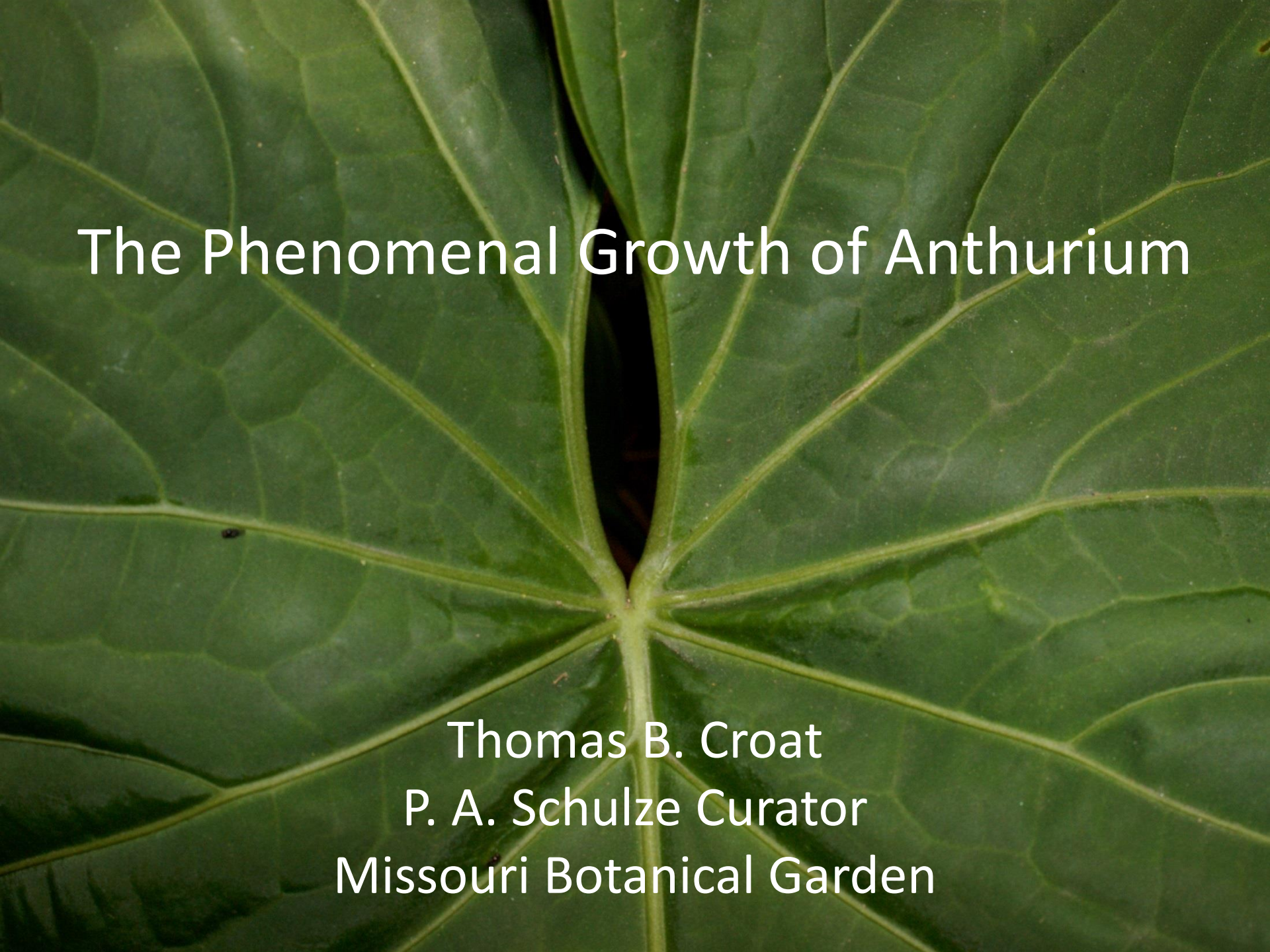
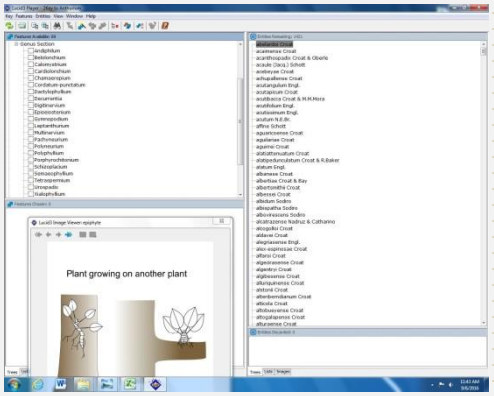


