Plants and People

Harris-Stowe State University

Biology 201

Spring, 2015

David Bogler, Ph.D

Syllabus Info

CONTACT INFO:

Office Hours: Tuesday-Thursday, 12:30–1:00, 2:20-3:00 p.m. (before and after class), and **also by appointment** at other times if needed.

I encourage you to contact me by e-mail at david.bogler@mobot.org ask questions or make arrangements.

My MBG office telephone, **314-577-0831,** has an answering machine where you can leave a message if I am not there when you call, even at night. I will often be working at my office there.

Syllabus Info

COURSE DESCRIPTION:

This course examines economically important plants and explores the link between plants and people.

- Specific objectives include understanding the history of plant use including origins of economically important plants, and the use of flowers, fruits, roots, stems and leaves for food, clothing, shelter, medicine and other purposes.
- The course will convey and foster understanding of the major principles and concepts of economic botany and its influence on scientific and cultural issues of the society.

Syllabus Info

LEARNING MATERIALS:

Required Text: Levetin, E. & K. McMahon. 2012. *Plants and Society*, ed. 6. NY: McGraw-Hill.

Required Website: http://www.mhhe.com/levetin6e

Assignments will be posted on the electronic **MyHSSU** - be sure to check several times a week.

Additional recommended resources may be assigned by instructor: see updates on MyHSS

How to Succeed in Bio. 201:

1. Read text assignment. Read it before class.
2. Attend class. Pay attention. Take notes on lectures. Use opportunity to learn material, ask questions if unclear.
3. Use Powerpoint slides on class web page to review. This is meant to supplement the text and lectures, not replace them.
4. Make a list, and study, unfamiliar terms. There will probably be many – in the process of learning them, you will learn much of the course material.
5. Participate – this will help you learn and make the experience more pleasant and positive for everyone.

Syllabus Info

ASSESSMENT:

Exams	200 pts
Final Exam	100
Homework assignments	200
Quizzes, announced or not	150
Projects	100

Tentative Grade Base = **750** pts total

Exams are a mix of matching, multiple choice, short answer, and short essay.

Homework (internet and chapter assignments) will be given during the semester.

Quizzes will be given usually at the start of class and unannounced, to assess your reading progress.

Projects - to be determined in class.

POLICIES:

Hornets email and MyHSSU: You are expected to check both your HSSU Hornets email account and the class MyHSSU pages regularly, meaning at least several times per week, and always if you miss a class. All students are responsible for all material posted on these pages. I will communicate with you through your HSSU hornets email address.

You are responsible for having backup copies of all your work: students are expected to keep backup copies of all work. Loss of data or homework is not acceptable and will result in a zero grade for the assignment. You are encourage to use cloud computing through HSSU Hornets SkyDrive.

Attendance- Each class period there may be a quiz which is given in the beginning or end and may not be 'made up' if you are tardy or leave early. See "Missed Work" above. Note that by university policy you will be withdrawn with failure due to excessive absences if you miss two consecutive weeks (or are marked absent for 4 consecutive classes), regardless of reason.

Tardiness- Students arriving after 1:00 pm are considered to be tardy. Arriving after 1:10 - you may be marked absent according to the HSSU rules..

Cell phones - University policy states that student cell phones, texting devices, cameras, and similar electronics must be turned off during class times. Faculty may approve an exception for special circumstances. Use of any electronic devices during any tests is specifically prohibited and will result in a zero for that test.

Academic policies are all stated in the university bulletin and semester course schedule, including academic honesty, conduct, absences, incomplete grades, drop dates, etc.

Plagiarism is the presentation of someone else's words or ideas as your own and is considered cheating, is not allowed anywhere at HSSU and will not be tolerated = Zero first offense, failure second offense, withdrawal from HSSU with repeated offenses. Sometimes group assignements may share group data, but reports must be written individually in your own words.

Lecture Schedule Spring 2015 (subject to modification)

Week T/Th Date	Unit	Subject or Activity, Chapter
Jan 13-14	I, II	Plants in Our Lives, Introduction to Plant Life (Chaps. 1–2)
Jan 20-23	II	Introduction to Plant Life (Ch. 3–5)
Jan 207-29	II	Introduction to Plant Life (Ch. 5–6)
Feb 3-5	II	Introduction to Plant Life (Ch. 6–9)
Feb 10	**I–II**	**Exam 1, Units I, II (Ch. 1–9)**
Feb 17-19	III	Plants as a Source of Food (Ch. 10–11)
Feb 24-26	III	Plants as a Source of Food (Ch. 11–13)
Mar 3-5	III	Plants as a Source of Food (Ch. 13–15)
Mar 10-12	IV	Spring Break
May 17	IV	Plants as a Source of Food (Ch. 16–18)
Mar 18	IV	**Exam 2, Units III, IV (Ch. 10–18)**
Mar 24-26	V	Plants and Human Health (Ch. 19–20)
Mar 31- Apr 2	V	Plants and Human Health (Ch. 20–21)
Apr 7-9	VI	Algae and Fungi: (Ch. 22–25)
Apr 14-16	VI	Algae and Fungi: (Ch. 22–25)
Apr 21-23	VI–VII	Plants and the Environment (Ch. 25–26)
Apr 28	VII	Plants and the Environment (Ch. 26)
Apr 30		Reading Day
May 5	**V-VII**	**Final Exam Tuesday, 12:00-2:00 pm**

Who is this guy?

