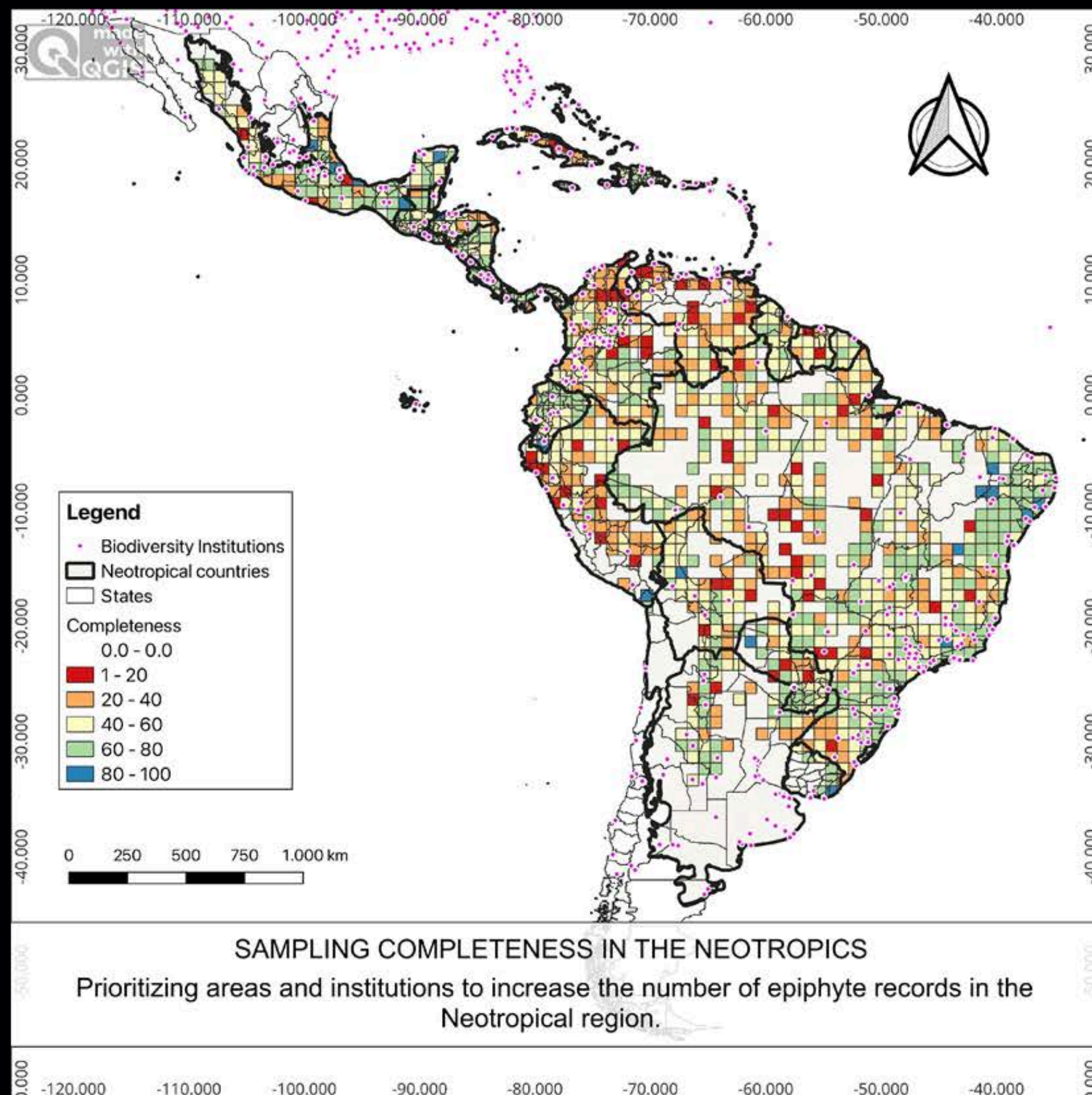
2 SHORTFALLS

Paramo
province

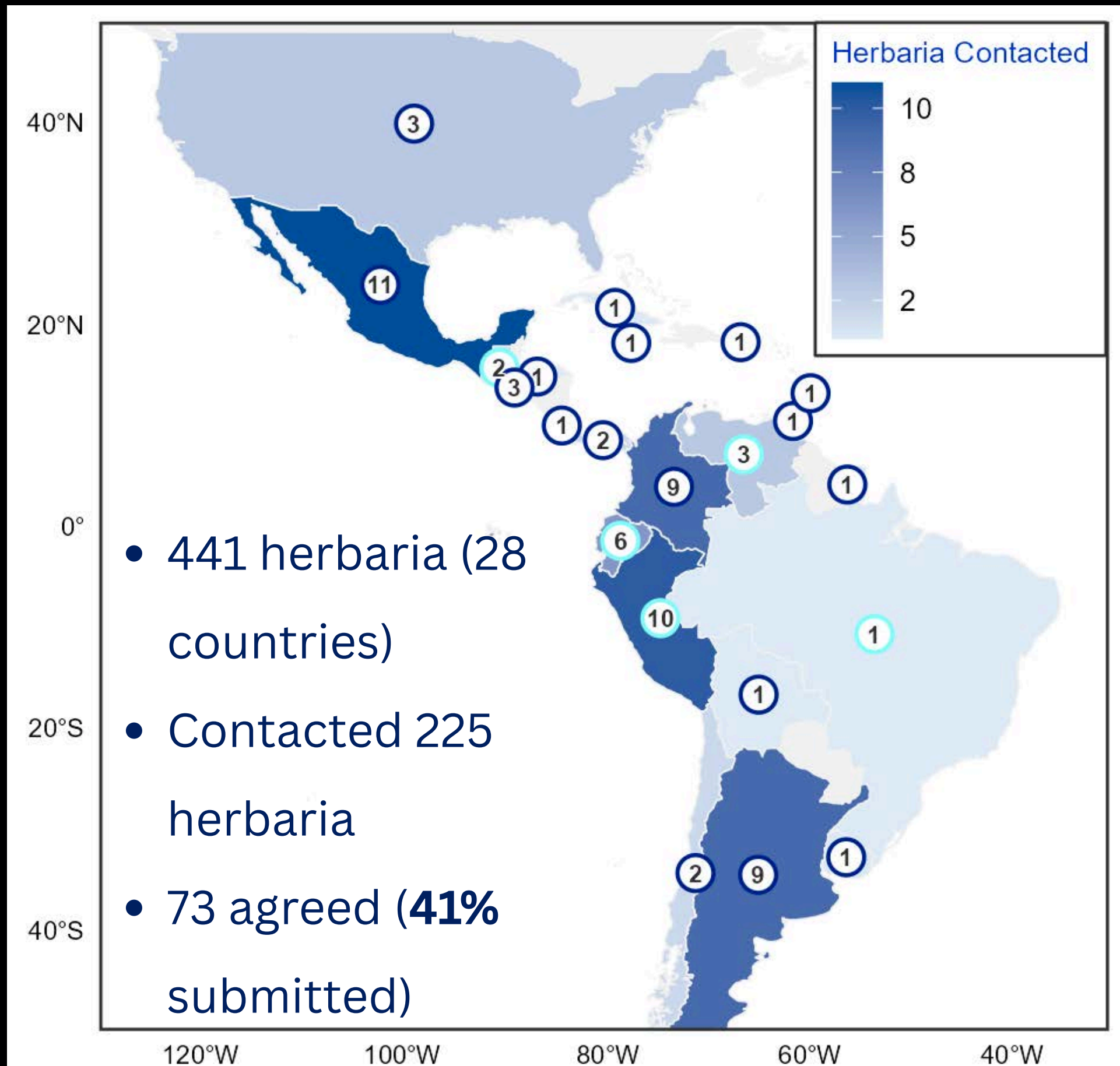


Maria Judith
Carmona-Higueta

B OCCURRENCE DATA



Elaborated by Maria Judith Carmona Higueta



*Turquoise circles indicate countries with herbarium data repositories. Brazil's repository includes +43 herbaria.

