

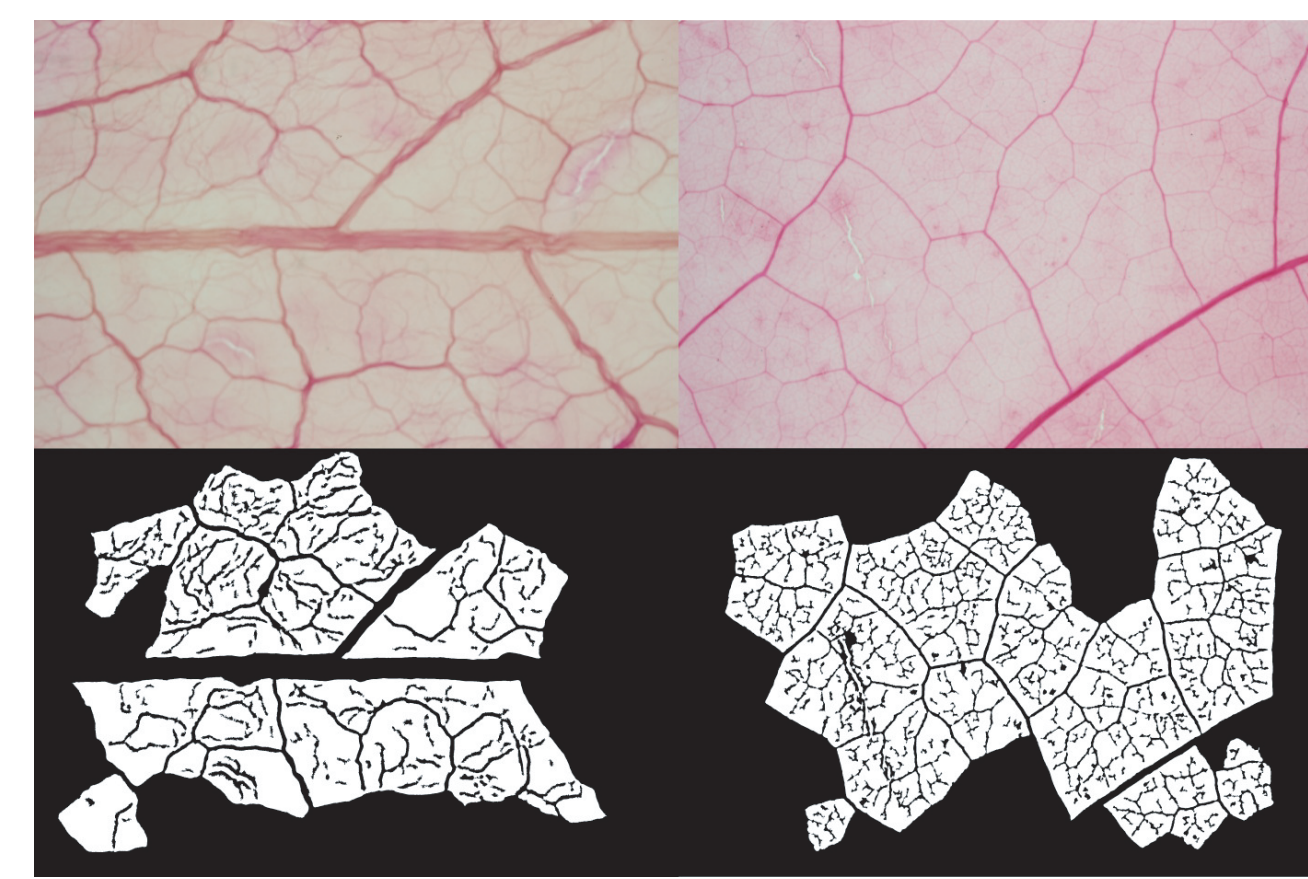
Disentangling ecological and phylogenetic signals in leaf venation patterns

