Testing the Phylogenetic Niche Conservatism Hypothesis with genus *Escallonia*

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ABAC

PHYLOGENETIC NICHE CONSERVATISM HYPOTHESIS

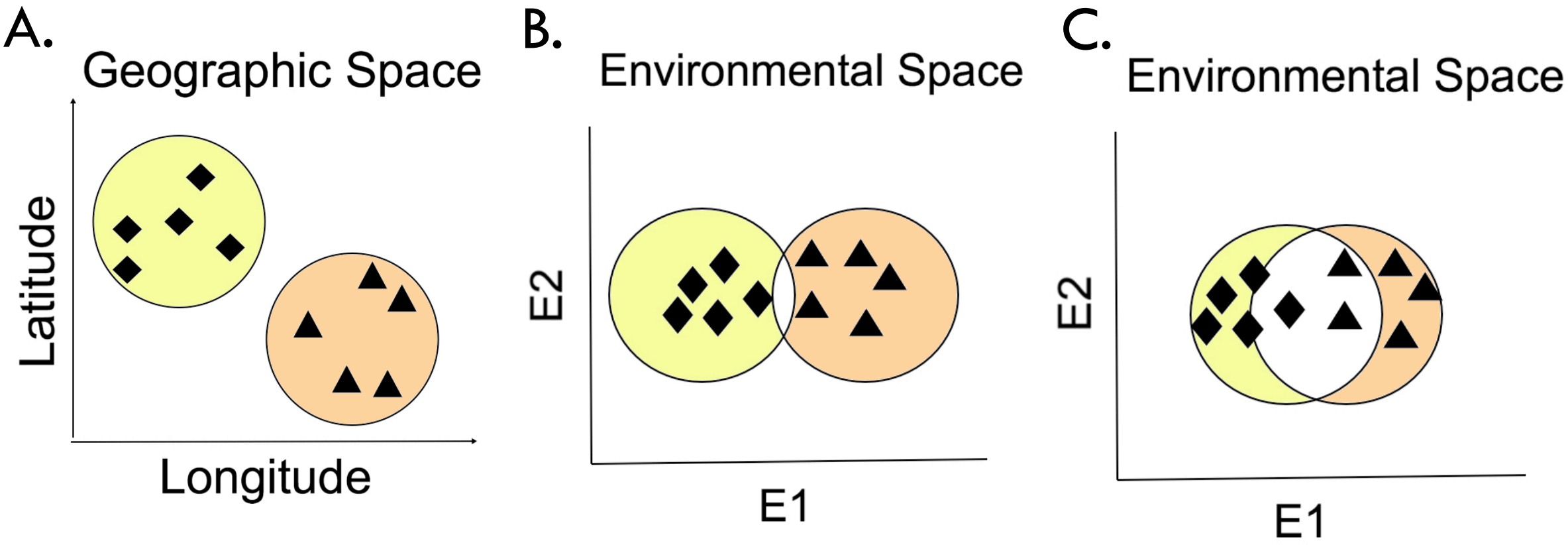
- “past and present phenotypes of a lineage would likely have occupied similar environments” (Harvey and Pagel 1991).

PREDICTION

- Climatic niche overlap increases as phylogenetic distance decreases

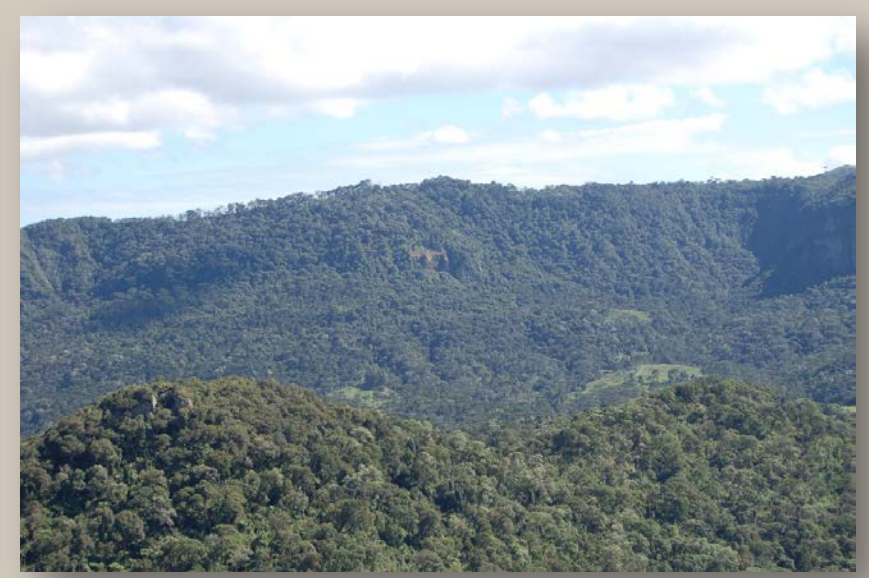
BACKGROUND ENVIRONMENT:

