

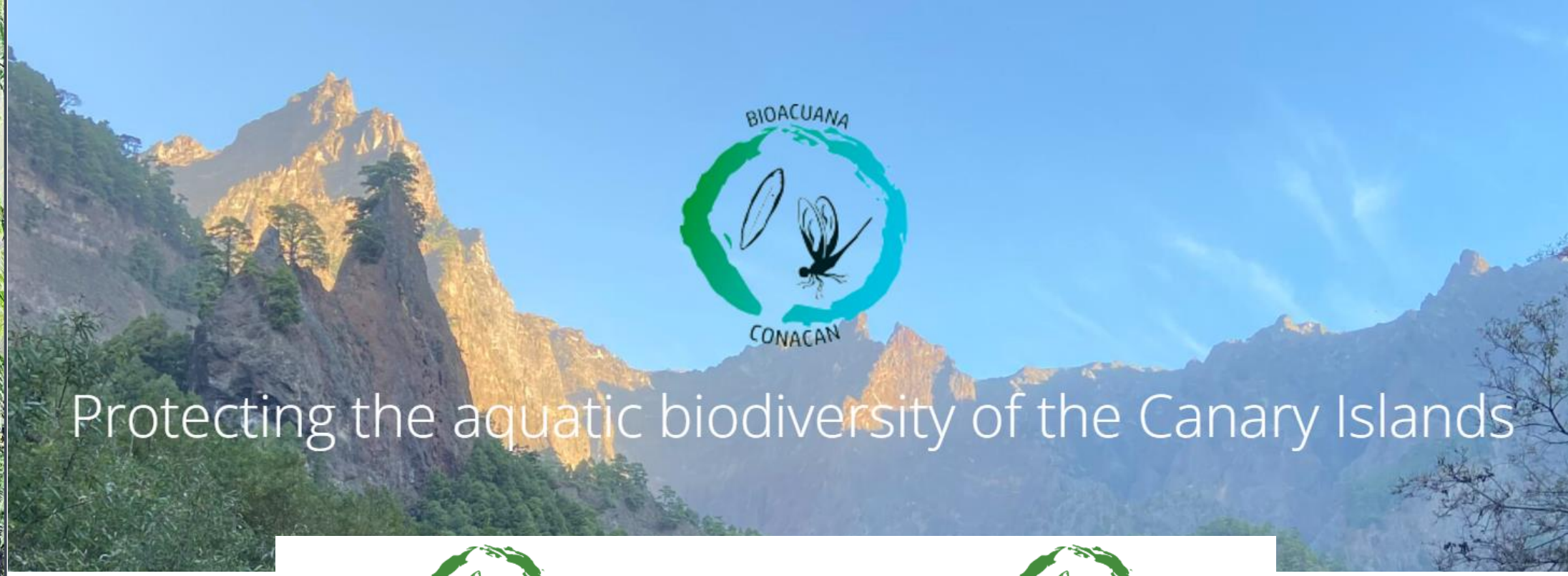
Assessing stream diatom communities in the Canary Islands: insights and preliminary results

Paula Mendoza, Xavier Benito, Rosa Trobajo, David Mann, Núria Cid, Raúl Acosta, José María Fernández-Calero, Jérôme Latron, Pilar Llorens, Francesc Gallart, Carles Alcaraz, Brent Emerson, Paula Arribas, Maria Soria, Núria Bonada, Pau Fortuño, Marcos González, Belinda Gallardo, Virgilio Hermoso & Miguel Cañedo-Argüelles.

FEHM lab RESEARCH GROUP
Freshwater Ecology, Hydrology & Management

IRTA Institute of Agrifood Research and Technology

UNIVERSITAT ROVIRA i VIRGILI



Protecting the aquatic biodiversity of the Canary Islands

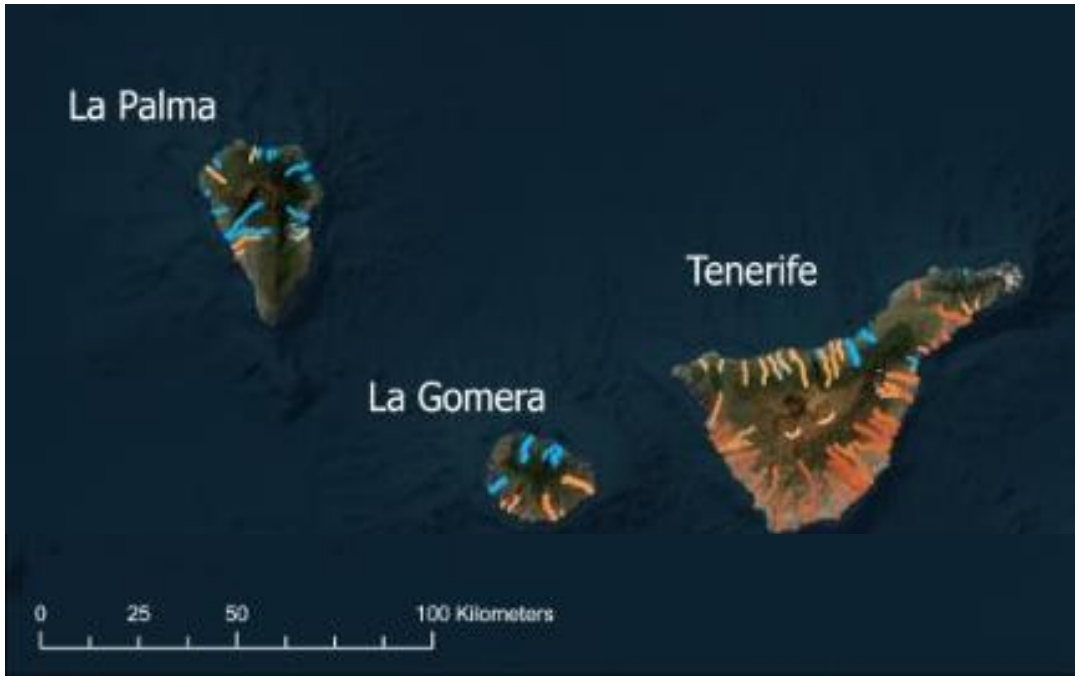
PROJECT 1: **BIOACUANA**

Distribution and vulnerability to climate change of the aquatic macroinvertebrates (+ diatoms)

PROJECT 2: **CONACAN**

Freshwater biodiversity conservation in National Parks in a context of water scarcity and invasive species

Source: https://conacuana.es/



Probability of flow intermittence

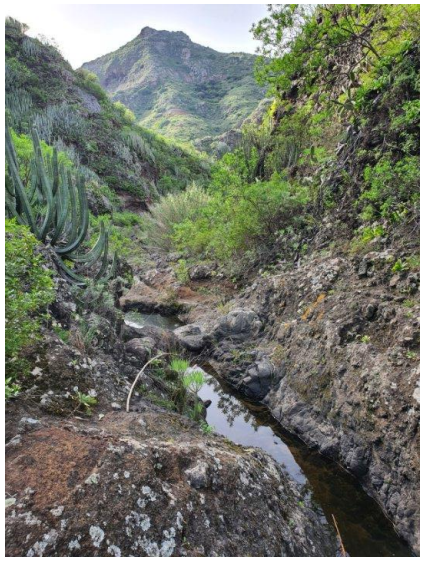
Non-perennial — Perennial

1.00 0.75 0.50 0.25 0

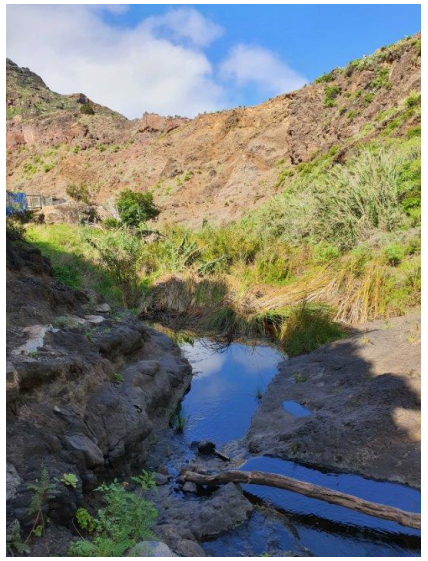
Santamarta, (2013)

Source:
https://conacuana.es/

Barranco de Igueste (Tenerife)



Barranco de Afur (Tenerife)



Barranco de Sobreagulo (La Gomera)