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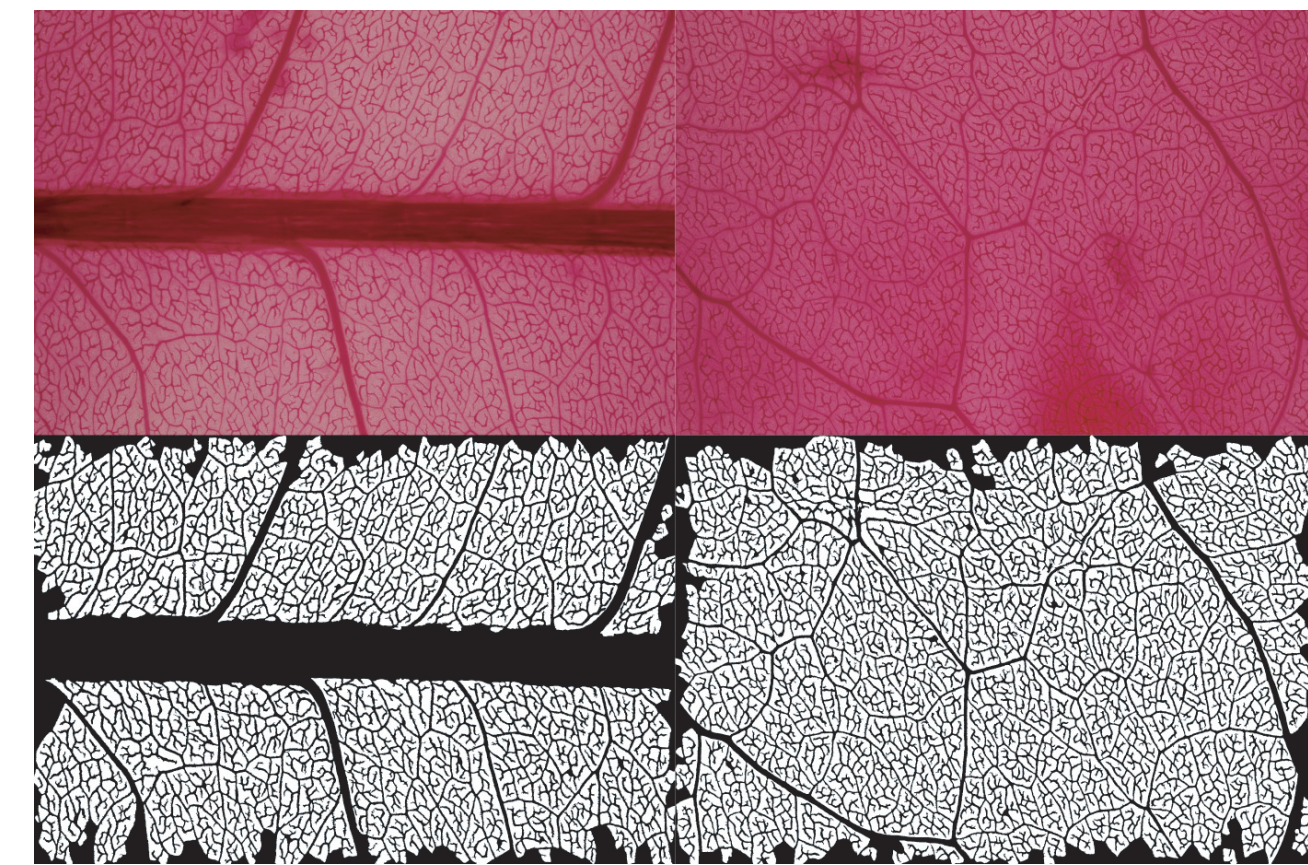
We automated the following measurements of each areole on photographs of cleared leaves of 120 species.



1



Unsatisfactory Images



Satisfactory Images

2

Aextoxicon punctatum
(Aextoxicaceae)
NCLC #: 2932, Phot. #: 10

Aextoxicon punctatum
(Aextoxicaceae)
NCLC #: 2932, Phot. #: 11

Sagittaria sp.
(Alismataceae)
NCLC #: 797, Phot. #: 14

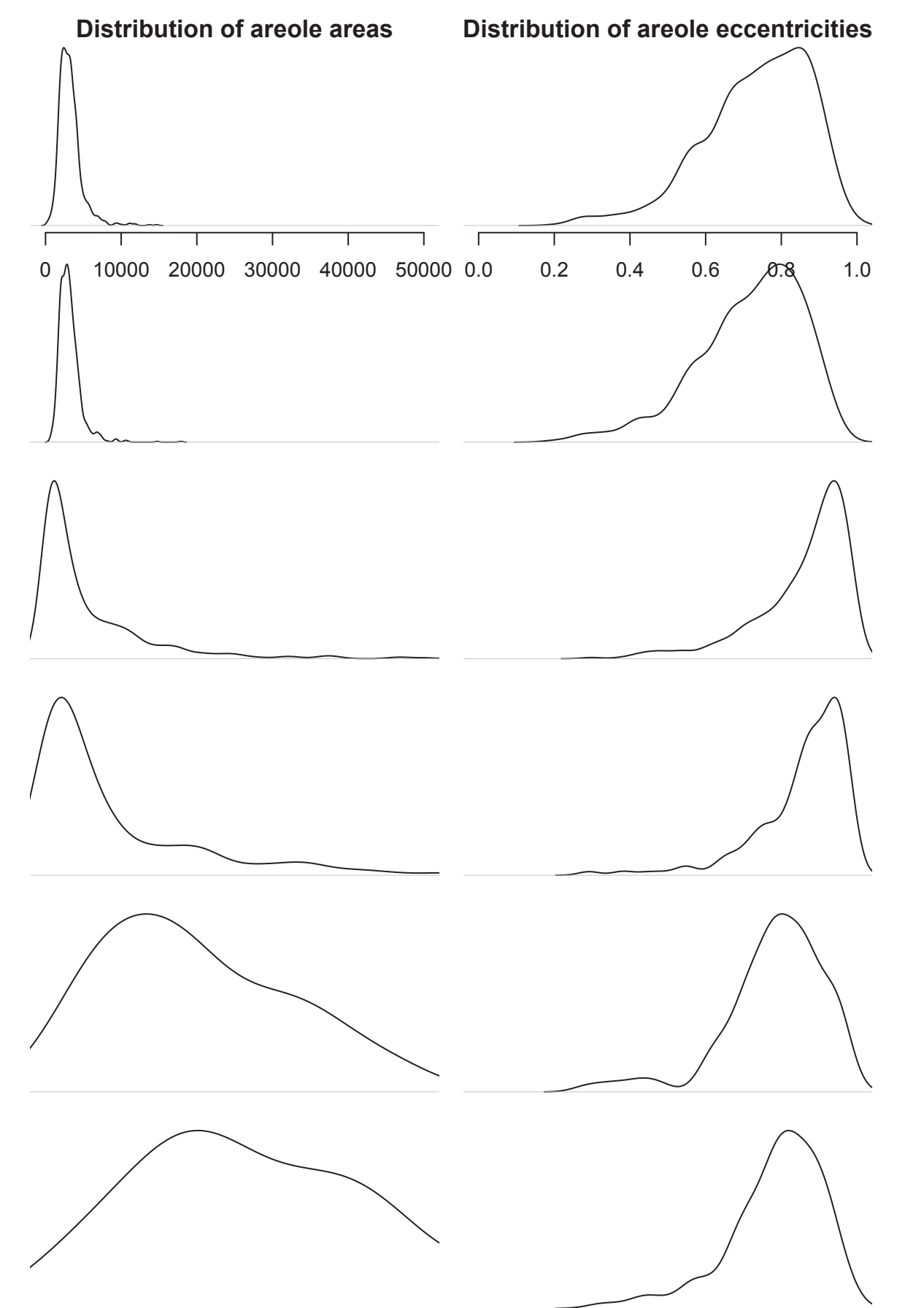
Sagittaria sp.
(Alismataceae)
NCLC #: 797, Phot. #: 15