THE ENVIRONMENTAL [CLIMATIC] CONDITIONS IN THE GEOGRAPHIC AREA AROUND THE SPECIES OCCURRENCES

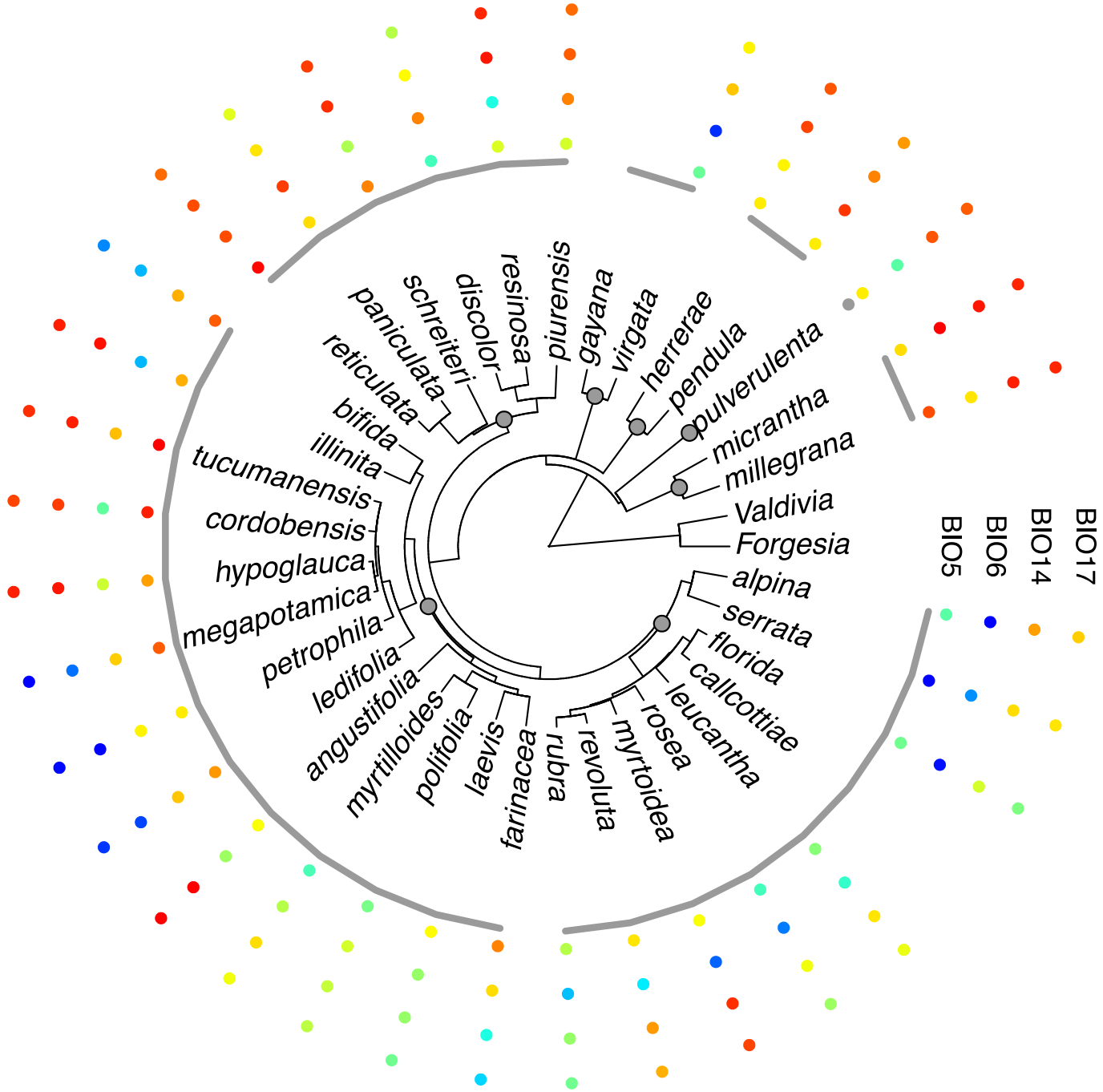


Methods

genus *ESCALLONIA*



Estimating Niche Conservatism