NOVEMBER 2022 — 1

2 — MAY 2023

NOVEMBER 2023 — 3

Source:
https://conacuana.es/

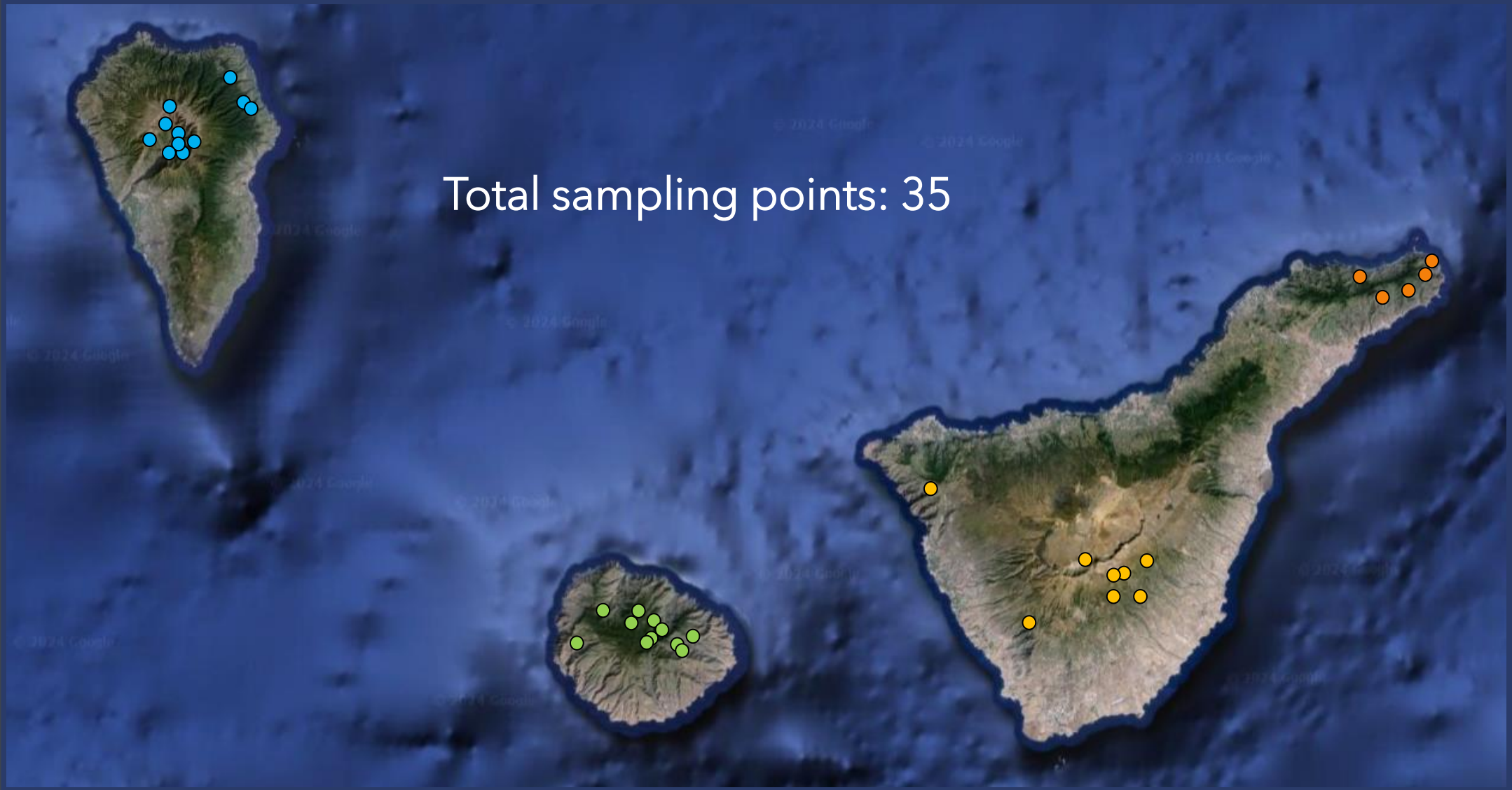


NOVEMBER 2022 — 1

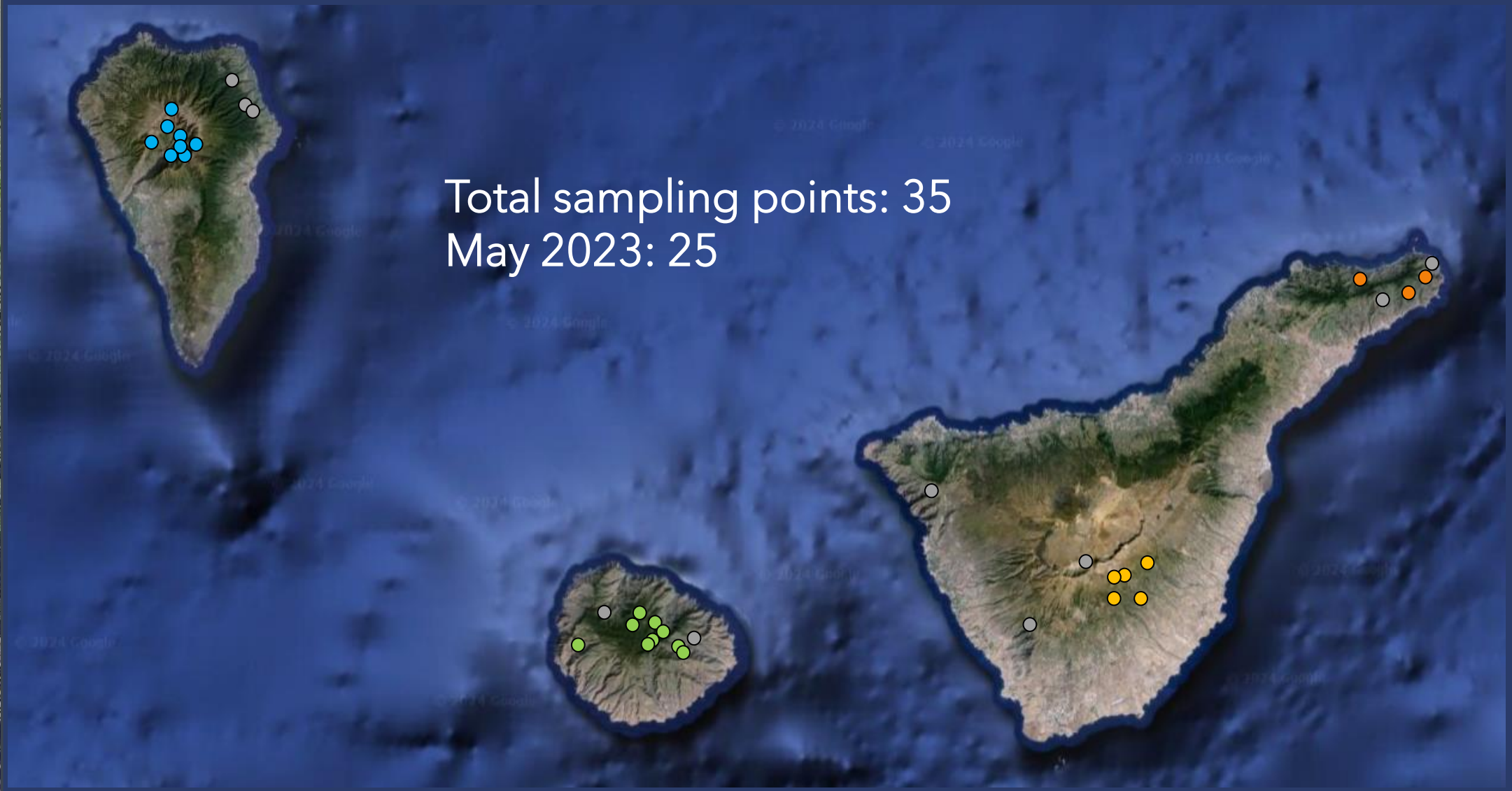
2 MAY 2023

NOVEMBER 2023 — 3

Source:
https://conacuana.es/

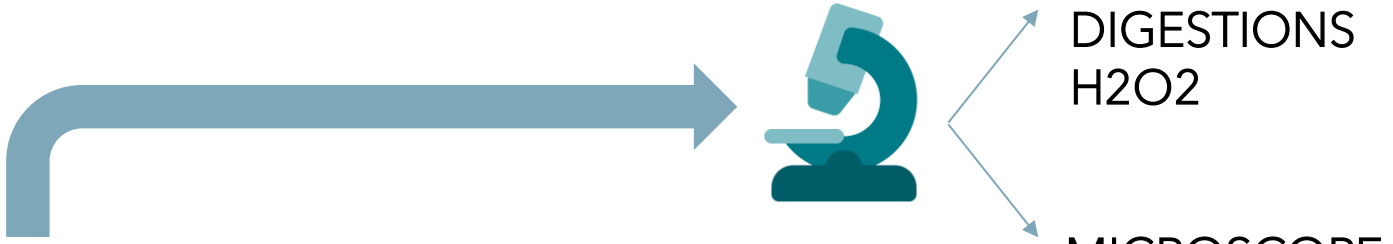


Sources:
1. https://earth.google.com/web
2. https://conacuana.es/



Sources:
1. https://earth.google.com/web
2. https://conacuana.es/

Morphology - LM



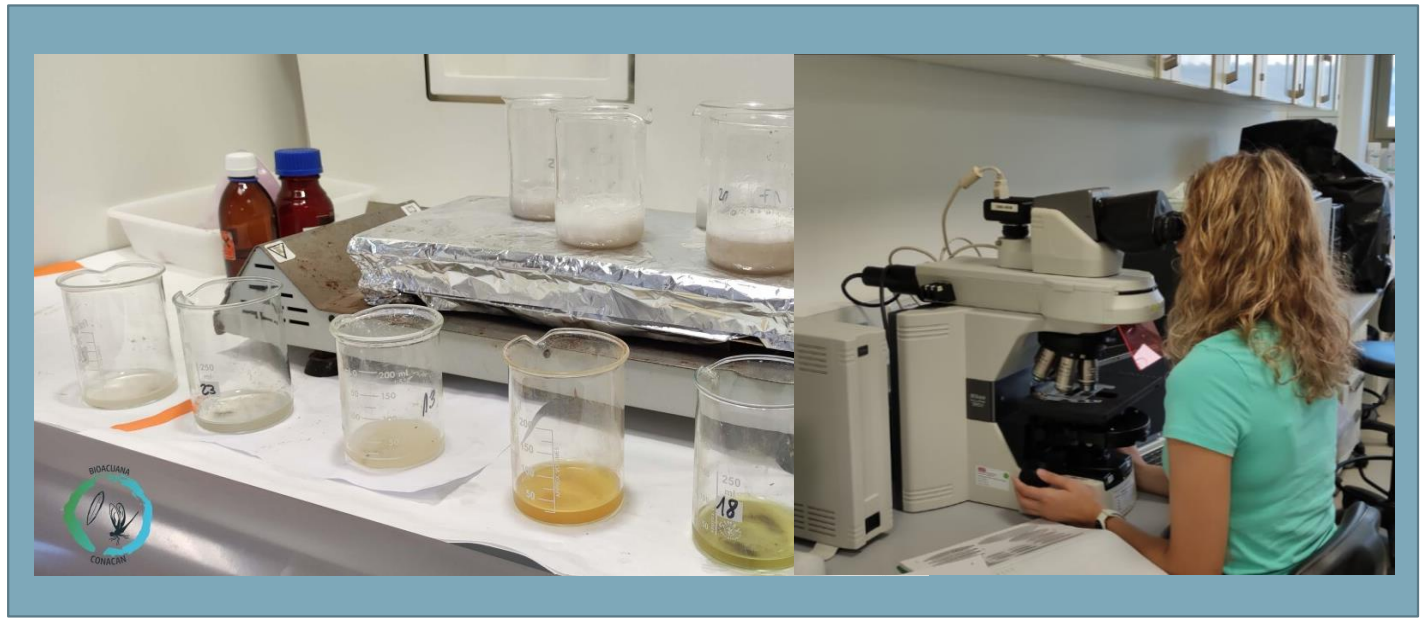


Morphology - LM

DIGESTIONS
H2O2

MICROSCOPE
x100





Morphology - LM

DIGESTIONS
H2O2

MICROSCOPE
x100



DNA metabarcoding

DIAT.BARCODE
version 11

rbcl

DADA2

Morphology - LM

DIGESTIONS
H2O2

MICROSCOPE
x100



DNA
metabarcoding

DIAT.BARCODE
version 11

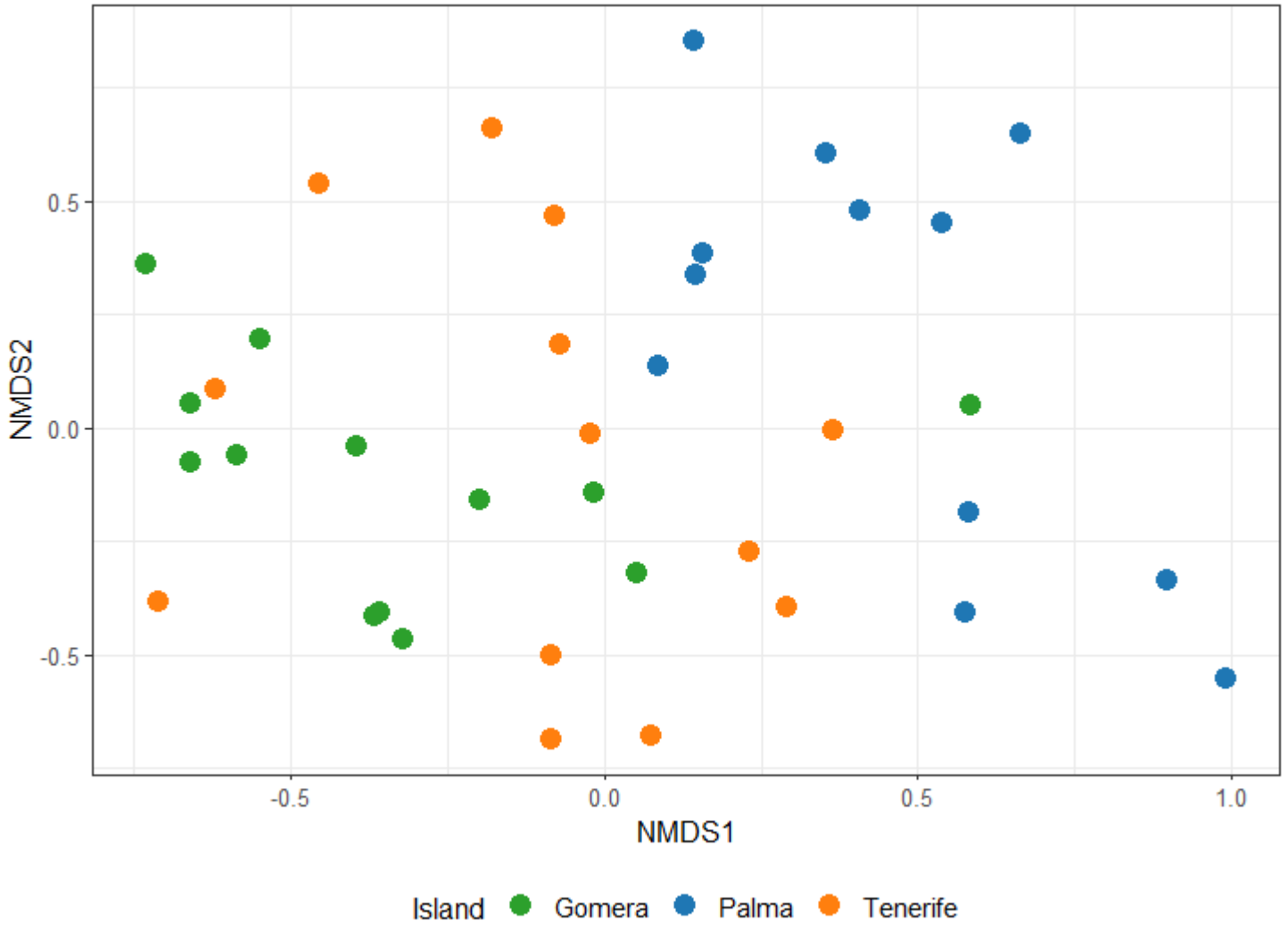
rbcl

