The *Anthurium* flora of Carchí Province, Ecuador

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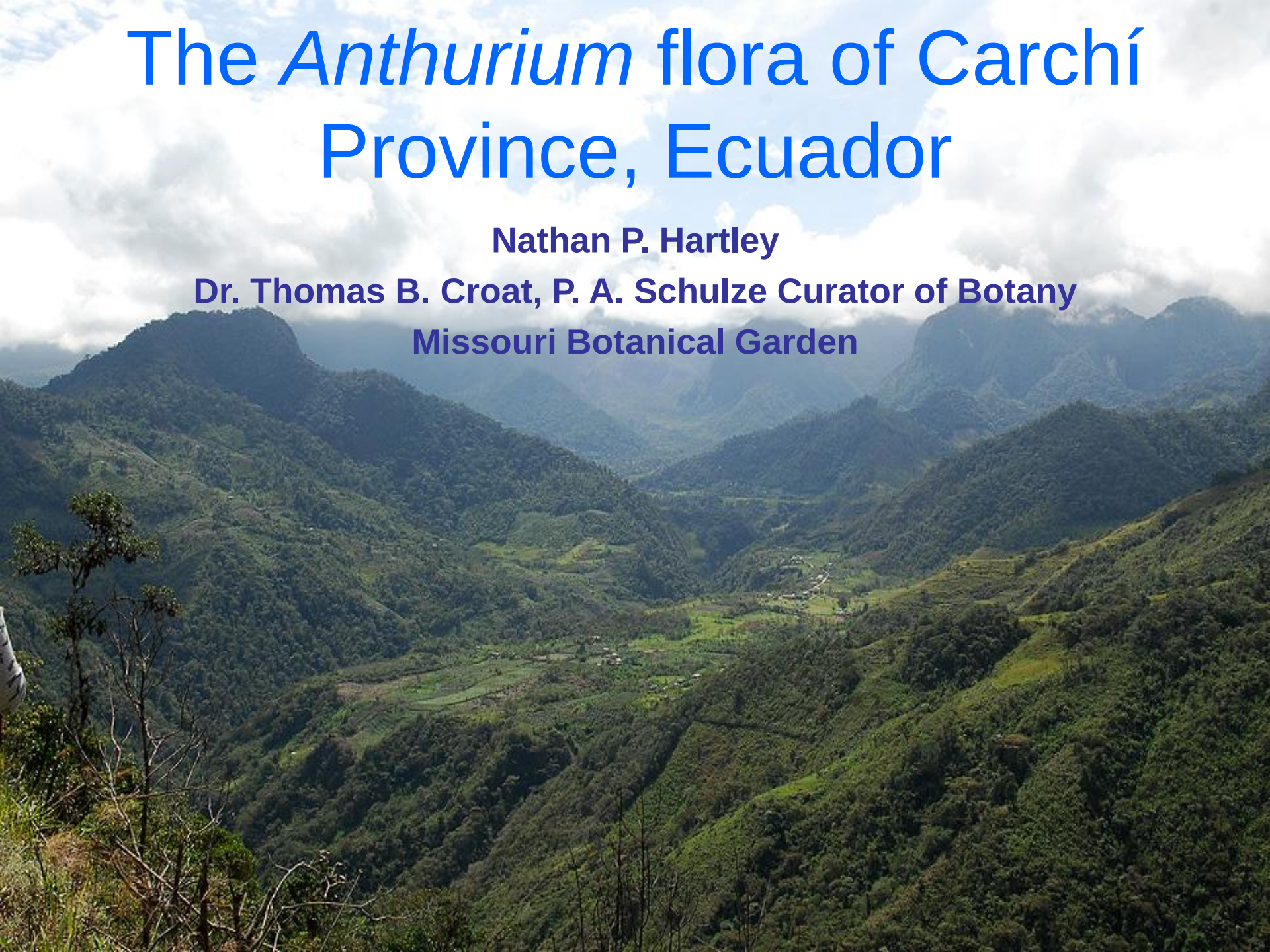


Objective

- **To identify and describe as many *Anthurium* species from Carchí Province (NW Ecuador) as possible in 10 weeks.**

Tom Croat

- Life-long affiliation with plants
- 48 years at MBG
- 2,000 new species
- 104,647 plant collections
- 1 of 4 people to collect over 100,000 plant specimens
- Cultivator of the world's largest aroid collection
- >200 publications
- Countless adventures and mishaps all over the globe in 65 countries

There are direct links from all terminal taxa and all internal nodes to the relevant page of the characterizations.