3



OCURRENCE

COMMUNITY

Bioregionalization

Climate change

Habitat loss & fragmentation on orchid population

Shortfalls

Endemism (25)

Conservation status (24)



Trait matching

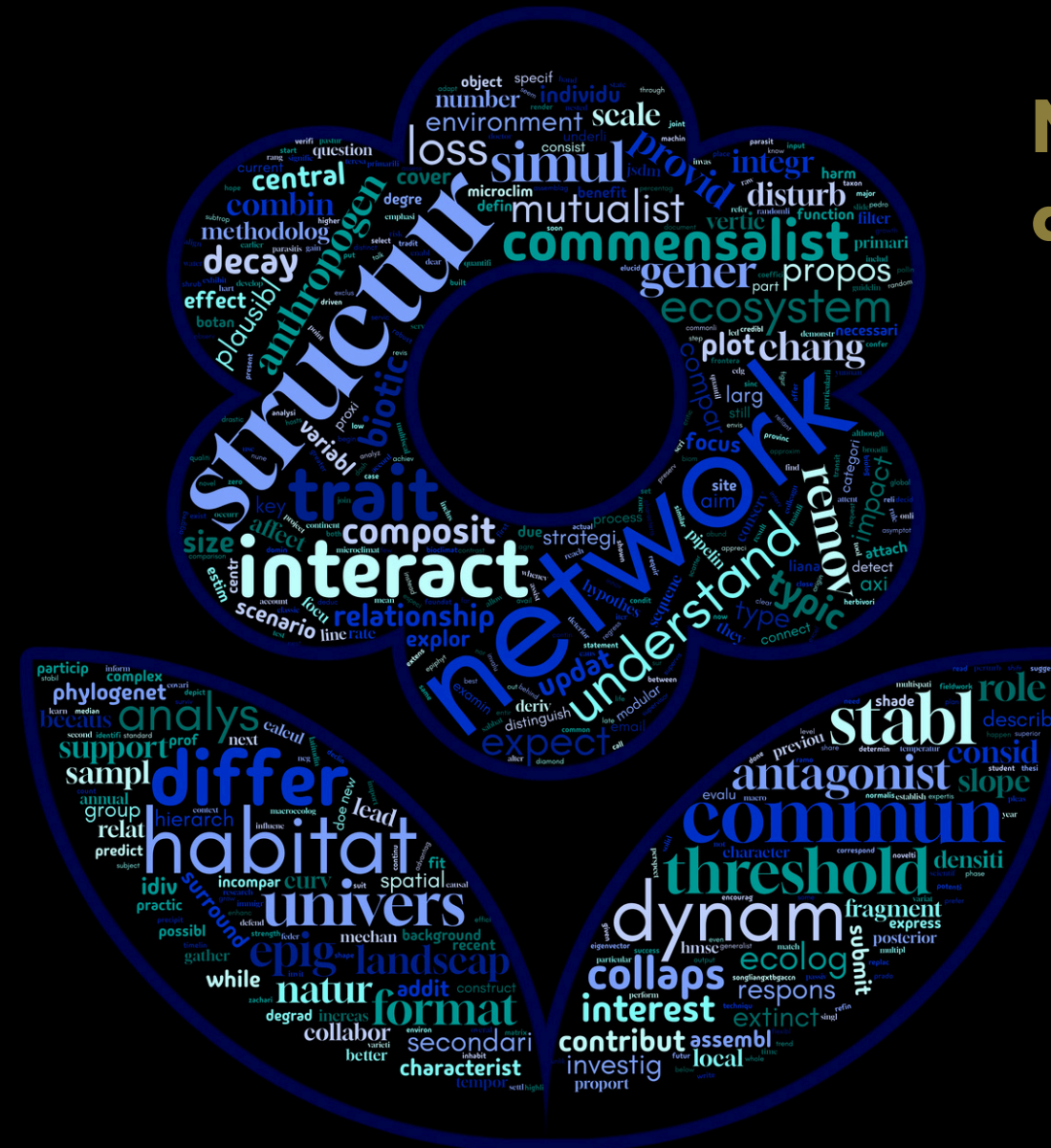
Neotropical epiphyte diversity

Forest loss & habitat type effect on epiphyte diversity

Ecosystem Decay

Epiphyte-Host Networks

Phylogenetic diversity & structure host-epiphyte interactions (23)



