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Rivers acting as barriers to gene flow in bat pollinated species: phylogeography of a passionflower in Atlantic Rain Forest

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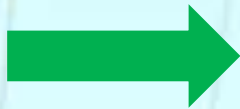
Brazilian Atlantic Rain Forest

- Strong seasonality
- Complex topography
- Easterly winds from the tropical Atlantic (that drive the orographic rainfall)
- Exceptionally high biological diversity
- Completely endangered



1500

2010



Passiflora L.

- The genus *Passiflora* L. has more than 520 species, in four subgenera, and is distributed preferentially in Neotropic.
- These species are climbing herbs, trees, and woody lianas, and present high morphological diversity (flowers, leaves, fruits). Always associated to preserved forest patches.



Passiflora ovalis

- Is one of 2% of passionflowers species that are bat pollinated, and its taxonomy is unstable.
- Until 2003, it was considered another genus in the family and only one species was known.
- In 2004 a new species was described. And in 2006 they were considered the same species and their morphological differences were attributed to clinal variation and the environment.
- The individuals are restricted to BARF, near the sea.



Where are they found?



The flowers



The pollinator



The fruits



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More about...

- Seed dispersers are unknown, but there are suggestions that fruits are eaten by birds.
- Initially described to occur from Pernambuco to São Paulo States, now is considerate extinct in Pernambuco and Sergipe, found from Bahia to SP (only in continuous forest patches).



Aims of this work

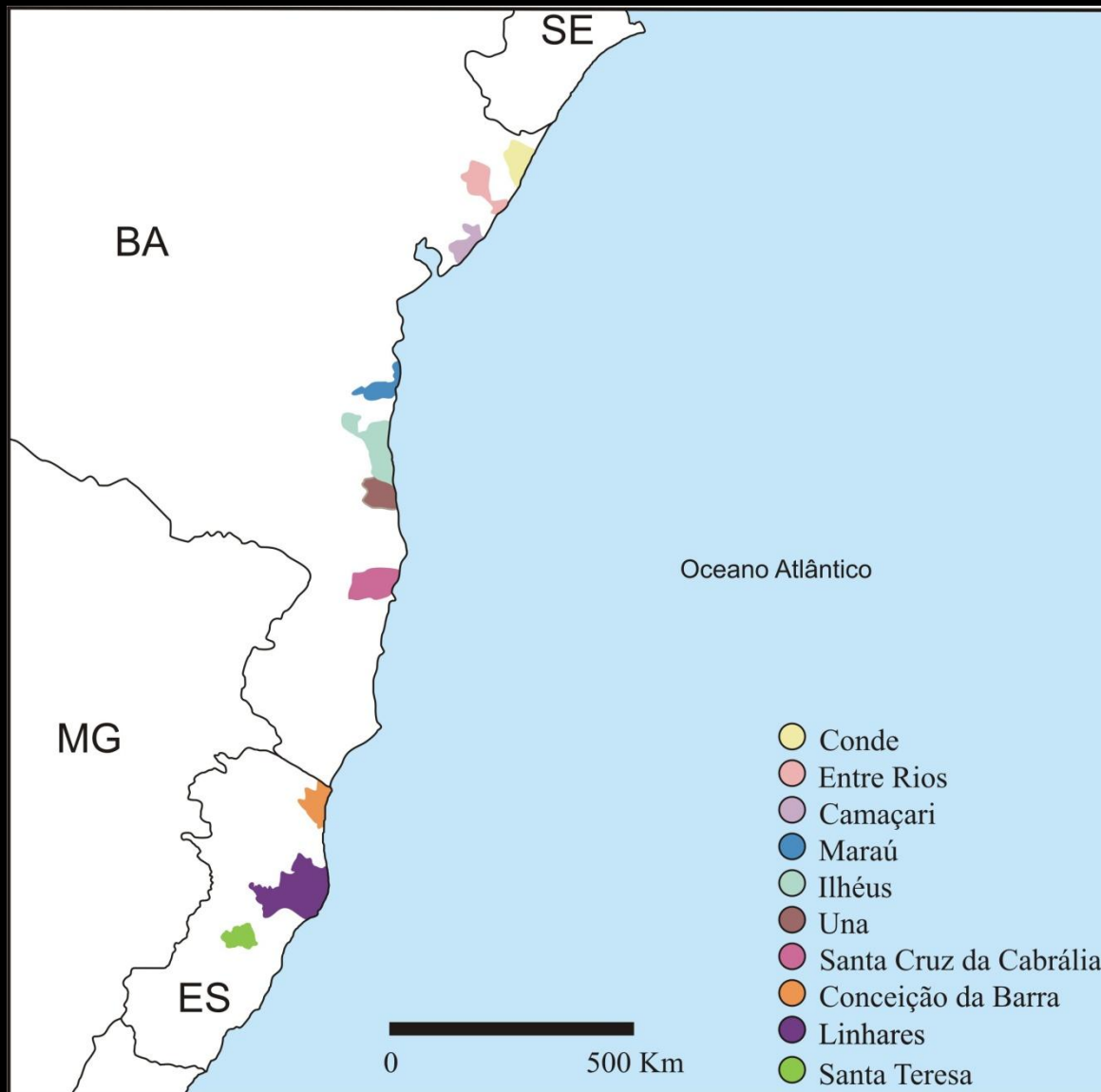
- **in general**
 - Evaluate the *Passiflora ovalis* genetic variability using molecular markers.
- **specifically**
 - Estimate the genetic structure; evaluate the evolutionary relationships among different populations; determinate the existence of historic barriers to gene flow.