Ph.D dissertation on Agave Family and relatives

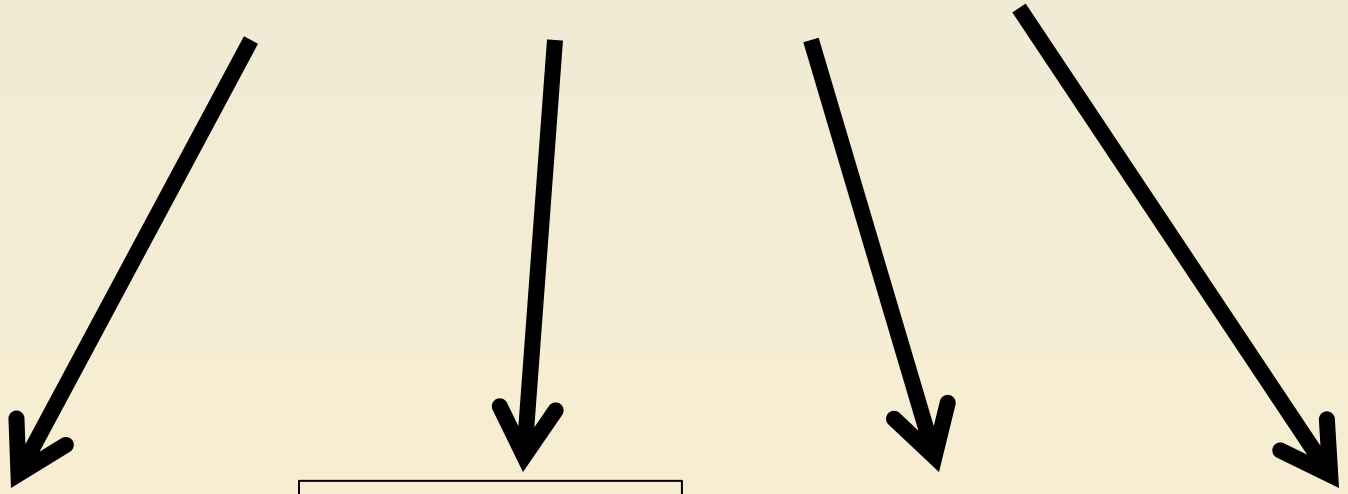
Dasylirion

Mescal *Agave*

my background and interests….

Plant Systematics

taxonomy, ecology, genetics, evolution, phylogeny



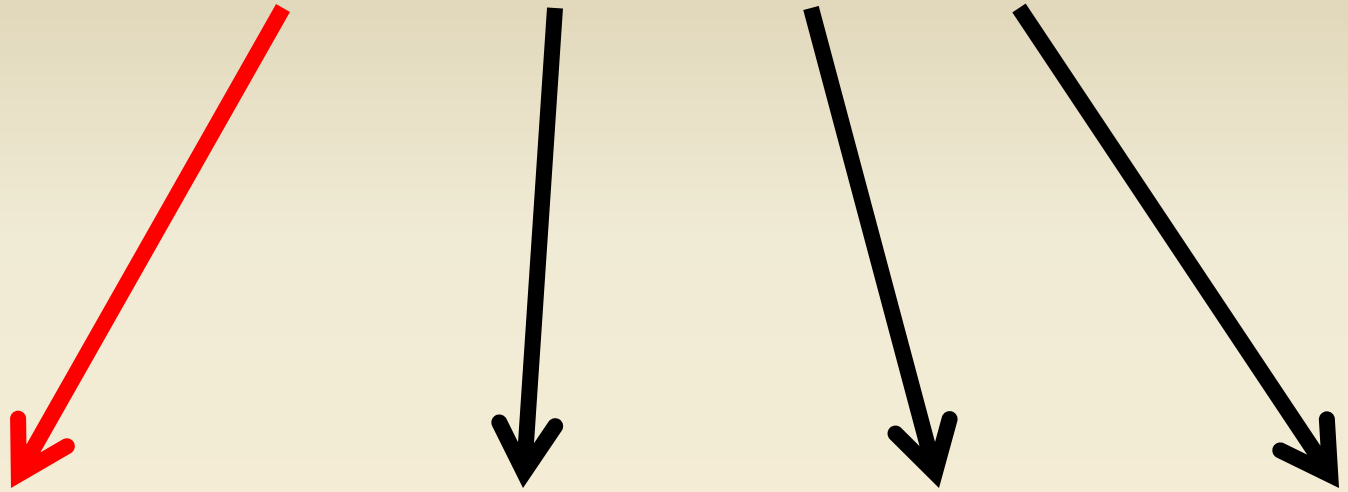
Floristic Treatments
Flora of Missouri
Flora North America
Interactive Keys

DNA Phylogeny
Agavaceae
Cycads
DNA Barcoding
Conservation
Genetics

Plant Anatomy
Pollen Atlas
Pollination Bio.