DADA2

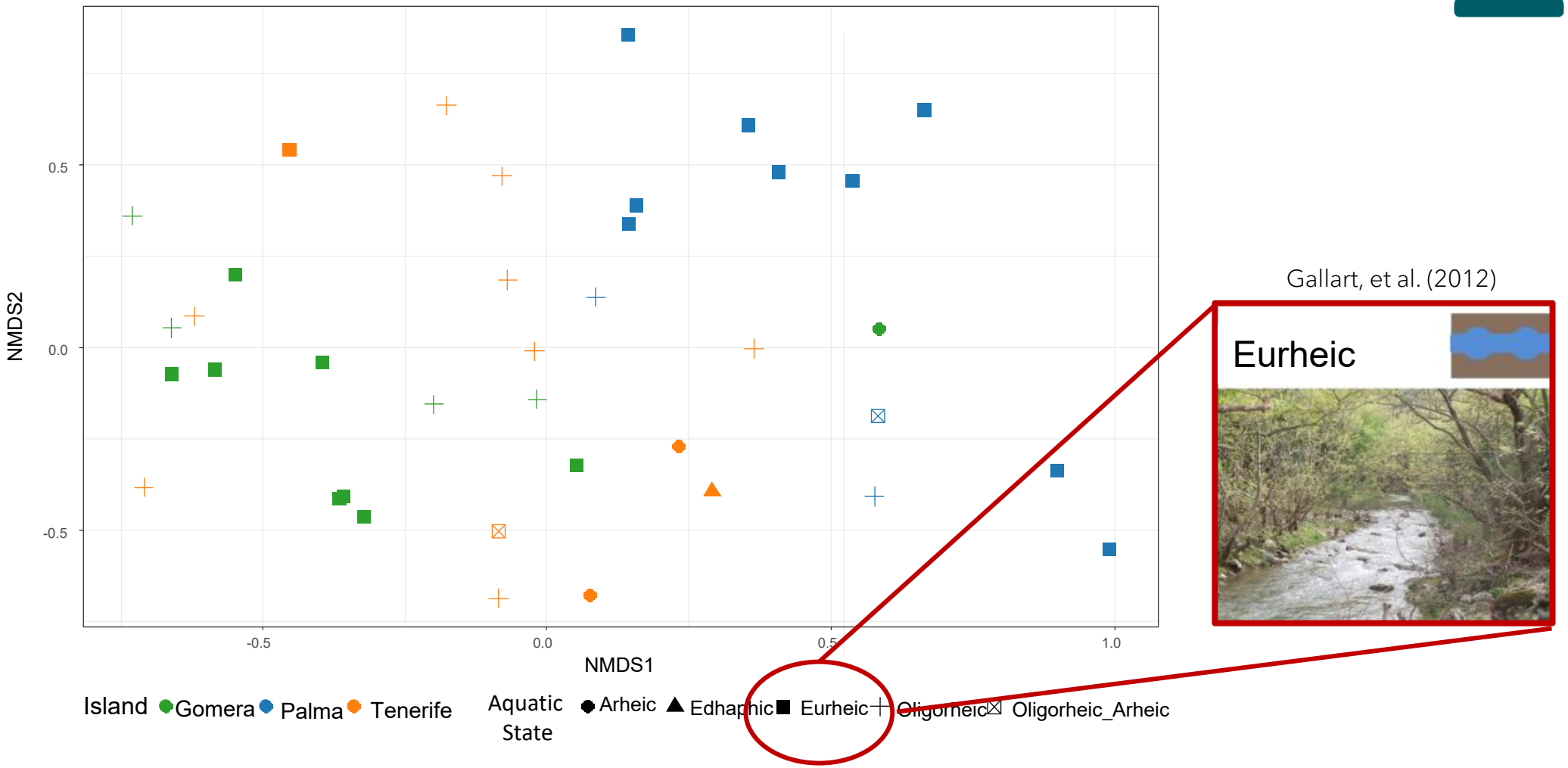
Statistical analyses

- PCA
- NMDS

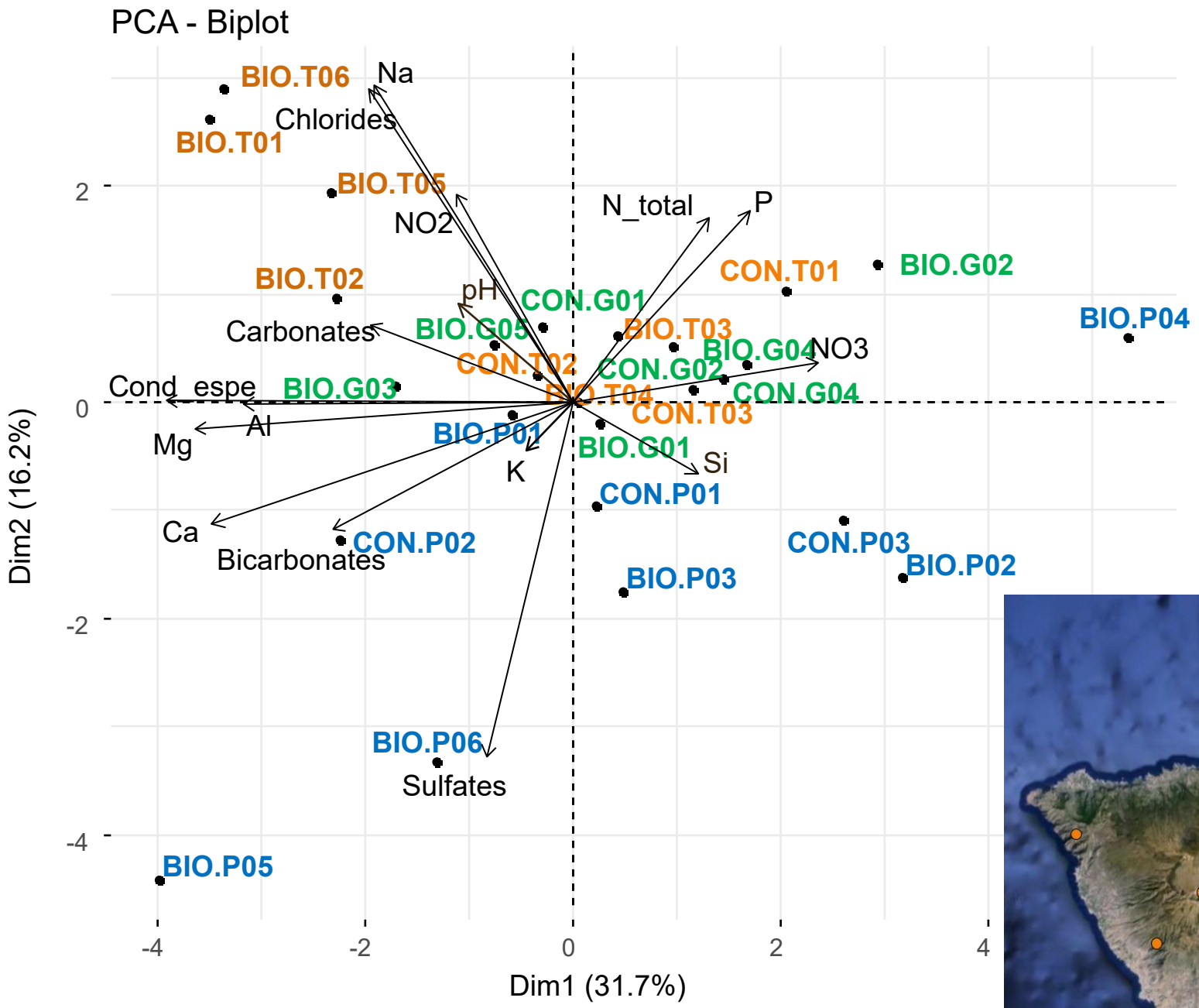
Diatom community

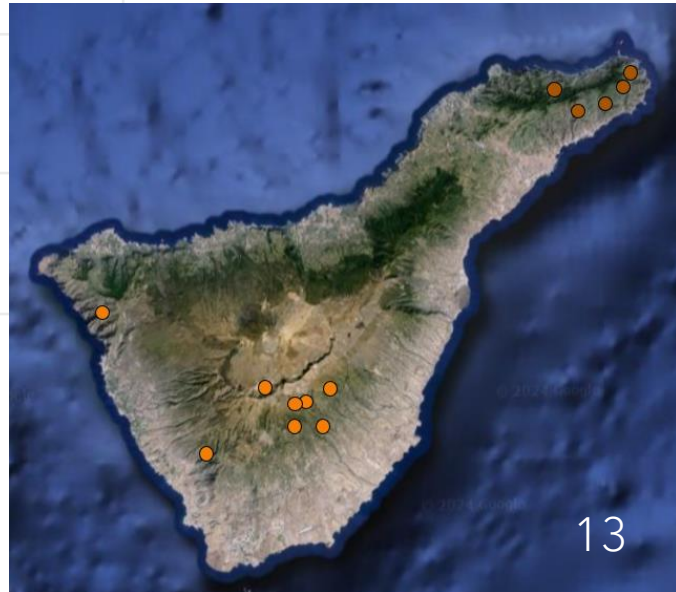


Diatom community + aquatic state



Gallart, et al. (2012)


PCA - Biplot
BIO.T06
Na
Chlorides
BIO.T01
BIO.T05
NO2
N_total
P
BIO.T02
pH
CON.G01
CON.T01
BIO.G02
BIO.P04
Carbonates
BIO.G05
BIO.T03
BIO.G04
NO3
CON.T02
CON.G02
Cond_espe
BIO.G03
BIO.T04
CON.G04
CON.T03
Al
Mg
BIO.P01
BIO.G01
Si
K
CON.P01
Ca
CON.P02
CON.P03
Bicarbonates
BIO.P02
BIO.P03
BIO.P06
Sulfates
BIO.P05
Dim2 (16.2%)
Dim1 (31.7%)
2
0
-2
-4
-4
-2
0
2
4

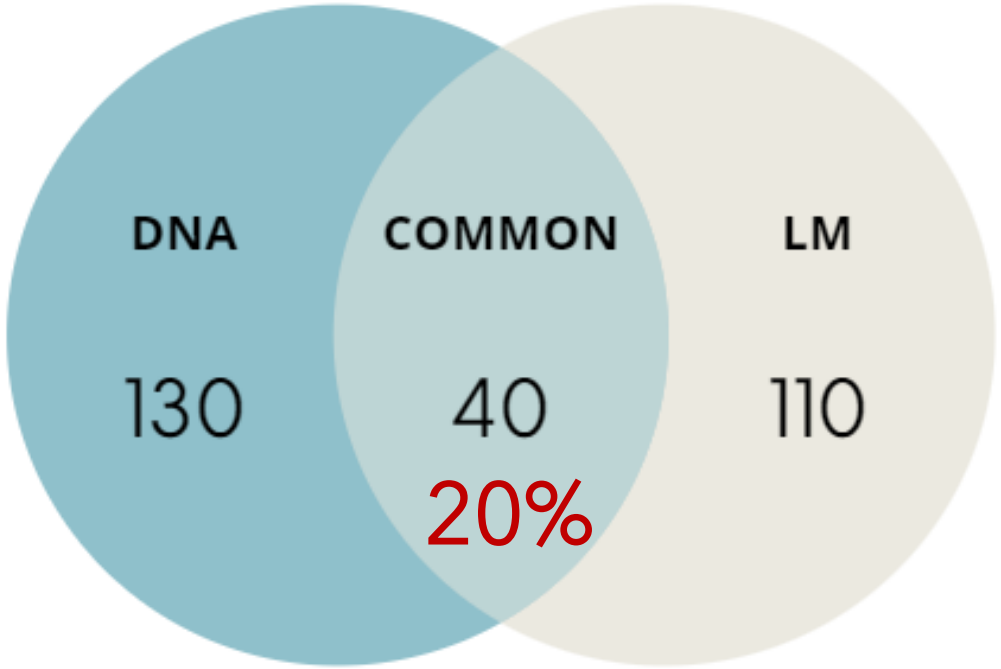


OK, OK, SO....

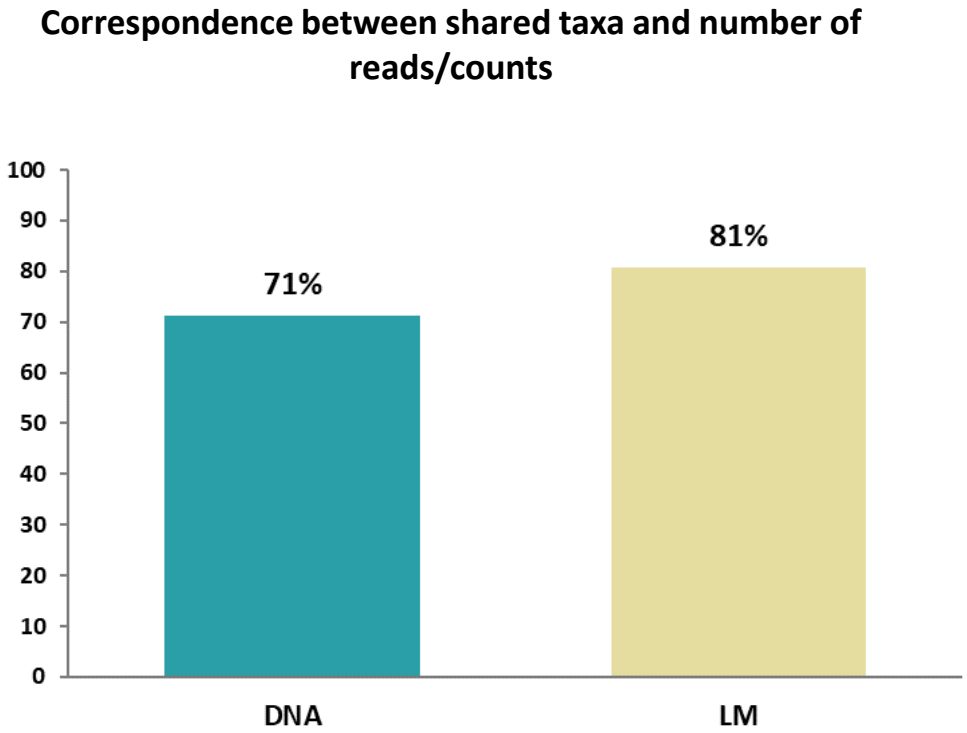
THIS IS A METABARCODING SESSION,

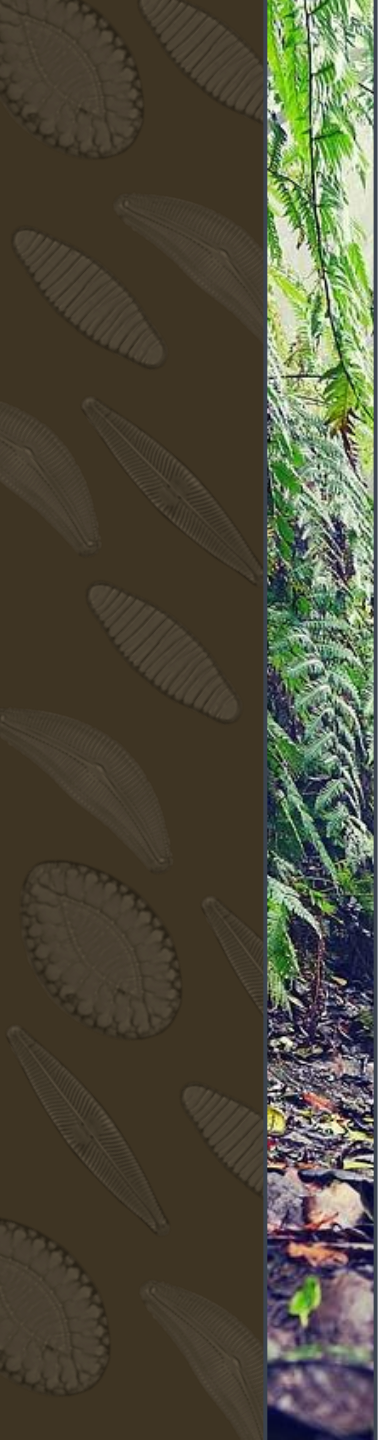


WHERE IS IT??