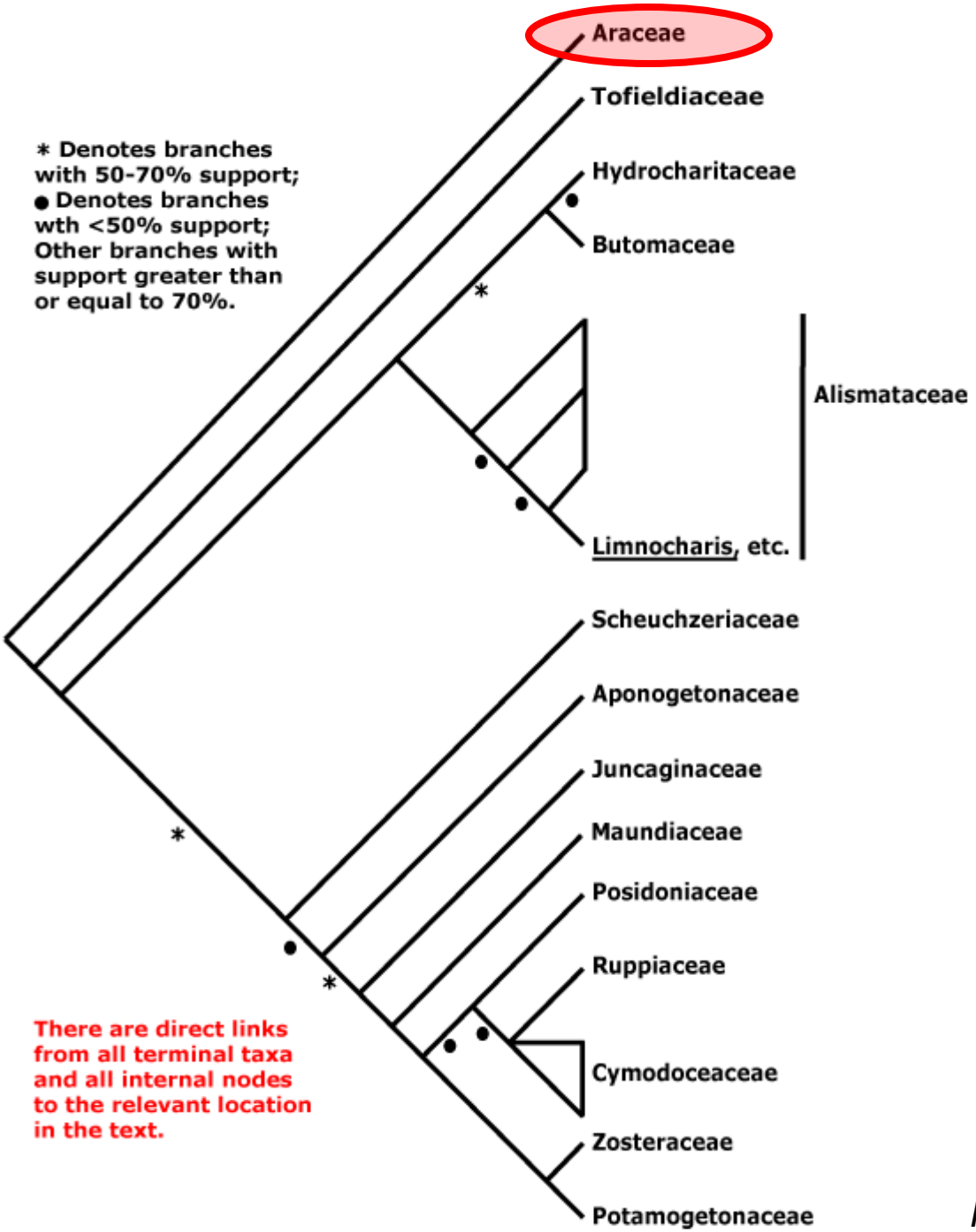
Tree icons link to or will link to tree for each order.