Teaching
Grant Writing
REU Program
Writing

Plant Systematics



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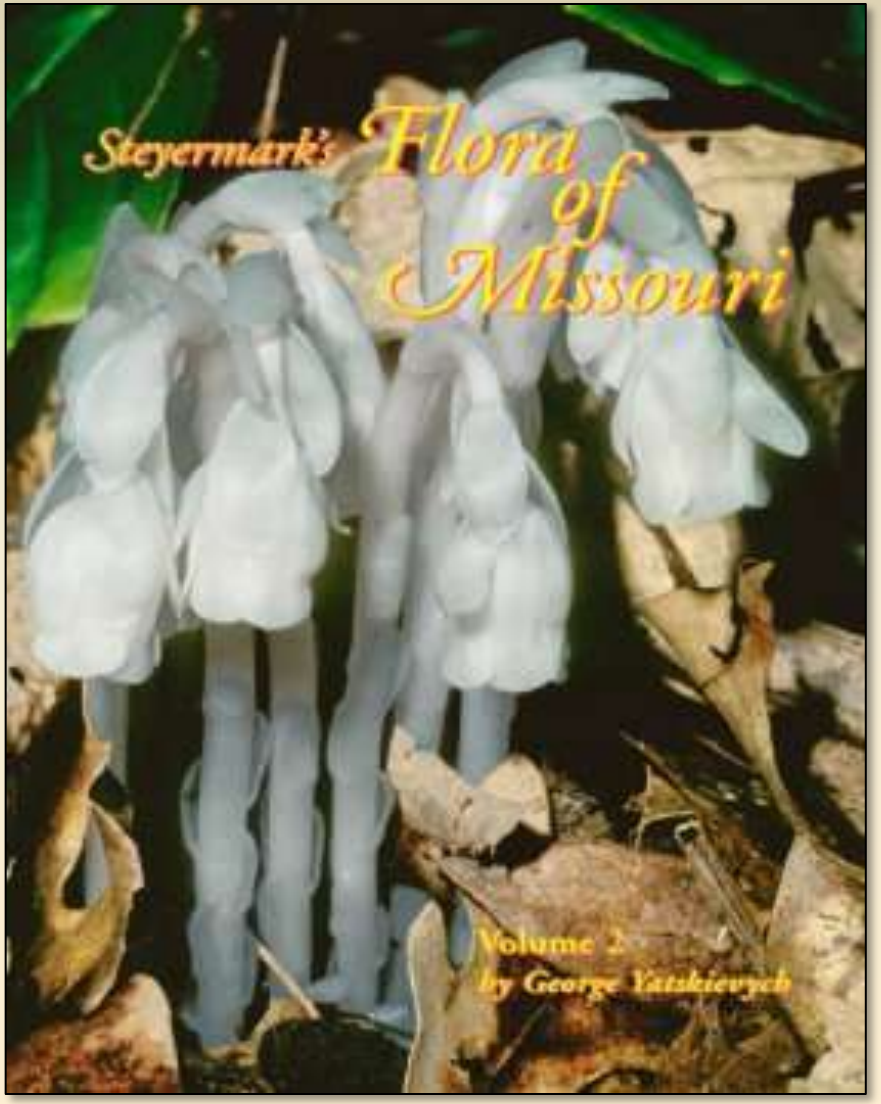
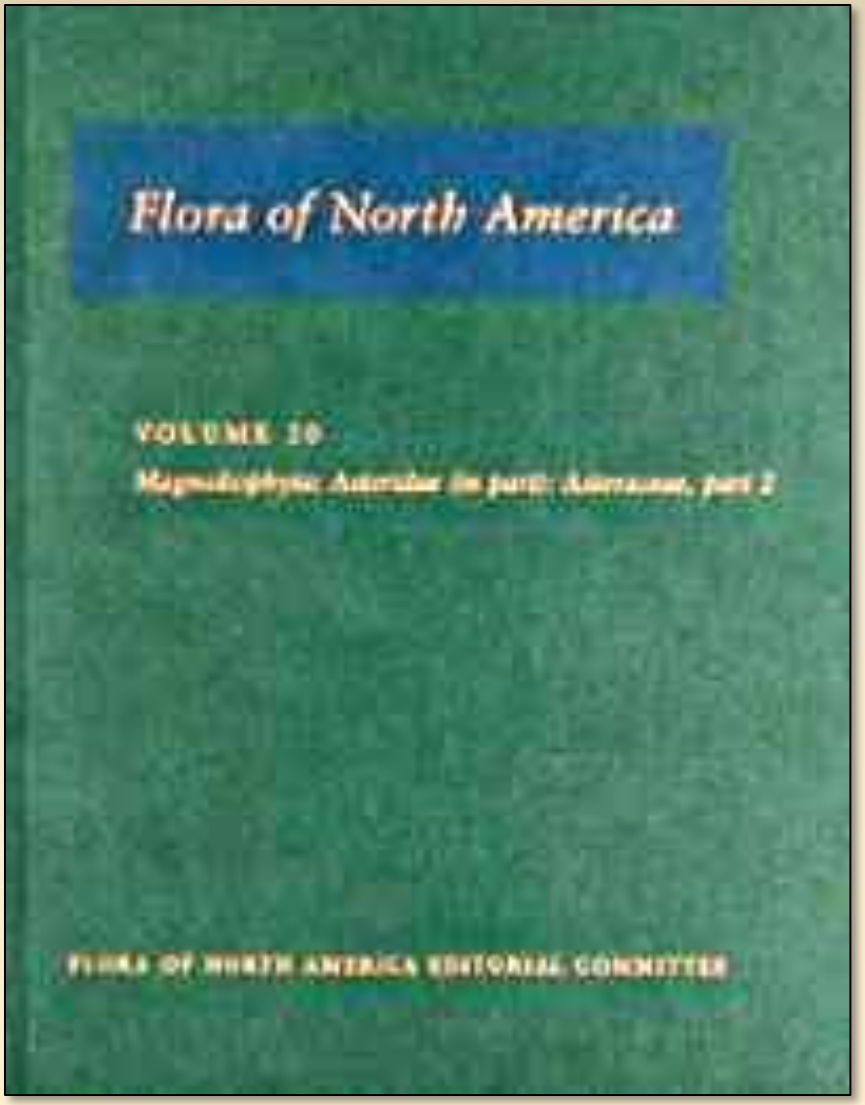
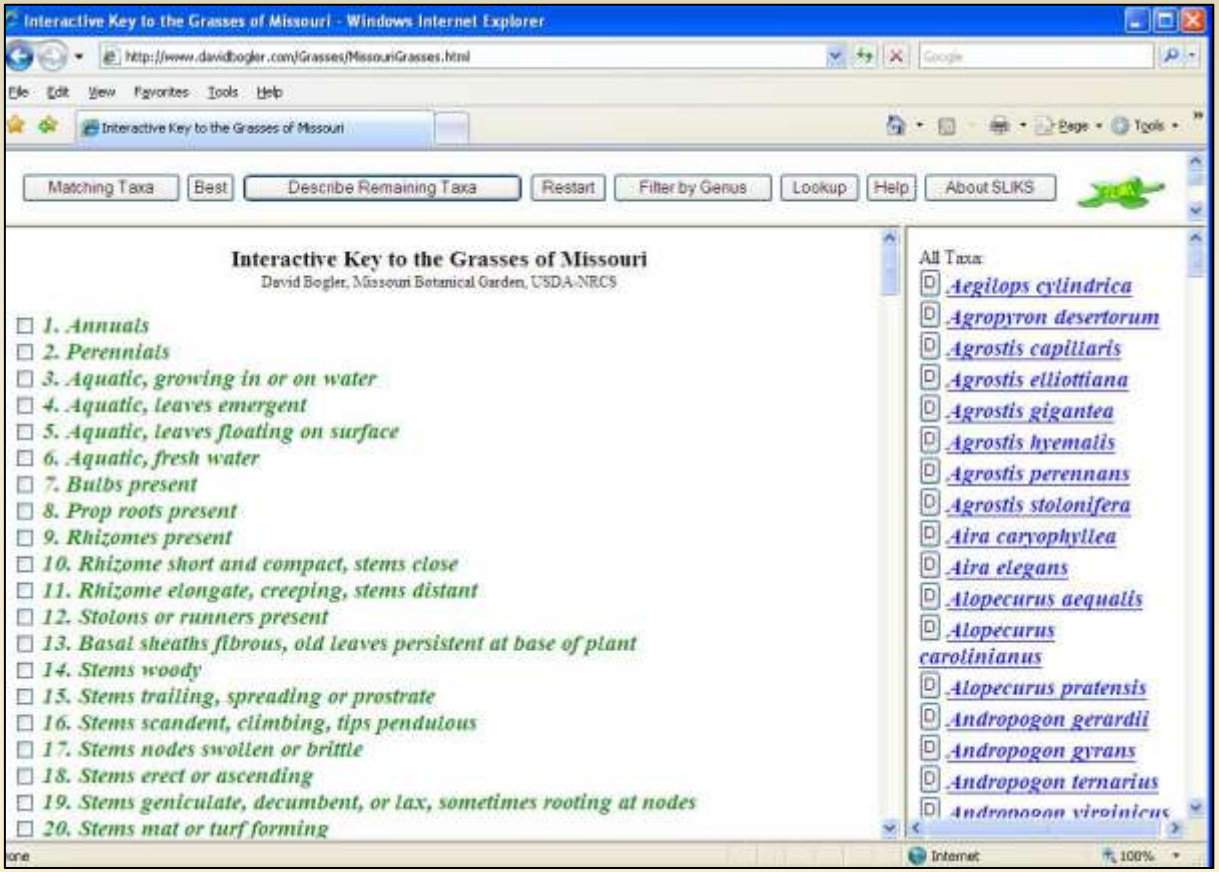
Floristic Treatments……





