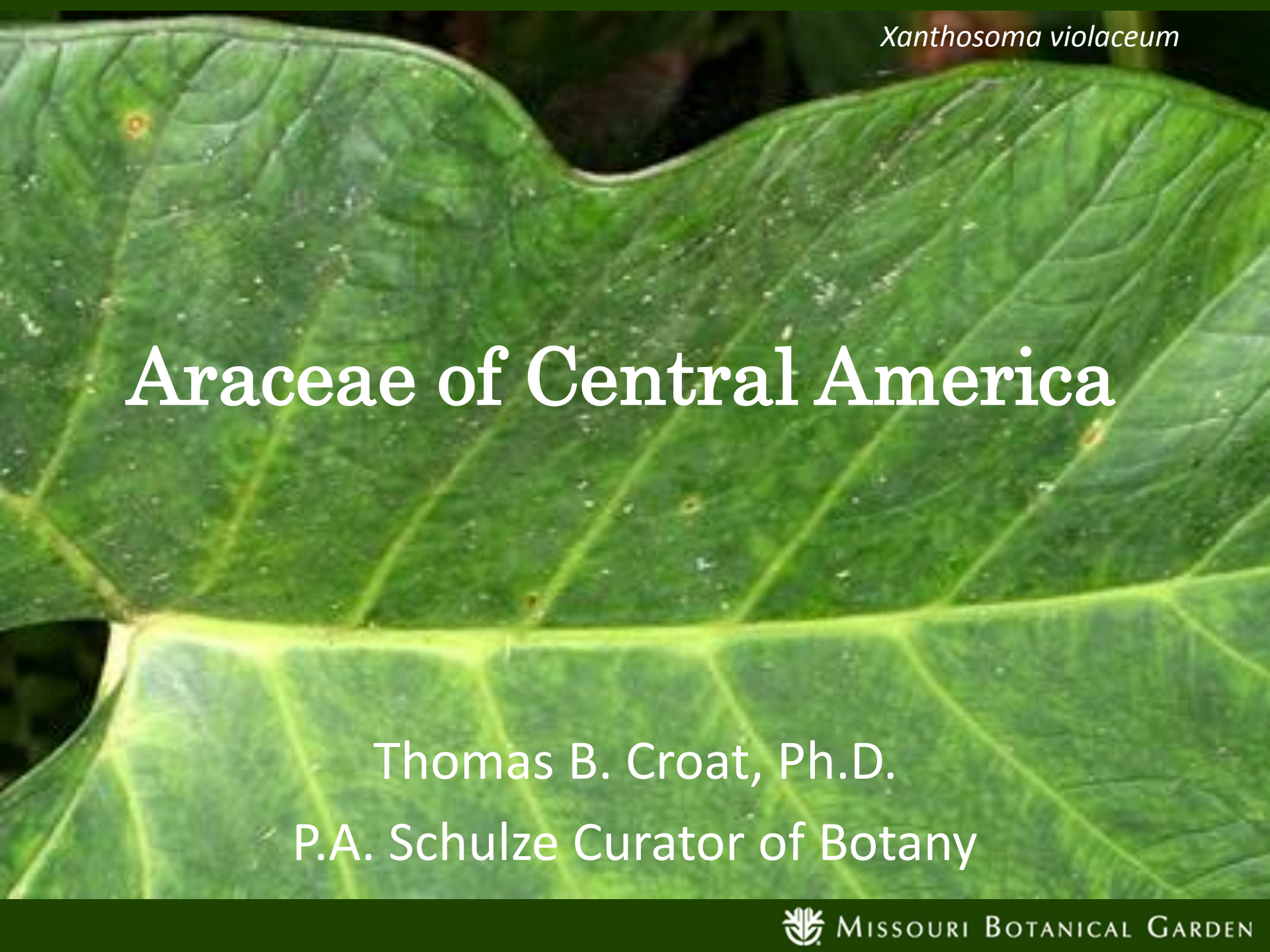



# Araceae of Central America

Thomas B. Croat, Ph.D.

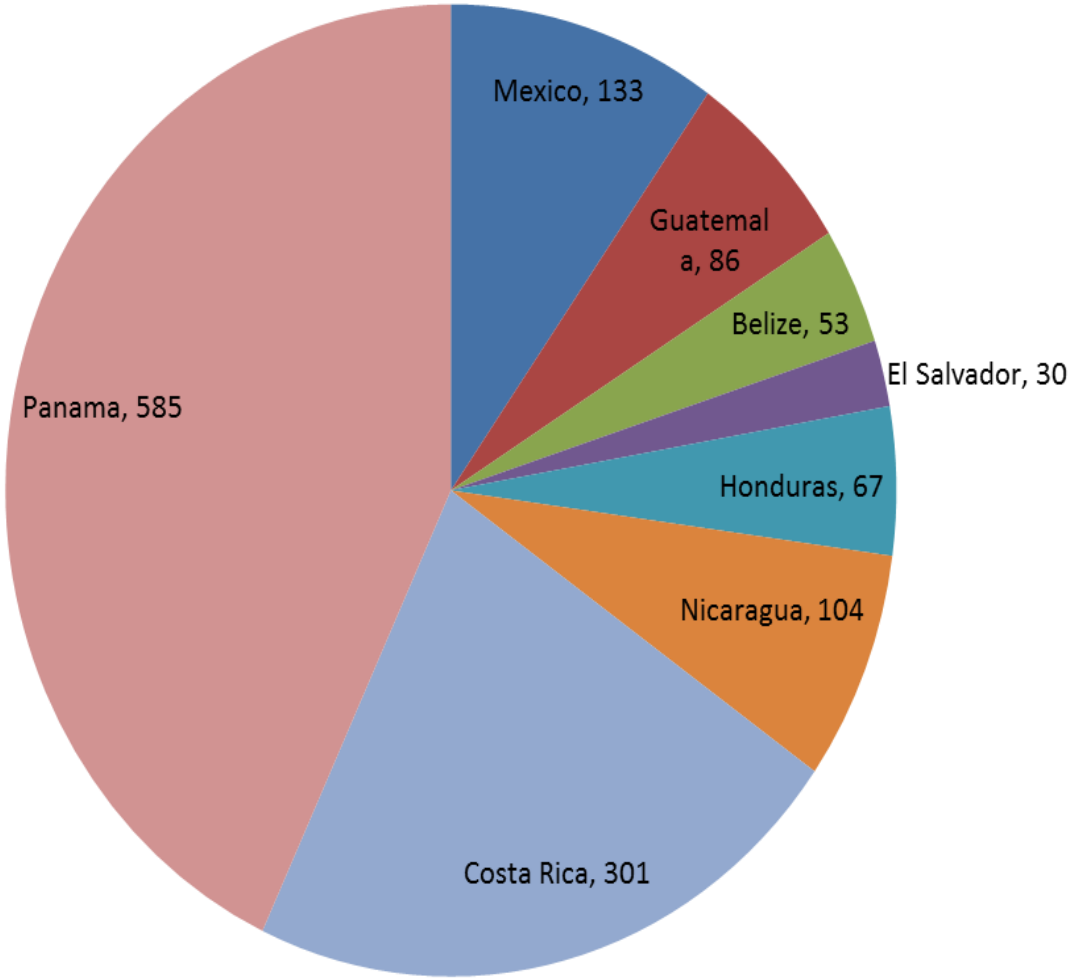
P.A. Schulze Curator of Botany


# General Statistics

- Total Genera 25
- Total Native Genera 22
- Total Species 732
- Total Taxa 768

# Number of species per country

- Mexico 133
- Guatemala 86
- Belize 53
- El Salvador 30
- Honduras 67
- Nicaragua 104
- Costa Rica 301
- Panama 585