* = nodes with rather weak support

Link to Model Organism Tree

P.F. Stevens 2012

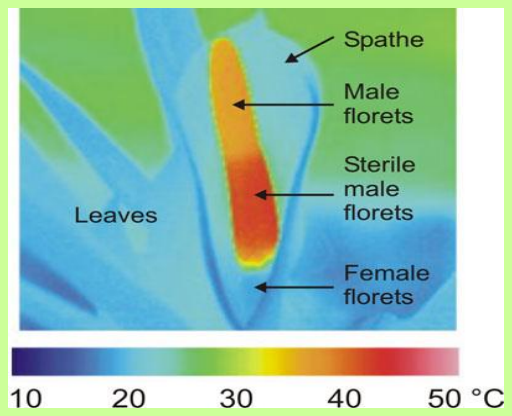
Alismatales

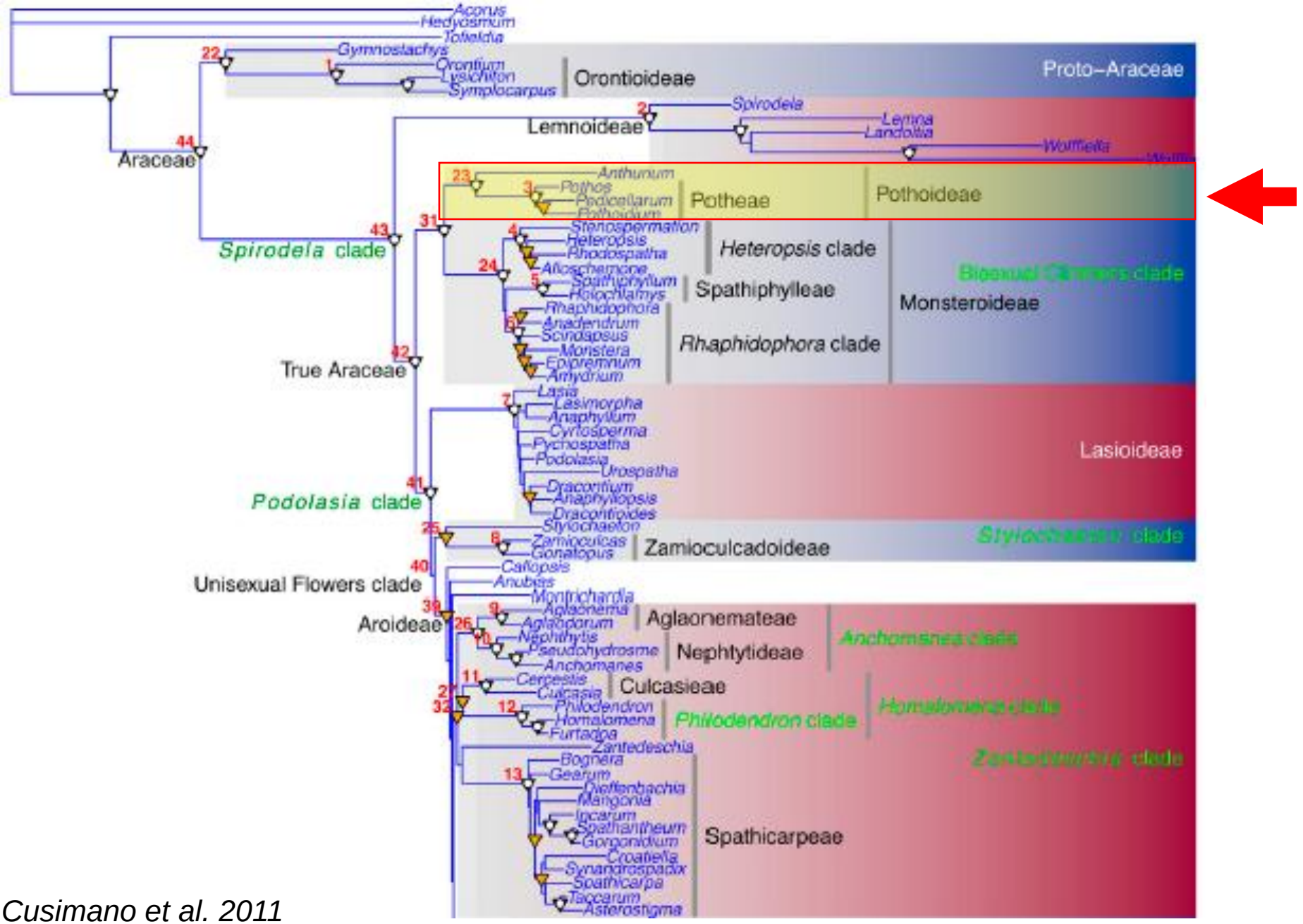


P.F. Stevens 2012

Araceae

- **117 genera, ~ 4,095 ssp. (est. ~ 5,422 and counting)**
- **Symplesiomorphic monocots**
  - Reticulate venation
  - Sympodial growth habit
  - 2-3 merous flowers densely spiraled around a central stalk (spadix)
  - Conspicuous inflorescence bract (spathe)
  - Berries





Cusimano et al. 2011

Anthurium Schott

- Largest genus in Araceae
- 905 published species
- ~1,300 described species
- Central and South America
- Highly endemic
- At the Sectional level

A. bakeri Hook.f.

A. peltigerum Sodiro

A. polyschistum R.E.Schult.& Idrobo

A. bogotense Schott

Carchí Province
Ecuador

Páramo del Ángel

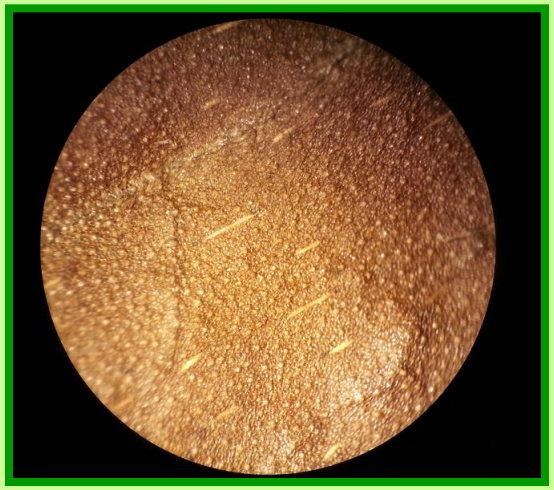
Espeletia sp.