Online Interactive Keys to Identify Species



http://davidbogler.com

Grasses of the U.S.

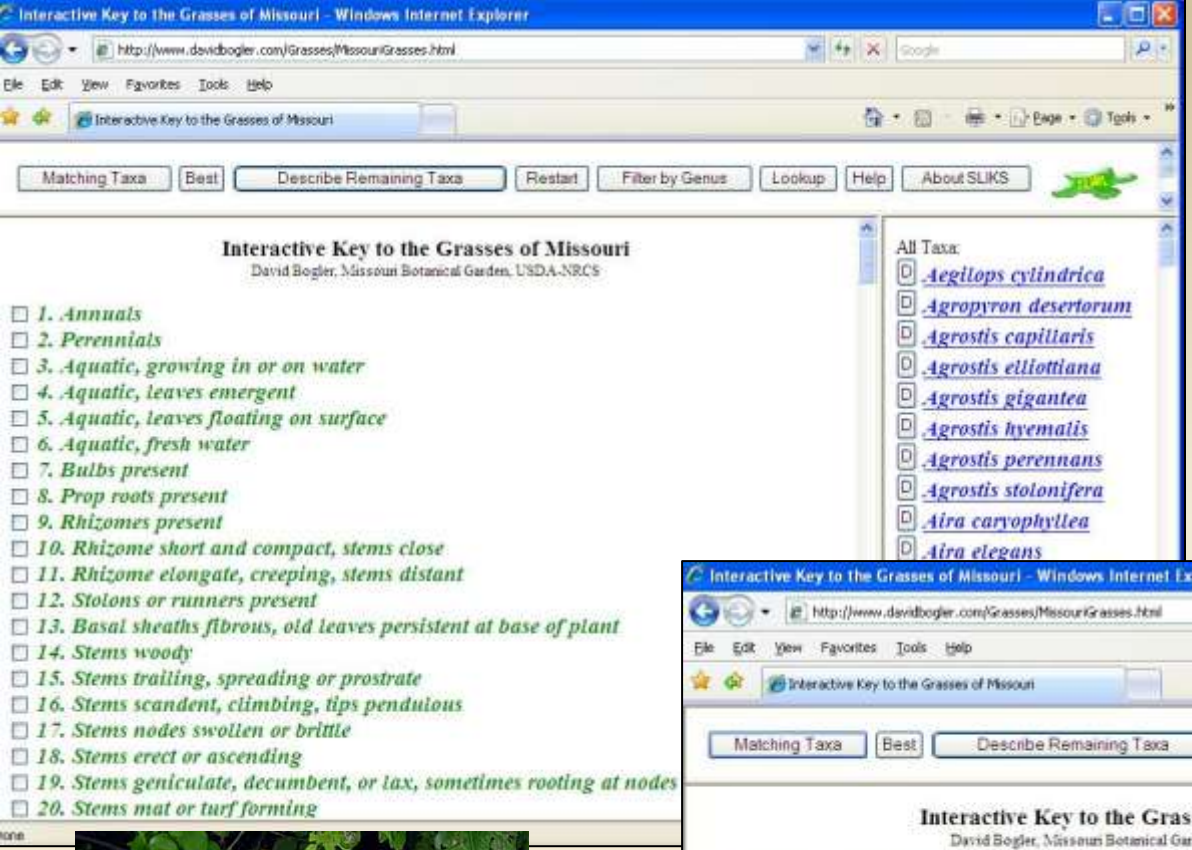
Legumes of the U.S.