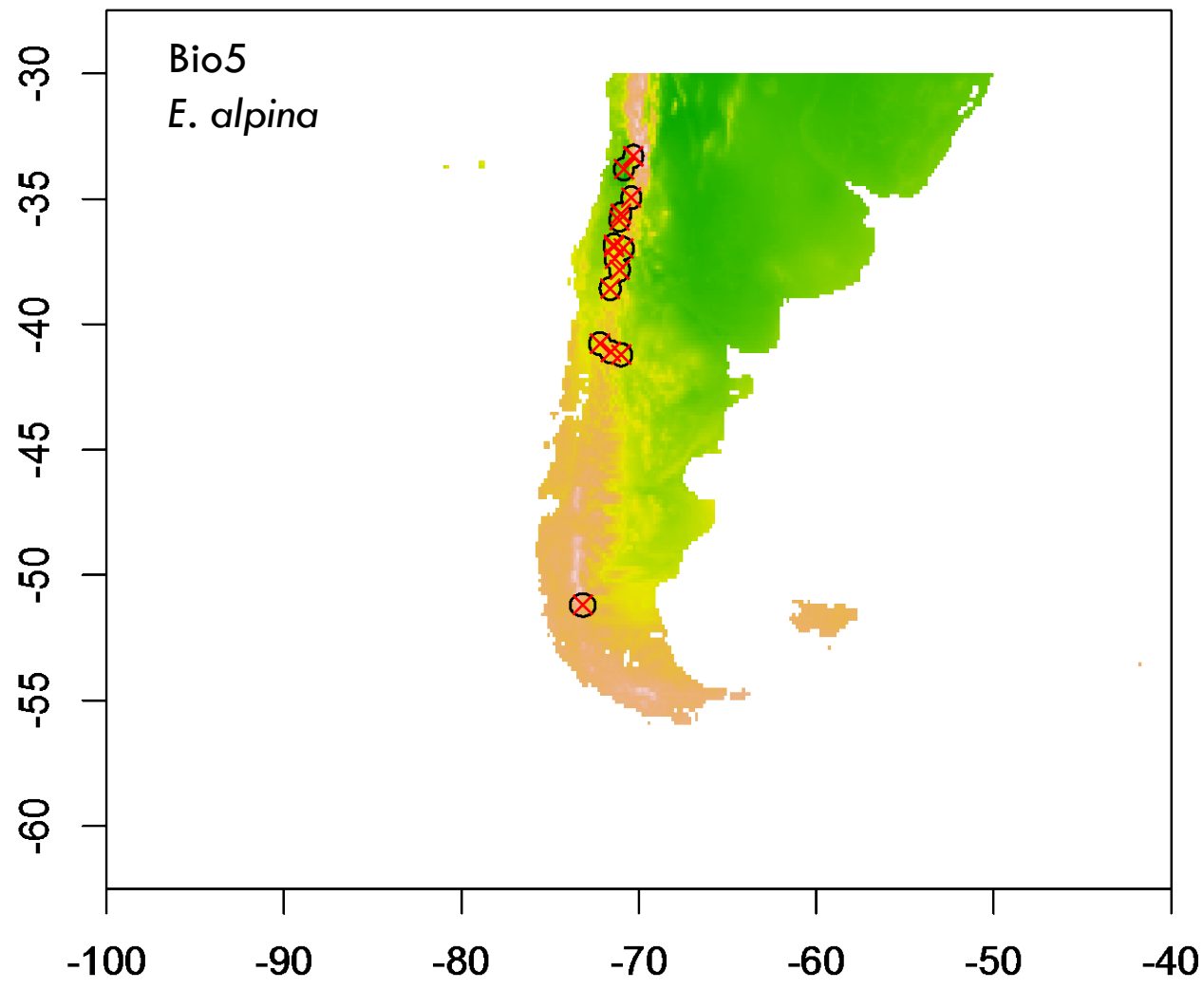
Climatic Variables

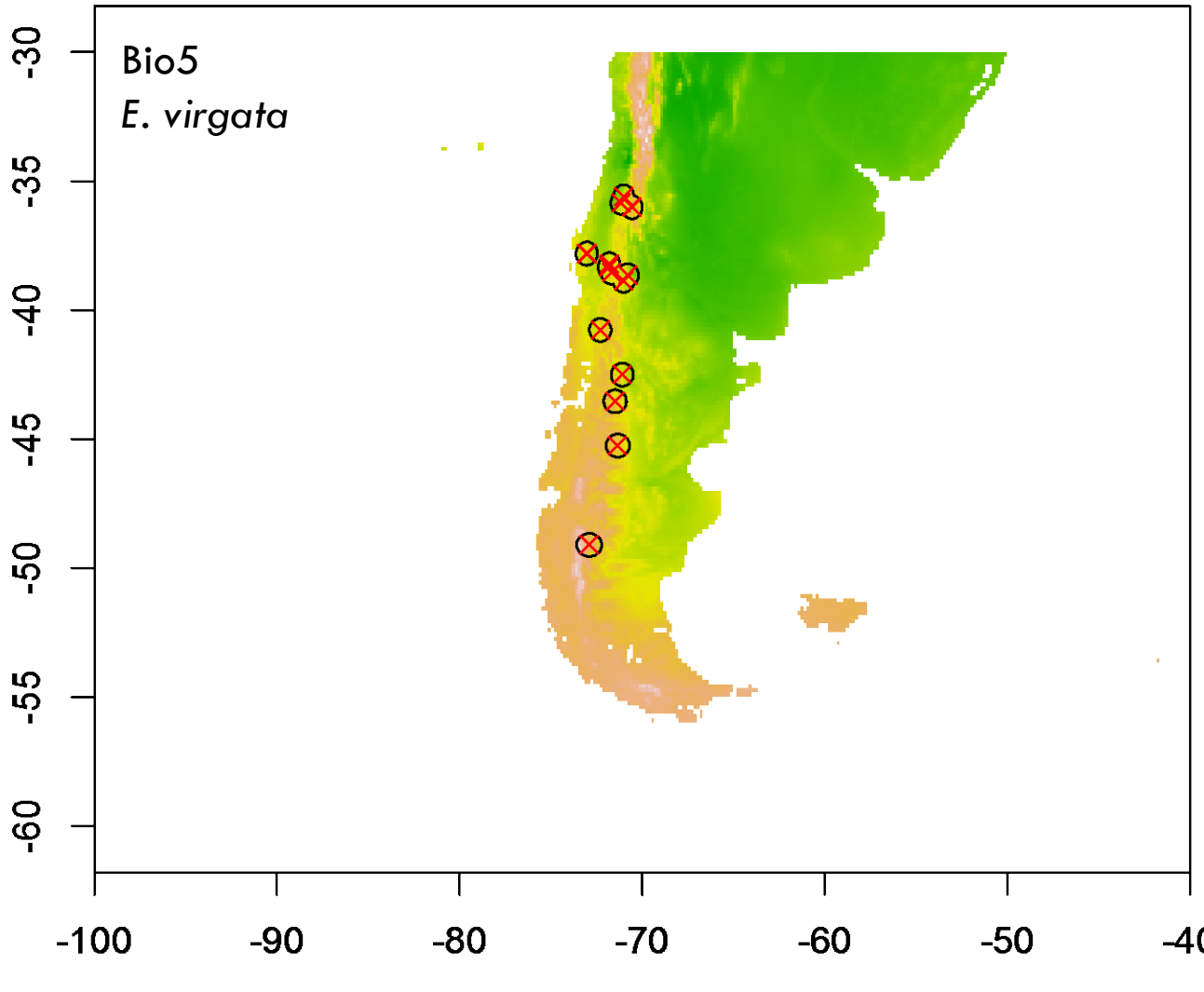
Precipitation of the Driest Quarter (BIO17)
Precipitation of the Driest Month (BIO14)