ADJACENT AREAS

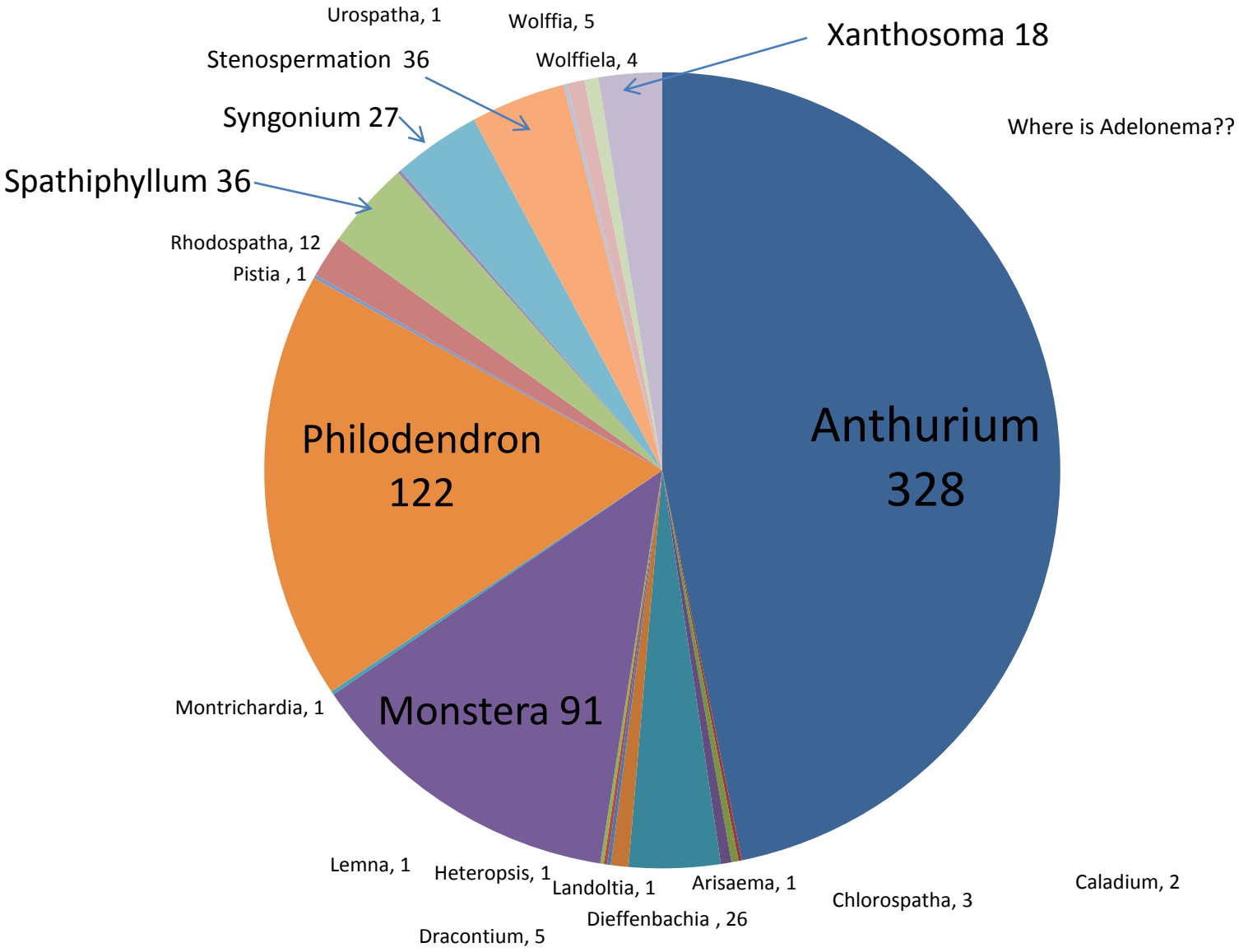
Colombia 809 species

North America 10 species

# General features of Central American Araceae

- General increase in number of species from Mexico eastward and southward to Panama
- Moderate endemism in Mexico, minimal endemism in Middle America, high endemism in Costa Rica and Panama.
- Discovery of new species expected in eastern Costa Rica and Atlantic slope of Panama and in eastern Panama (Darién)

# Species per Genus in Central America



# Rank in order of size of Genera in Central America

| | | | |
|---|---|---|---|
| Anthurium | 328 | Wolffia | 5 |
| Philodendron | 122 | Wolffiela | 4 |
| Monstera | 91 | Chlorospatha | 3 |
| Syngonium | 27 | Caladium | 2 |
| Dieffenbachia | 26 | Arisaema | 1 |
| Spathiphyllum | 25 | Heteropsis | 1 |
| Stenospermation | 36 | Landoltia | 1 |
| Xanthosoma | 18 | Lemna | 1 |
| Rhodospatha | 12 | Montrichardia | 1 |
| Adelonema | 7 | Pistia | 1 |
| Dracontium | 5 | Spirodela | 1 |
| | | Urospatha | 1 |

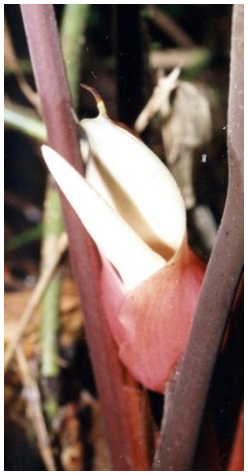
# Adelonema
# 7 species

Characterized by: Terrestrial habit, short internodes, frequently spiny or pubescent petioles, close parallel minor veins, anise-flavored scent, spathe constricted, reclosing after anthesis, unisexual flowers, frequent presence of staminodea among pistils