2012 Colombia-Ecuador Expedition Crew

How do you identify a new species?

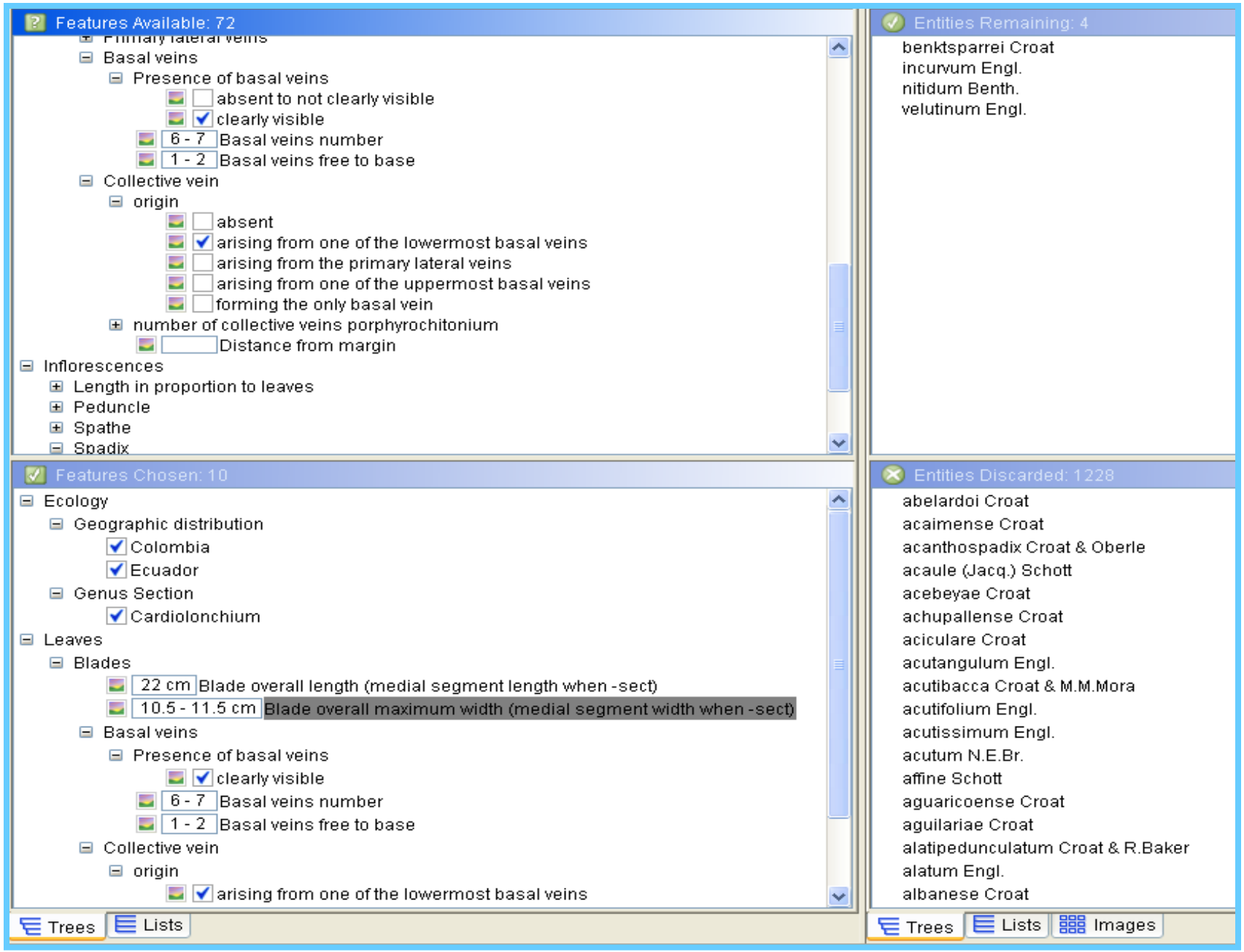
- Group specimens based on section, gestalt, and conservative characters
- Confirm tentative groupings with expert
- Character analysis in Lucid *Anthurium* key
- Compare specimen with most similar species
- Distinguish differences between specimens
- Morphometric analysis of novel specimen(s)
- Begin describing!