OCURRENCE

Bioregionalization

Climate change

Habitat loss & fragmentation on orchid population

Shortfalls

✓ Endemism

Conservation status



COMMUNITY

Trait matching

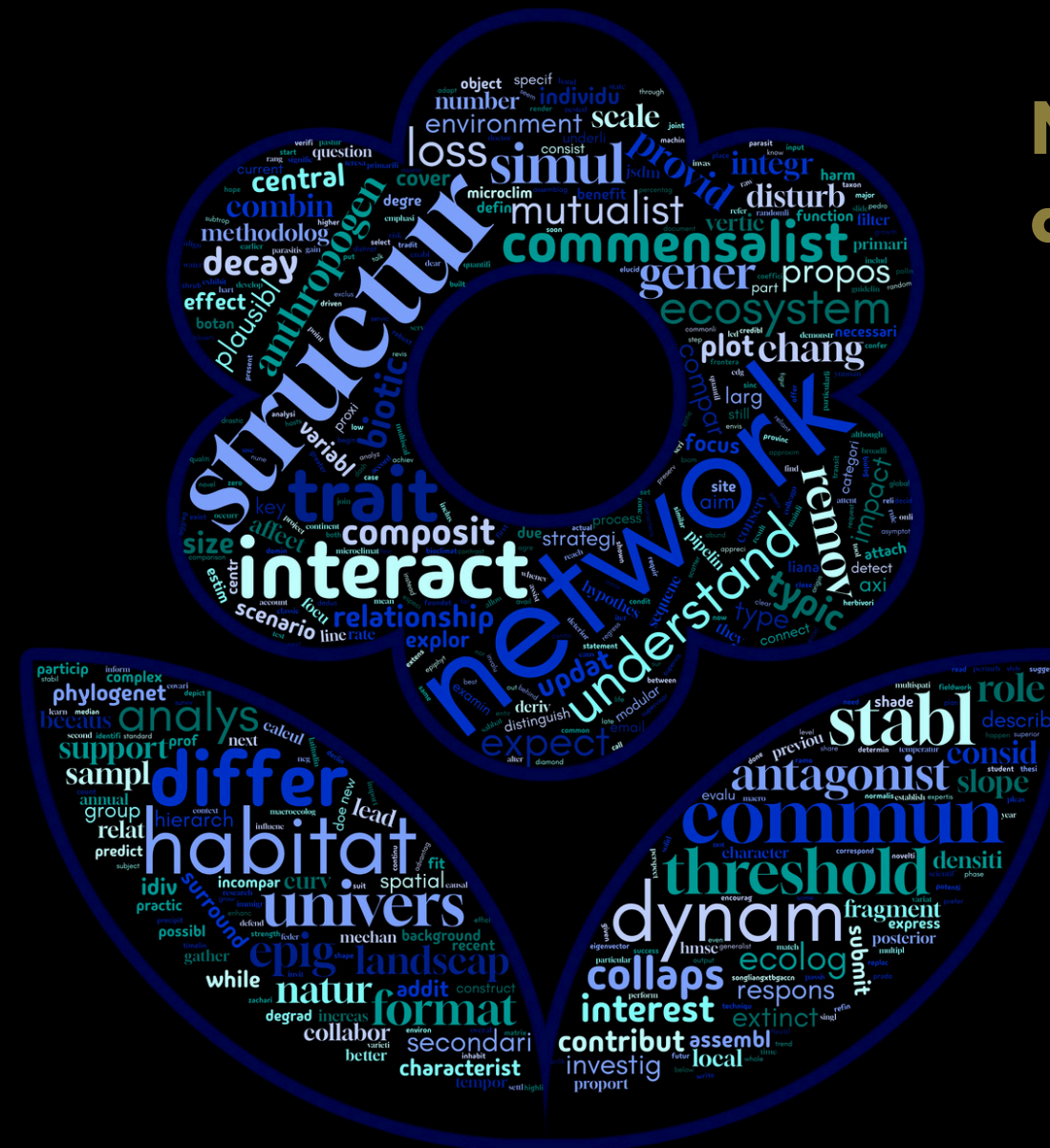
Neotropical epiphyte diversity

Forest loss & habitat type effect on epiphyte diversity

Ecosystem Decay

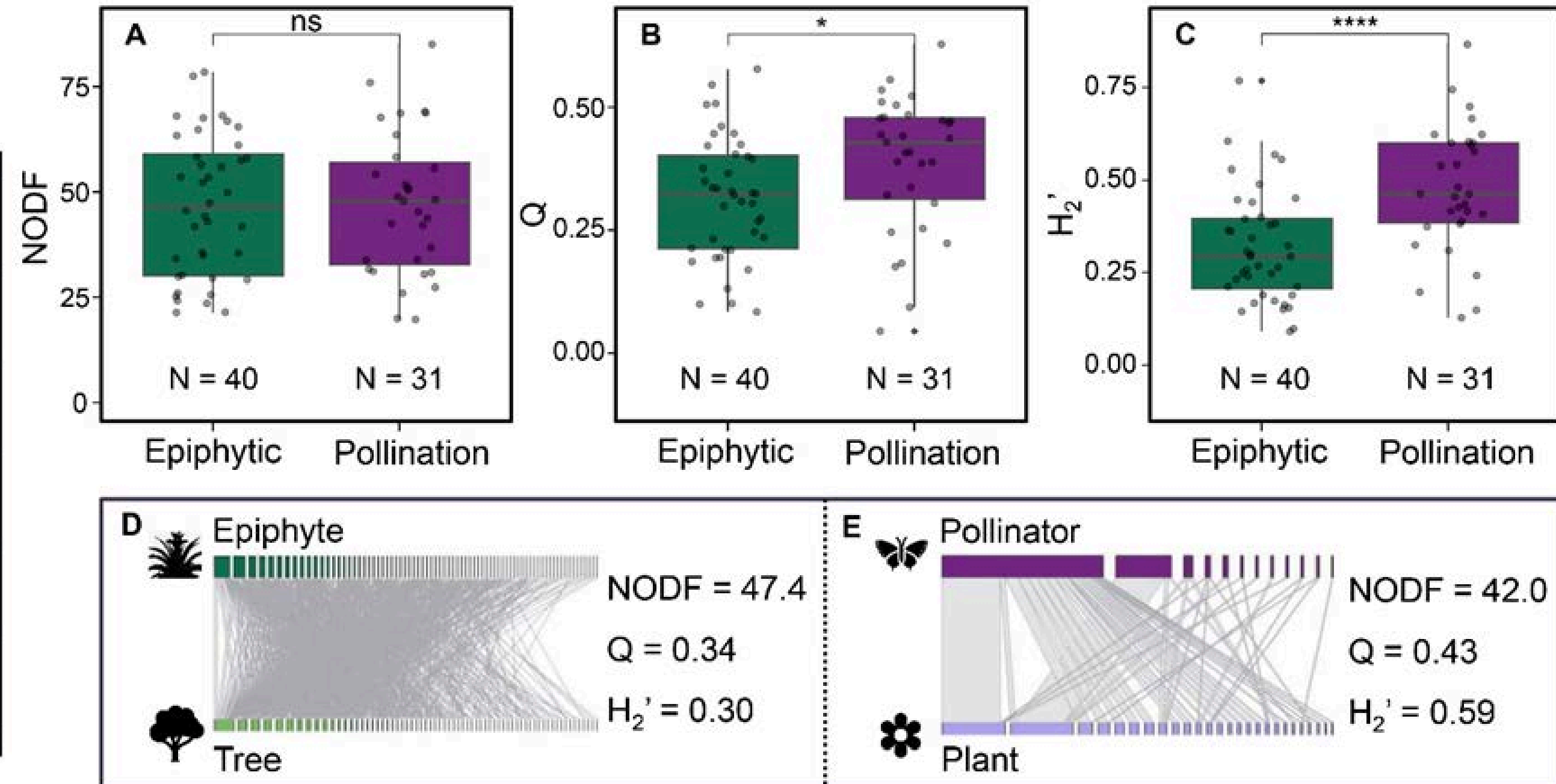
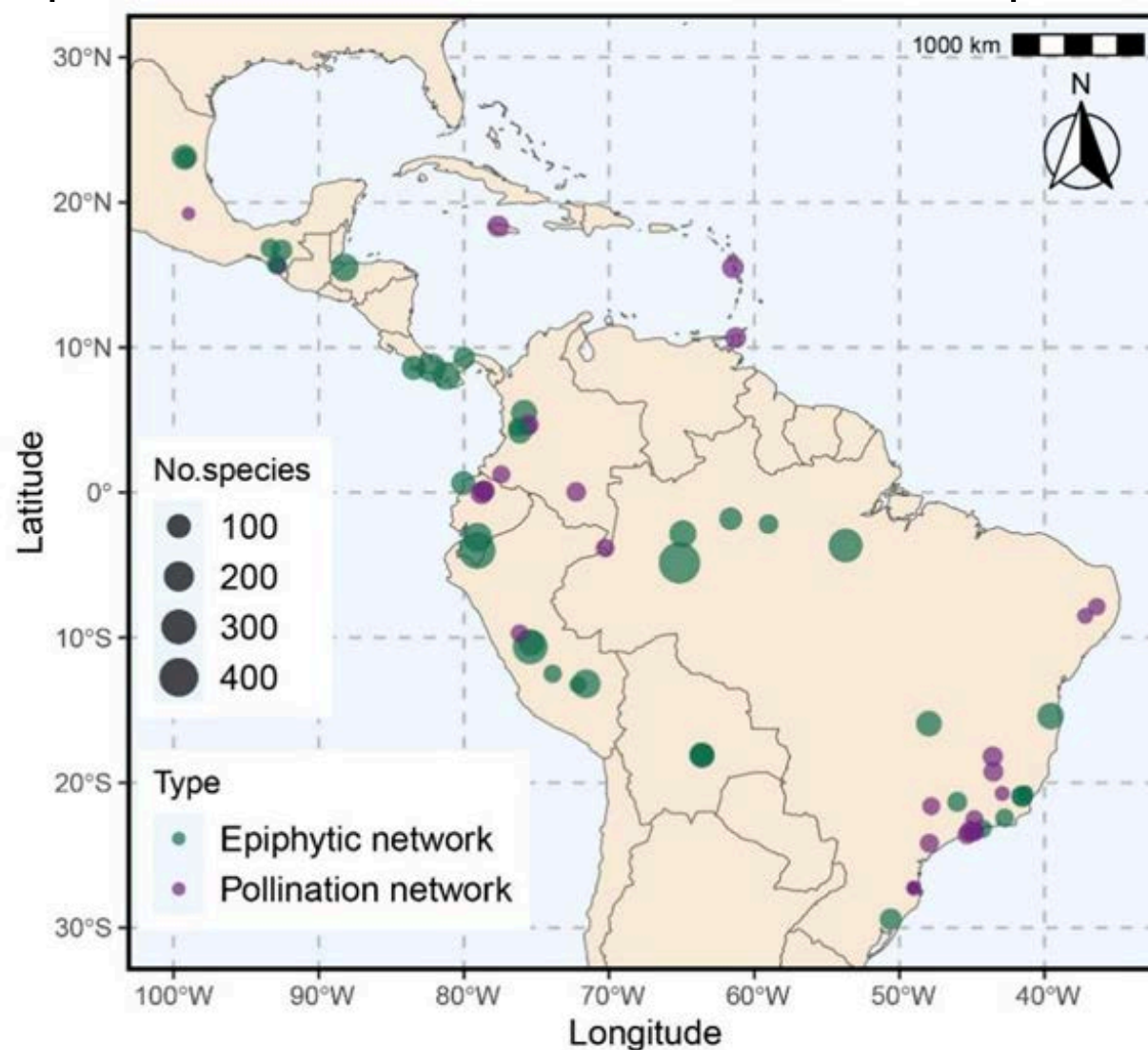
Epiphyte-Host Networks (?)