The Phenomenal Growth of Anthurium

Thomas B. Croat
P. A. Schulze Curator
Missouri Botanical Garden

Lucid Technology Has Eased the Discovery of New Species



- Lucid key developed at Kew
- Authored by Anna Haigh, Laura Reynolds & Tom Croat
- The initial 600 species entered in Lucid at Kew
- Since ca. 2012 Lucid is being developed by MO
- Current number of species ca. 1400

Other Developments Which Have Led to Species Discovery

- Access to Loans from Colombia and Ecuador
- OPUS trip to South America
  - 25 Herbaria visited
  - 7,000 images of undeterminable specimens
    - Specimen data is being entered into Tropicos
    - Images are being labeled and added to Tropicos
- OPUS trip to 13 European Herbaria
- OPUS trip to 16 Central American Herbaria

Areas of Greatest Growth

- Anthurium sect. Polyneurium from Lita-San Lorenzo Region
  - Revision by Jordan Teisher
- Anthurium sect. Polyneurium from Carchi Province
  - Revision by REU Student Rob Wood (2015)
- Anthurium sect. Belolonchium
  - Revision by REU Student Tyler Hughes (2016) & Jim Grib
- Anthurium sect. Cardiolonchium
  - Revision by REU Student Clarice Guan (2016) & Bob Hormell
- Anthurium sect. Tetraspermium
  - Revision by Anbreen Bashir
- Anthurium sect. Calomystrium
  - Revision by Jere Deal & David Belt
- Anthurium sect. Xialophyllium
  - Revision by Jonathan Watt
- Anthurium sect. Porphyrochitonium, King of Species Growth