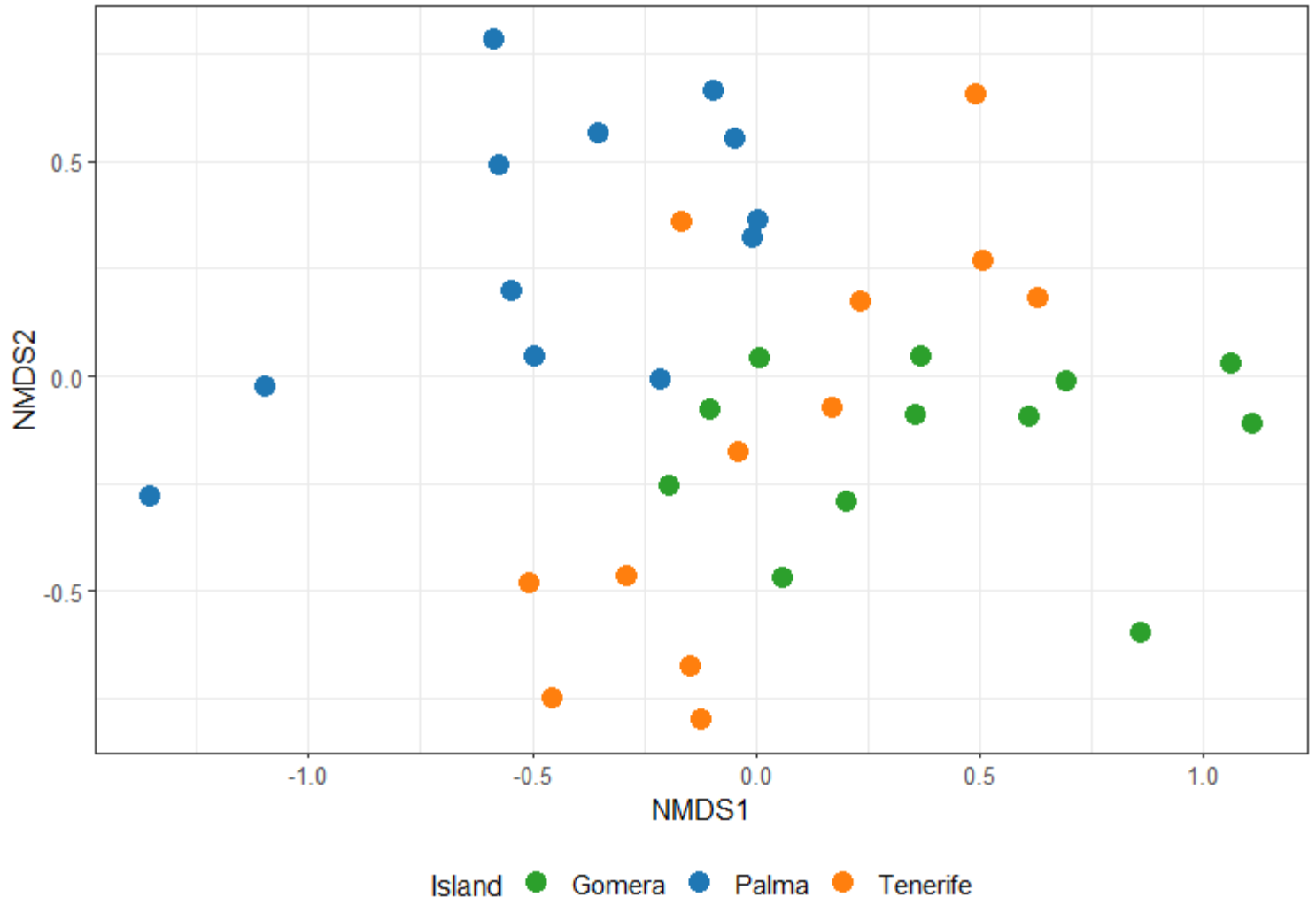


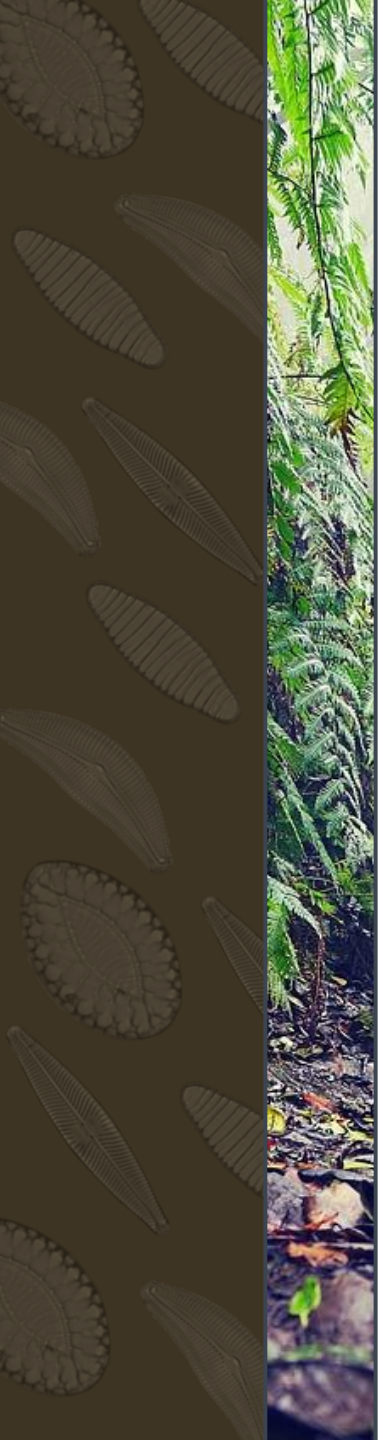
Shared taxa accounted for most of the total valves (morphology) and reads recorded (DNA)





Diatom community (DNA)

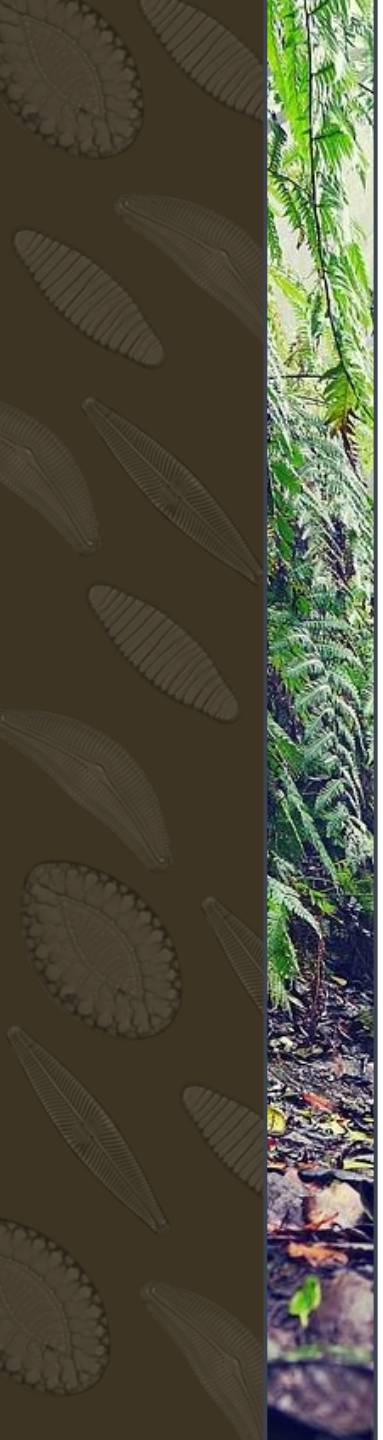




OK, SIMILAR RESULTS SO,

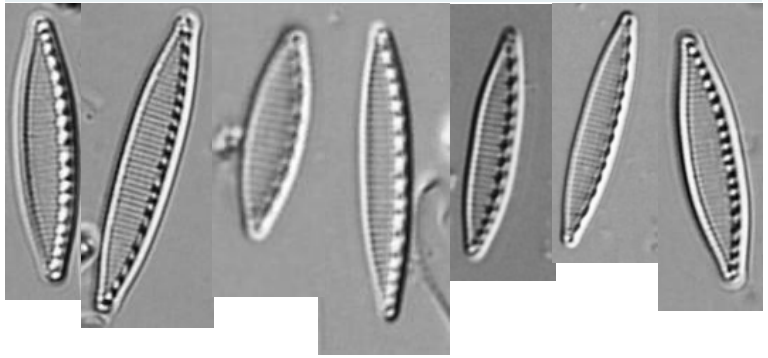
...

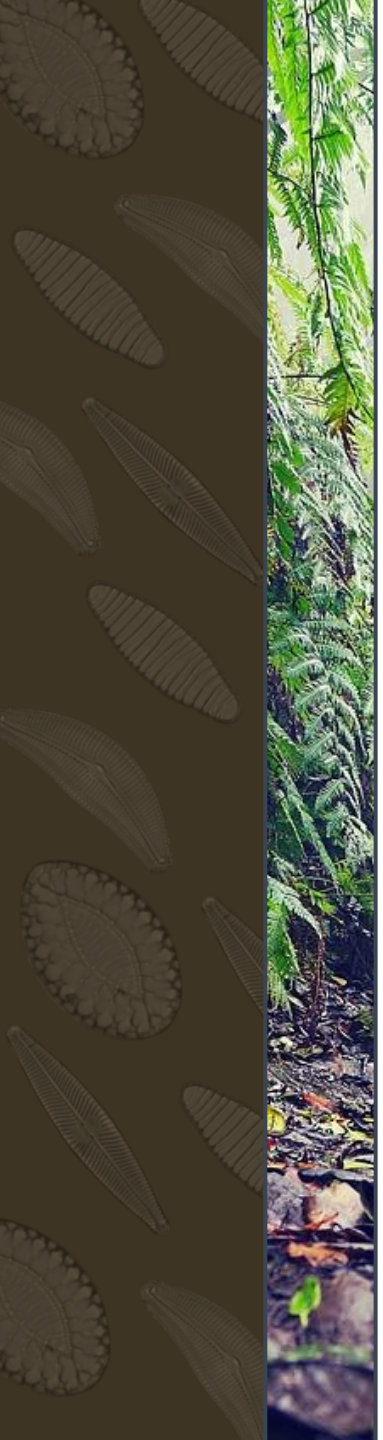
WHAT PROVIDES METABARCODING IN THIS STUDY?



<u>CASE 1:</u> Small Nitzschias

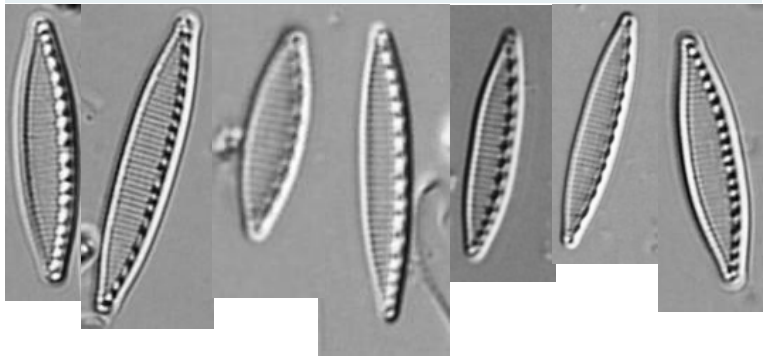
N. costei?? *N. inconspicua*??
Or ??





CASE 1: Small Nitzschias

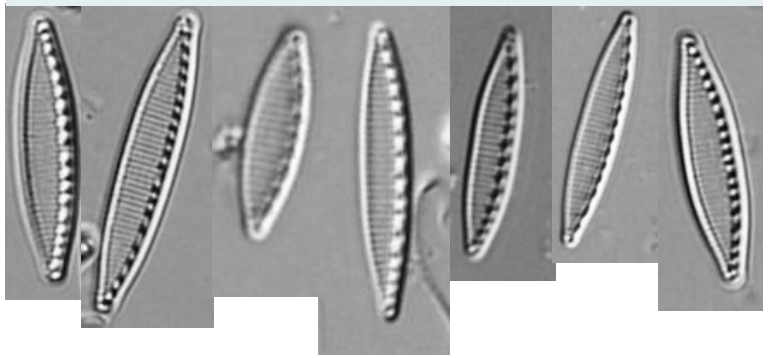
N. costei?? *N. inconspicua*??
Or ??