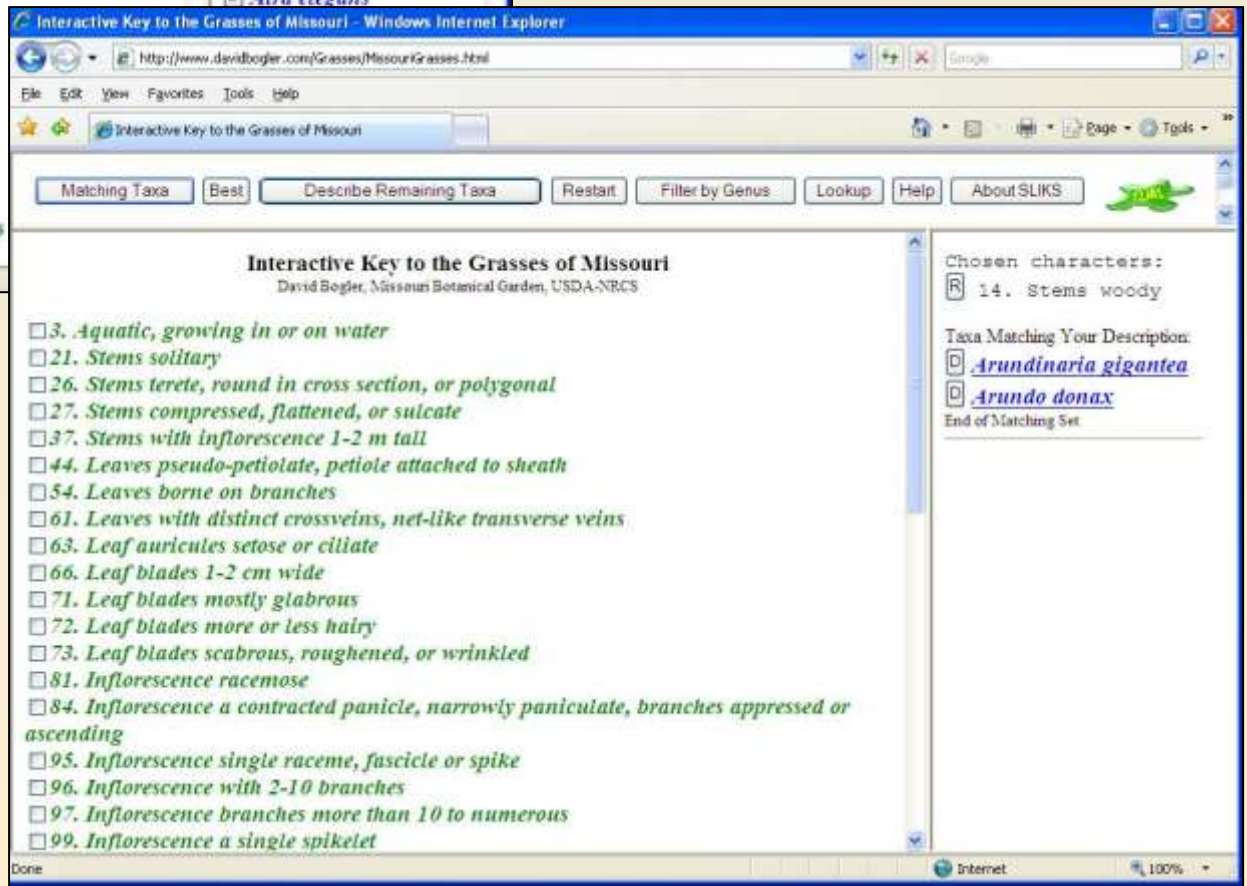
Monocots of the U.S.