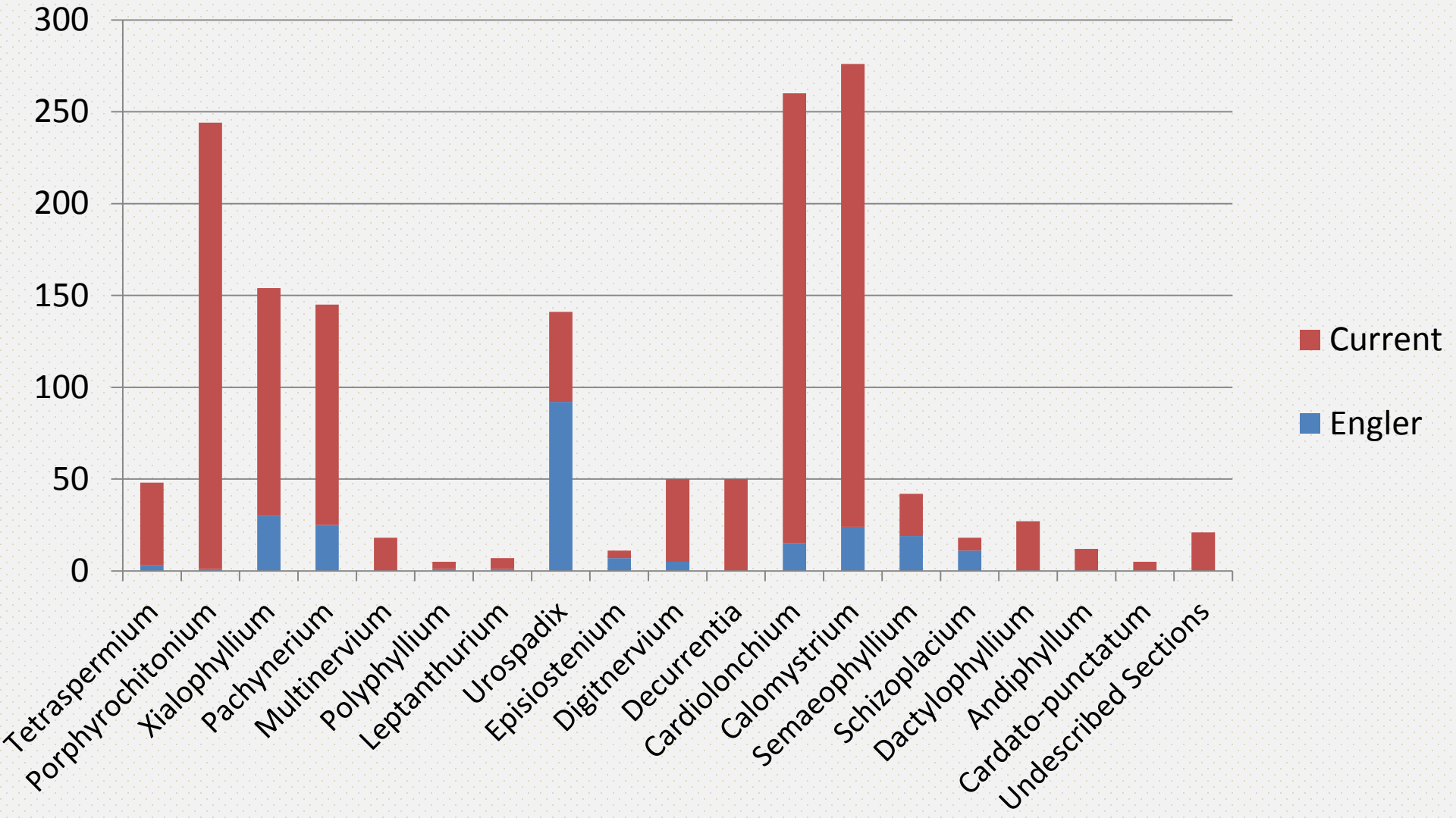
Growth in Size of Sections

	Engler	Current
• Tetraspermium	3	45
• Porphyrochitonium	1	243
• Xialophyllium	30	124
• Pachyneurium	25	120
• Multinervium	0	18
• Polyphyllium	1	4
• Leptanthurium	1	6
• Urospadix	92	49
• Episiostenium	7	4
• Digitinervium	5	45

Growth in Size of Sections, cont.

	Engler	Current
• Decurrentia	0	50
• Cardiolonchium	15	254
• Calomystrium	24	252
• Semaeophyllium	19	23
• Schizoplacium	11	7
• Dactylophyllium	0	27
• Andiphyllum	0	12
• Cordato-punctatum	0	5
• Undescribed Sections		21