*A.* peltatum

A. hammelii

A. wallisii



A. picturatum

A. panamense

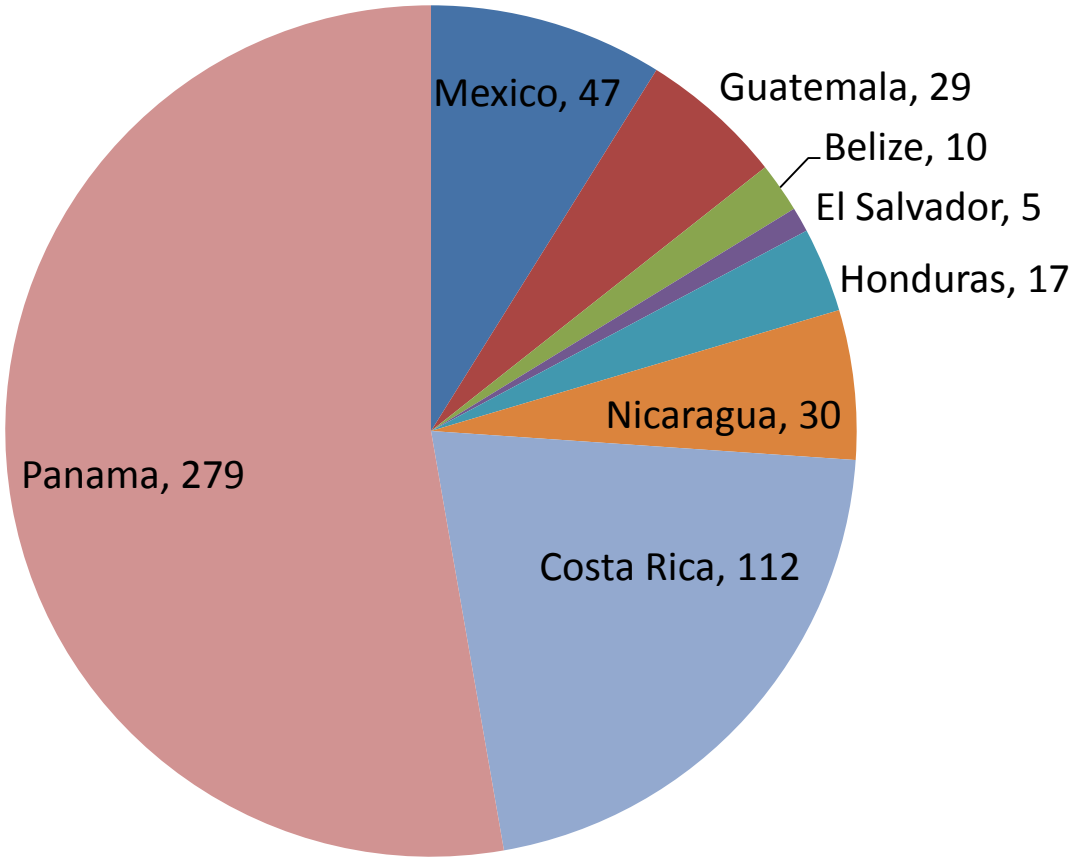
A. wendlandii

# Anthurium
# 333 species, 350 taxa

*Anthurium* in Panama increased in size from 148 species in 1986 to 275 species in 2017, an 85% increase

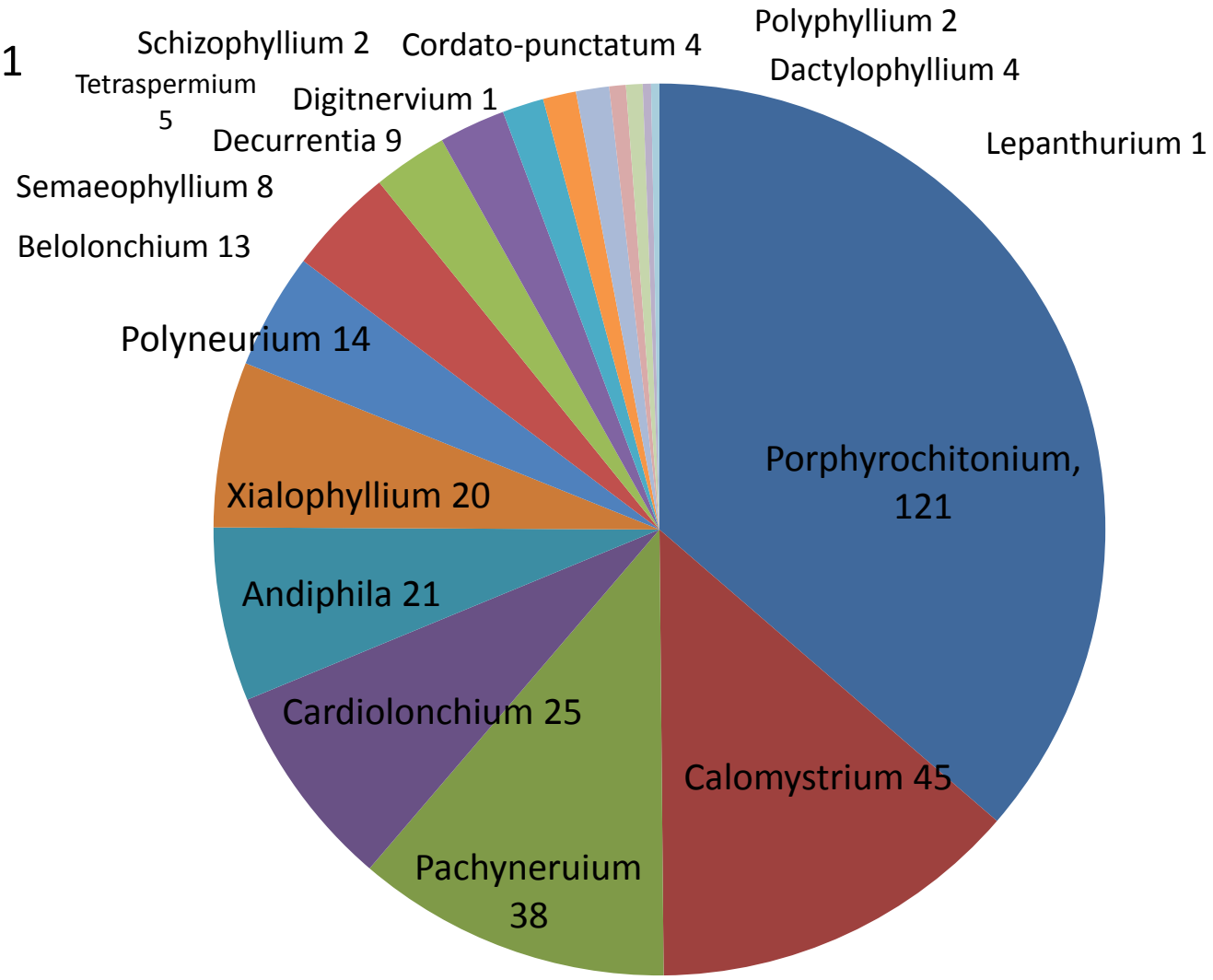
## Numbers of species per country

| | |
|---|---|
| Panama | 279 |
| Costa Rica | 112 |
| Mexico | 47 |
| Nicaragua | 30 |
| Guatemala | 29 |
| Honduras | 17 |
| Belize | 10 |
| El Salvador | 5 |



# Number of Anthurium species per section in Central America

| | |
|---|---|
| Porphyrochitonium | 121 |
| Calomystrium | 45 |
| Pachyneruium | 38 |
| Cardiolonchium | 25 |
| Andiphila | 21 |
| Xialophyllium | 20 |
| Polyneurium | 14 |
| Belolonchium | 13 |
| Decurrentia | 9 |
| Semaeophyllium | 8 |
| Tetraspermium | 5 |
| Cordato-punctatum | 4 |
| Dactylophyllium | 4 |
| Polyphyllium | 2 |
| Schizophyllium | 2 |
| Digitnervium | 1 |
| Lepanthurium | 1 |