Materials and Methods

- Plant material
 - 207 plants collected in 10 populations, seven in Bahia and three in Espírito Santo
 - Young leaves only
 - 21 plants collected in two populations, one in SP and other in RJ (different morphology).





Materials and Methods

- DNA regions:
 - cpDNA – intergenic spacer between *trnS-trnG*
 - nuDNA – ribosomal internal transcribed spacers (ITS 1, ITS 2 and 5.8S gene)

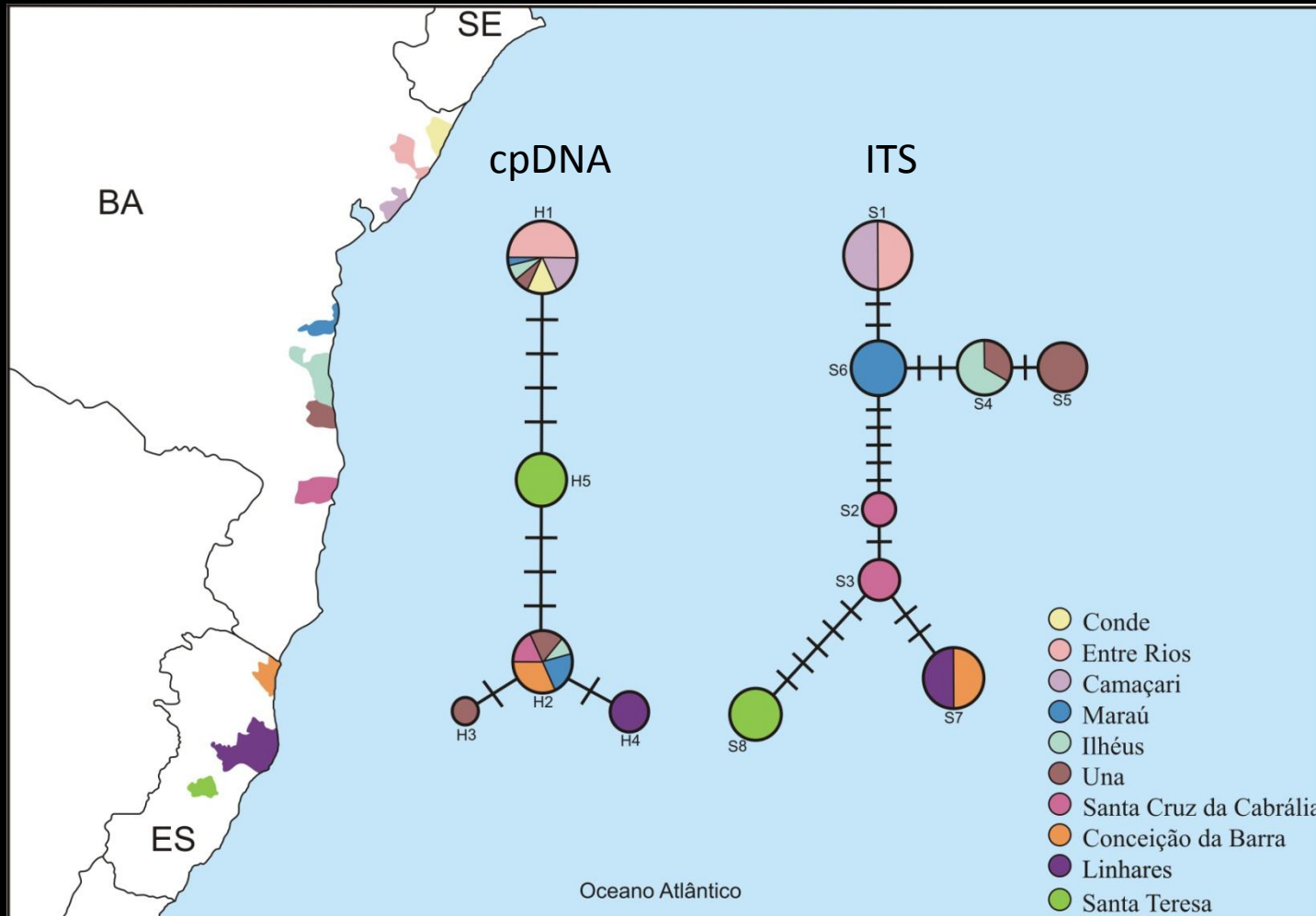


Analyses

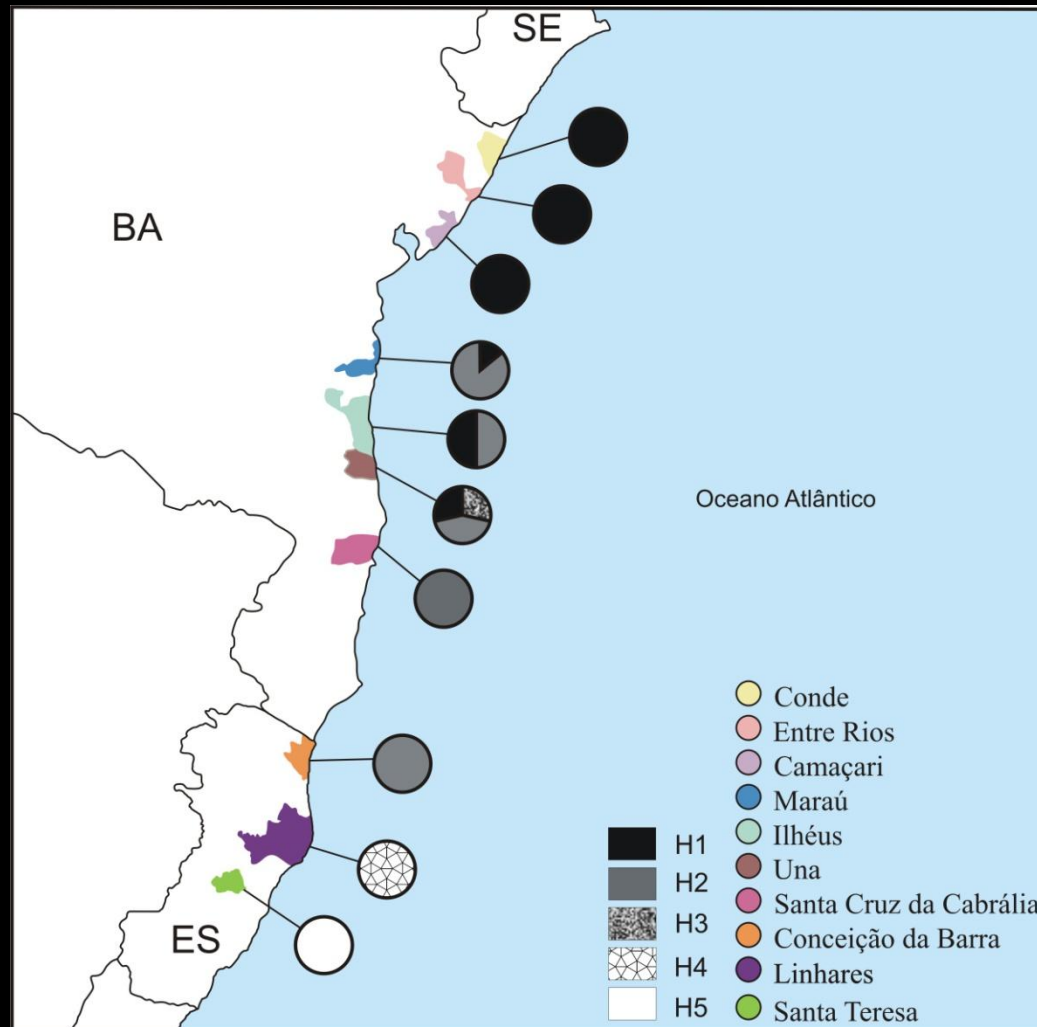
- Haplotypes and DNA sequence types determined by Phase and DNAsp
- Neutrality tests (Tajima's D and Fu's F_S), Mismatch distribution, AMOVA, diversity indices
- Network using median joining network
- Mantel's test; spatial autocorrelation; Monmonier, SAMOVA.