Phylogenetic diversity & structure host-epiphyte interactions



3 Epiphyte-Host Networks

Structural differences of epiphytic and pollination networks in the Neotropics.

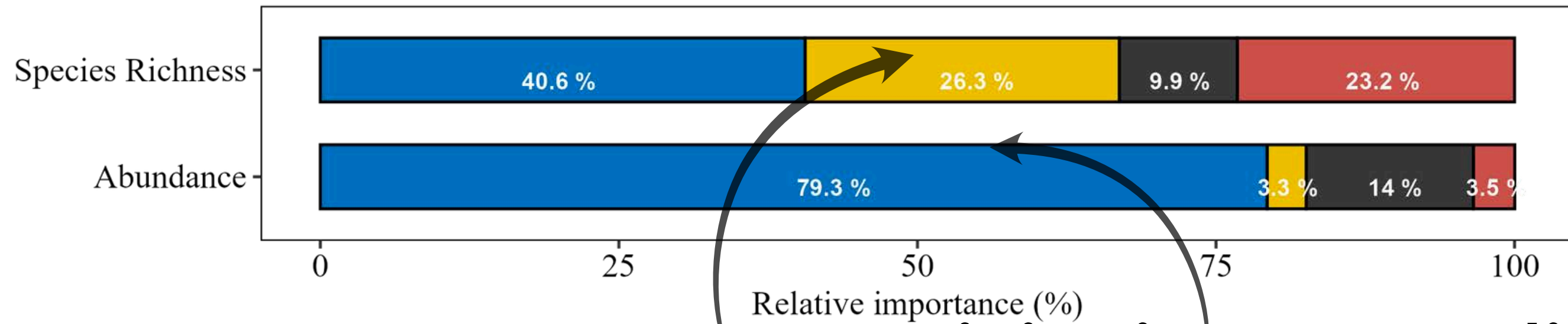


Structural stability of mutualistic systems
and **commensalistic**.