Grouping, I.D.ing, Comparing & Analyzing



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1																		
2	Coll. #	Blade Lnth	Blade Wdth	L-W Ratio	Bld./Pet. Ratio	Pet. Lnth	Leaf Lgth	Sinus Depth	Sinus Width	Ant. Lobe	Post. Lobe Lnth	Post. Lobe Wdth	Ped. Lnth	Spathe Lnth	Infll. Lgth	Spathe Wdth	Ped./Spth. Ratio	Spdx Lnth
3																		
4	A. hartleyi	38.5	31	1.241935	0.506578947	76	104	10	3	28	14.5	14.5	30.5	9.5	40	9.5	3.210526316	5.2
5	1	35.5	28.5	1.245614	0.420118343	84.5	110	8.5	1.5	25.5	12.5	12.5	30	9.5	39.5	6	3.157894737	5.5
6	2	23.5	22	1.068182	0.412280702	57	74	6	3.5	17	10.5	10						
7	3	31.5	27	1.166667	0.355932203	88.5	113.5	7	4	25	11	12						
8	4	32.5	25.5	1.27451	0.481481481	67.5	92	7	1.1	24.5	12	12						
9	5	36.5	28	1.303571	0.459119497	79.5	105.5			26	13.5	14.25	25..5	9	34.5	6	2.833333333	
10	7	34	28	1.214286	0.459459459	74	98	9		24	13	14						
11	8	36	30.5	1.180328	0.371134021	97	123	8.5	0.5	26	14	14.5						
12	9	33	26.5	1.245283	0.559322034	59	83	8.5	1	24	12.5	12.5						
13	Para 1	47.5	40	1.1875	0.688405797	69	102			33	18.5	19	38	8.5	46.5	7	4.470588235	6.5
14	Para 2	53.5	36	1.486111	0.672955975	79.5	116.5			37	19.5	18	39					
15	Para 3	15	11.75	1.276596	0.666666667	22.5	34	3	0.4	11.5	5	5.5						
16						36.5												
17						50												
18																		
19																		
20																		
21																		
22	Maximum	53.5	40	1.486111	0.688405797	97	123	10	4	37	19.5	19	39	9.5	46.5	9.5	4.470588235	6.5
23	Minimum	15	11.75	1.068182	0.355932203	22.5	34	3	0.4	11.5	5	5.5	30	8.5	34.5	6	2.833333333	5.2
24	Average	34.75	27.895833	1.240882	0.504454594	67.17857143	96.2917	7.5	1.875	25.125	13.04166667	13.22916667	34.375	9.125	40.125	7.125	3.418085655	5.733333

A Closer Look at the Lucid *Anthurium* Key….



Describing a New Species

- Type information

Anthurium tufinoense Croat, Ecuador. Carchi. Along road between El Chical and Tulcán, 34.2 km E of El Chical, 22.1 km E of Maldonado, 0.8 km E of El Laurel, 46.9 km W of Tufiño, 3000 m, 00°52'48"N, 78°02'24"W, 10 August 2004, *T. B. Croat & G. Ferry 93195* (holotype, MO-5885123-25; isotypes, AAU, B, CAS, COL, F, HUA, K, NY, S, SEL, US, USM).

- Description

- Life zone(s)

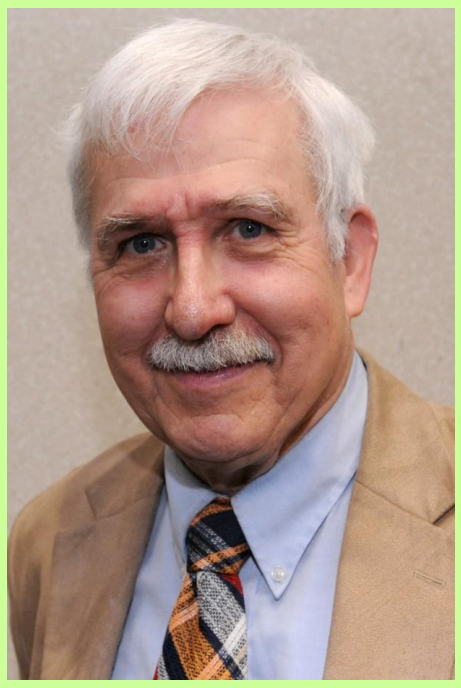
Anthurium tufinoense is known only Ecuador in Carchi Province at 3000 m in a *Lower montane wet forest* life zone.