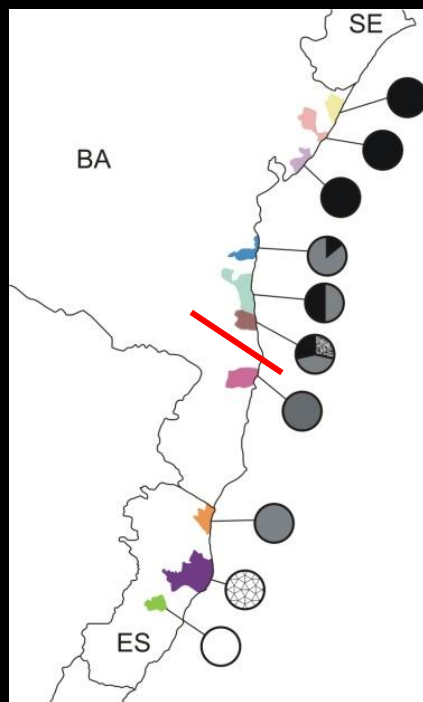
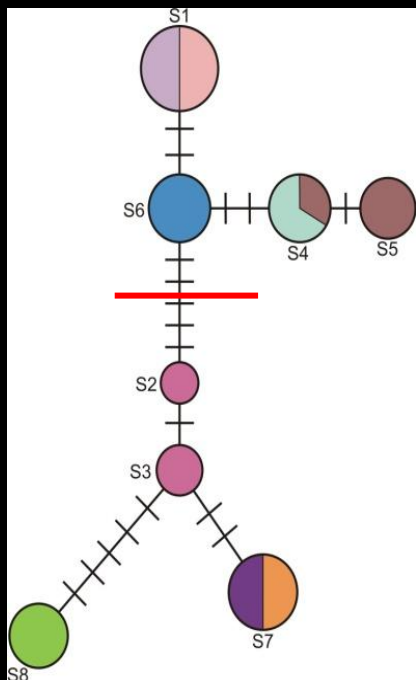
Networks



cpDNA haplotypes frequencies

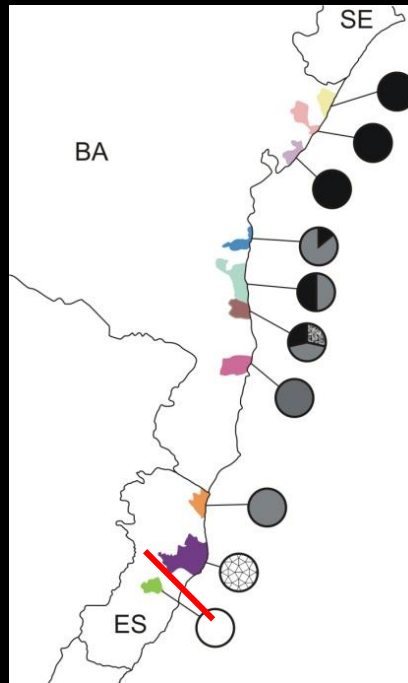
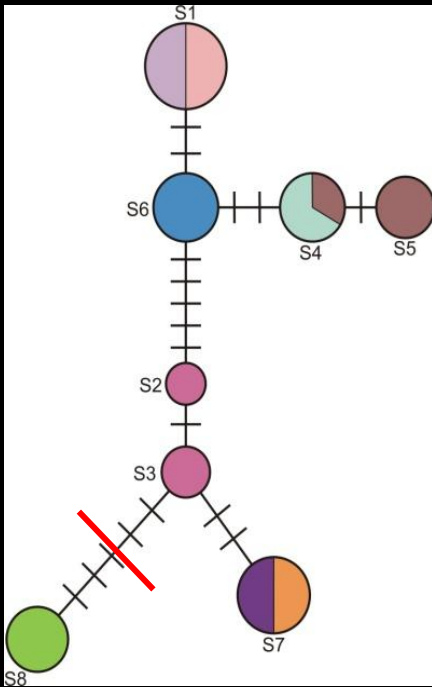