# Anthurium

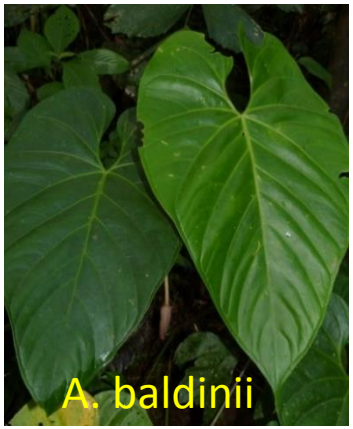
Characterized by blades with collective veins, spathe free, flowers bisexual with perianth; berries colorfull, typically 2-seeded

Largest Sections:

| | |
|---|---|
| Porphyrochitonium | 121 |
| Calomystrium- | 45 |
| Pachyneurium- | 38 |
| Cardiolonchium- | 25 |
| Andiphila | 21 |
| Xialophyllium | 20 |
| Polyneurium | 14 |
| Belolonchium | 13 |


A. berguidoi


A. hofffmanii


A. baldinii


A. berriozabalense


A. brownii


A. Intactum


A. Interruptum

# Anthurium

TOM: Since you have other slides of Anthurium, I wasn't sure what you wanted here. Amy: I moved this comment to the previous slide but since I mentioned colorful berries we should try to find a spadix with mature berries and squeeze one in there. There should be many images. Perhaps search on berry

# Anthurium
# Smaller sections

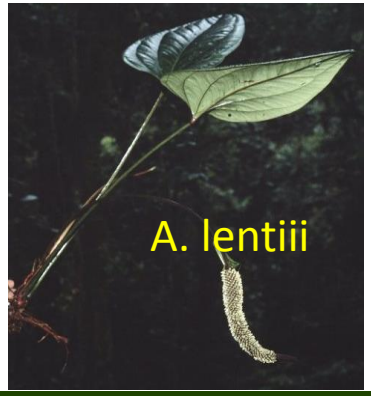
| | |
|---|---|
| Decurrentia- | 9 |
| Semaeophyllium | 8 |
| Tetraspermium | 5 |
| Dactylophylliuim | 4 |
| Cordato-punctatum | 4 |
| Polyphyllium | 2 |
| Schizoplacium | 2 |
| Digitinervium | 1 |
| Leptanthurium | 1 |


A. chucantiense


A. impolitum

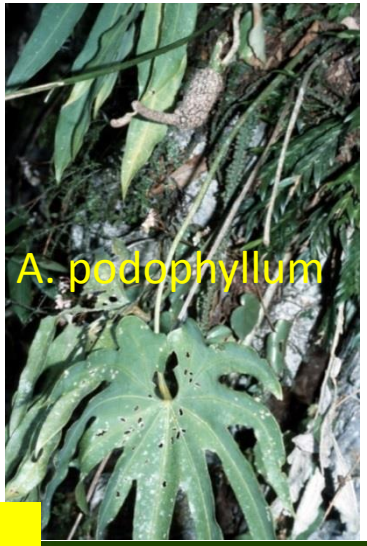

A. kunthii

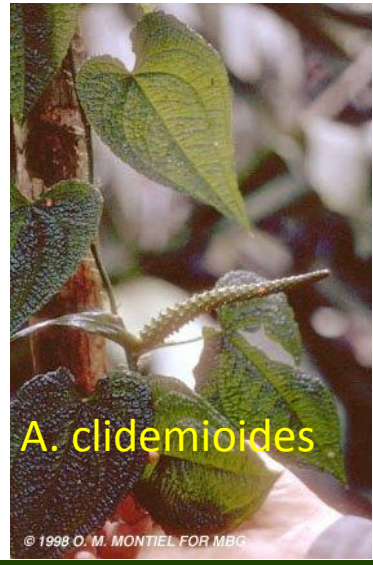

A. obtusum


A. lentiii


A. gracile


A. olongiipeltlalum

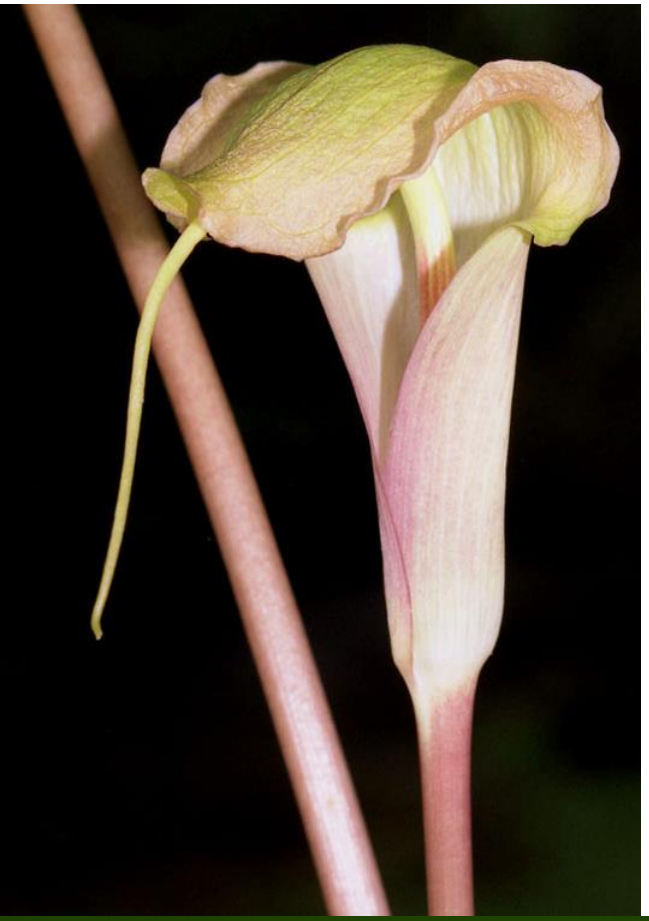

A. podophyllum



A. clidemioides

# Arisaema macrospathum

3 species in New World, one in Mexico. Characteristics: Tuberous stems, 1-2 leaves, blades compound; inflorescccnce solitary; spathe convolute at base forming tube at base, blade often hooding; spadix with a sterile segment and prominent appendix; flowers unisexual, naked.