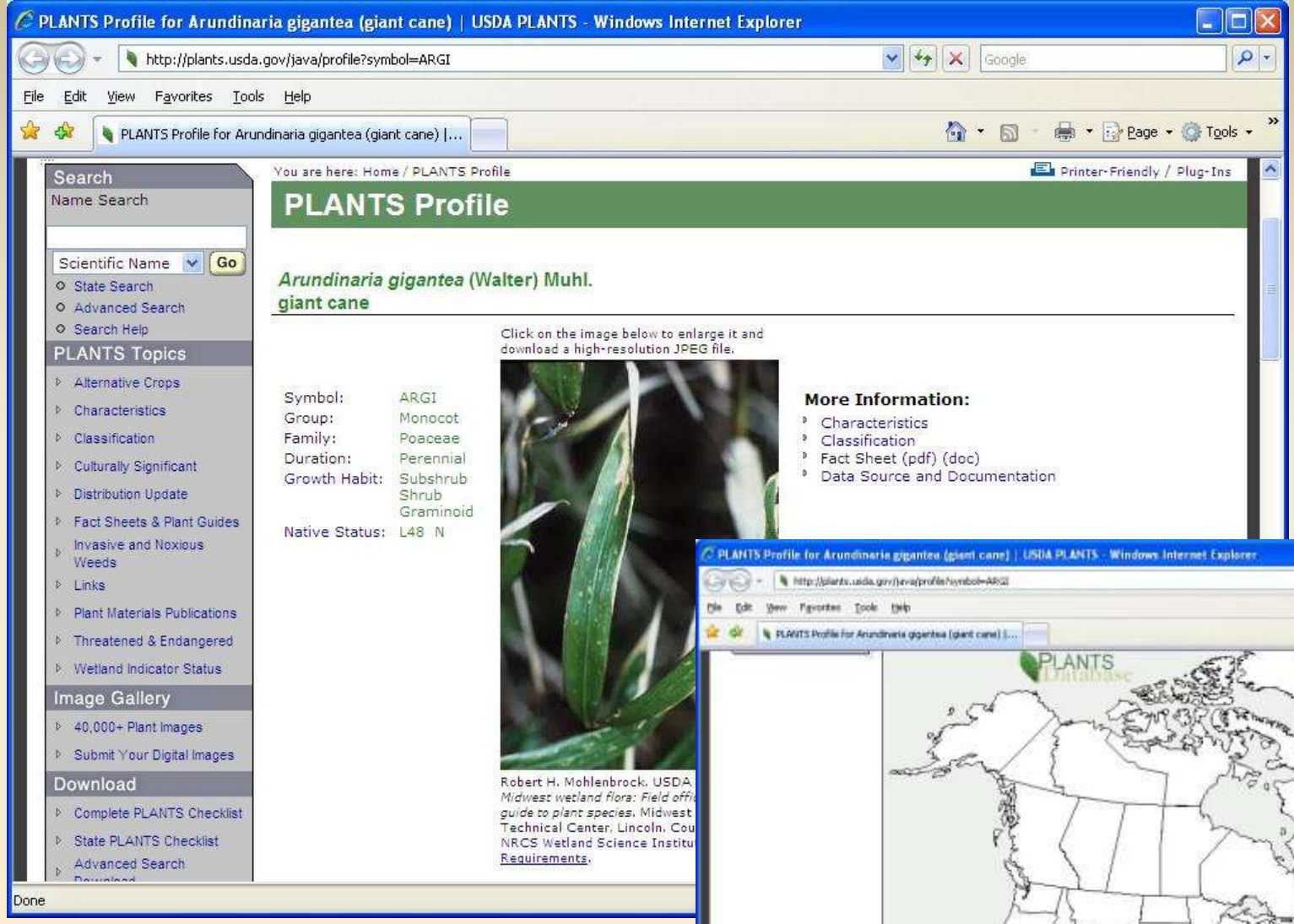
Works well on iPhones and tablets

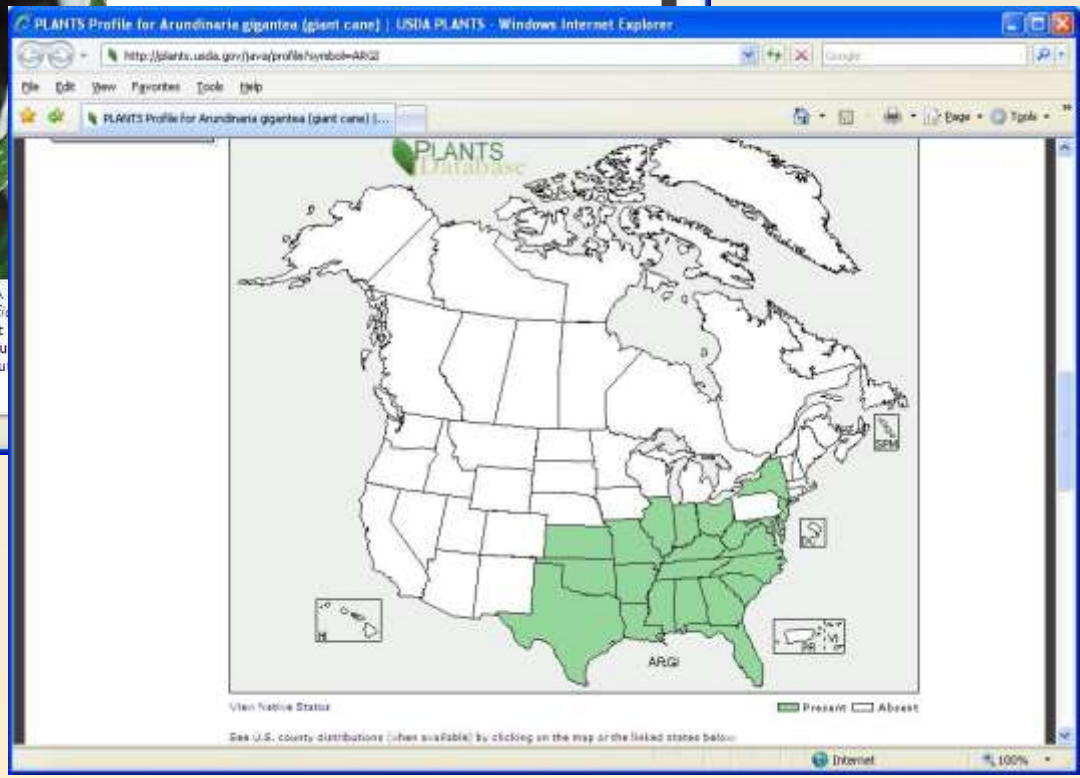
Interactive Keys

1. Check the character boxes
2. Click Matching Taxa button
3. Narrow the possibilities
4. ID the species, go to page for more info



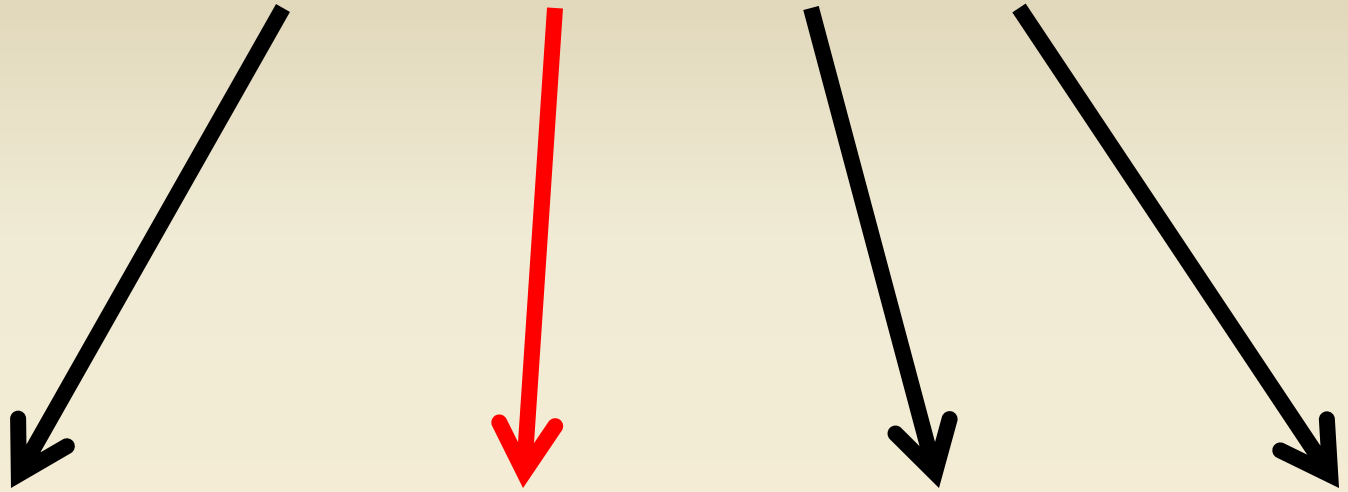






Links to data, images, maps, more information.