1st Barrier



Jequitinhonha River

2nd Barrier



Doce River

Like others...

- The majority of the studies concerning historical processes of diversification in the Brazilian Atlantic Forest (fauna and flora) proposes a relation between the high indices of diversity and endemism observed and the Quaternary Refuges Model. The population fragmentation events due to climatic fluctuations would have caused a rise in diversity, or could even have favored speciation events.



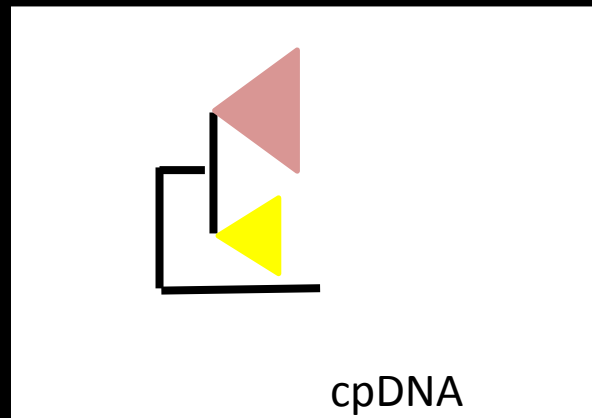
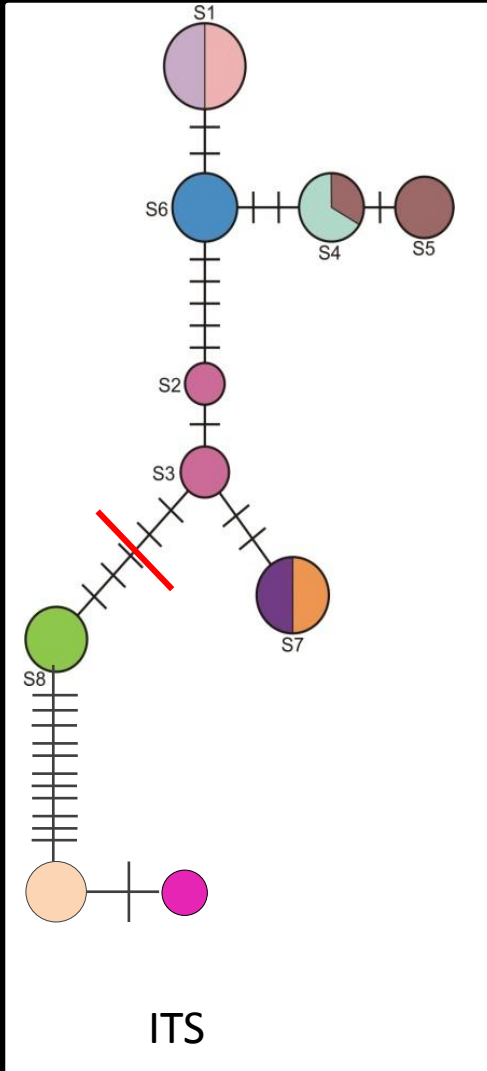
Conservation

- Extinct in Sergipe
- Only three individuals found in Pernambuco (Zona da Mata, near sugarcane plantation; 2009, without flowers)
- Two most diverse regions (South Bahia and Espírito Santo – like refugia suggested by many authors)
- Two important barriers to gene flow (MUs?)



Taxonomical considerations

- Two true species supported by:
 - Morphology (Vitta & Bernacci, 2004)
 - cpDNA (reciprocal monophyly)
 - ITS (high genetic distance as proposed by Mader et al.)



Obrigada!



Thanks!

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