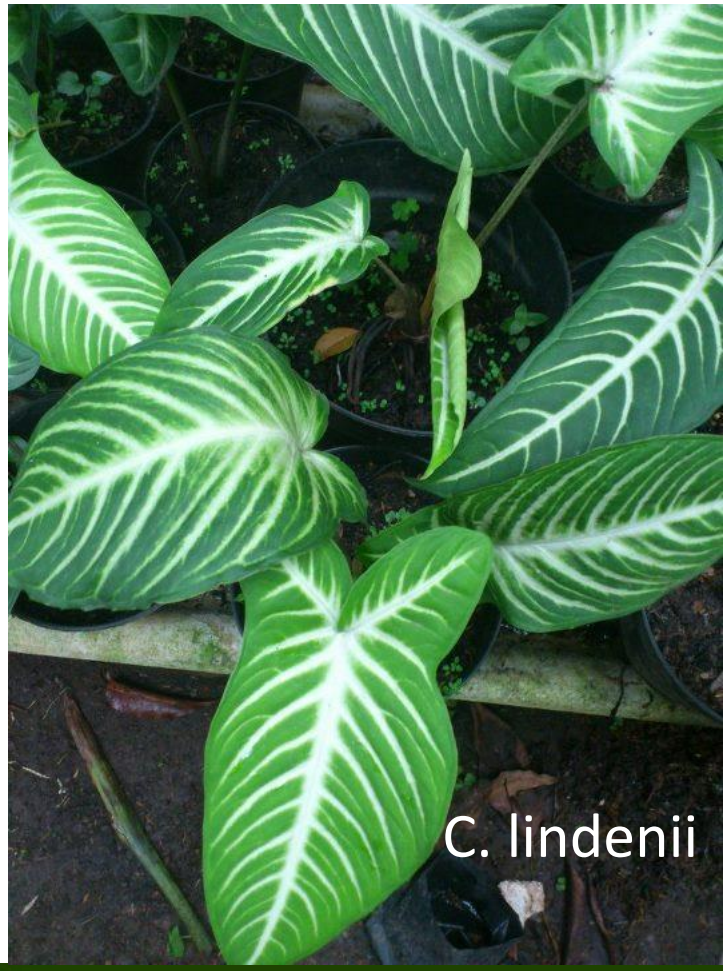


# Caladium
# 2 species

15 species, overall. 2 in Central America.

Characteristics: Tuberous stem; petiole sheathed; blades often peltate, variegated; venation reticulate; spathe enclosing spadix; flowers unisexual; pollen shed in monads.

C. bicolor



C. lindenii

# Dieffenbachia

27 species distributed throughout C.A. with greatest diversity in Costa Rica and Panama. ca, 115 species.

Characteristics: Terrestrial, elongate thick stems, sap with oxalic acid, sheathed petioles, thick typically elongate blades, naked unisexual flowers, female flowers fused to spathe; pistils surrounded by clavate staminodia; staminate flowers in synandria.


D. concina


D. crebipistillata


D. crebipistillata


D. oerstedii

D.standleyi

D. wendlandii


D. nitidipetiola


D. killipii

D. lutheri

D. oerstedii

# Geographic Distribution of *Dracontium*

23 Species; 5 in Central America

# Dracontium

Characteristics: Tuberous stems, seasonal growth, tubercules, variegated petioles, leaf highly divided, fly pollination, hooding spathes, bisexual flowers



D. grayumii

Leaf blade

Tuber

Seed

D. gigas

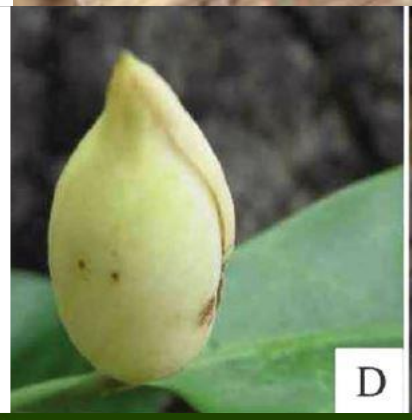
D. Soconuscum (3)

D. pittieri

D. spruceanum

# Heteropsis

- Characteristics: hemiepiphytic habit, long slender somewhat woody stems, long pendent flexible roots, short winged petioles, oblong blades, short-pedunculate inflorescences with caduceus boat-shaped spathes and cylindrical spadices with naked bisexual flowers.
- ca. 18 recognized species, all but two in the Amazon basin.
- H. oblongifolia is only species in Central America, and a doubtful species. The type is from eastern Brazil. Perhaps it is merely H. ecuadorensis Sodiro.




# Lemnoideae
# 19 species

(duck weeds) A group long separate from Araceae but which molecular reviews place firmly within Araceae.

Characteristics: minute size, free-floating habit, minute typically solitary flowers, usually consisting of a single anther and pistil.

5 genera in the subfamily. Lemna with 12 spp. (9 in Central America); Landoltia (1 species in area); Spirodela 4 spp., one present; Wolffia (11 spp., 5 in area) and Wolffiella (19 spp., 4 in area).

| | |
|---|---|
| Landoltia punctata | 1 |
| Lemna | 9 |
| Spirodela | 1 |
| Wolffia | 4 |
| Wolffiella | 4 |

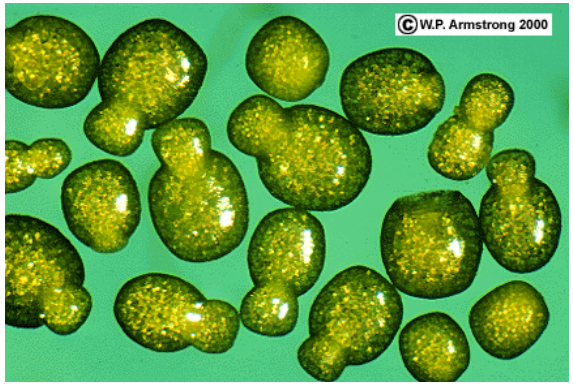

Landoltia punctata

Spirodela polyrrhiza


Spirodela polyrrhiza

Lemna gibba


Wolffia colombiana




Wolffiella gladiata

# Monstera

- Characteristics: petioles heavily sheathed; juvenile growth with blades diverse (shingled or spreading); adult blades mostly perforate or lobed; Inflorescence 1-several; spathe boat-shaped, thick & deciduous; spadix thick cylindroid; flowers bisexual.
- 91 species in 4 sections.
- In 1977, 20 species reported in Central America. Now at least 80 species. 400% increase.


Monstera punctulata

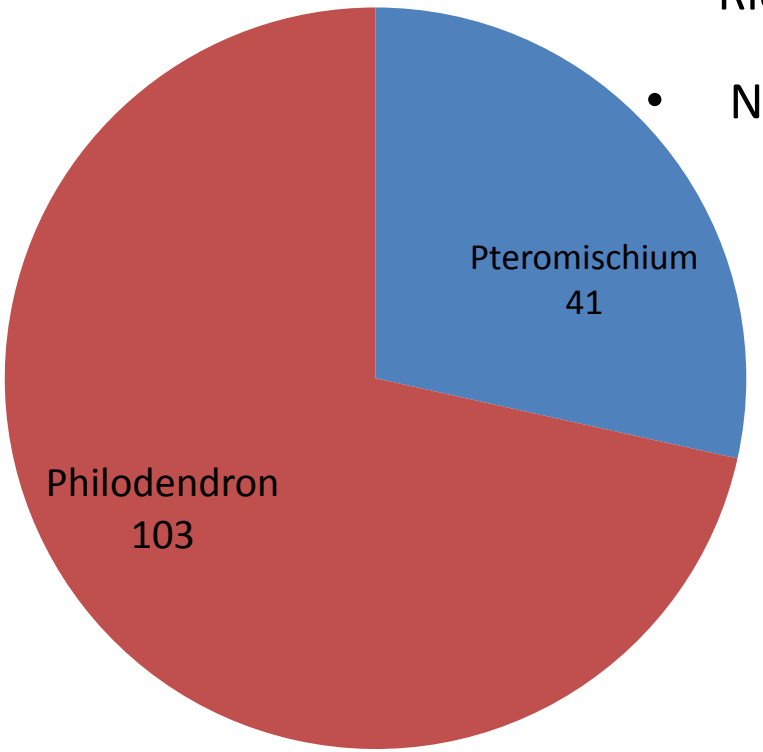
# Montrichardia

A single verified species, M. arborescens but I think that M. linifera also occurs in Panama.