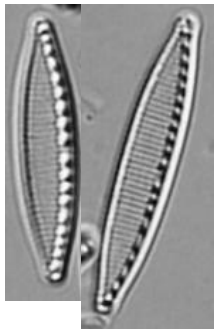
Diat.barcode

<u>CASE 1:</u> Small Nitzschias

N. costei?? *N. inconspicua*??
Or ??



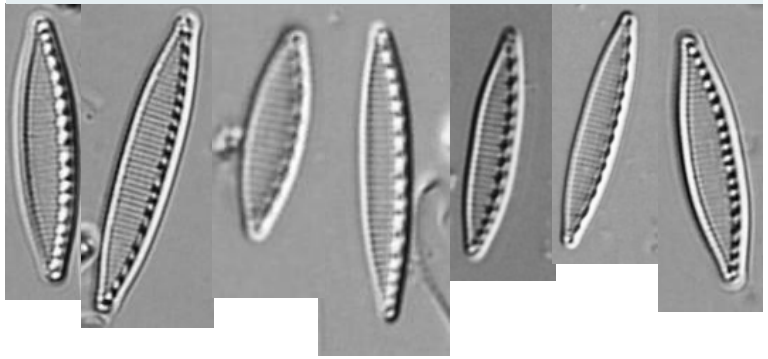






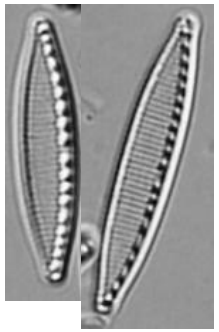
CASE 1: Small Nitzschias

N. costei?? *N. inconspicua*??
Or ??



ASV_7	CGTAACAGCT	263	Nitzschia_costei	100	100

Nitzschia costei



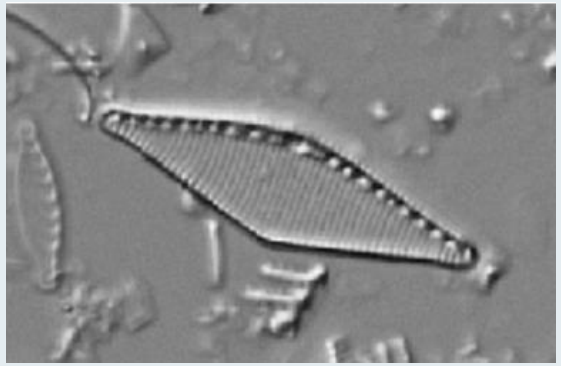


DISTRIBUTION

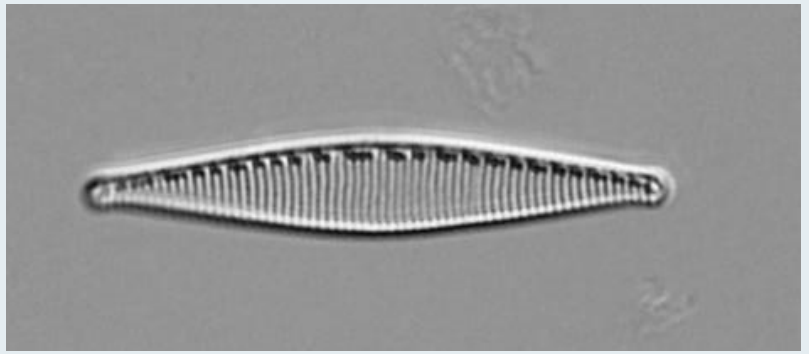
ECOLOGY

CASE 2: The *Nitzschia tenerifa* and *Nitzschia macaronesica*

Nitzschia tenerifa

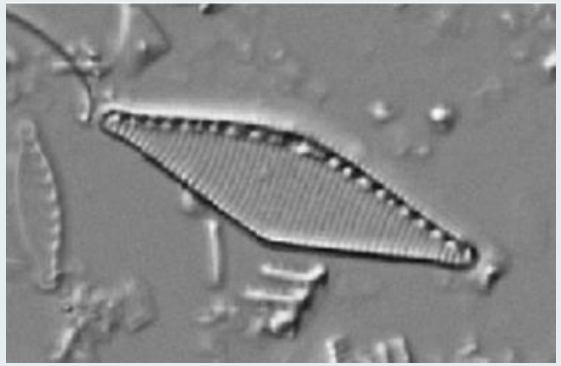


Nitzschia macaronesica

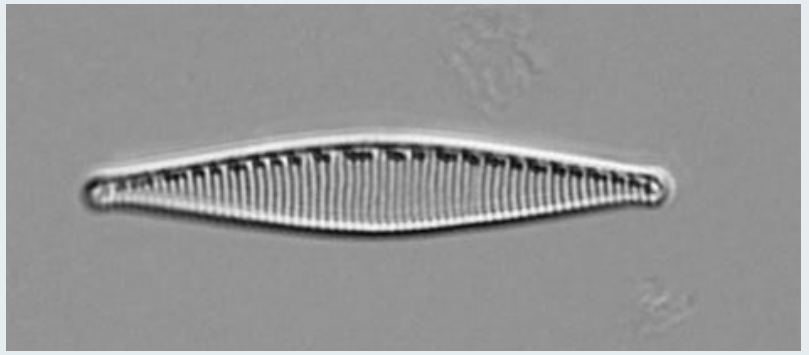


CASE 2: The *Nitzschia tenerifa* and *Nitzschia macaronesica*

Nitzschia tenerifa



Nitzschia macaronesica





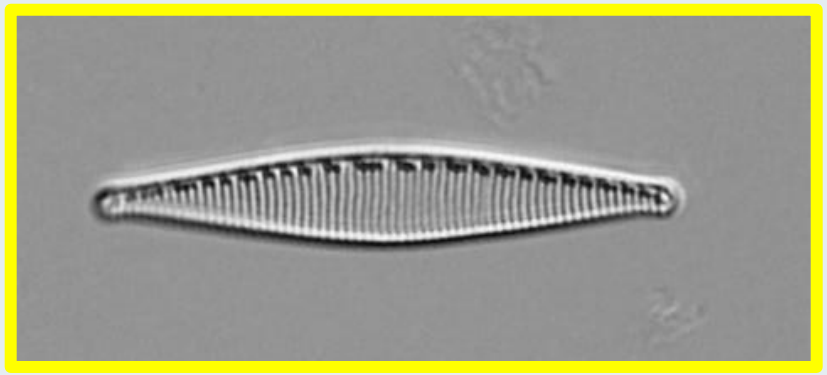
Source: https://www.directoalpaladar.com/libros-de-cocina/pastillas-juanola-recetas-para-sorprender

CASE 2: The *Nitzschia tenerifa* and *Nitzschia macaronesica*

Nitzschia tenerifa

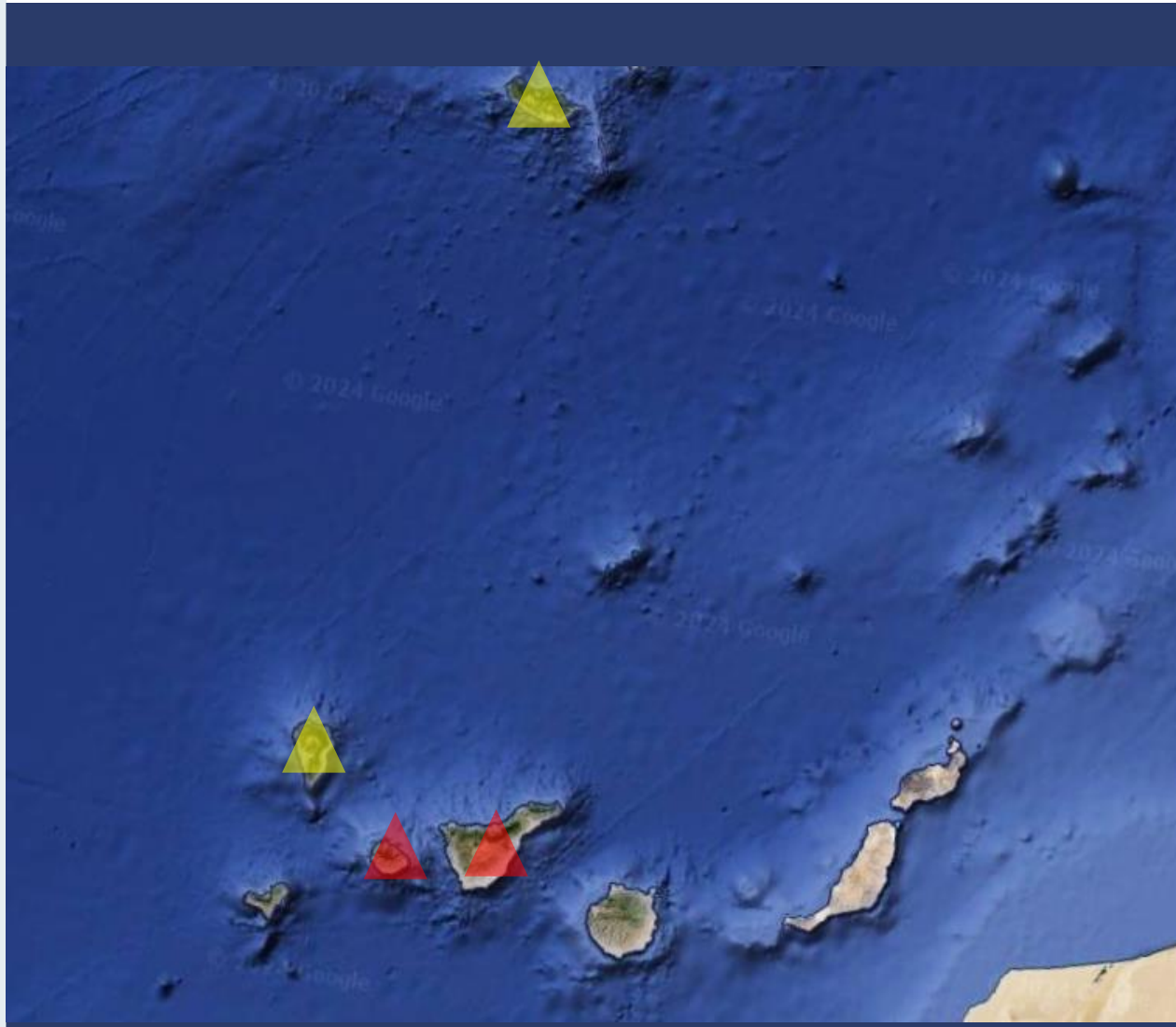


Nitzschia macaronesica



Lange-Bertalot, H. and Krammer, K. (1987)

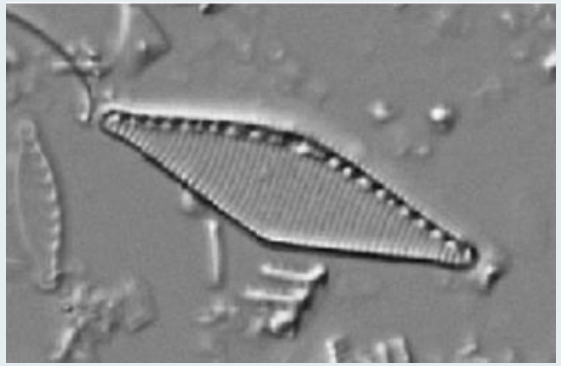
Lange-Bertalot, H. (1993)