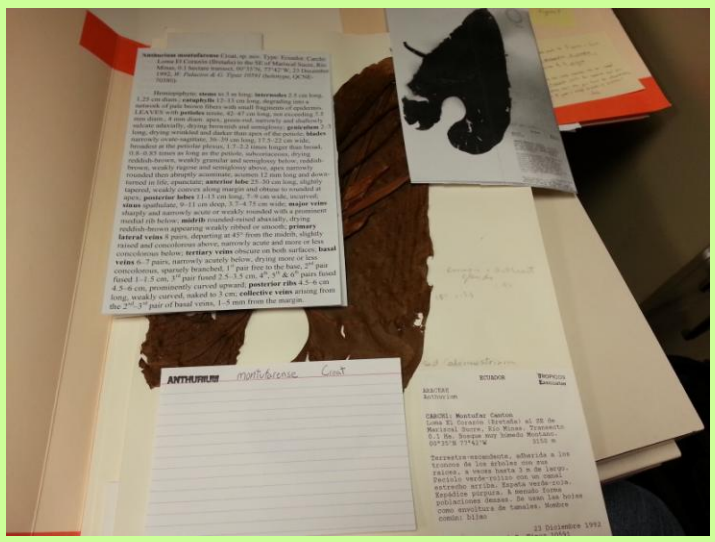
- Discussion

The species is named for the type locality near Tufiño a village located between Maldonado and Tulcan in Carchi Province.