Min. temp of the Coldest month (BIO6)
Max. temp of the Warmest month (BIO5)

Zapata 2013
WorldClim.org

Species Occurrences and Respective 50 km Buffer Defining Background Environment





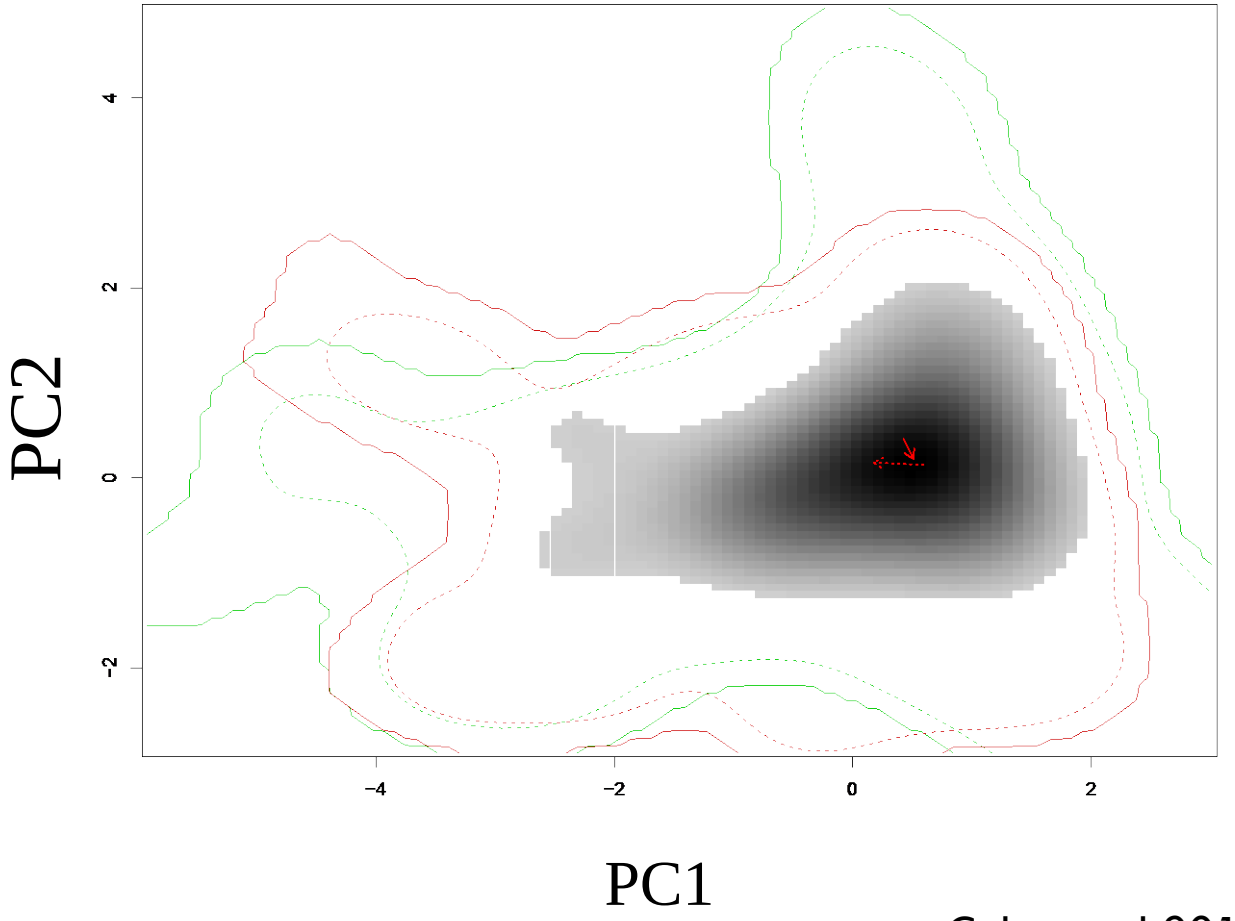
Measurement of Niche Overlap

Schoener's D