Plant Systematics



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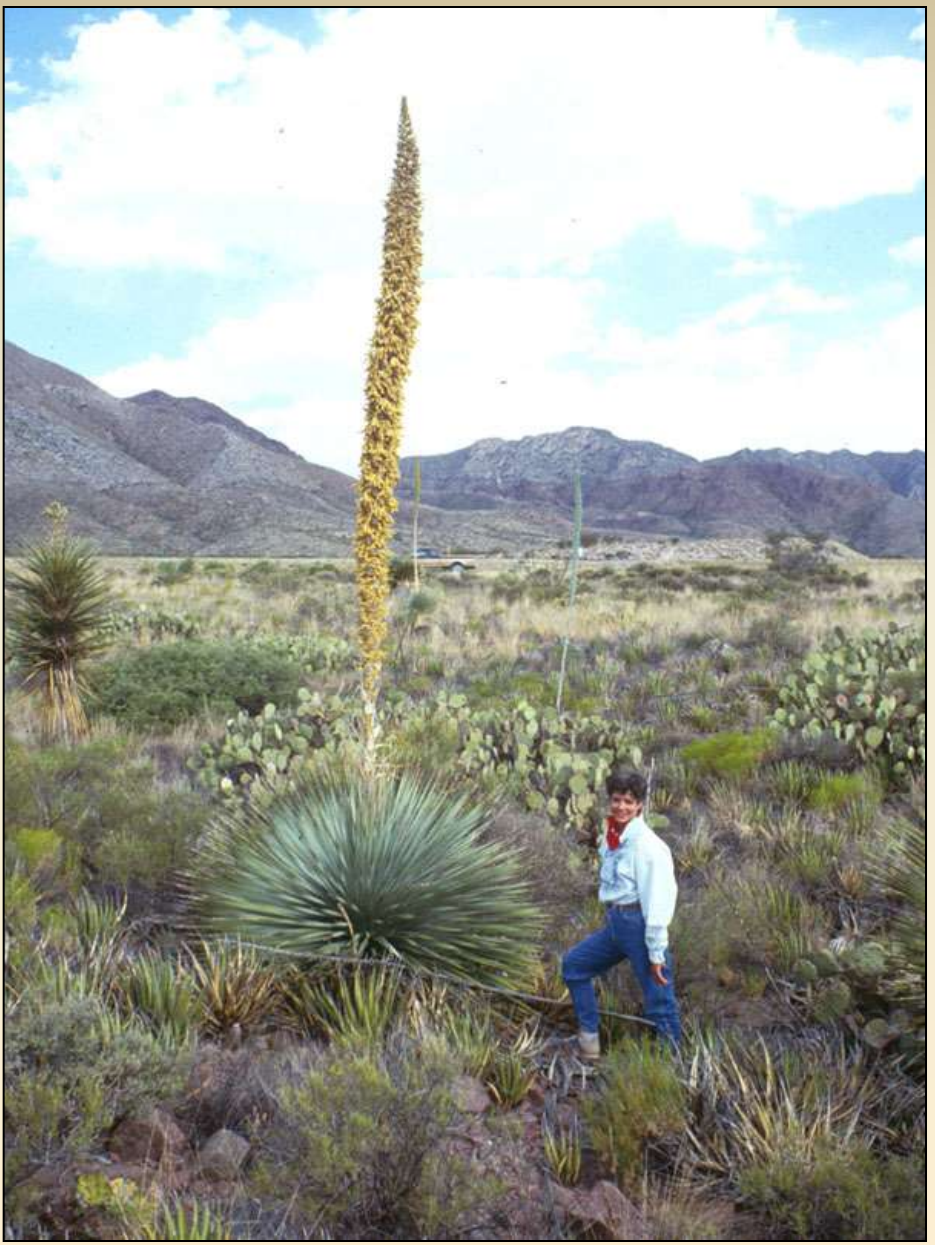
Agave Family and Relatives