Periophthalmea gauthierioides
(Alseuosmittiaceae)
NCLC #: 8418, Phot. #: 16

Periophthalmea gauthierioides
(Alseuosmittiaceae)
NCLC #: 8418, Phot. #: 17

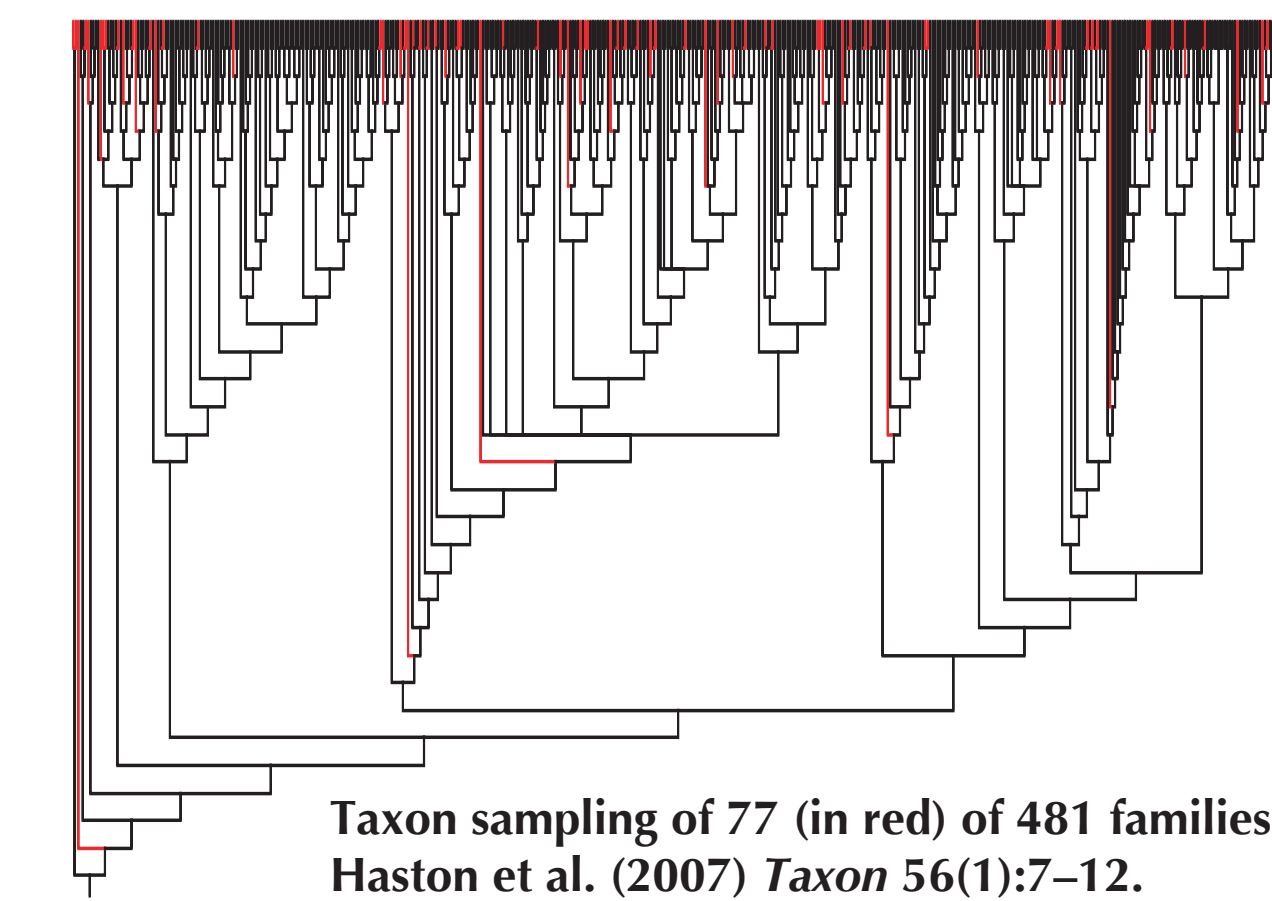
Examples of some different images...