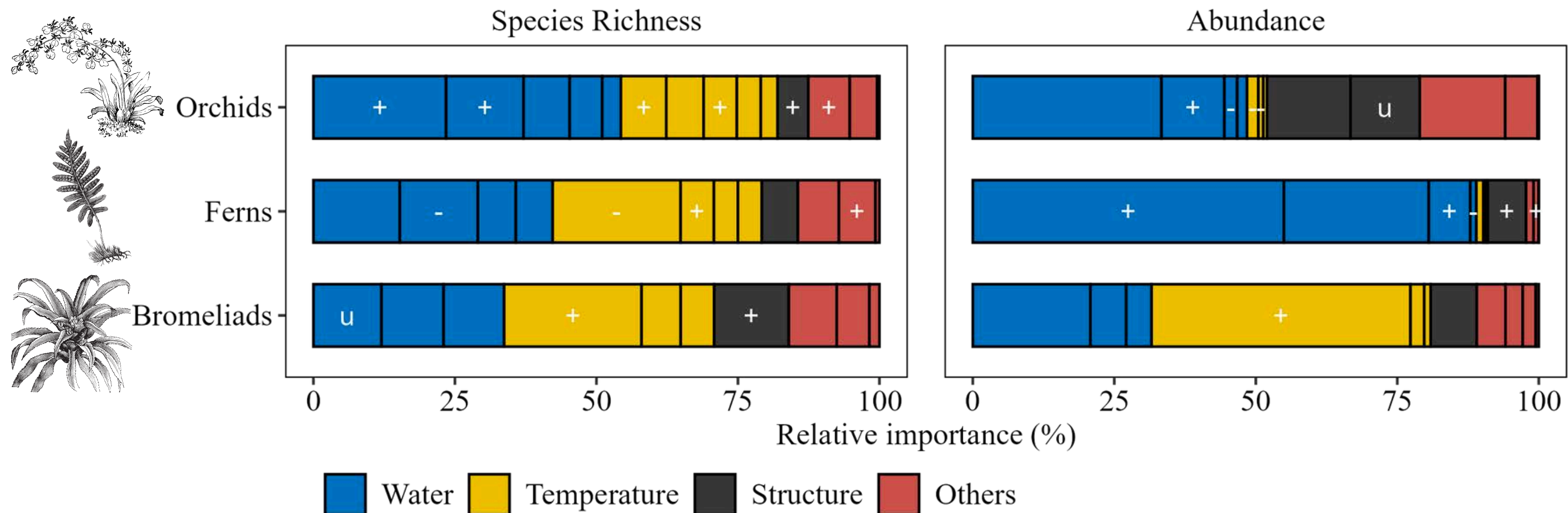
3 Neotropical epiphyte diversity

a. Drivers by facet



temperature & precipitation seasonality

b. Drivers by taxonomic group

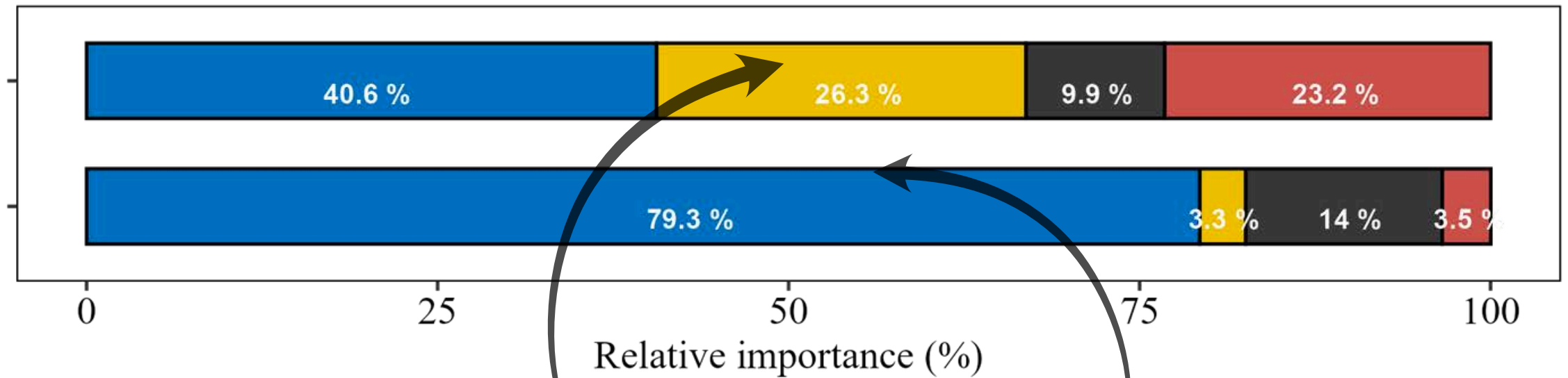