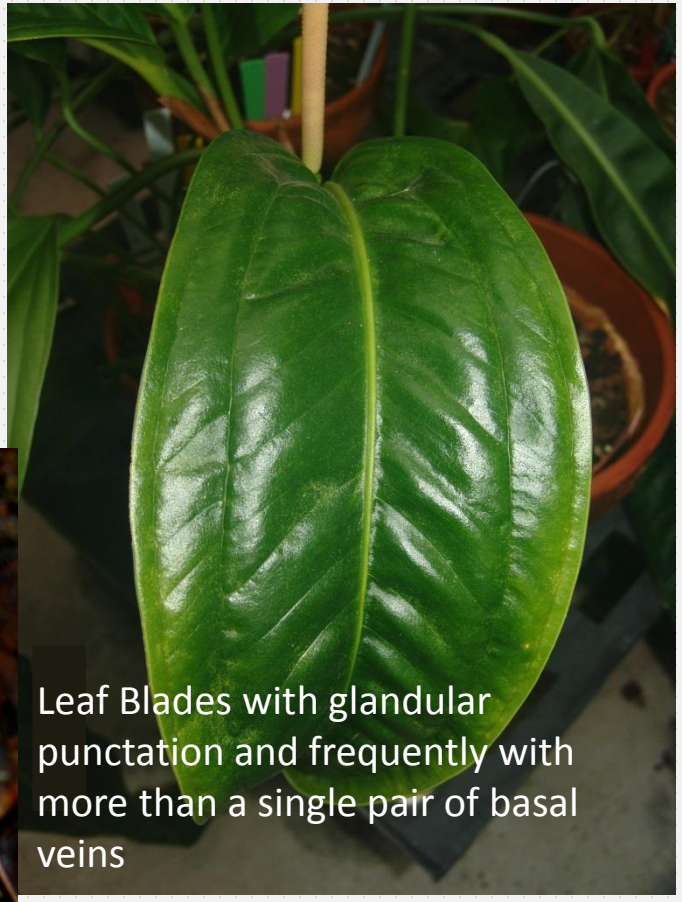
Growth in Size of Sections



Engler's sections of Anthurium

	Engler	Current
Tetraspermium	4	3
Gymnopodium	1	1
Porphyrochitonium	1	1
Pachyneurium	54	25
Polyphyllium	1	1
Xialophyllium	43	30
Polyneurium	47	23
Urospadix	92	49
Episiostenium	7	4
Digitinervium	16	5
Cardiolonchium	30	15
Chamaerepium	2	1
Calomystrium	27	24
Belolonchium	90	54
Semaeophyllium	24	19
Schizoplacium	15	11

Section Tetraspermium



Leaf Blades with glandular punctation and frequently with more than a single pair of basal veins

Characterized by:

- elongated internodes
- glandular punctations
- berries with 2-4 seeds per locule
- chromosome base # 10

Increase from 3 to 45 species
Being revised by Dr. Anbreen Bashir

Section Porphyrochitonium

Constituting the largest increase among the larger sections increasing from 28 to 243 species.

Characterized by:

- elongated glandular-
- punctate leaf blades
- short internodes
- persistent catapyll fibers
- berries 2 or more per locule
- chromosomes 2n = 29-31

Section Pachyneurium

Characterized by:

- mostly bird's nest habit
- involute vernation
- short internodes
- dense roots

Engler revised with 25 sp. (1905).
Revised by Croat with 114 spp (1991).
Today there are 120 spp.
From 25 to 120, a 380% increase.

Sect. Multinervium

Section novo, 16 specie of which were included with sect. Pachyneurium (Croat, 1991).

Molecular studies show it to be distinct at sectional level.

Characterized by:

- involute vernation
- usually bird's nest habit
- inconspicuous primary lateral veins
- usually orange berries

A. holmnielsenii

A. holmnielsenii

Sect. Polyphyllium

Characterized by

- elongate internodes
- roots along internodes
- fruits with blade shiny seeds

1 species included by Engler; currently 4 species

A. flexile

A. clidemioides

Sect. Lepanthurium

Characterized by

- epiphytes with short internodes
- roots with velamen
- heavily sheathed petioles
- chromosome base number 10

1 species treated by Schott & Engler, now 6 to 10

A. barrieri

A. gracile

Sect. Decurrentia

Characterized by

- short internodes
- elongated epunctate blades

New section by Croat (2005) initially with 6 species. Now with 50 species in the section.

A. chucantiense

A. caullorhizum

A. anchicayense

Sect. Xialophyllium

Characterized by
- elongated internodes
- leaves elongated

Probably two natural groups
1. glossy & drying brown, fruits red to purplish
2. matte and drying matte, berries green to yellow

30 species included by Engler, now 124 species, a 313% increase.