Characteristics: arborescent aquatic free-standing herbs; petiole heavily sheathed; blades with prominently developed posterior ribs; venation reticulate; inflorescence usually solitary; spathe constricted, deciduous; spadix constricted; flowers unisexual; ovary 1-locular; ovules 1-2; berries large, subcylindric.

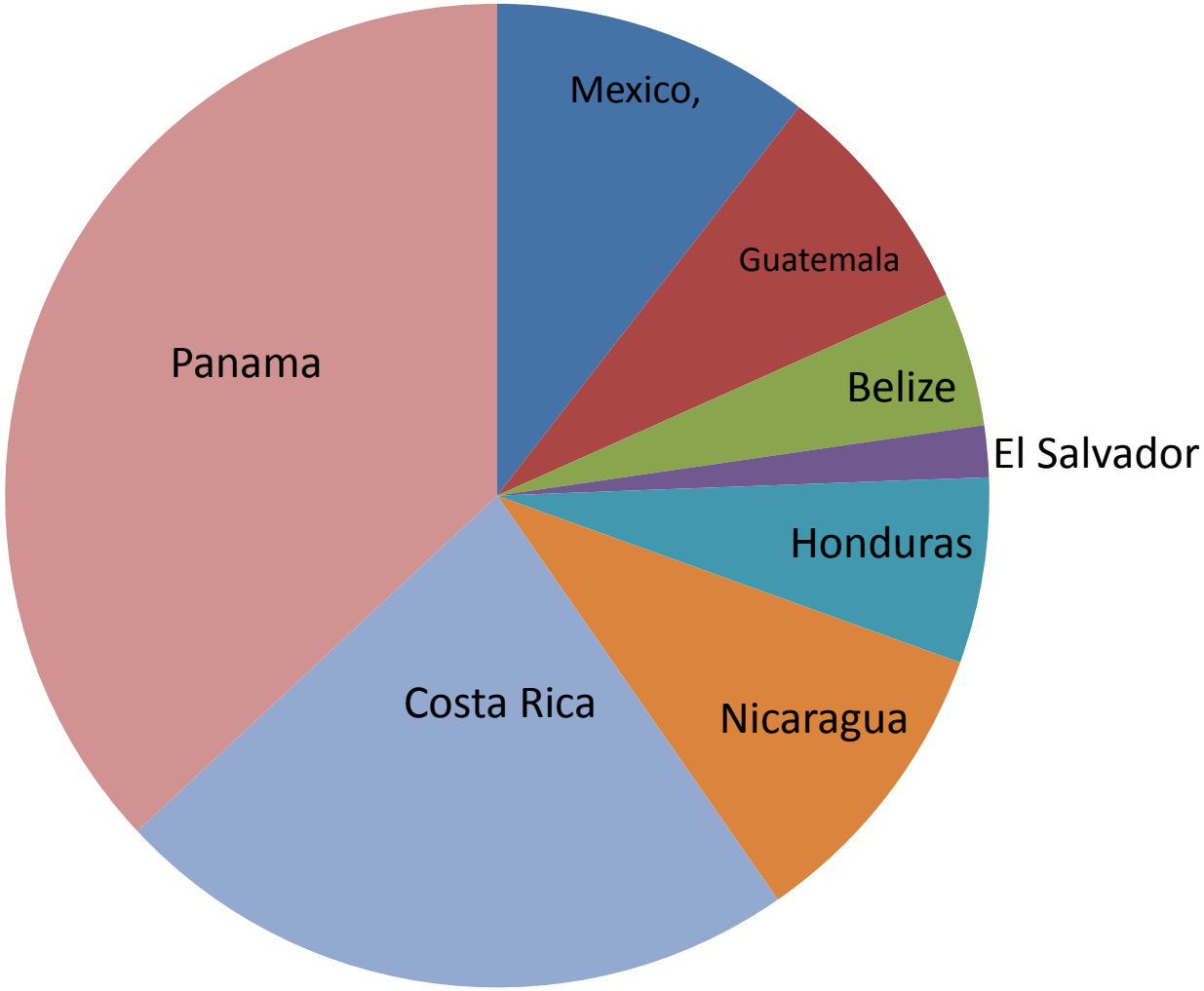
# PHILOENDRON SECTIONS

- Most species in sect. Philodendron (103 sp.)
- Rich assortment of sect. Pteromischium (41 sp.)
- No known members of sect. Meconostigma



# Philodendron
# Species per country

| | |
|---|---|
| Panama | 109 |
| Costa Rica | 67 |
| Mexico | 31 |
| Nicaragua | 29 |
| Guatemala | 23 |
| Honduras | 18 |
| Belize | 13 |
| El Salvador | 5 |



# Philodendron general distribution

- Mexico has only 30 species
- In contrast to Anthurium, Philodendron in Middle America is relatively rich with 75 species (owing mostly to the richness in Costa Rica).
- Panama still leads in distribution with 109 species.

# Philodendron

Characteristics: habit and blade shape diverse; subgenera Philodendron and Pteromischum occur only in Central America. Inflorescence 1-several per axil; spathe reclosing after anthesis; spadix with sterile staminate zone; flowers unisexual.