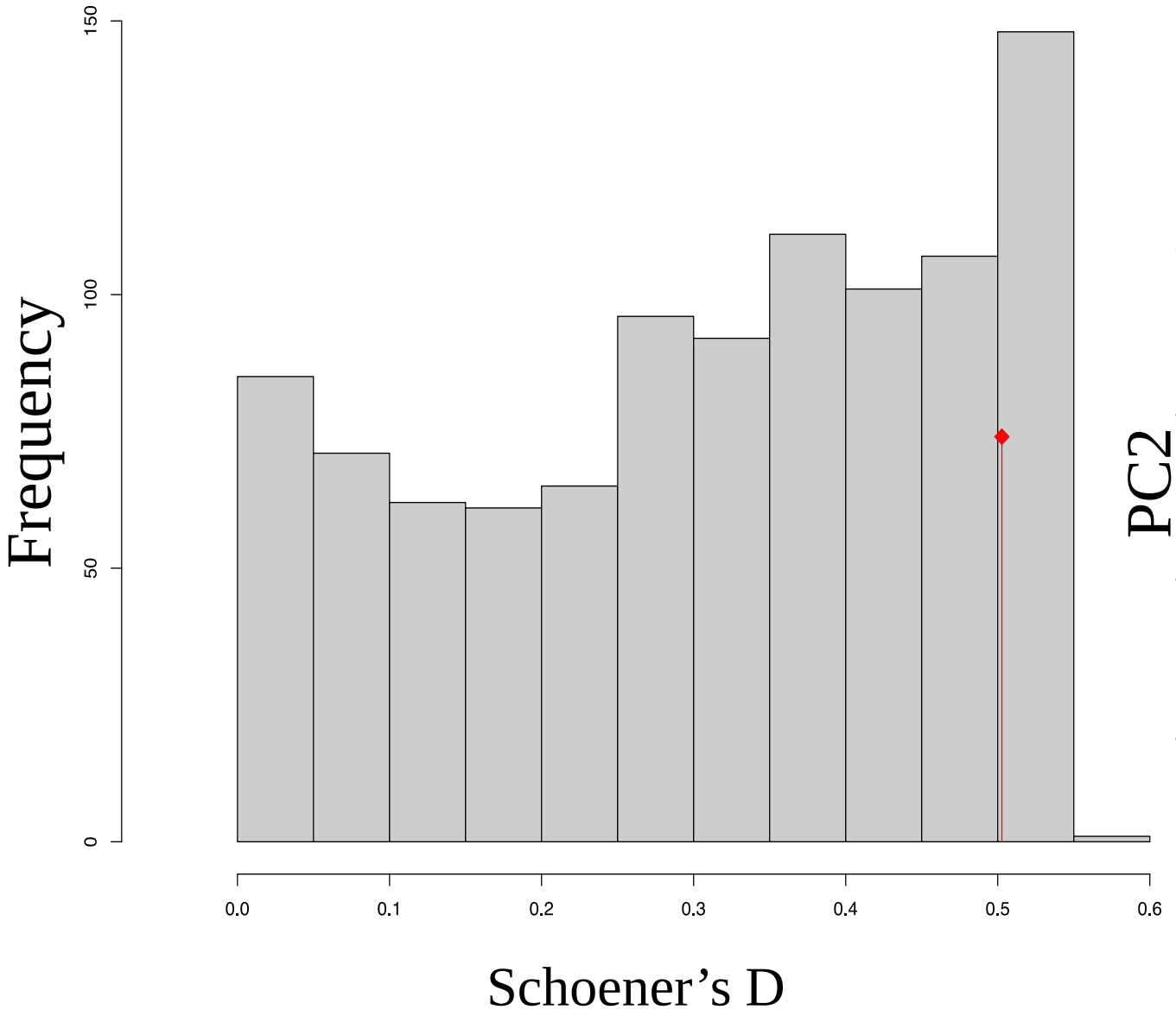
$$D = 1 - \frac{1}{2}\left(\sum_{ij} |z_{1ij} - z_{2ij}|\right)$$

- D ranges from 0 (No overlap) between 1 (complete overlap)
- ij: refers to a particular grid cell
- Z1: species occupancy of *E. virgata*
- Z2: species occupancy of *E. alpina*