3 Neotropical epiphyte diversity



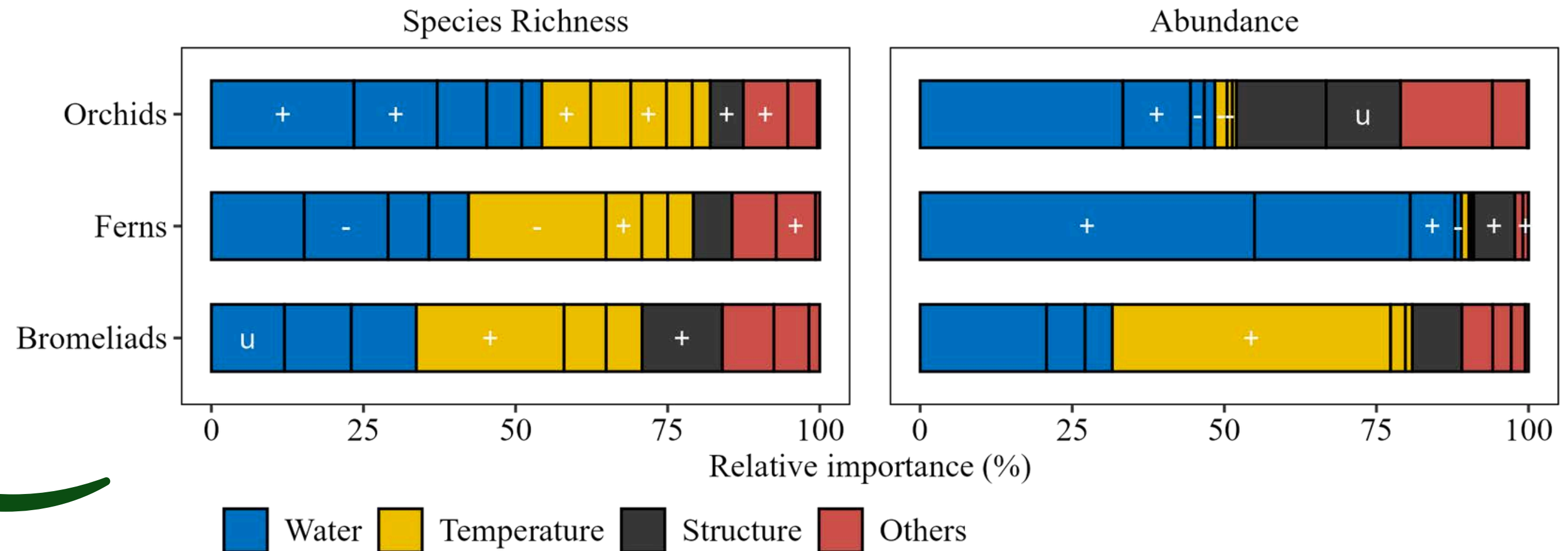
Species Richness

Abundance



temperature & precipitation seasonality

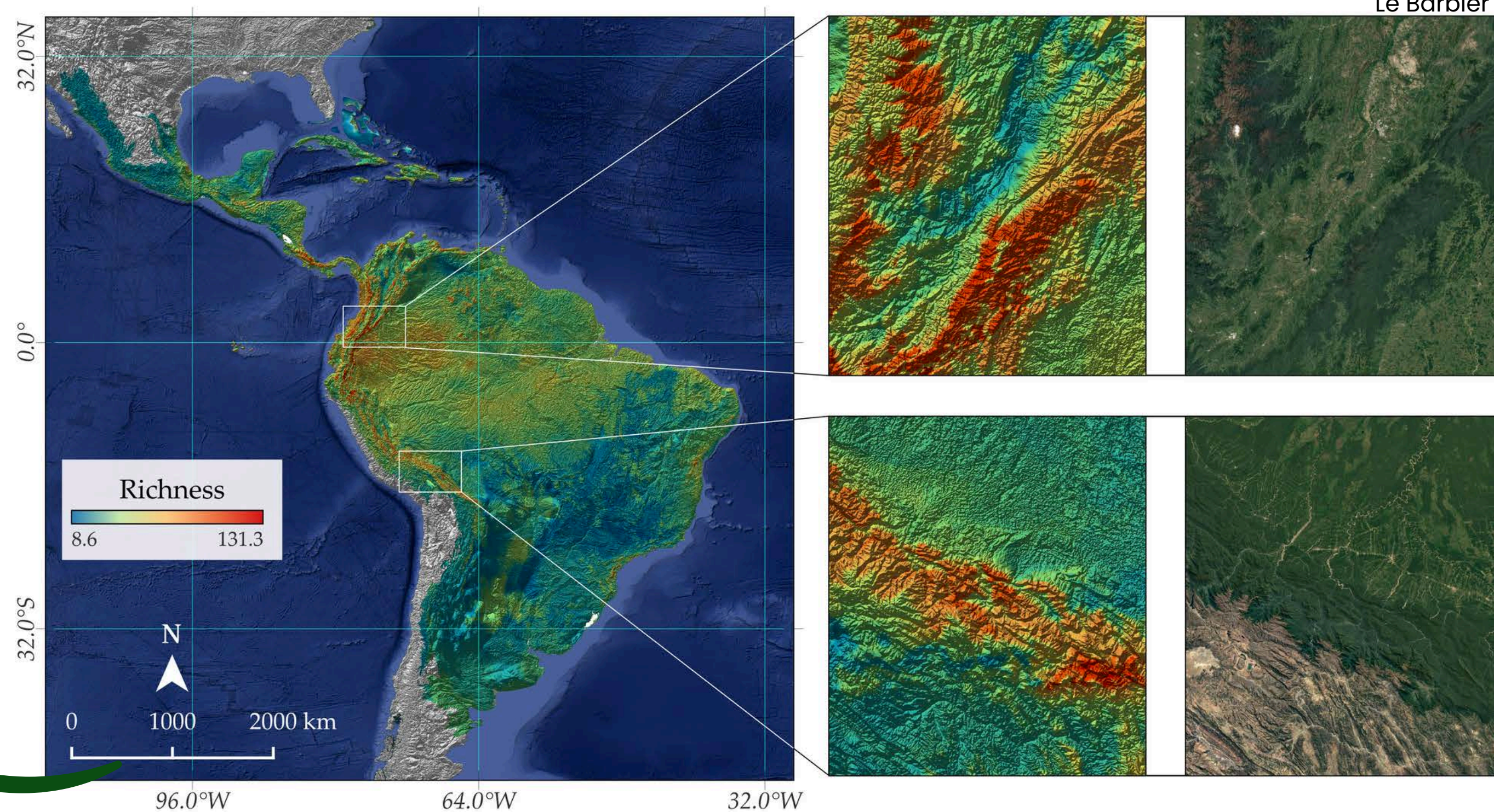