A. microspadix

A. carnosum

A. mindense

Sect. Polyneurium

Characterized by
- short internodes
- fibrous cataphyll fibers

Possibly two sections
1. blades semiglossy, moderately few veins.
2. blades matte, primary lateral veins many

Engler treated 23 species; currently there are 188 species.

A. alluriquinense

A. cuspidatum

A. albispadix

Sect. Urospadix

Characterized by:

- mostly eastern Brazil
- mostly elongated blades
- sometimes punctate but not glandular-punctate.

Engler treated 92 species; now 49 owing to many which were not really sect. Urospadix.

A. gladiifolium

A. acaule

A. gladiifolium

Sect. Episeiostenium

Characterized by:

- endemic to West Indies
- typically cordate blades but without good characters

4 species recognized by Engler, currently 8 species.
Confirmed by molecular studies by Carlsen.

Sect. Digittinervium

Characterized by:

- usually having ovate-cordate blades with 2 or more basal veins that reach apex
- glandular-punctate surfaces
- ovules 2 or more locular
- berries usually square when young.

Engler treated 5 species, currently there are 45 species.


A. jesusii


A. terticollectivum


A. aromoense

Sect. Cardiolonchium

A. angamarcanum

Characterized by:

- typically velvety blades which dry greenish
- often ribbed petioles
- chromosomes 2n=32 with B chromosome

From Engler's 15 species, the count is now 245, an increase of 1533%.

A. carlablackiae

A. angamarcanum

Sect. Calomystrium

Characterized by:

- persistent intact cataphylls
- typically terete petioles
- usually cordate blade
- frequently with short pale lineations and with dark punctations
- typically thick and glossy flowers

Engler included only 15 species; current count is 252 a 950% increase.

Section Belolonchium

Characterized by:

- typically from high elevation
- cataphylls persisting as dense fibers
- no punctations
- spathe hooding
- frequently pendent spadix

Engler treated 54 species;
current count is 276,
an increase of 410%

A. albessei

A. herthae

A. cupulispathum

A. antonioanum

Sect. Semaeophyllium

Characterized by three lobed blades

Possibly annatural group

19 species were treated by Engler; section was revised by Carlsen & Croat (2007) with a total of 23 species.

A. alatum

A. madisonianum

A. truncicola

Sect. Dactylophyllium

Characterized by leaf blades 3 or more lobed with lobes free to the base.

Treated as sect. Schizoplacium by Engler with 11 species.

Presently there are 28 species.

A. clavigerum

A. cutacuense

A. arisaemoides

Sect. Andiphyllum

A. rzedowskii

Treated principally as sect. Belolonchium by Engler but now a distinct endemic section in Mexico and Guatemala.

Twelve species are recognized.

A. berriozabelense

Characterized by:

- Mexican and Guatemalan endemic
- Usually D-shaped petioles
- Mostly ovate-cordate blades
- Epunctate
- Berries orange
- Mesocarp pasty
- Seeds large and pale

A. cerrobaulense

Sect. Cordatopunctatum

Characterized by:

- Unique to Mexico & Guatemala
- Cordate blades with glandular punctations.

Only a single species was recognized by Engler who placed it in sect. Belolonchium. The remainder were described later.
Currently there are only 6 species in the section.

A. longipeltatum

A. lucens

A. chiapasense

Conclusions

- While Engler's Revision dealt with 454 names many are now considered synonyms. Thus his total number of names was only 266 species.
- This contrasts with the present total of 1834 names, an increase in 580 % increase from the time of Engler. Most of the species have been described in recent years and 1688 of the total are authored by Croat (92 % of the current total).

The Important Take Away

- Since this provides evidence that there are many new species it is critical that field collected material be clearly identified with the source of origin in order that the species can offically be recognized. All material should be permanently marked and the locality data must be forwarded when exchanging material.