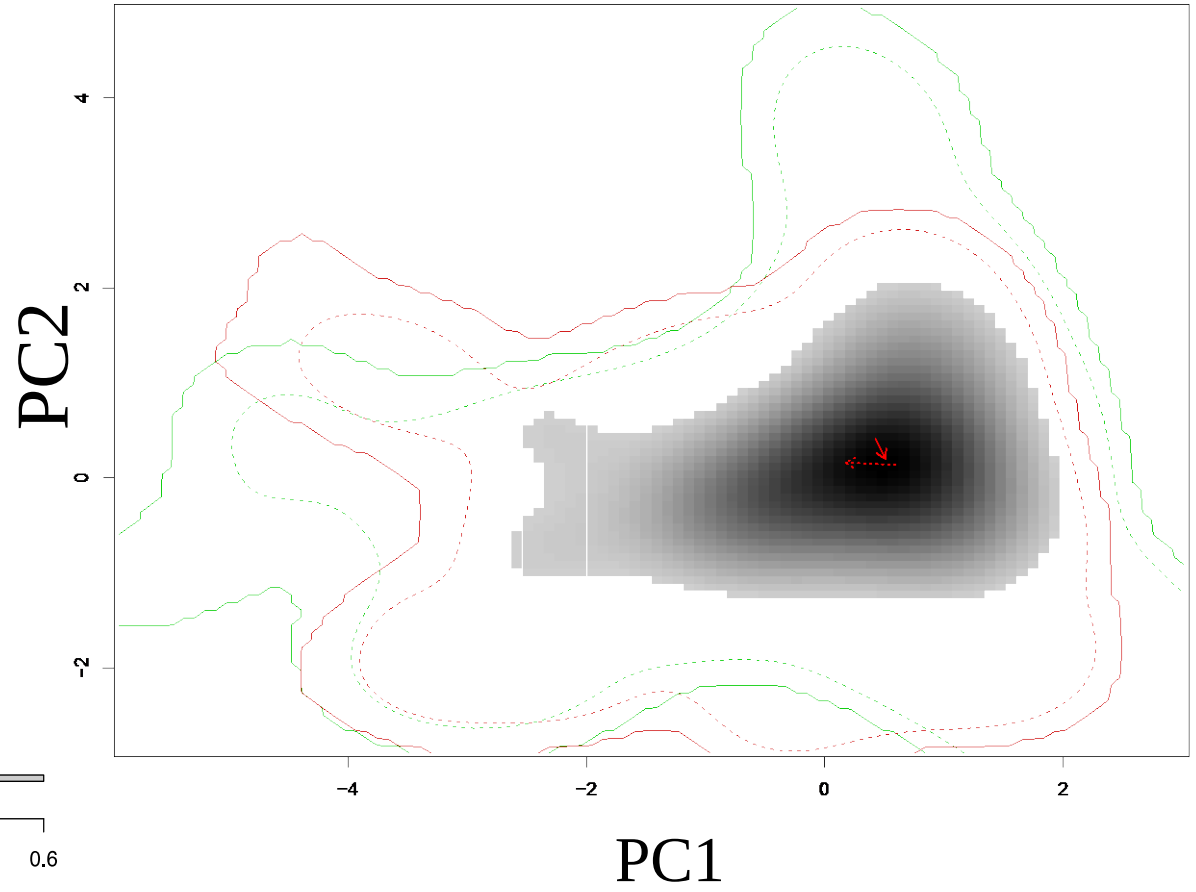
E. virgata (grid) vs *E. alpina* Niche Overlap

