

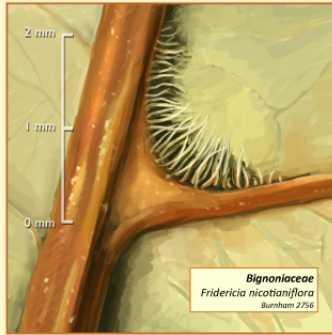
Phylogenetic signal in the Acarodomatia of Neotropical Lianas

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ABSTRACT: Acarodomatia represent mite dwellings that are often present in the axils of leaf veins of tropical plants. Despite their ecological importance, very little is still known about the biology, ecology, and phylogenetic history of the structures. We surveyed leaves of 21 families of neotropical lianas for acarodomatia and classified the domatia into several distinct categories in an effort to standardize terminology of leaf-borne acarodomatia. Overall, we found wide variation in the types of domatia encountered but a clear phylogenetic signal at the generic level. These results indicate that acarodomatia represent a great tool for field identification of vegetative samples to genus, and suggest an important role for acarodomatia in the diversification of tropical lianas as a whole.

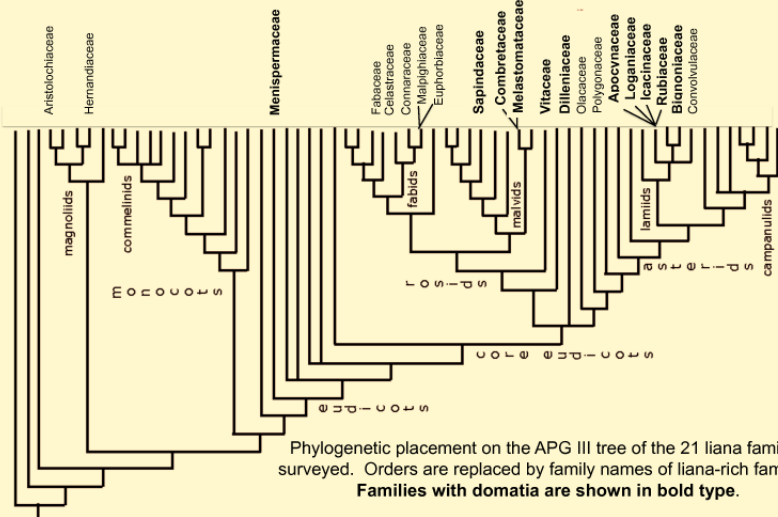
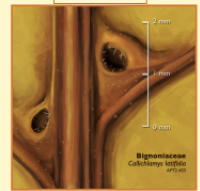
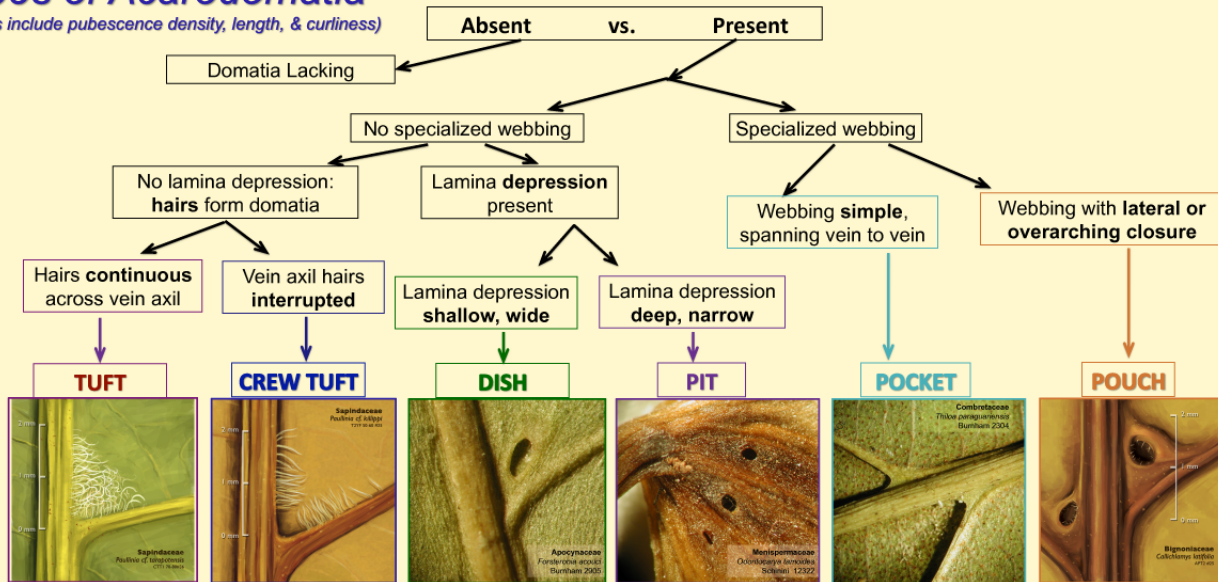