3

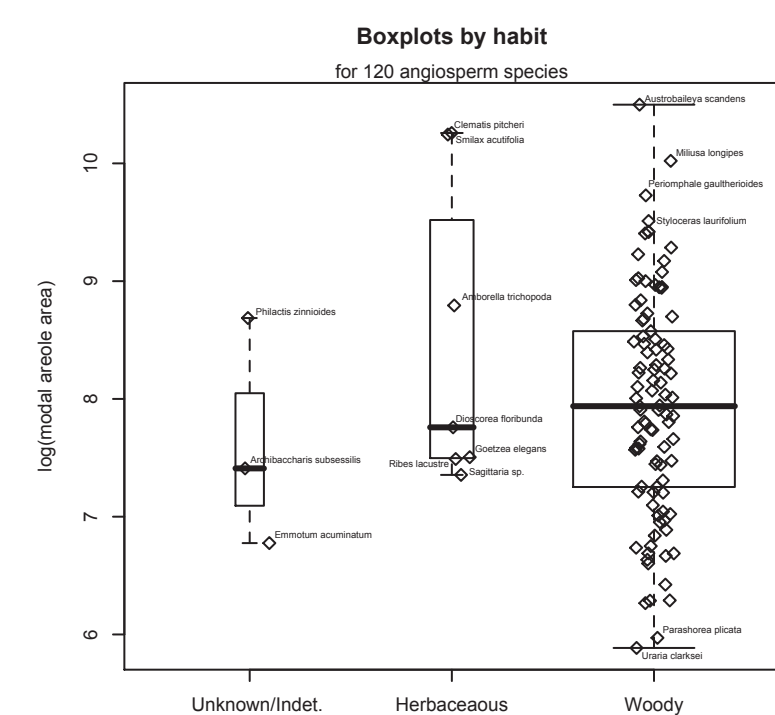


...with their associated areole measurements.

4

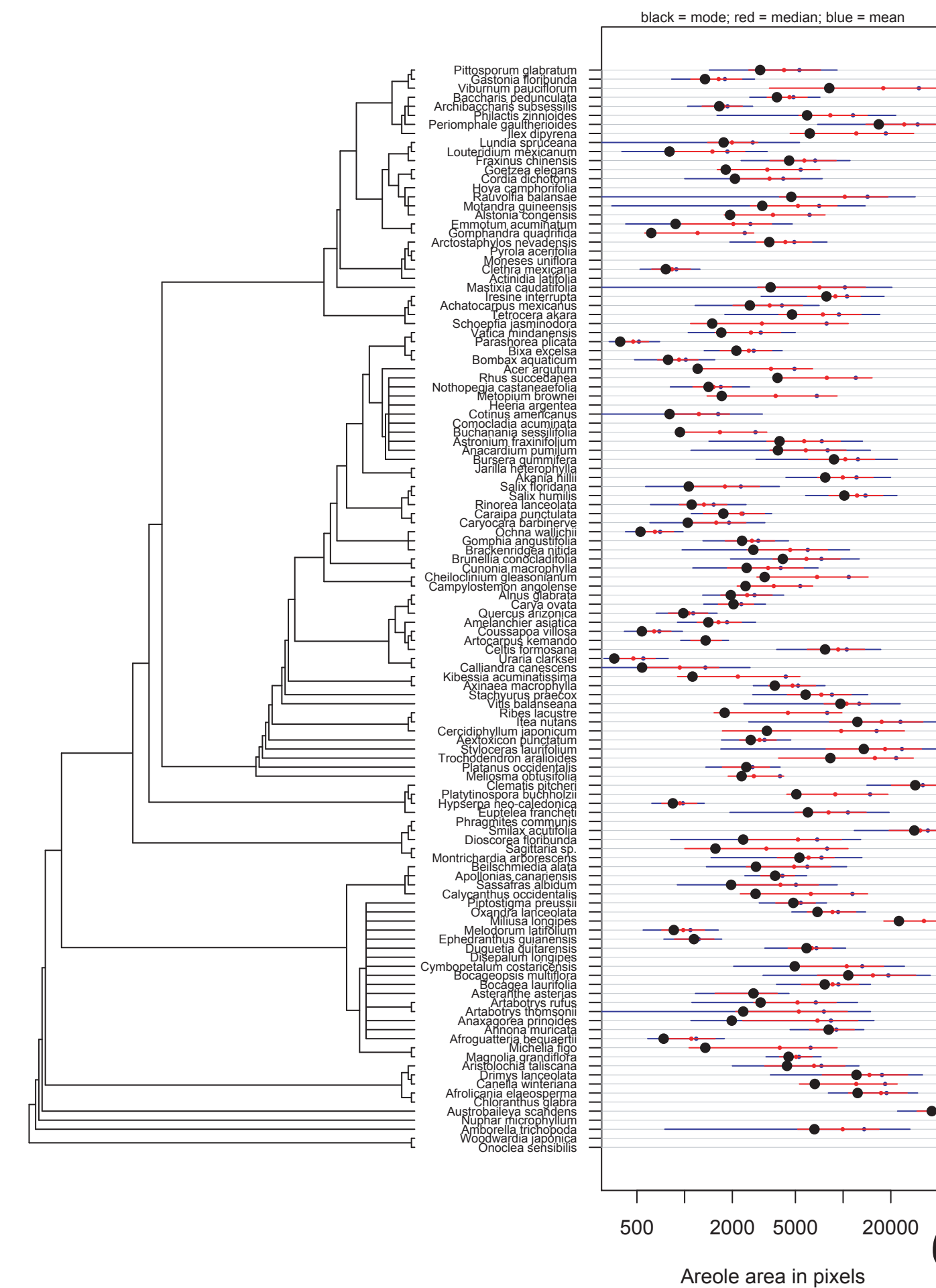


Taxon sampling of 77 (in red) of 481 families in Haston et al. (2007) *Taxon* 56(1):7-12.