b. Drivers by taxonomic group



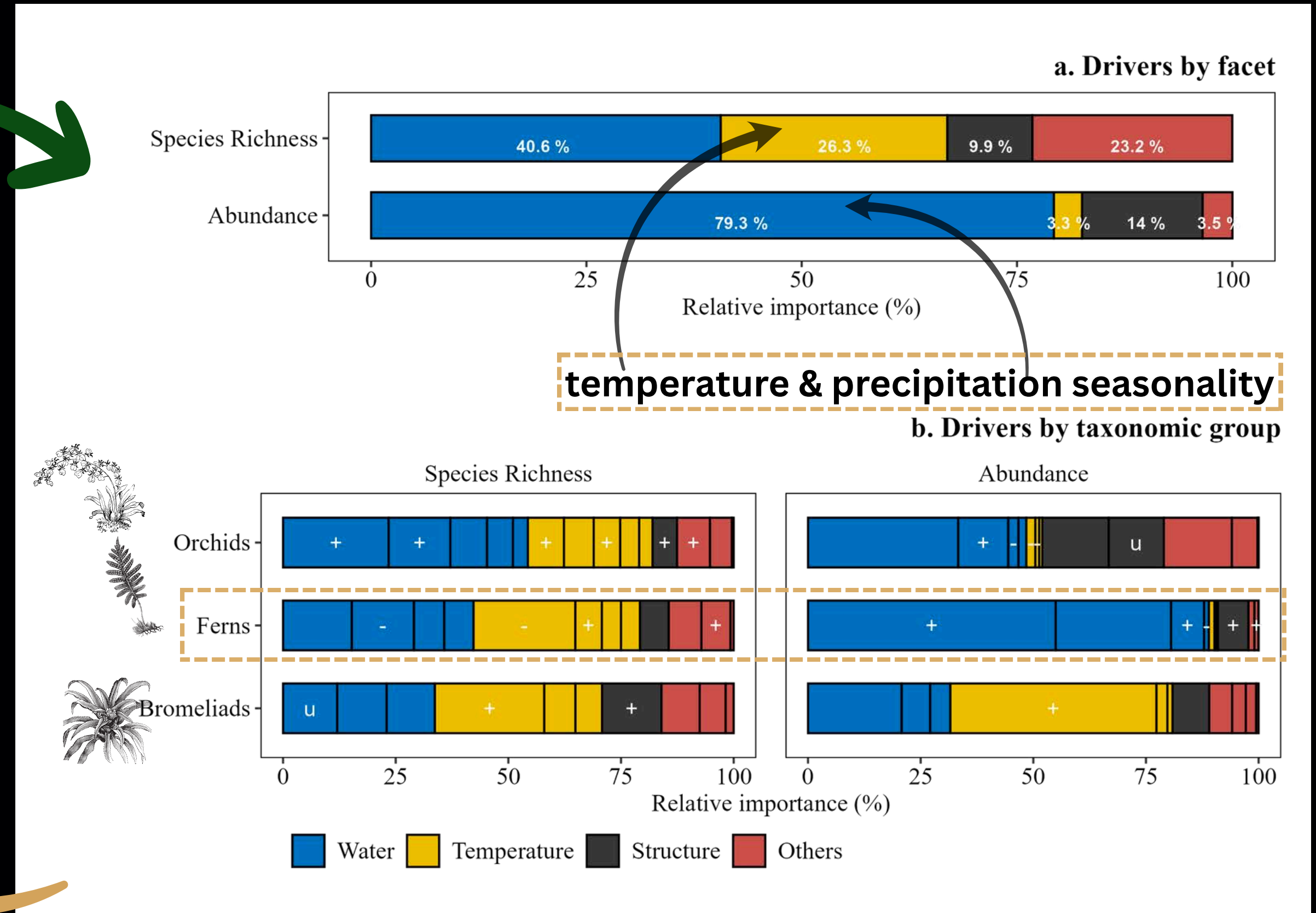
3 Neotropical epiphyte diversity



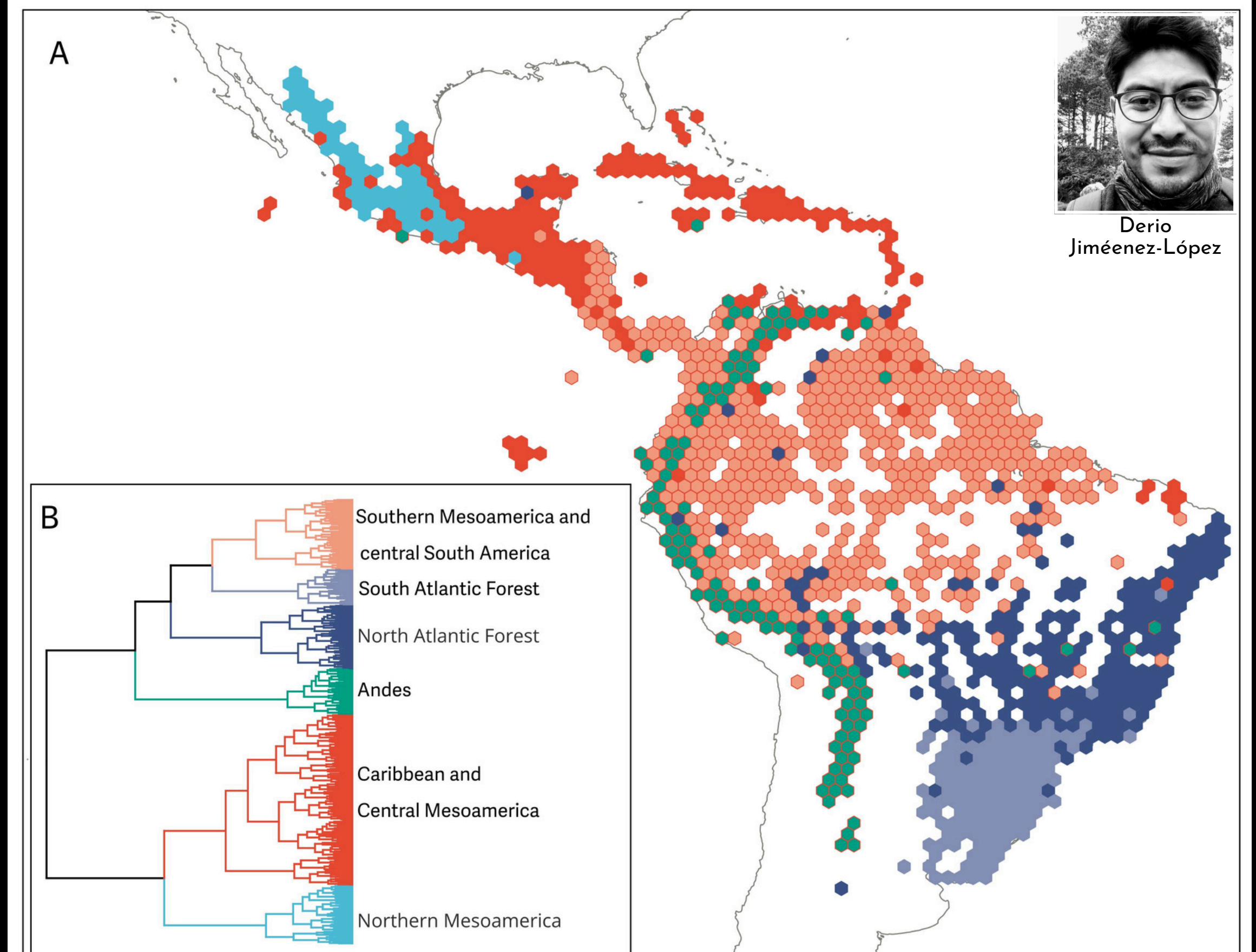
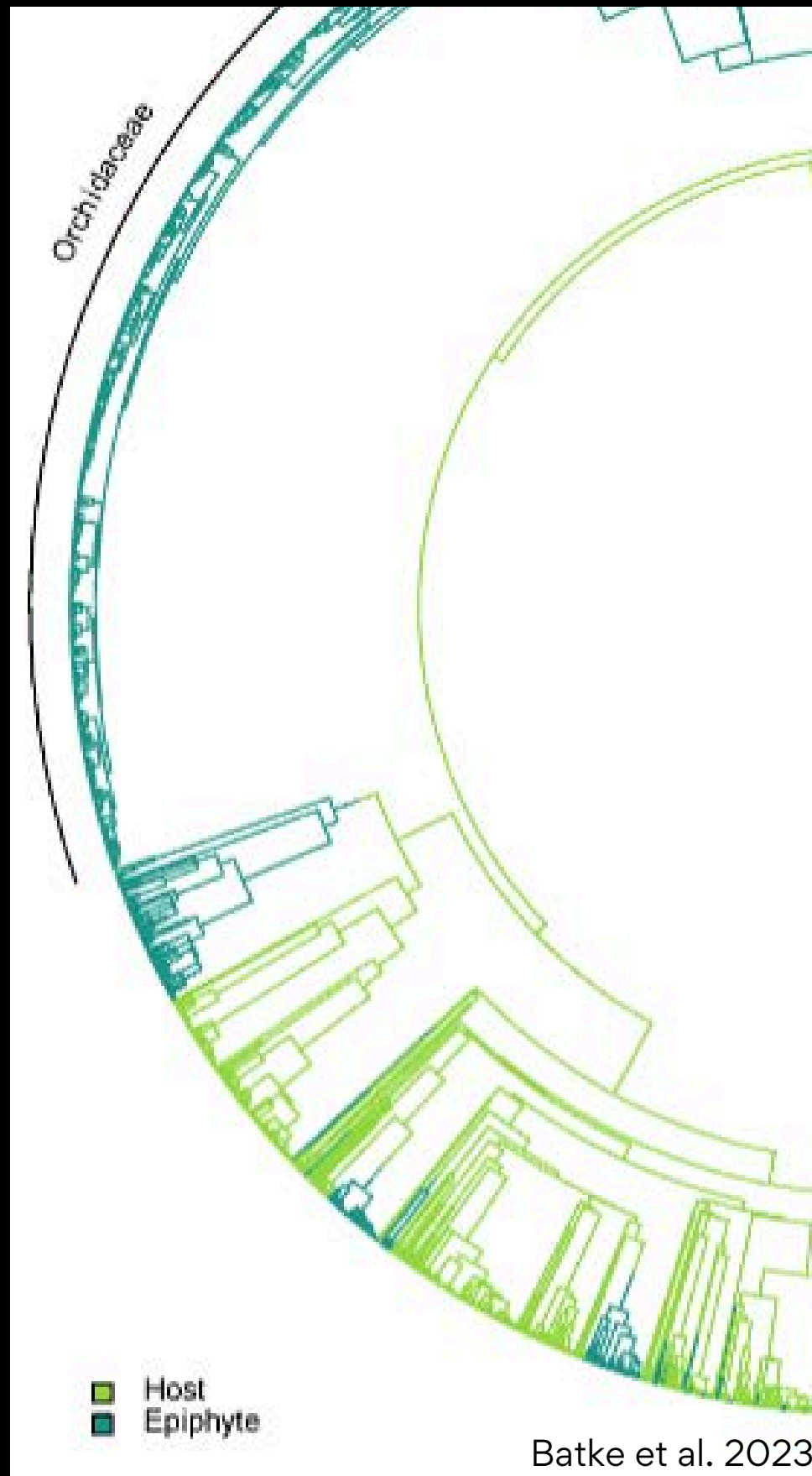
Jorge González
Le Barbier