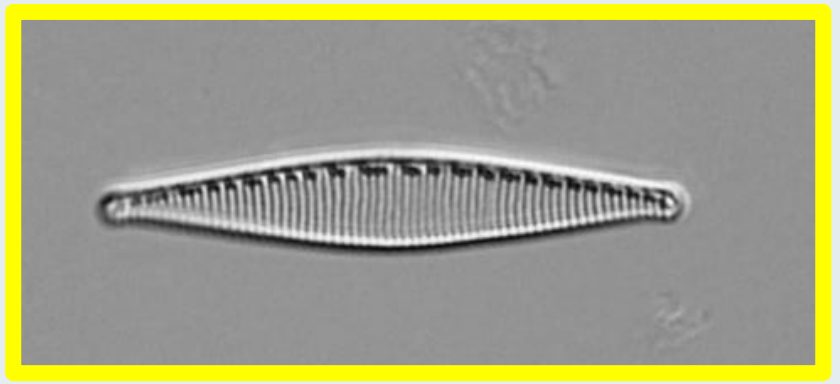
Source: https://earth.google.com/web

CASE 2: The *Nitzschia tenerifa* and *Nitzschia macaronesica*

Nitzschia tenerifa



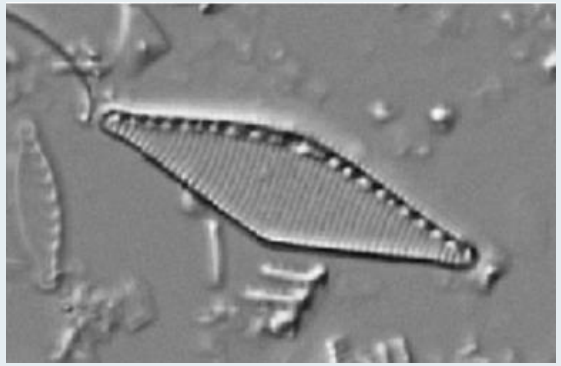
Nitzschia macaronesica



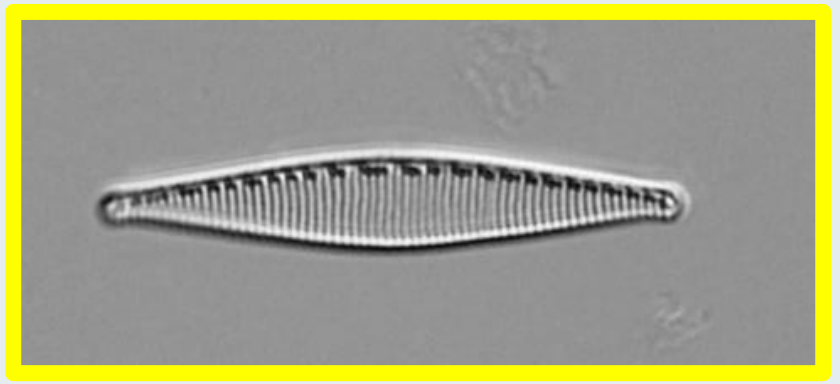
Diat.barcode

CASE 2: The *Nitzschia tenerifa* and *Nitzschia macaronesica*

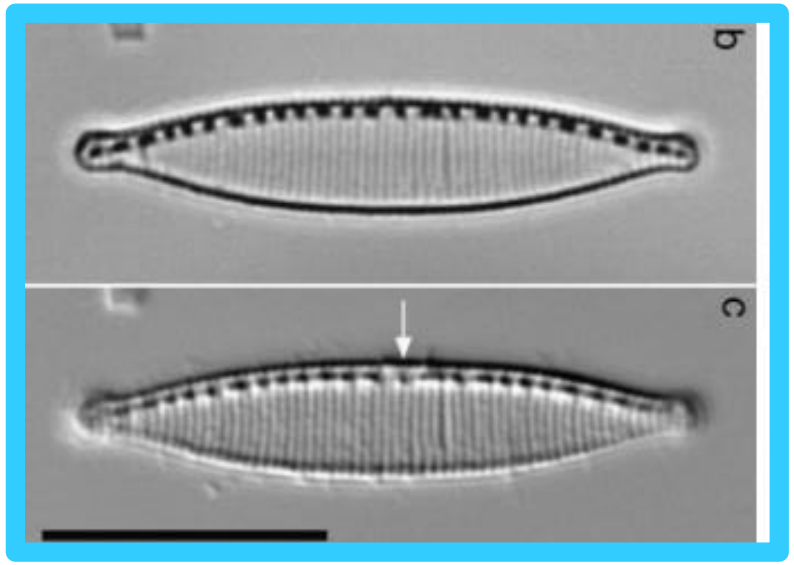
Nitzschia tenerifa



Nitzschia macaronesica



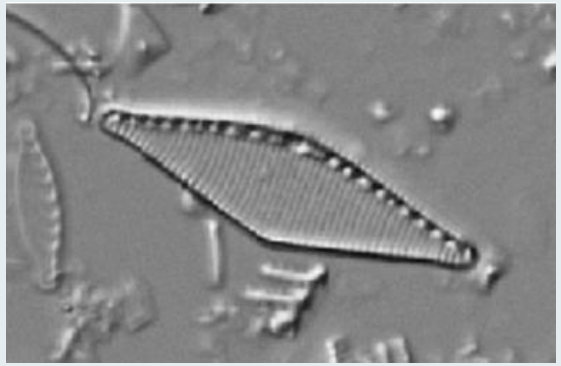
Nitzschia fonticola



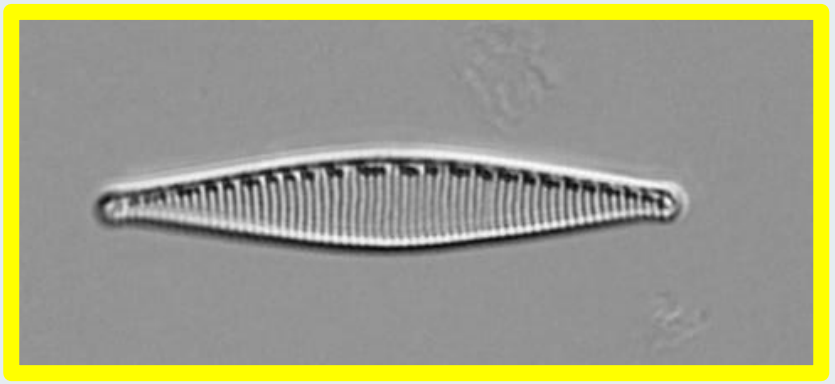
Trobajo, et al. (2006)

CASE 2: The *Nitzschia tenerifa* and *Nitzschia macaronesica*

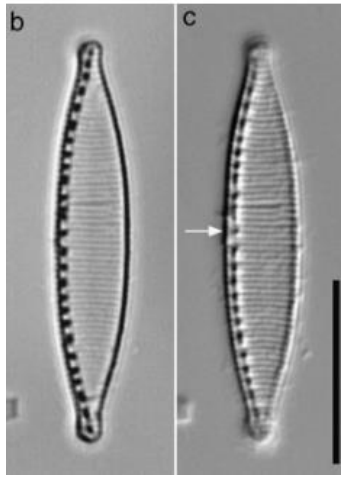
Nitzschia tenerifa



Nitzschia macaronesica



Nitzschia fonticola

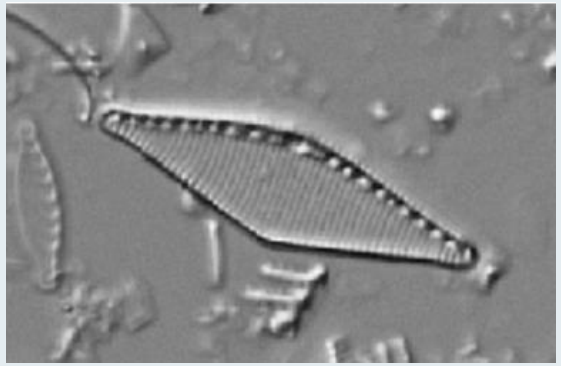


Trobajo, et al. (2006)

ASV_67	CGTTACTGGT	263	Nitzschia_communis	100	100	1780
ASV_84	CGTAACAGCT	263	Nitzschia_fonticola	100	100	4143
ASV_164	CGTAACAGCT	263	Nitzschia_fonticola	100	100	30
ASV_19	TGTTACAGCT	263	Nitzschia_inconspicua	100	100	44
ASV_6	CATTACAGCA	263	Nitzschia_linearis	100	100	903
ASV_136	CGTTACGGCT	263	Nitzschia_supralitorea	100	100	47

CASE 2: The *Nitzschia tenerifa* and *Nitzschia macaronesica*

Nitzschia tenerifa



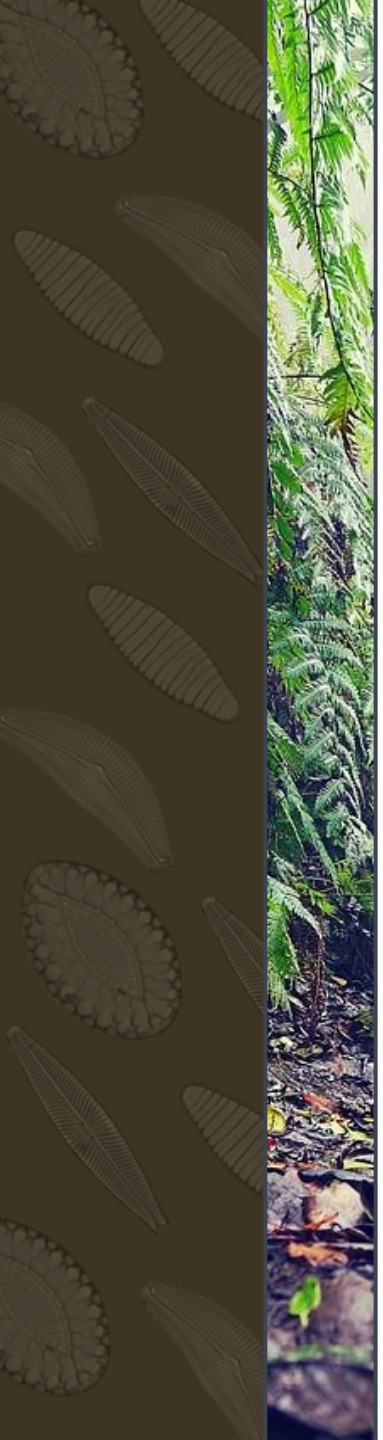
Nitzschia macaronesica

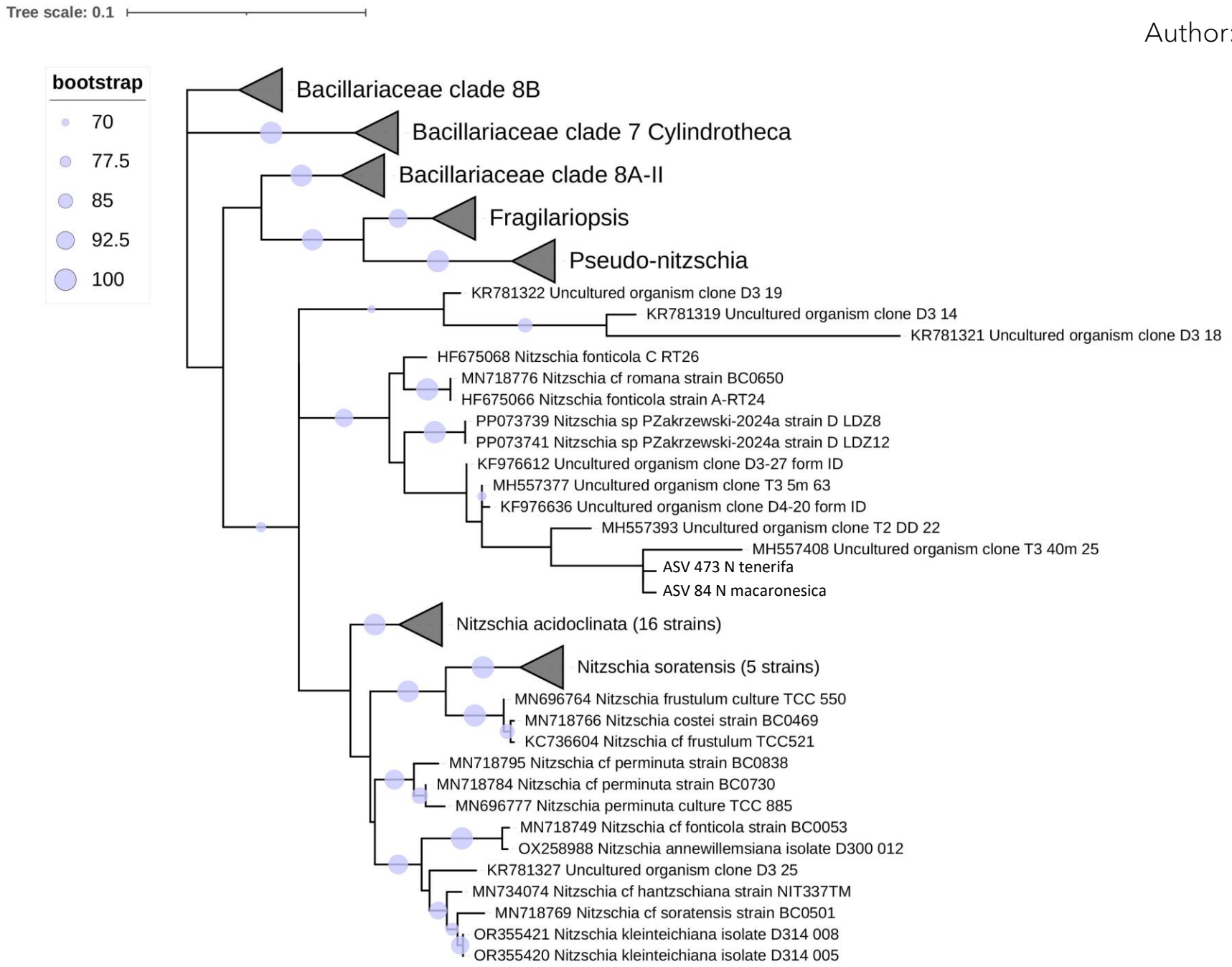


ASV_84	CGTAACAGCT	263	Nitzschia_fonticola	100	100
ASV_473	CGTAACAGCT	263	Nitzschia_fonticola	98	98