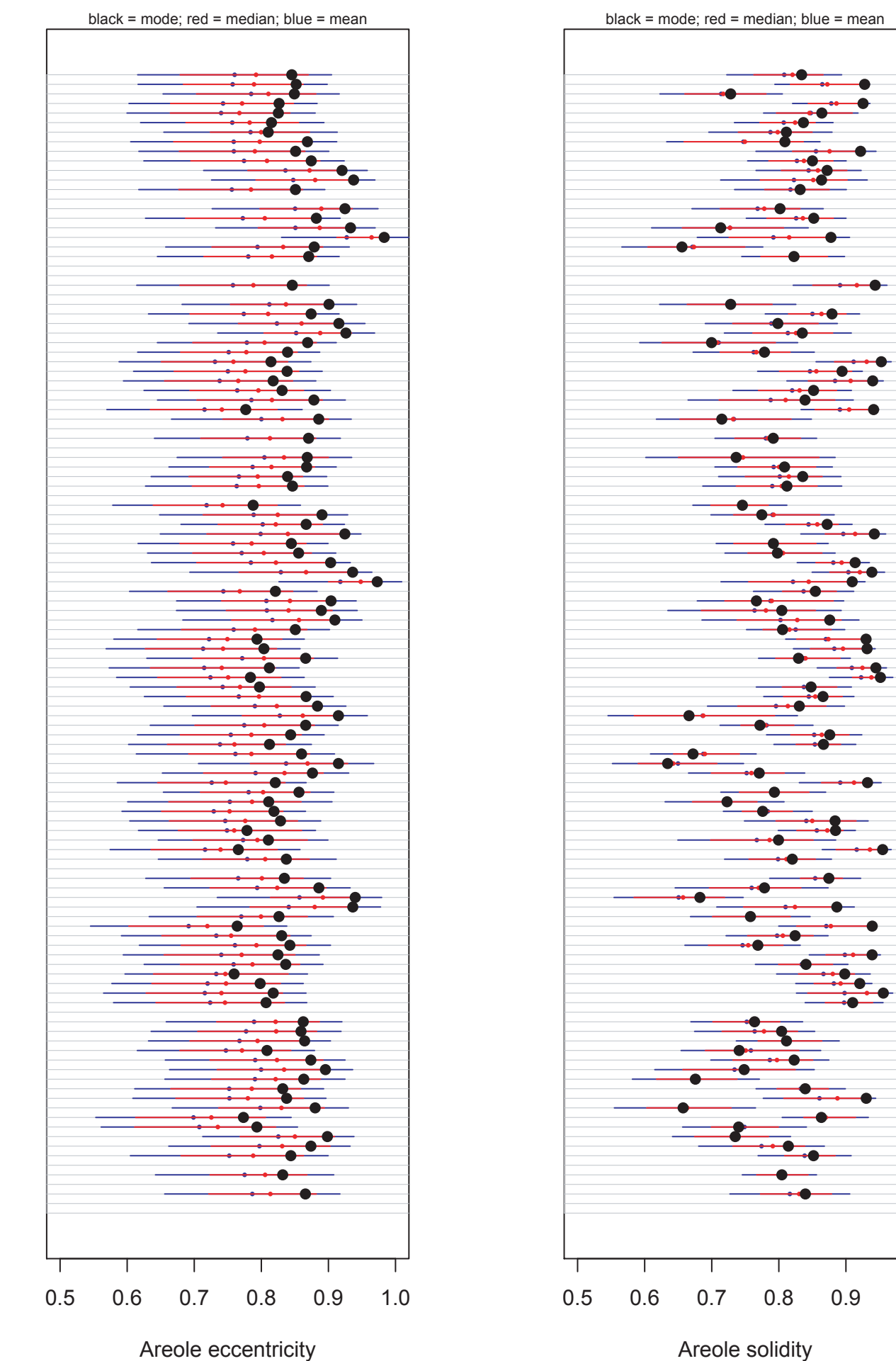


The seven herbaceous species we were able to sample do not have areoles significantly larger than woody species.