P. sagittifolium

P. madronoense

P. verrucosum

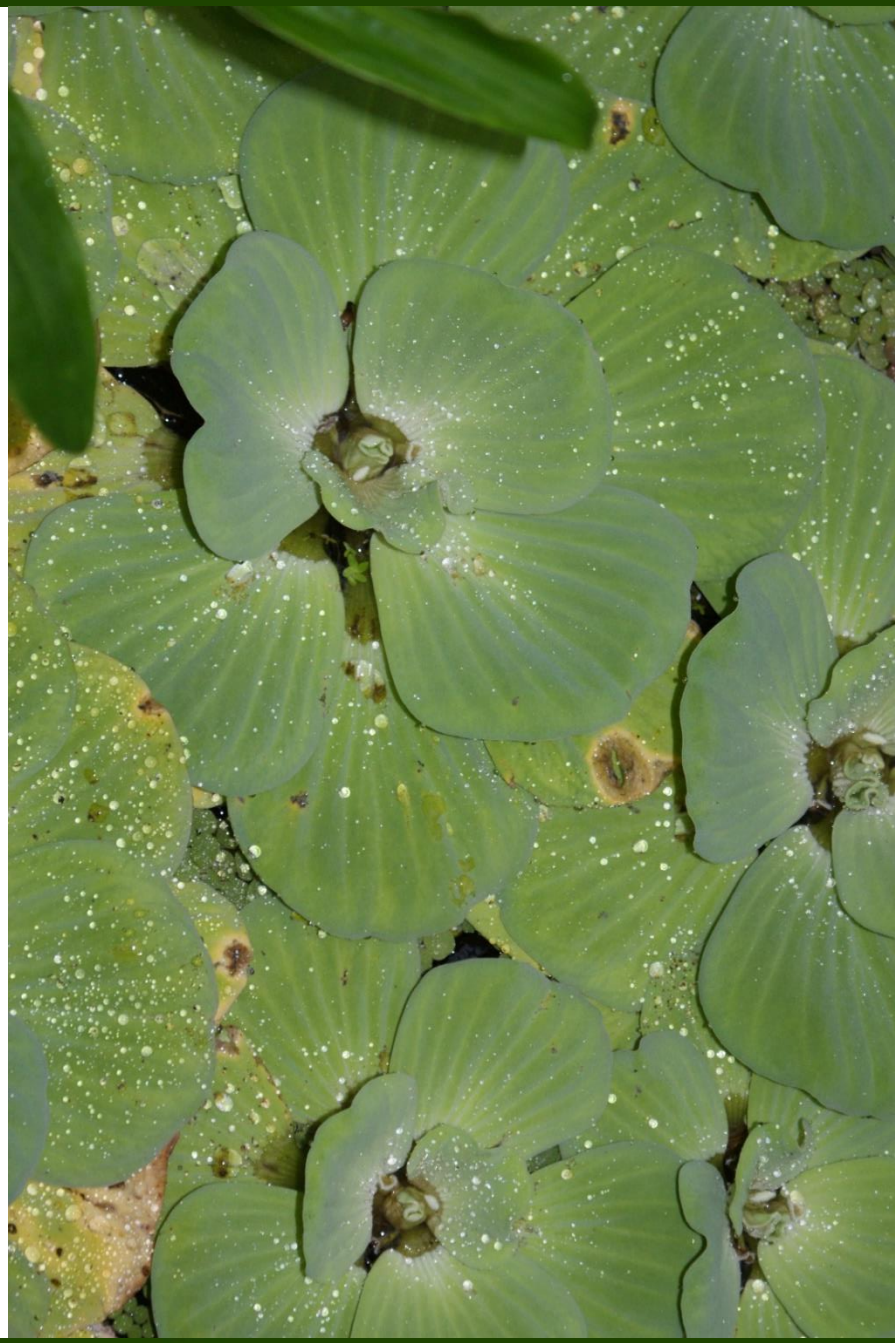
P. radiatum

P. grandipes

P. gigas

# Pistia stratiotes

Characteristics: free-floating aquatics; leaves spongy; inflorescence solitary; spathe constricted, pubescent; spadix fused to spathe except male zone; 2 connate stamens.



# Rhodospatha
# 12 species

ca. 90 species, 12 in Central America

Except for R. wendlandii, nearly all species are newly described species from Costa Rica and Panama

R. moritziana

# Rhodospatha

Characteristics: hemiepiphytic, rarely terrestrial; internodes longer than broad; petioles heavily sheathed; blades elongated; primary lateral veins prominent with a descending series of alternating less conspicuous lateral veins; spathe boat-shaped, deciduous; spadix cylindroid-tapered; flowers bisexual, naked.


R. wendlanii


R. monsalveae


R. wendlandii


R. monsalveae


R. ovata


R. antonense


R. antonense

# Spathiphyllum 21 species

The group is not particularly rich or endemic;
Endemics: Mexico 2, Panama 3

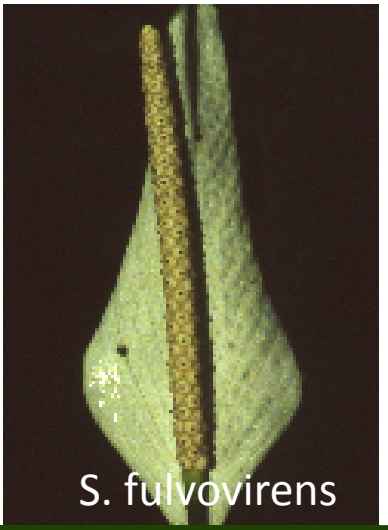
Characteristics: terrestrial; rhizomatous, short internodes, heavily sheathed petioles; blades elongate, not cordate; primary lateral veins typically close; inflorescence long-pedunculate; spathe green to white, boat-shaped, persistent; spadis cylindrical; flowers bisexual, tepalate.