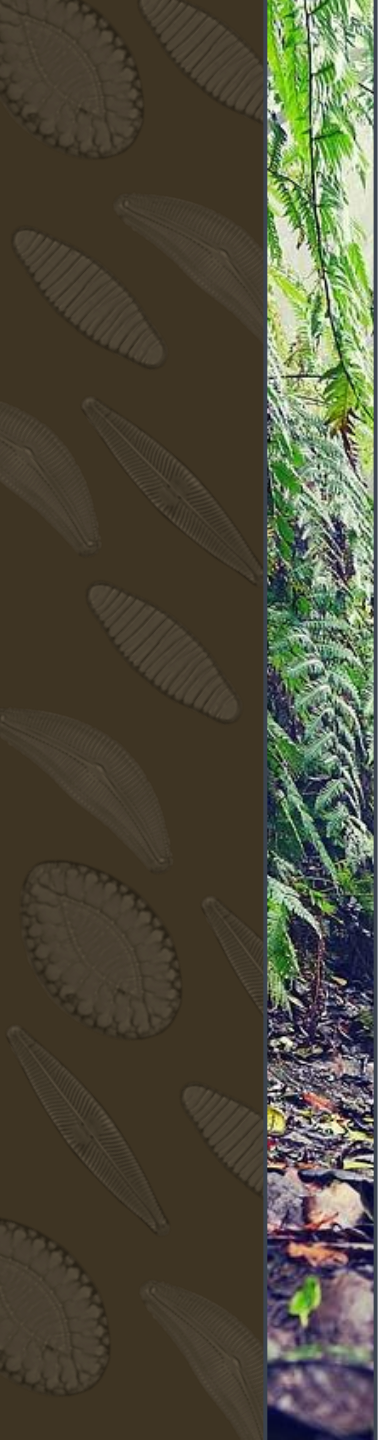
BLAST

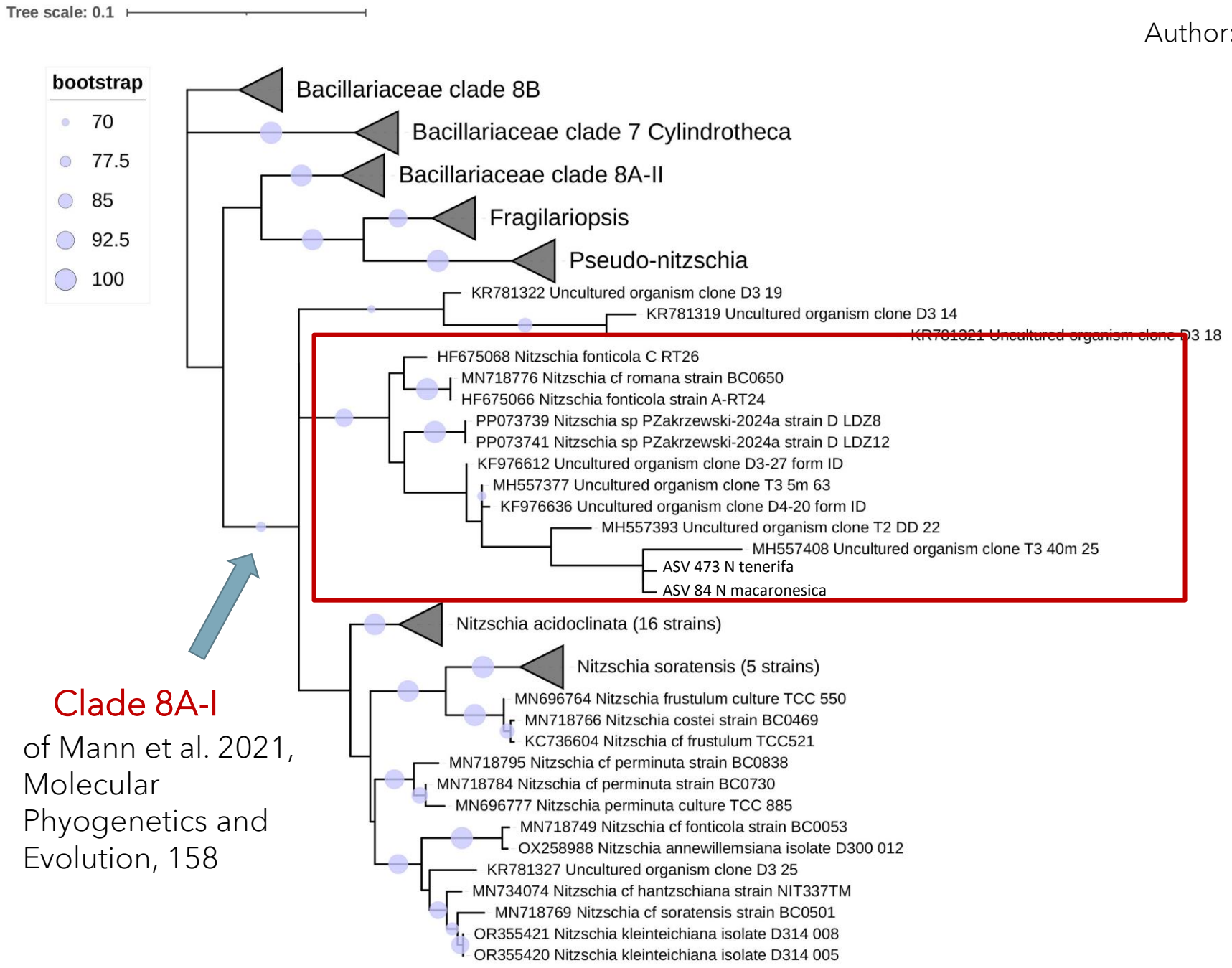
Nitzschia fonticola partial rbcL gene for RuBisCO, large subunit, strain B-RT25	Nitzschia fonticola	464	464	100%	5e-126	98.48%
Nitzschia fonticola partial rbcL gene for RuBisCO, large subunit, strain A-RT24	Nitzschia fonticola	464	464	100%	5e-126	98.48%
Nitzschia cf. romana strain BC0650 ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit (rbc…	Nitzschia cf. ro…	464	464	100%	5e-126	98.48%
Uncultured organism clone T3_40m_25 ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit …	uncultured orga…	459	459	100%	2e-124	98.10%
Uncultured organism clone T2_DD_22 ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit (…	uncultured orga…	459	459	100%	2e-124	98.10%





Author: David Mann



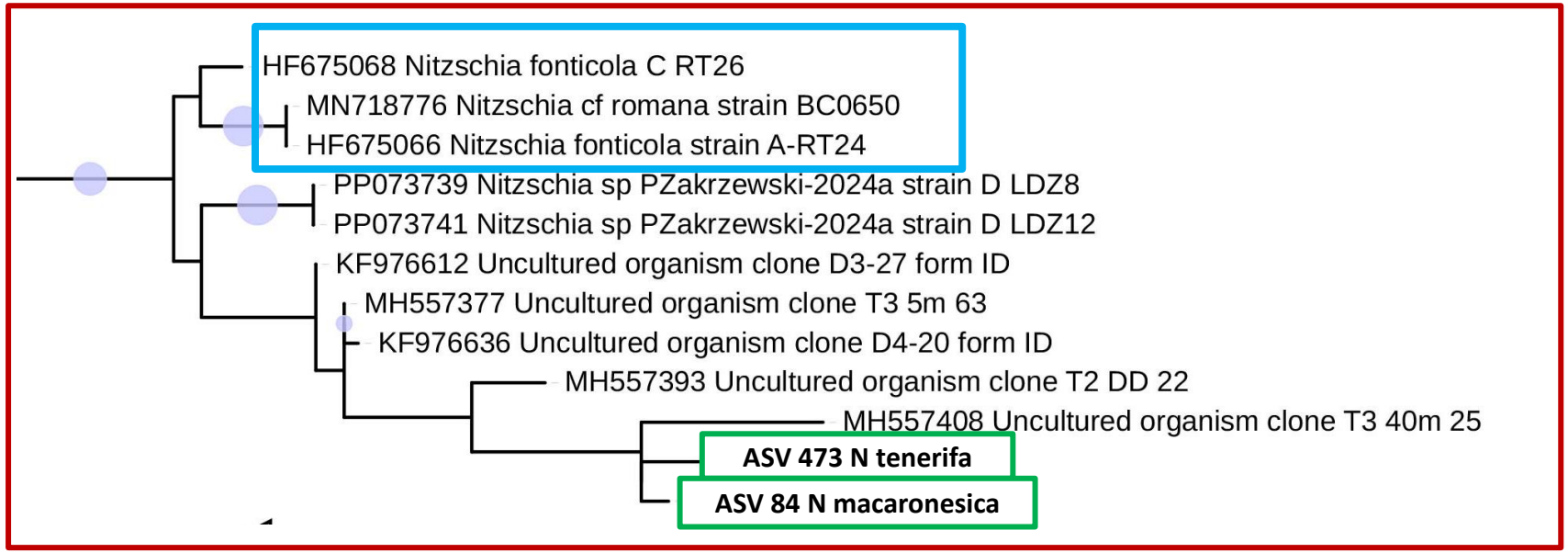


Clade 8A-I

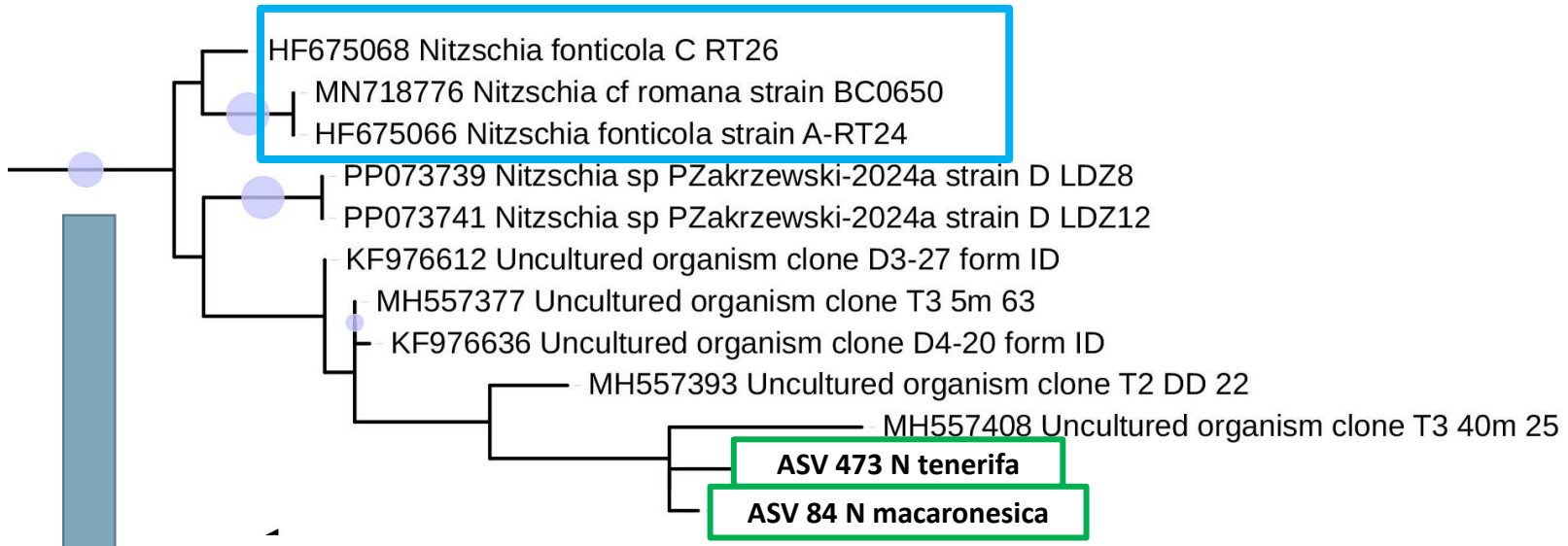
of Mann et al. 2021, Molecular Phyogenetics and Evolution, 158