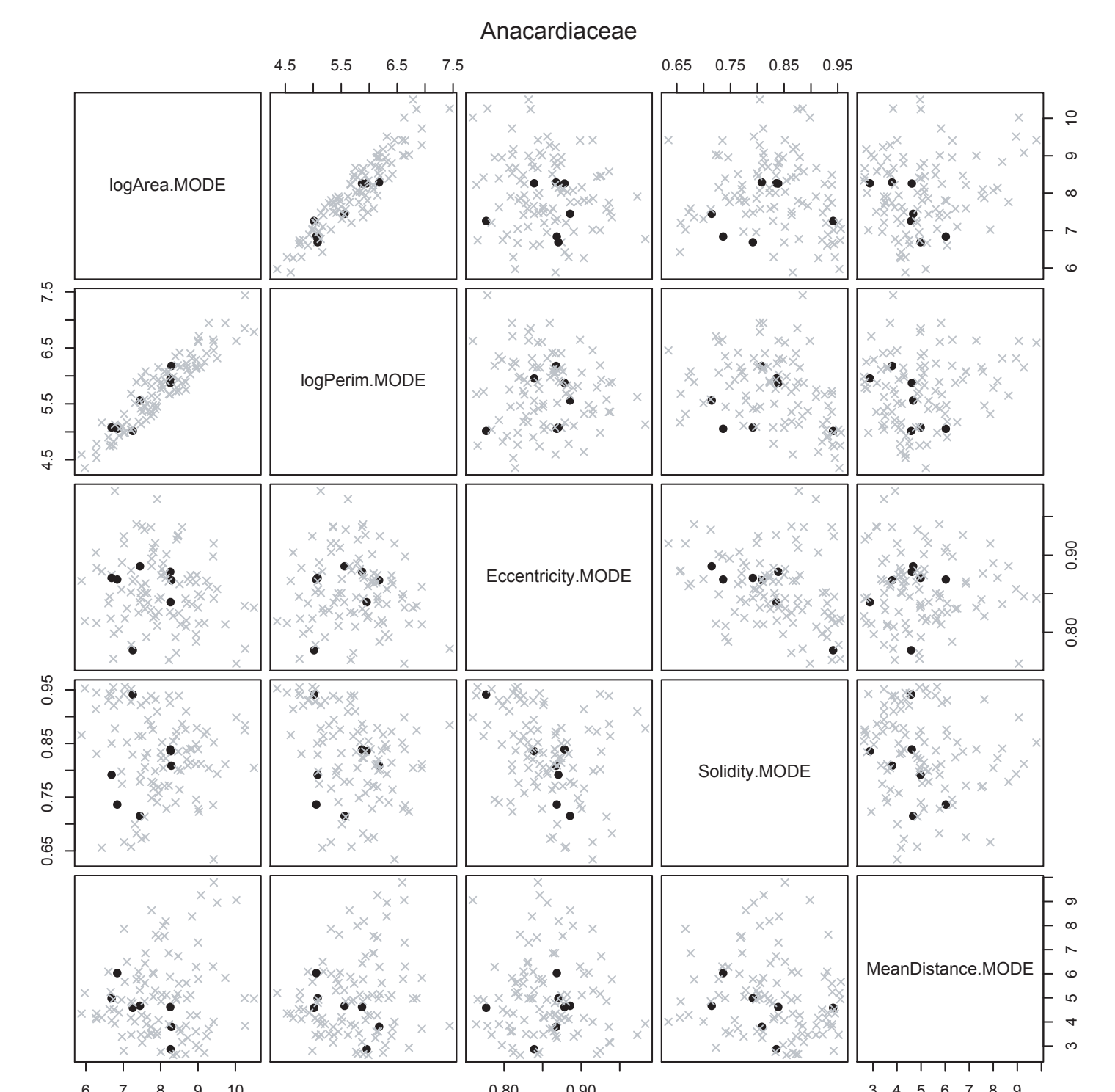
5



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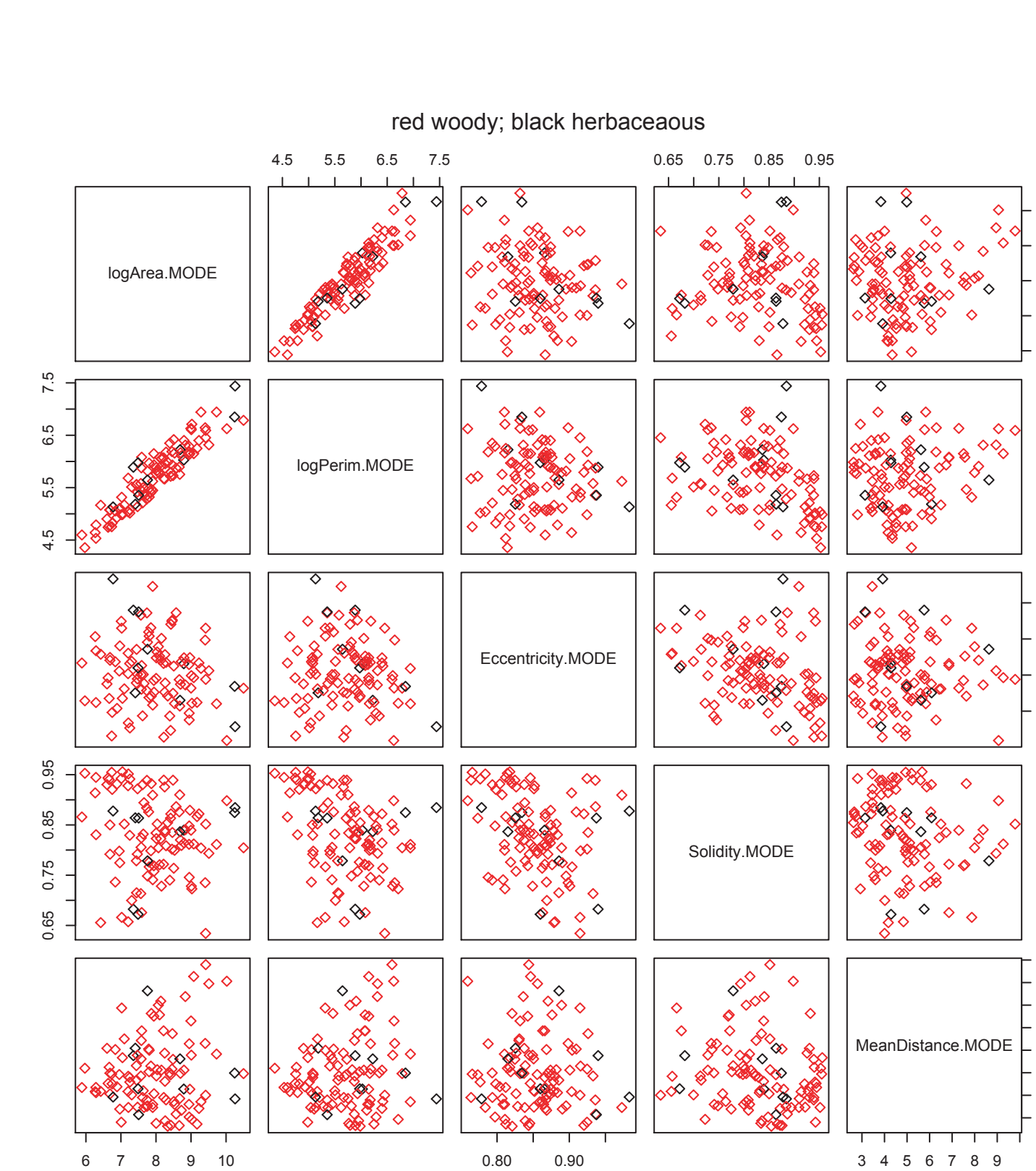