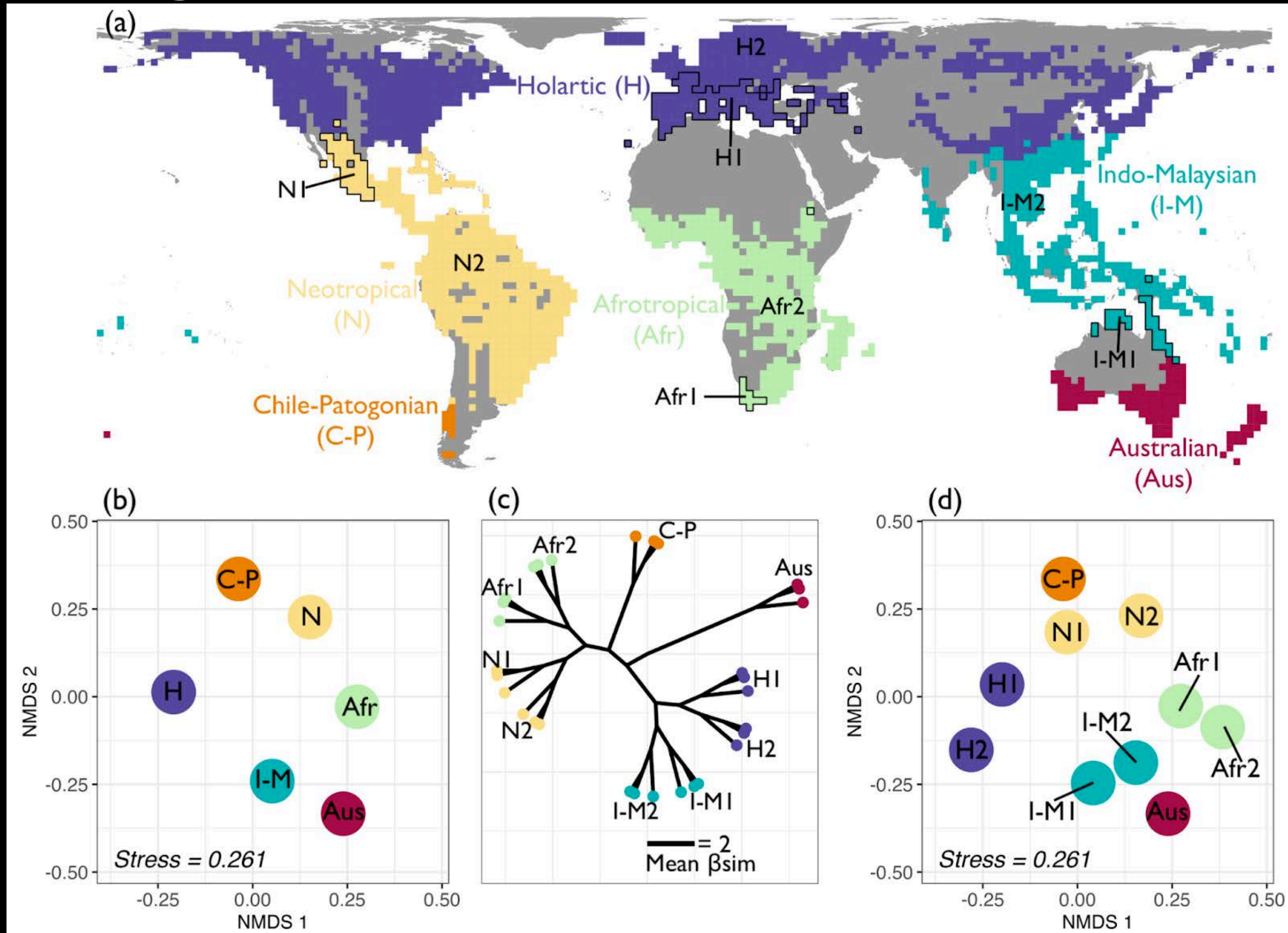
3 NEXT STEPS



3 Bioregionalization



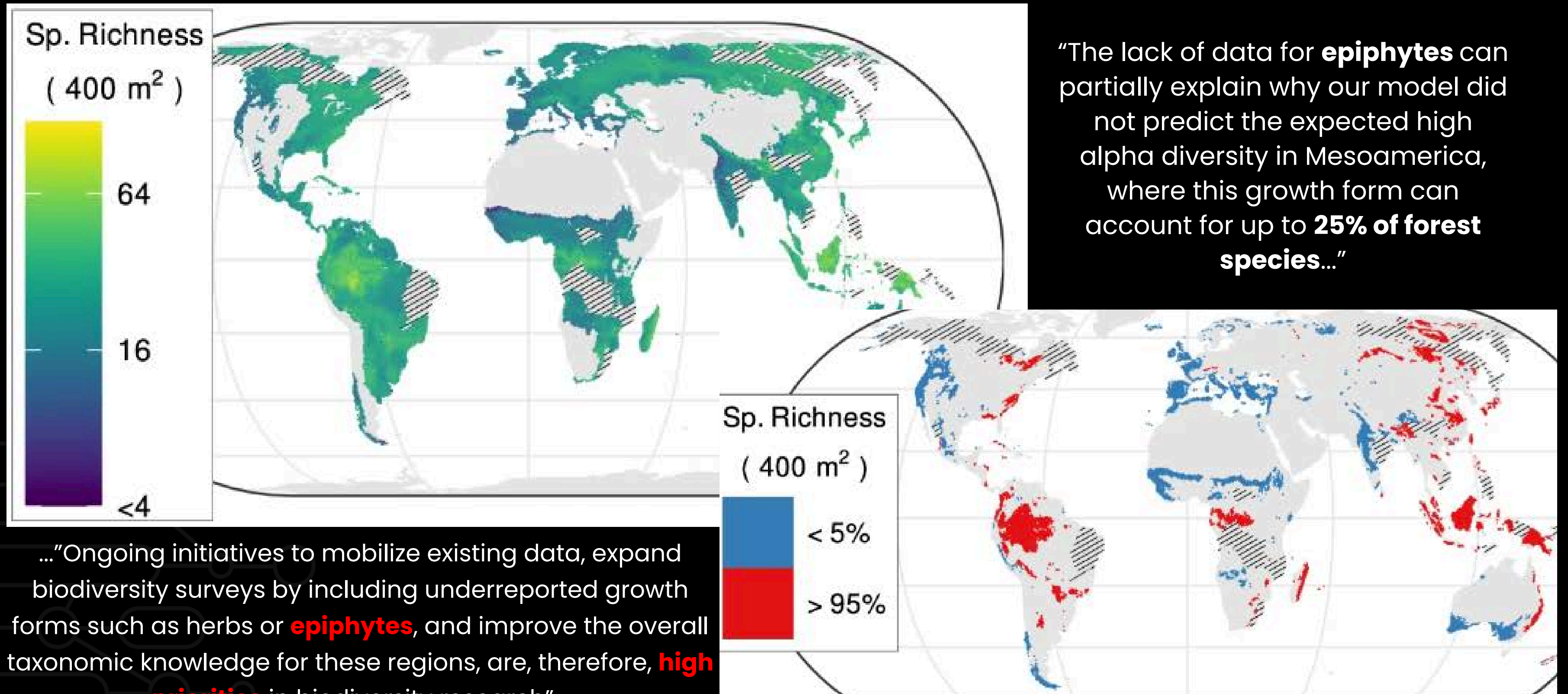
3 Bioregionalization



Global patterns of vascular plant alpha diversity

in forests

Sabatini et al 2022. Global patterns of vascular plant alpha diversity. Nat Commun.



...“Ongoing initiatives to mobilize existing data, expand biodiversity surveys by including underreported growth forms such as herbs or **epiphytes**, and improve the overall taxonomic knowledge for these regions, are, therefore, **high priorities** in biodiversity research”...

Thanks! Gracias! Obrigada! Danke! 謝謝!

Epiphyte Inventory Group



**Maria Judith
Carmona-Higuera**
Philipps-Universität
Marburg

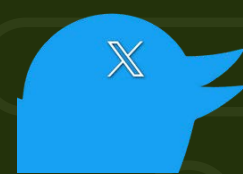


Ángela Melgar Vilchez
EpIG

**Derio Antonio
Jiménez-López**
Ecosur, Mexico



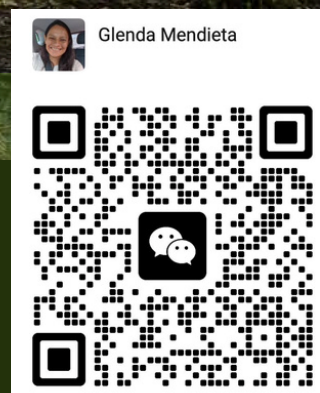
- Borja Jiménez-Alfaro, University of Oviedo/IMIB, Spain.
- Flavio Nunes, University of Alfenas, Brasil.
- Thorsten Kroemer, University of Veracruz, Mexico.
- Gerhard Zotz, University of Oldenburg, Germany.
- Ana Maria Benavides, Botanical Garden of Medellin, Colombia.
- Michael Kessler, University of Zurich, Switzerland.
- André L. de Gasper, Regional University of Blumenau, Brasil.
- Alexander Zizka, University of Marburg, Germany.



@gmendietal

@EpigGroup

glendamendieta@gmail.com



DFG

Deutsche
Forschungsgemeinschaft

Philipps



Universität
Marburg

! FURTHER COLLABORATIONS

epigdatabase.org