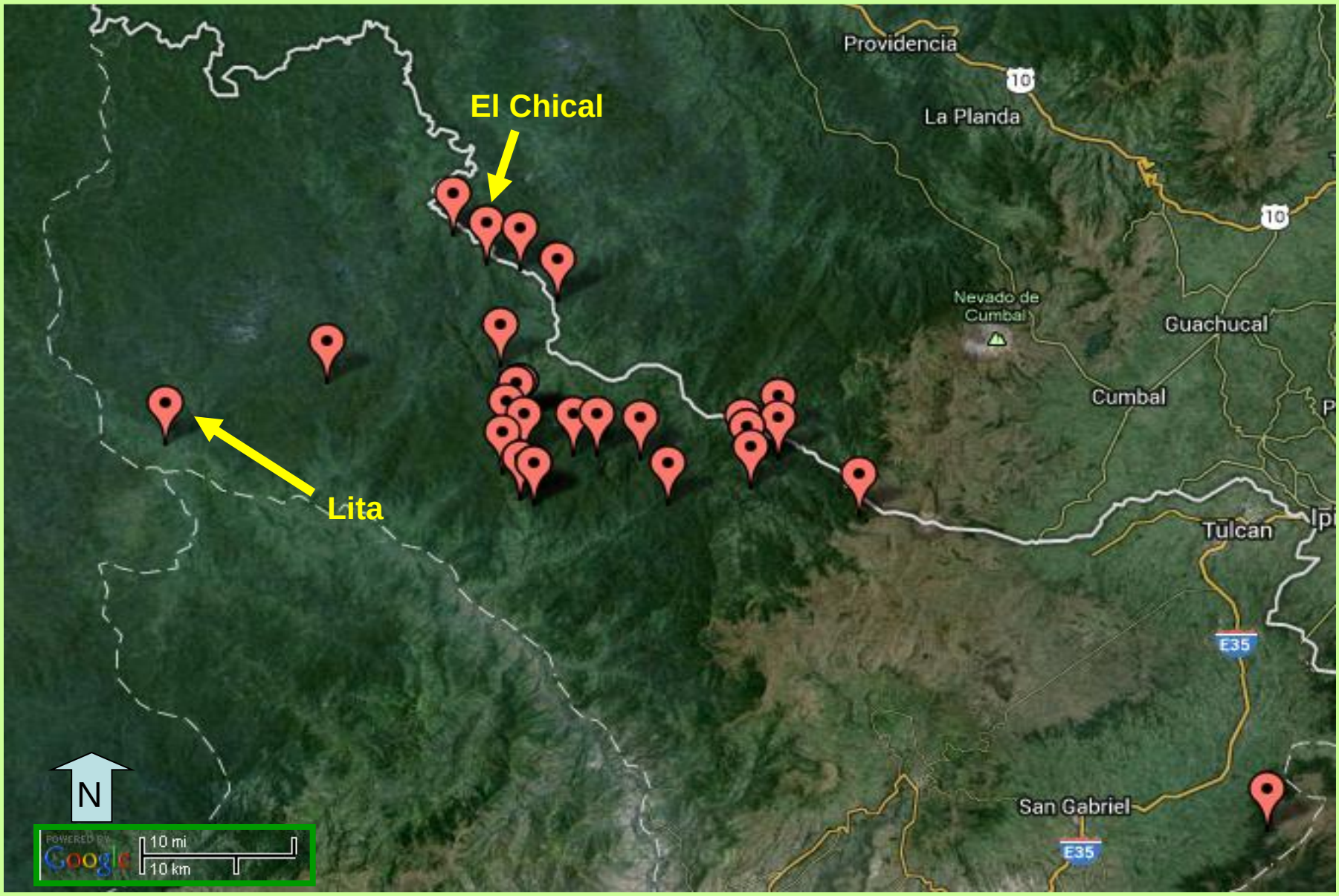
- Ex siccatae

Review, Processing & Filing



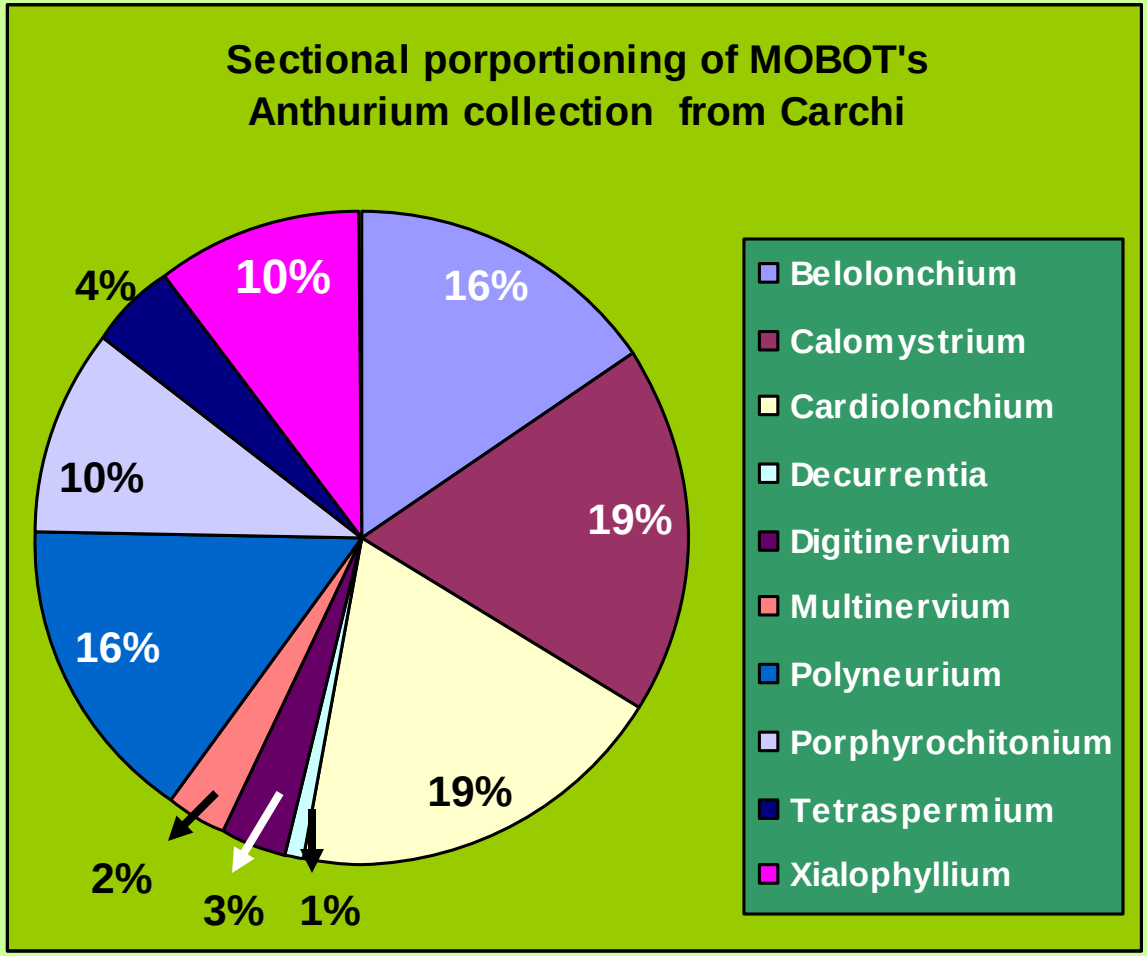


Distribution of Described Species



Breakdown by section

- 4 sections account for 70% of species
- 10 out of 18 sections represented
- *Decurrentia* is the most depauperate
- *Cardiolonchium* is the most species rich (by 1 taxa)