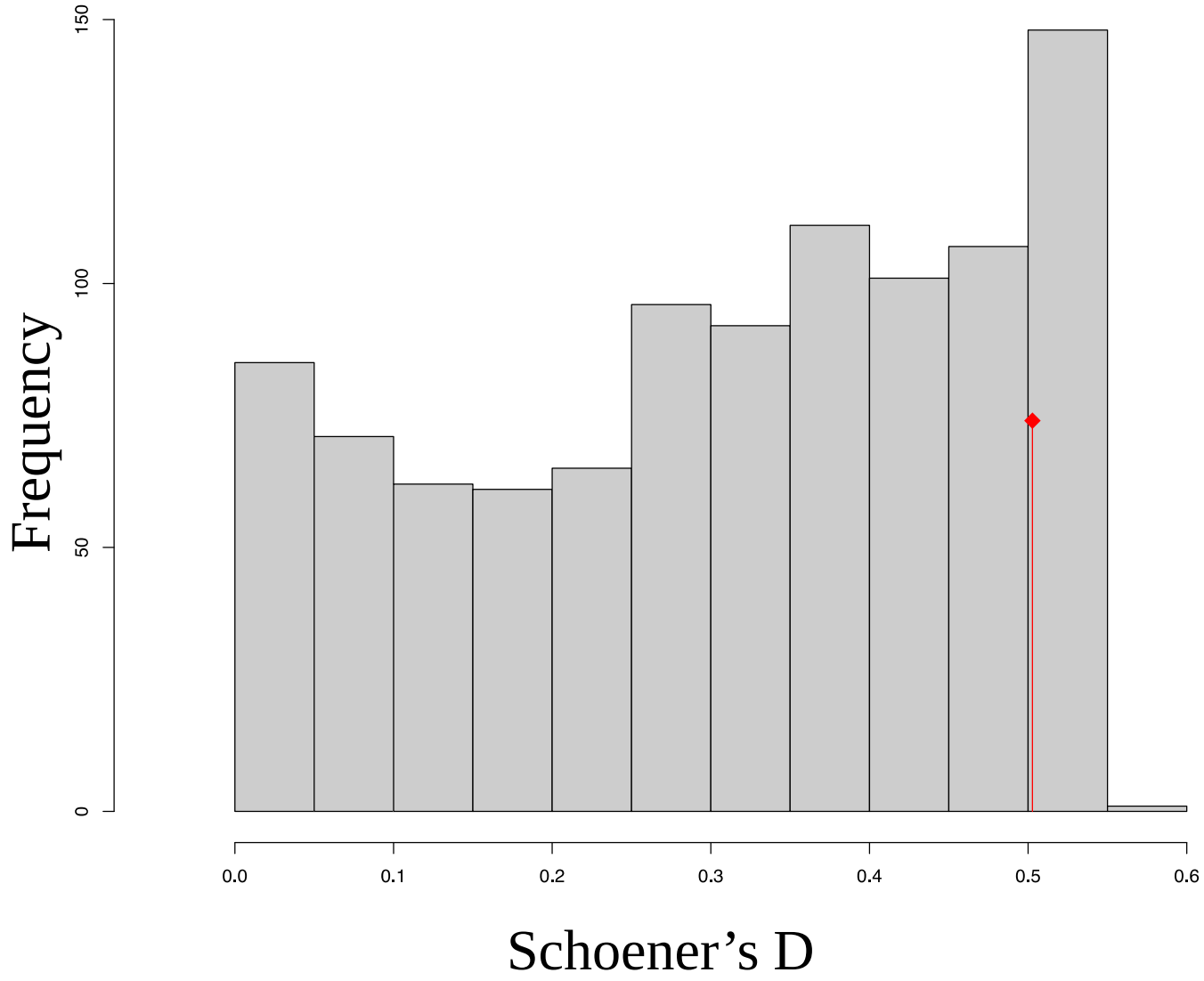


Cola et. al 2017



E. *virgata* (grid) vs E. *alpina* Niche Overlap





Standardized Effect size of Schoener's D

(Do – mean(Db)) / sd(Db)

Prediction

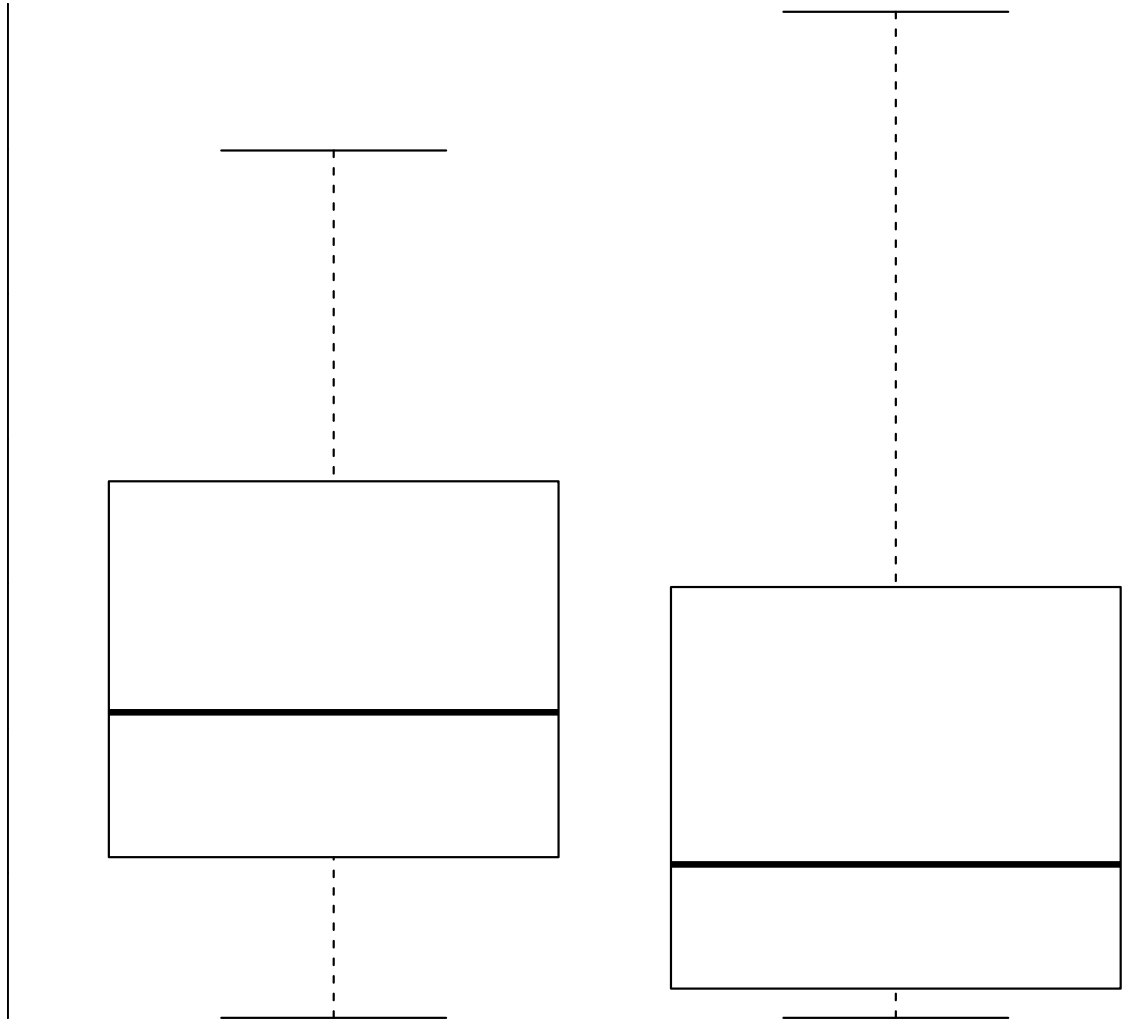
CLOSELY RELATED SPECIES WITHIN CLADE WOULD TEND TO SHOW A GREATER AMOUNT OF CLIMATIC NICHE OVERLAP THAN AMONG CLADES