INTRODUCTION AND GOALS OF RESEARCH:

Acarodomatia provide habitation structures for mites, who serve a variety of roles in foliar micro-habitats of tropical plants. Domatia are constructed by the host plants, in a classical mutualism. Tropical lianas can be found in >90 plant families, comprising up to 25% of species diversity, but usually only 5-10% of the biomass of neotropical forests. Our research aimed to 1) characterize the types of acarodomatia found in neotropical climbing plants and to 2) determine whether domatia types are diagnostic of phylogenetic rank and affinity of lianas. Further, the characterization and use of acarodomatia in identification of difficult tropical species will open avenues of ecological research using sterile plant specimens.

Types of Acarodomatia

(subtypes include pubescence density, length, & curliness)



Phylogenetic placement on the APG III tree of the 21 liana families surveyed. Orders are replaced by family names of liana-rich families. Families with domatia are shown in bold type.

FAMILY	# Genera Examined	# Species Examined	# Specimens Examined	Main Domatia Type
Apocynaceae	16	56	327	Tuft, Pit, Dish
Aristolochiaceae	1	57	85	NONE
Bignoniaceae	20	104	700	Pocket, Tuft, Pit
Celastraceae	10	48	195	NONE
Combretaceae	2	23	96	Tuft, Pocket
Connaraceae	4	44	90	NONE
Convolvulaceae	15	87	162	NONE
Dilleniaceae	4	34	71	Tuft, None
Euphorbiaceae	4	46	138	NONE
Fabaceae	24	81	95	NONE
Hernandiaceae	1	4	10	NONE
Icacinaceae	4	5	11	Tuft, None
Loganiaceae	1	36	80	Tuft, None
Malpighiaceae	8	42	400	NONE
Melastomataceae	5	20	105	Tuft, None
Menispermaceae	13	43	265	Pocket, Pit
Oleaceae	1	1	10	NONE
Polygonaceae	3	16	20	NONE
Rubiaceae	16	49	113	Tuft Pouch
Sapindaceae	4	42	209	Tuft Pocket
Vitaceae	2	31	83	Tuft
TOTAL	158	869	3265	

Table of surveyed families. All species observed were from Central & South America represented by 1-25 specimens each. Note distribution of families lacking domatia in APG Phylogeny.

RESULTS / DISCUSSION: Within angiosperm families, domatia types are usually constant, or show only a pair of character states. Within genera, it is remarkable to find more than one domatia type. However, many genera bearing domatia also include some species with domatia lacking, suggesting that domatia presence and type may both be useful in species identifications. Tuft domatia are most common among lianescent angiosperms, with pockets second in frequency. Lamiids are particularly likely to bear domatia while Fabiids are not. The greatest intra-familial variation is found in the very diverse Bignoniaceae and Apocynaceae, whose genera differed from one another in domatia type, suggesting that mite protection has been consistently exploited in these two families. Diverse domatia types are found within relatively basal Ranunculales (Menispermaceae) as well as in the derived Asterids. We found that species with abaxially pubescent laminae are less likely to bear domatia, possibly because mites can find protection under the lamina hair.