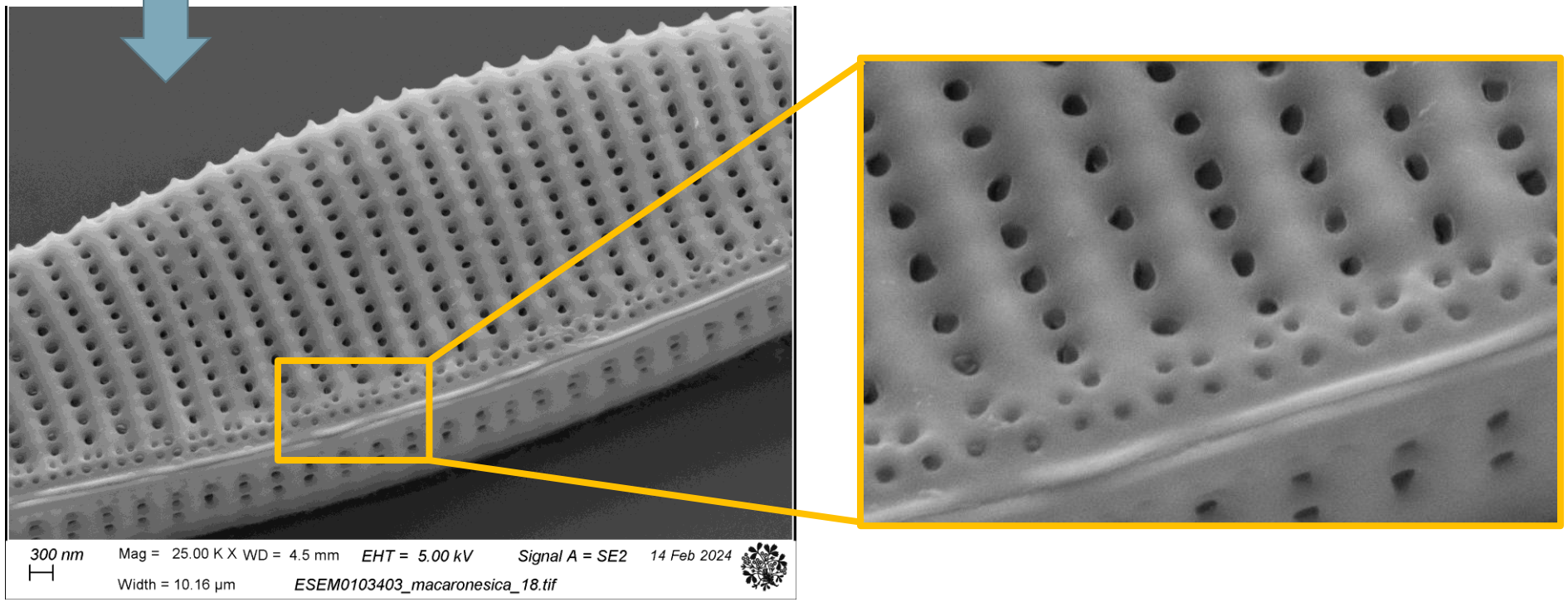
Author: David Mann

Author: David Mann



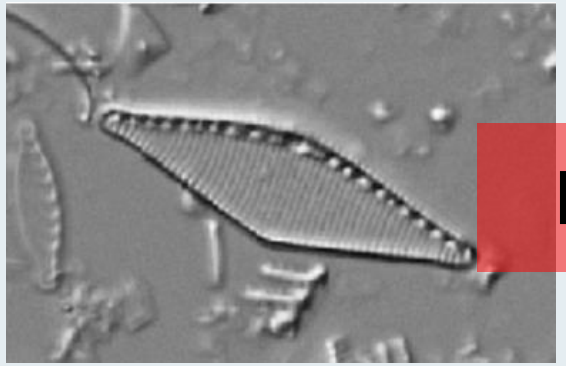
Author: David Mann



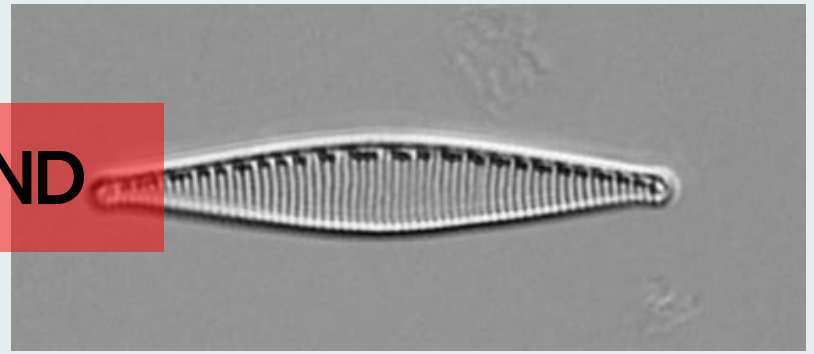


CASE 2: The *Nitzschia tenerifa* and *Nitzschia macaronesica*

Nitzschia tenerifa



Nitzschia macaronesica

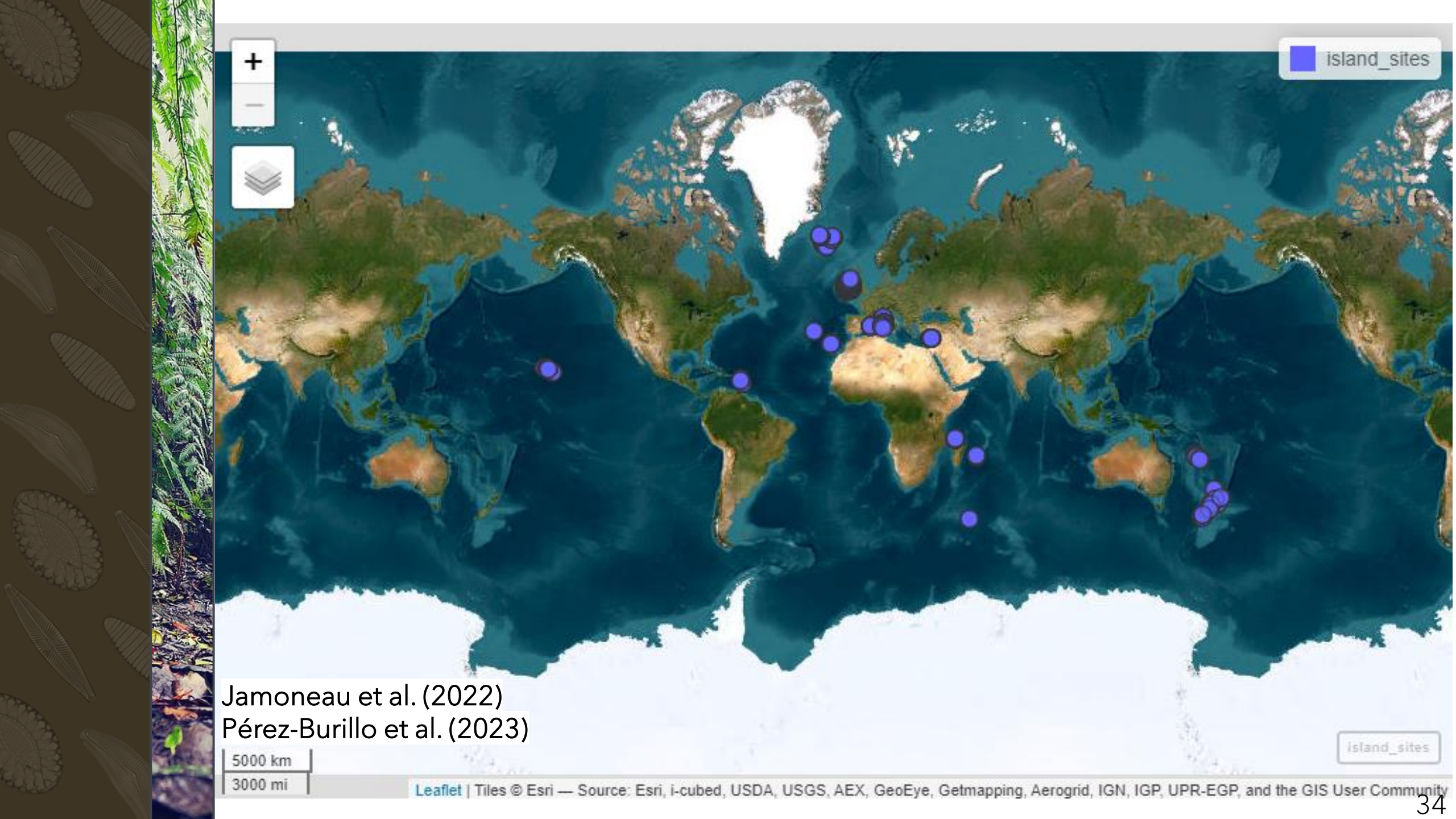


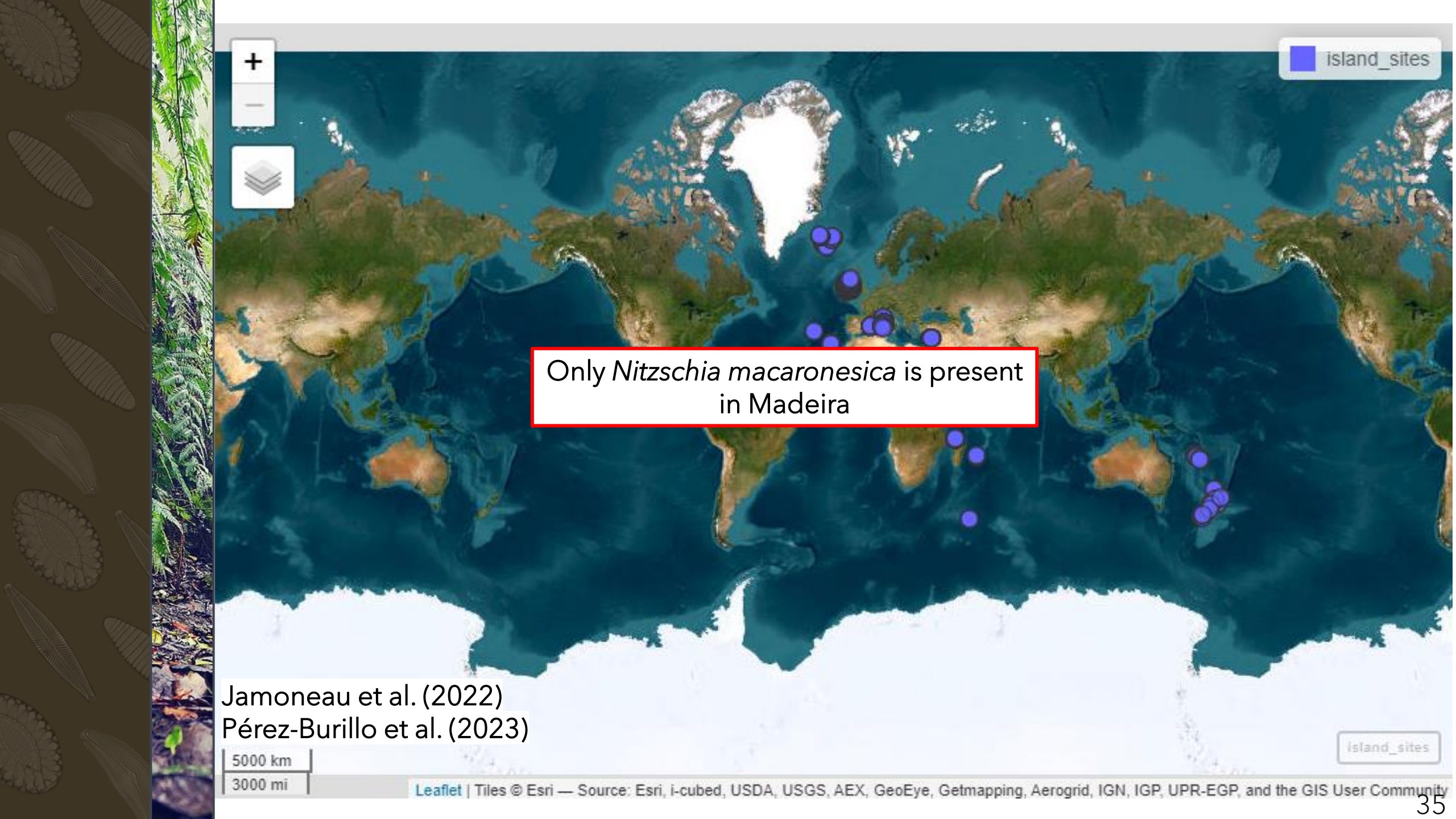
NOT FOUND

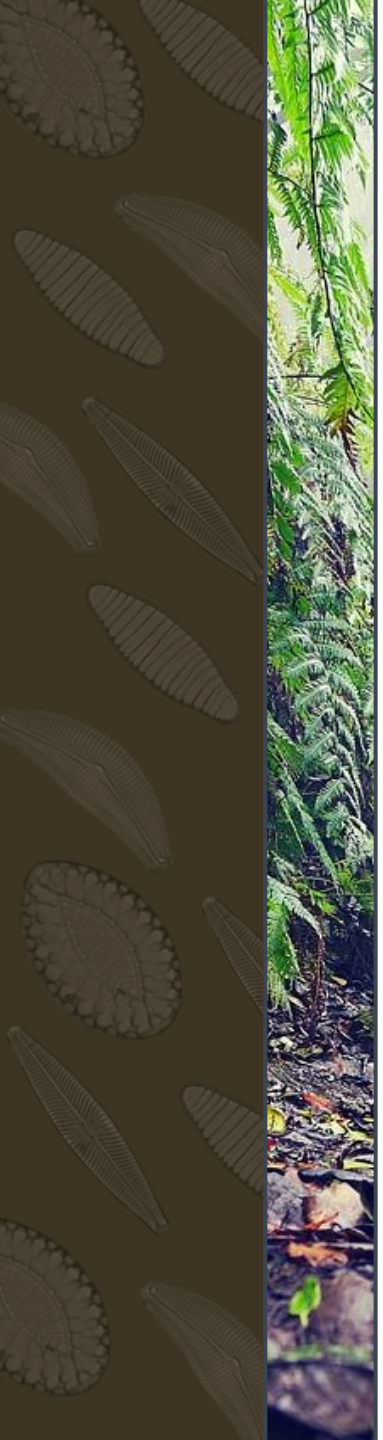
California	French rivers
Ontario	French lakes
Ohio	Mayotte
Fennoscandia	French water treatment works
Leon	UK
Catalonia	Tibet

+ dataset from karstic rivers in Croatia
+ Portugal Salomé Almeida

The dataset is drawn from over 3300 samples and the total number of reads was over 90 million

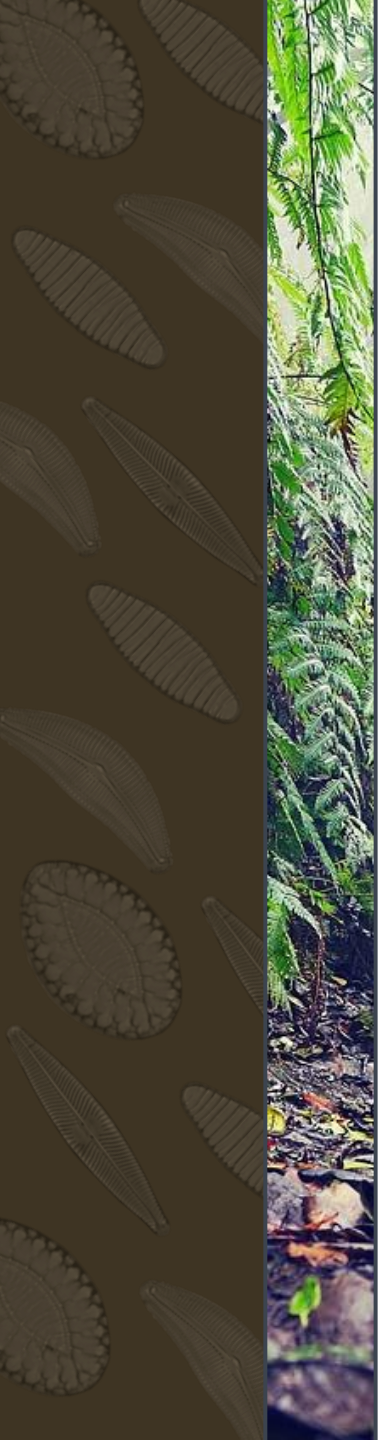

island_sites
Jamoneau et al. (2022)
Pérez-Burillo et al. (2023)
5000 km
3000 mi
Leaflet | Tiles © Esri — Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, UPR-EGP, and the GIS User Community


island_sites
Only *Nitzschia macaronesica* is present in Madeira
Jamoneau et al. (2022)
Pérez-Burillo et al. (2023)
5000 km
3000 mi
Leaflet | Tiles © Esri — Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, UPR-EGP, and the GIS User Community



WHAT PROVIDES METABARCODING IN THIS STUDY?

1. Allows differentiation of morphologically similar species
2. Helps to understand distribution and ecology
3. Offers much greater sampling depth and numbers of samples
4. Facilitates research for species and variants across the world



TO BE CONTINUED...

ACKNOWLEDGMENTS



ANY QUESTIONS?