7



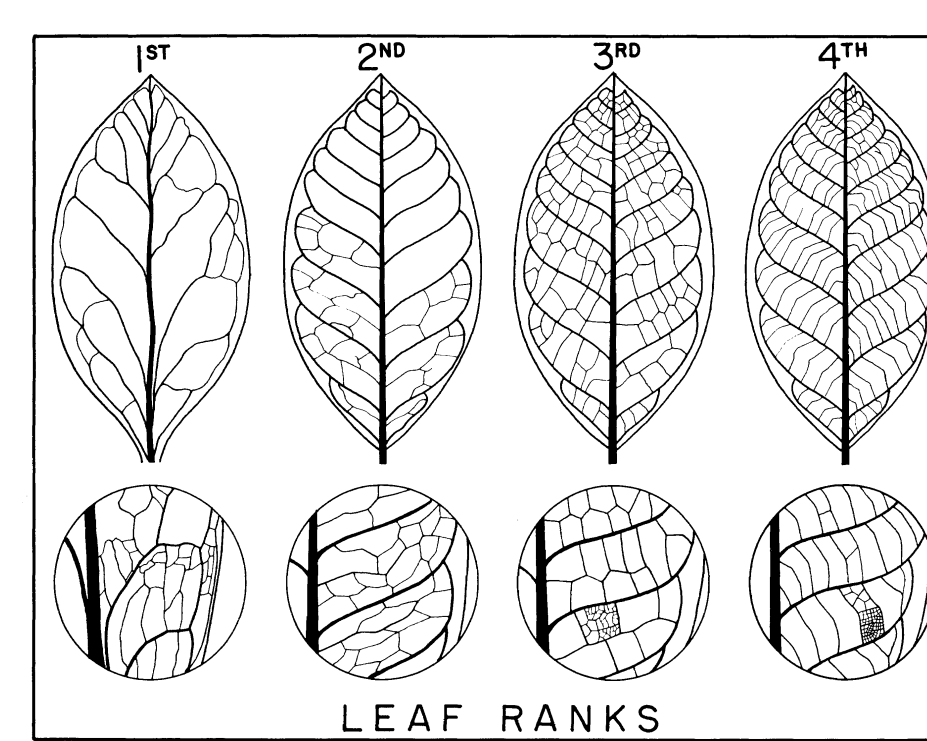
The within-family spread is a significant fraction of the overall spread for all variables measured. There do not seem to be obvious phylogenetic patterns evident above the level of family.

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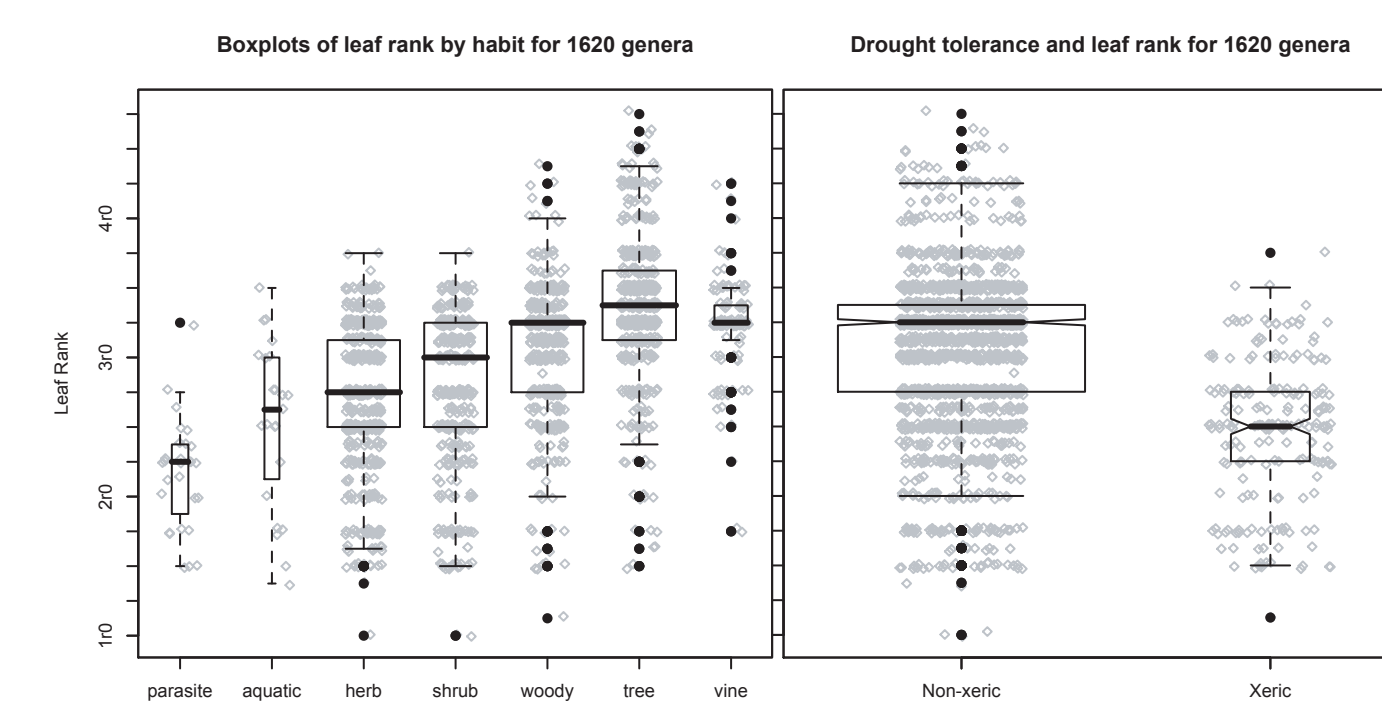
Herbaceous species do not clearly cluster when measured by any of the variables considered.