S. cochlearispathum


A. luteynii


S. abelianum


S.sp. Veracruz


S. fulvovirens


S. phryniifolium

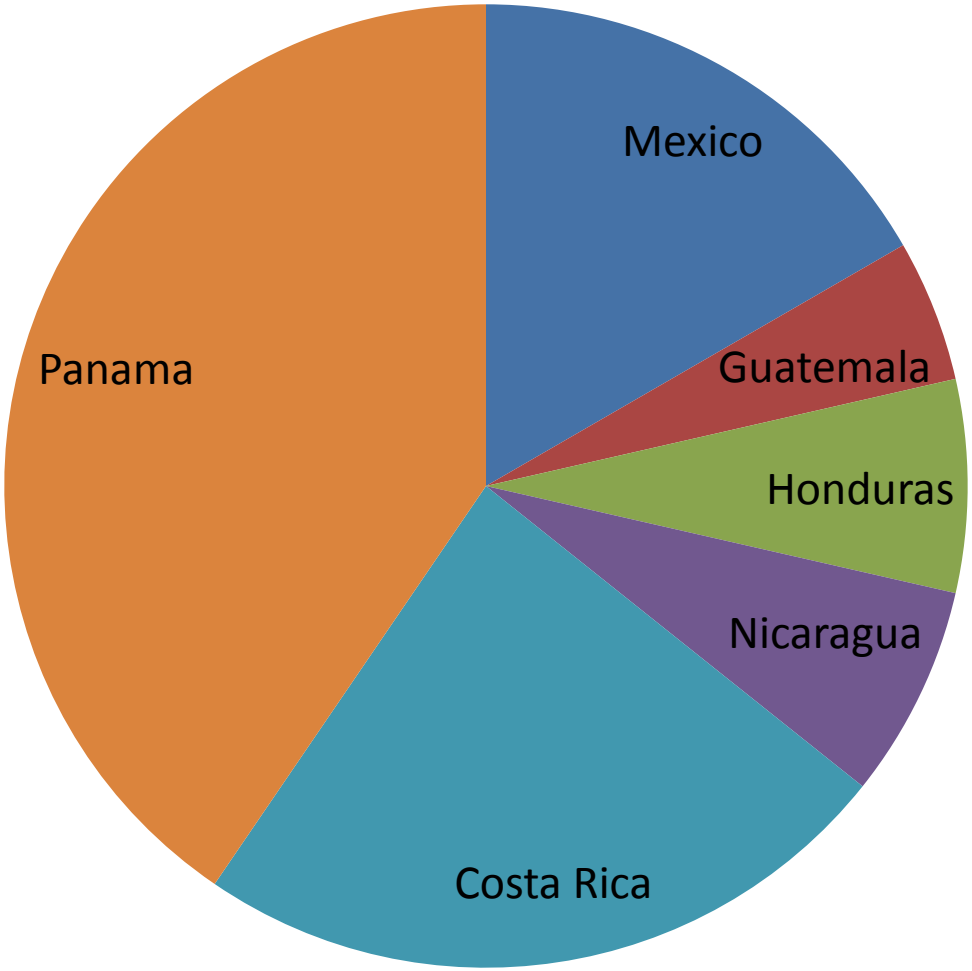

S. brevirostre


S. friedrichsthalii


S. dressleri

# Spathiphyllum Species by Country

| | |
|---|---|
| Panama | 17 |
| Costa Rica | 10 |
| Mexico | 7 |
| Honduras | 3 |
| Nicaragua | 3 |
| Guatemala | 2 |
| Belize | 0 |
| El Salvador | 0 |



# Stenospermation
# 33 species

S. multiovulatum (2)

Only 7 species in the 1986 revision of the genus for Central America; now a minimum of 36 species (increase of 414%).

Characteristics: mostly epiphytic; internodes short or elongate, heavily sheathed petiole; blades elongate, not cordate; primary lateral veins obscure; upper blade surfaces variously configured on drying; inflorescence erect to cernuous; spathe boat-shaped, promptly deciduous; perianth lacking; style truncate to sloping; stigma linear to round; berries orange to yellow or white, many-seeded.

S. angustifolium

S. marantifolium

S. sessile

S. robustum

# Syngonium
# 27 species

40 species, 27 in Central America

Characteristics: hemiepiphytic; sap milky; internodes elongate; petioles heavily sheathed; blades simple and oblong to triangular to pinnately lobed or compound and 3-11 parted or lobed, venation reticulate; inflorescence 1-several per axil; spathe convolute, constricted, blade deciduous; spadix with sterile zone, constriction and male flowers in staminodia; berries connate to form syncarp


S. Crassifolium (2)


S. macrophyllum (2)

S. Tacotalpense (3)

# Urospatha grandis-

Characteristics: aquatic rooted herb; internodes short, deeply sunken in mud; petioles heavily sheathed; blades with posterior lobe well-developed; venation reticulate; inflorescence long-pedunculate; spathe erect, convolute, twisted; spadix short; flowers bisexual, tepalate; tepals 4-6, fornicate.

# Xanthosoma
# 18 species

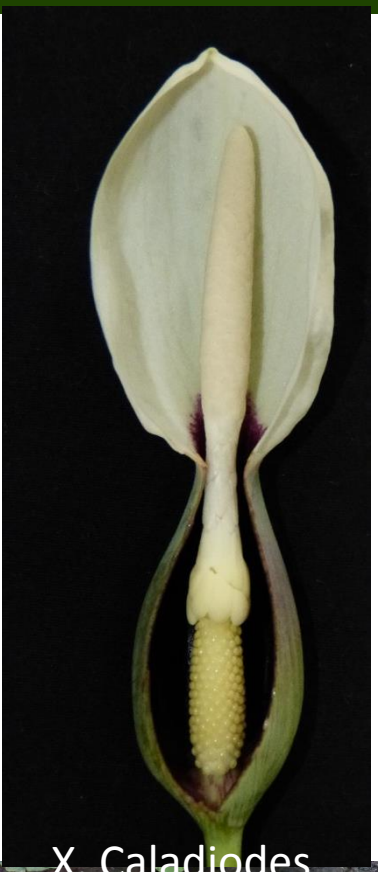
Half of the species are recently described or have not yet been published.

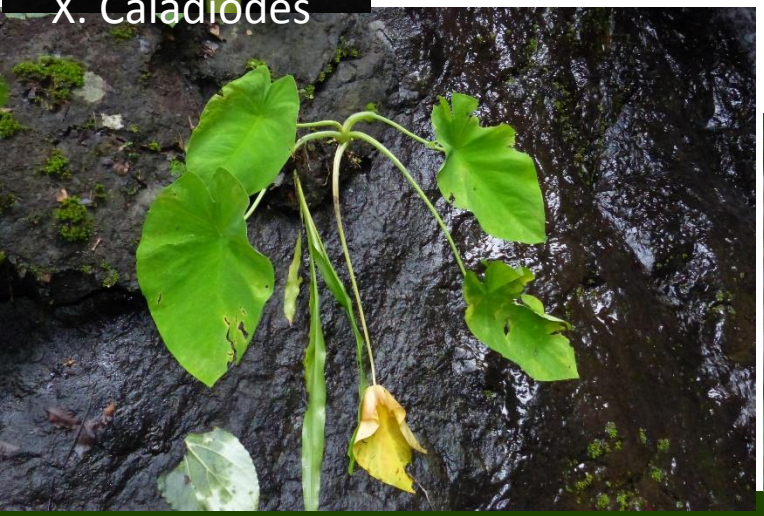
It is unusual that Xanthosoma distribution shows less stark difference between the different countries and unusual richness in El Salvador.

| | |
|---|---|
| Panama | 10 |
| Costa Rica | 8 |
| Mexico | 6 |
| Guatemala | 4 |
| El Salvador | 4 |
| Nicaragua | 4 |
| Belize | 3 |
| Honduras | 3 |

# Xanthosoma

Characteristics: Terrestrial, rhizomatous or tuberous (seasonal); thin blades, reticulate venation, milky sap; inflorescences in sympodia; sterile segment diverse; berries with many seeds


X. Caladiodes




X. undipes


X. mexicanum


X. undipes


X. robustum


X. mexicanum


X. helleborifolum

# Conclusions

- The Araceae of Central America is massively smaller than that of South America but it is also much more well known proportionately.
- Some genera in Central America, namely Monstera and Syngonium seem to be proportionately much richer than in South America.
- Species richness and endemism increases as one approaches South America

# Comparative size of Panama and Colombia (ca. 15 times larger)



Panama: 75,420 sq, km  Colombia 1, 038, 700 sq. kilometer

# Relative size of known Aroid flora

- Panama:  585 species
- Colombia: 820 species
    - Only 1.4 times as many species
    - But 15 times larger geographically
- Colombia is topographically similar to Panama and likely has a flora as much as 5 or more times the size of its presently known flora owing to its incredibly diverse topography and proximity to the equator.
- Moreover the Flora of Panama could double in size if fully explored

# Threats of Extinction

Owing to the high rates of endemism in Araceae any clearing of forest almost anywhere jeopardizes species richness and probably results in extinction. Yet destruction goes forward on all fronts while our efforts to collect are increasingly diminished.

COLOMBIANS MUST REDOUBLE EFFORTS TO COLLECT AROIDS.