Results

SCHOENER'S D

(WITHOUT ACCOUNTING THE BACKGROUND ENVIRONMENT)

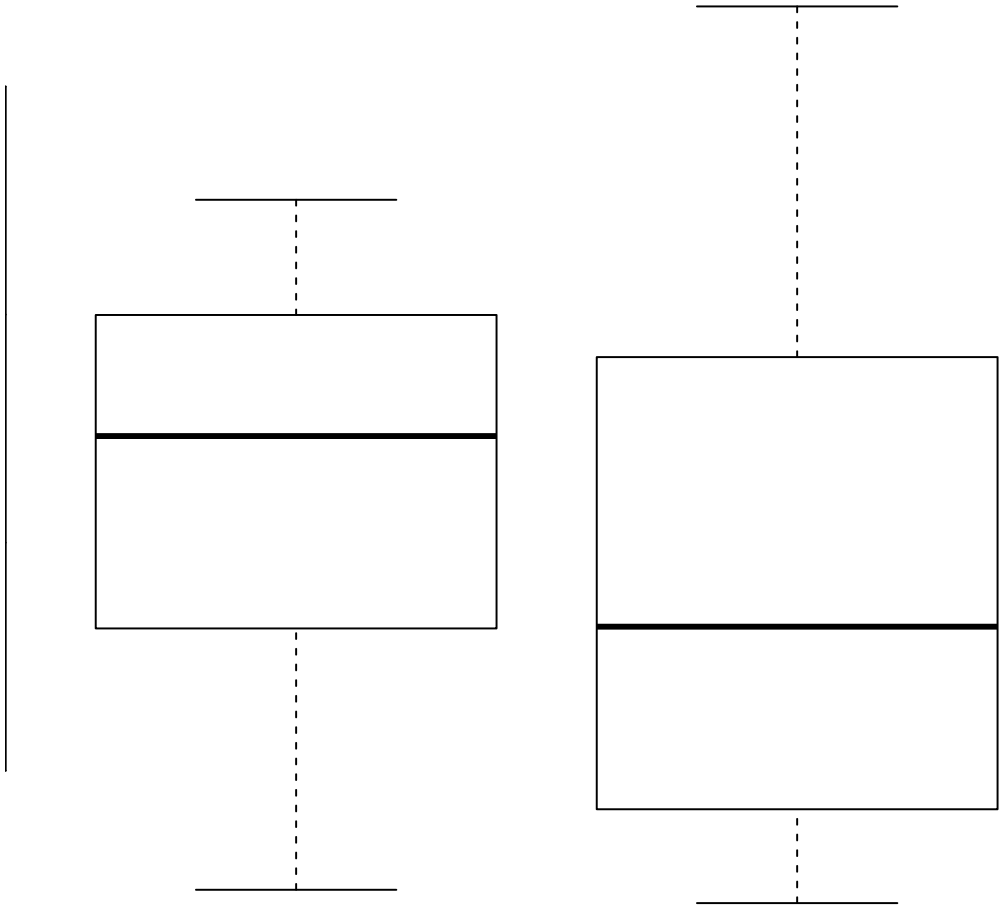
p value= .02



STANDARDIZED EFFECT SIZE OF SCHOENER'S D

(ACCOUNTING FOR THE BACKGROUND ENVIRONMENT)

p value= .04



CONCLUSION

- Closely related *Escallonia* species tend to overlap more in climatic niche space than distantly related species

- Our findings confirm Zapata's results suggesting phylogenetic niche conservatism and show that these results are not simply a reflection of the background environment.

Acknowledgements

- Madalyn Stoeker
- Peter Hoch
- Wendy Applequist
- Monica Carlsen-Krause
- 2017 MBG REU interns

NSF

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