9



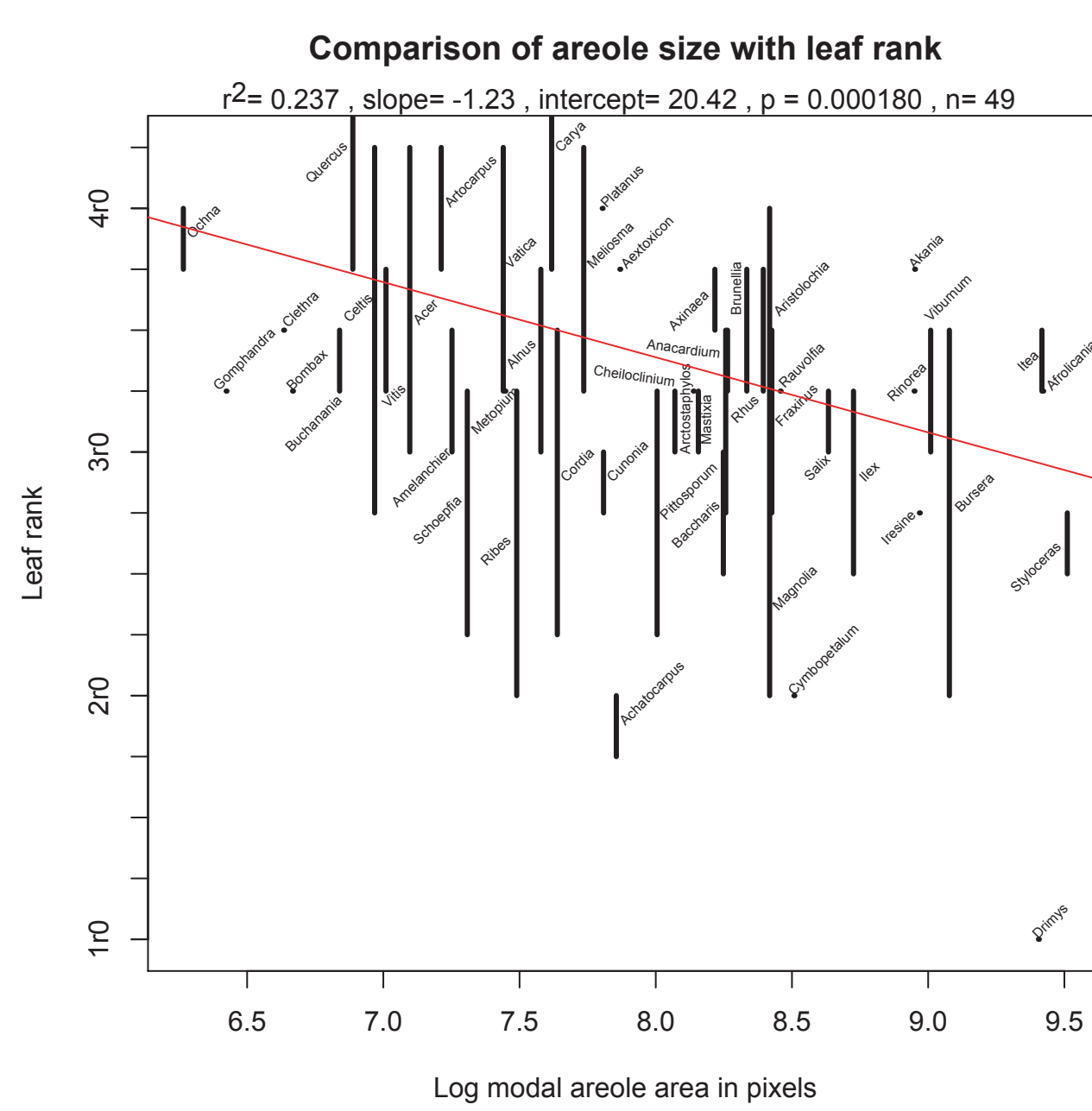
Leaf ranks provide a subjective, semi-quantitative method of sampling more genera than we have yet been able to measure explicitly.

Hickey, L. J. 1977. *Stratigraphy and Paleobotany of the Golden Valley Formation (Early Tertiary) of Western North Dakota GSA Memoirs 150.*



Genera with different growth forms and drought tolerances have significantly different leaf ranks.

10



There is a strong correlation between measured areole area and leaf rank. We therefore conclude that the lack of significant ecological or phylogenetic signal in our measurements to date is probably a result of insufficient taxon sampling. The final tile shows some of our areole size measurements superimposed on the images from which they were obtained. This shows how the mode and spread of the measured size distribution successfully capture a gestalt impression of areole sizes.

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