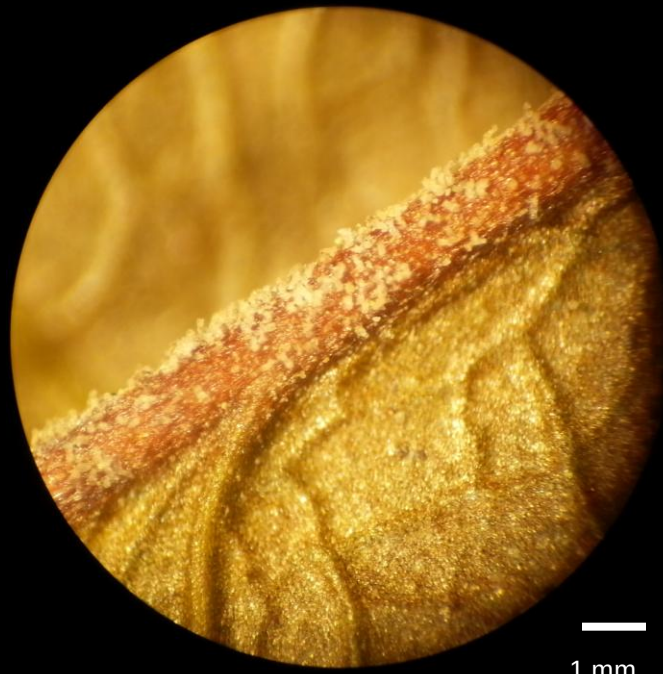


Belolonchium

- Short internodes
- Cataphylls persisting as a network of fibers
- Spathe hooding with a pendent spadix
- Concave lateral margins
- Granular or wing-ribbed major veins

A. granulinervium Croat sp. nov.

- Granular-puberulent major veins
- Sulcate and distinctly ribbed petiole
- Broadly concave anterior lobe



Newly described *Belolonchiums*

- *A. aspericostum* Croat
- *A. chilmabajense* Croat
- *A. erubescataphyllum* Croat
- *A. flabellatum* Croat
- *A. hippocrepiformum* Croat
- *A. latesinuatum* Croat
- *A. montufarense* Croat
- *A. pleipleurum* Croat
- *A. rawlinsii* Croat
- *A. teretiusculum* Croat
- *A. tufiñoense* Croat

Calomystrium

- Cataphylls persisting completely intact
- Blades often dark-punctate and short pale-lineate
- Petioles usually terete
- Spadix and spathe usually colorful
- odorous inflorescence

Anthurium andreanum Linden

Newly described *Calomystriums*

- *A. gualpimedense* Croat
- *A. hartleyi* Croat
- *A. longipedical* Croat
- *A. rotunditriangulum* Croat

Newly described *Cardiolonchiums*

- *A. atrinspergendum Croat*
- *A. granulatepalum* Croat
- *A. inopinatum* Croat
- *A. tertiprominens* Croat


Newly described *Porphyrochitonium*
A. penasense Croat

Identified Species

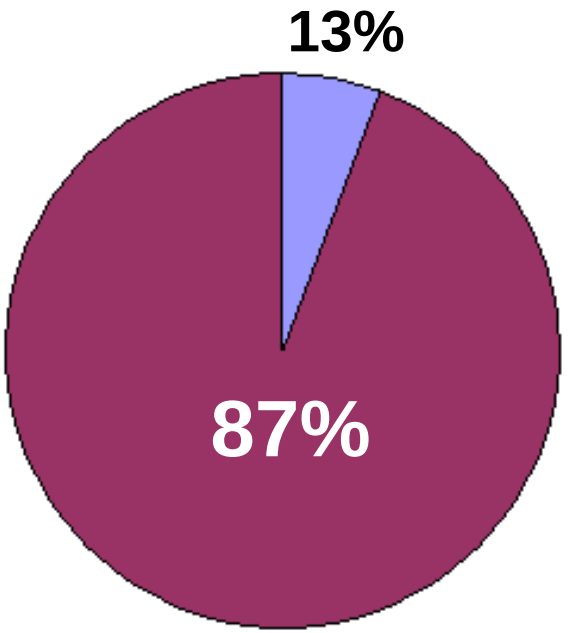
- *A. cymbispathum* Sodiro (*Belol*.)
- *A. dolichostachyum* Sodiro (*Cardio*.)
- *A. giganteum* Engl. (*Belol*.)
- *A. pluviaticum* R.E. Shultes (Cardio)
- *A. teisheri* Croat (*Belol*.)
- *A. trishafrankiae* Croat (*Cardio*.)
- *A. versicolor* Sodiro (*Cardio*.)

Estimates of Progress

Section	# of described species	# of identified species	% of section completed
Belolonchium	11	3	43.75
Calomystrium	4	1	13.16
Cardiolonchium	3	3	15.38
Decurentia	0	0	0
Digitinervium	0	0	0
Multinervium	0	0	0
Polyneurium	0	0	0
Porphyrochitonium	1	1	9.52
Tetraspermium	0	1	11.11
Xialophyllium	0	0	0

Future Directions

- 2013 expedition
- Publish new taxa
- Araceae flora of Carchí



Thank you!

- **Dr. David Bogler**
- **Dr. Tom Croat**
- **Justin Zweck**
- **National Science Foundation**
- **Missouri Botanical Garden**
- **Steve Aylward**
- **Carla Kostelac**
- **The Croat Lab Volunteers**
- **Ron Liesner**
- **Peter Stevens**
- **Steve Wolff**
- **2013 MBG REU Cohort**

¿Questions?