Tequila Plantation, Jalisco, Mexico

Tequila, Jalisco, Cuervo Distillery

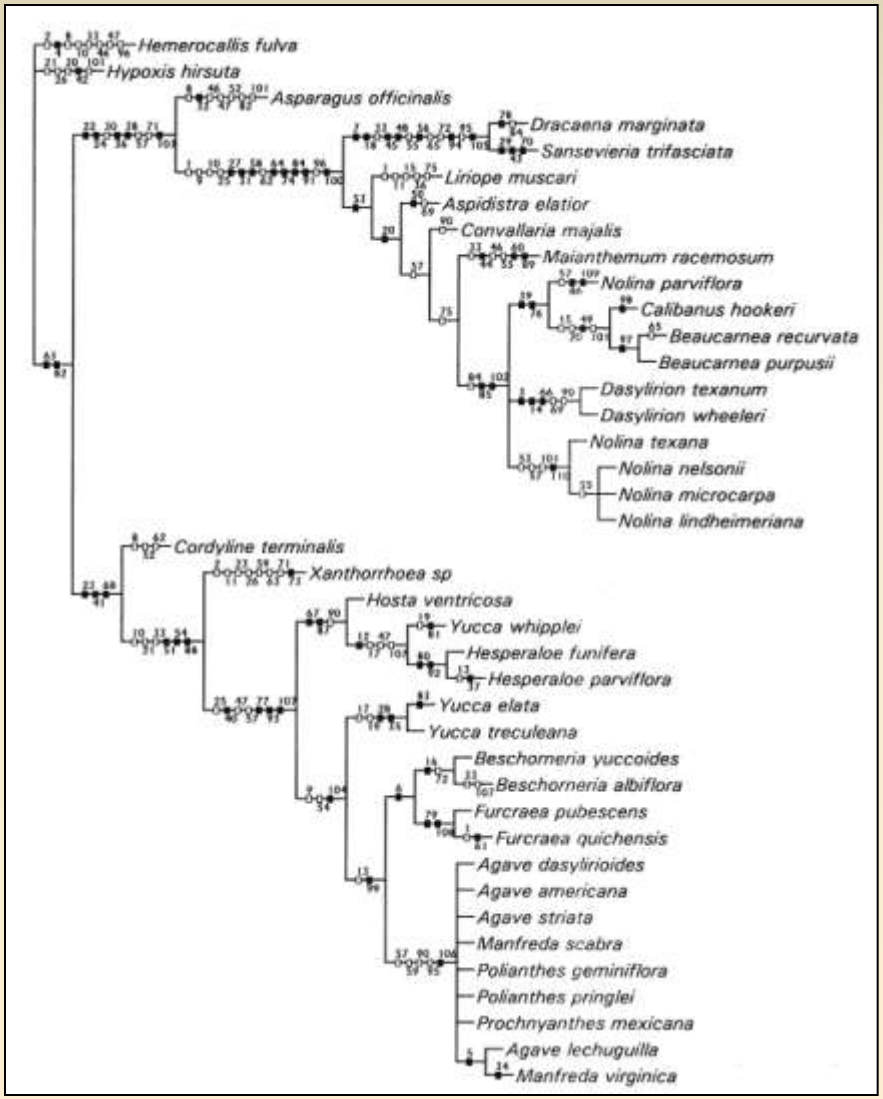


Dasylirion wheeleri

Nolina parviflora

Phylogeny of Agavaceae based on cpDNA Restriction Sites

Bogler and Simpson. 1995. Syst. Bot. 20: 191



Dracaenaceae

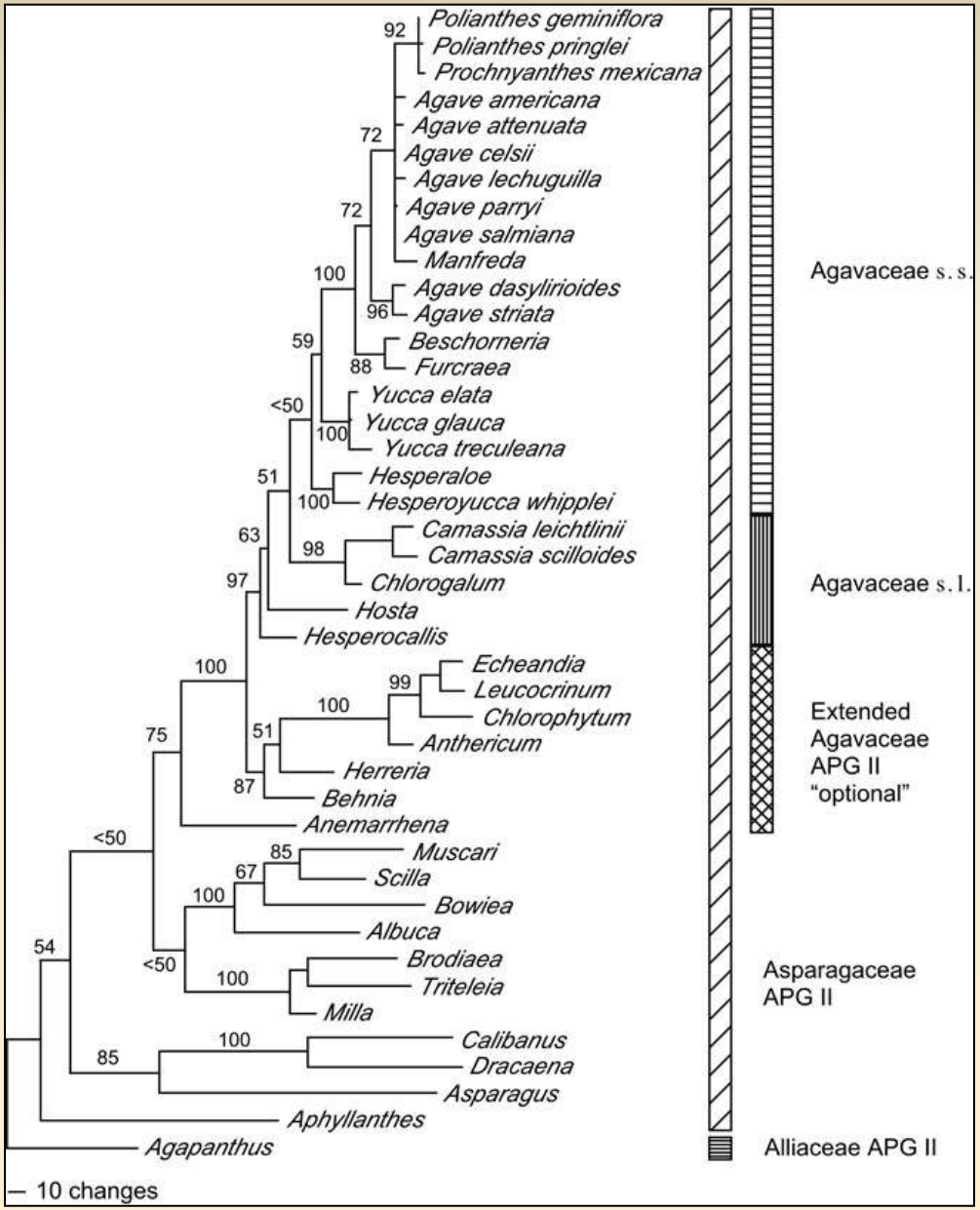
Convallariaceae

Nolinaceae

Agavaceae s.s.

Phylogeny of Agavaceae

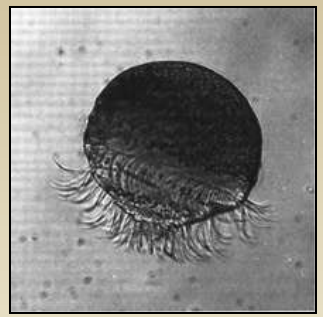
Based on rbcL, ndhF, and ITS DNA sequences



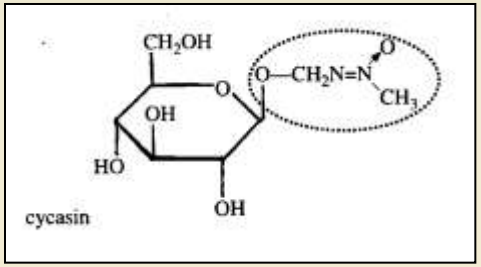
Bogler et al. 2006
Aliso **22**: 313–328

Atala Herbivory

Relict Distribution



Motile Spermatozoid



Toxins

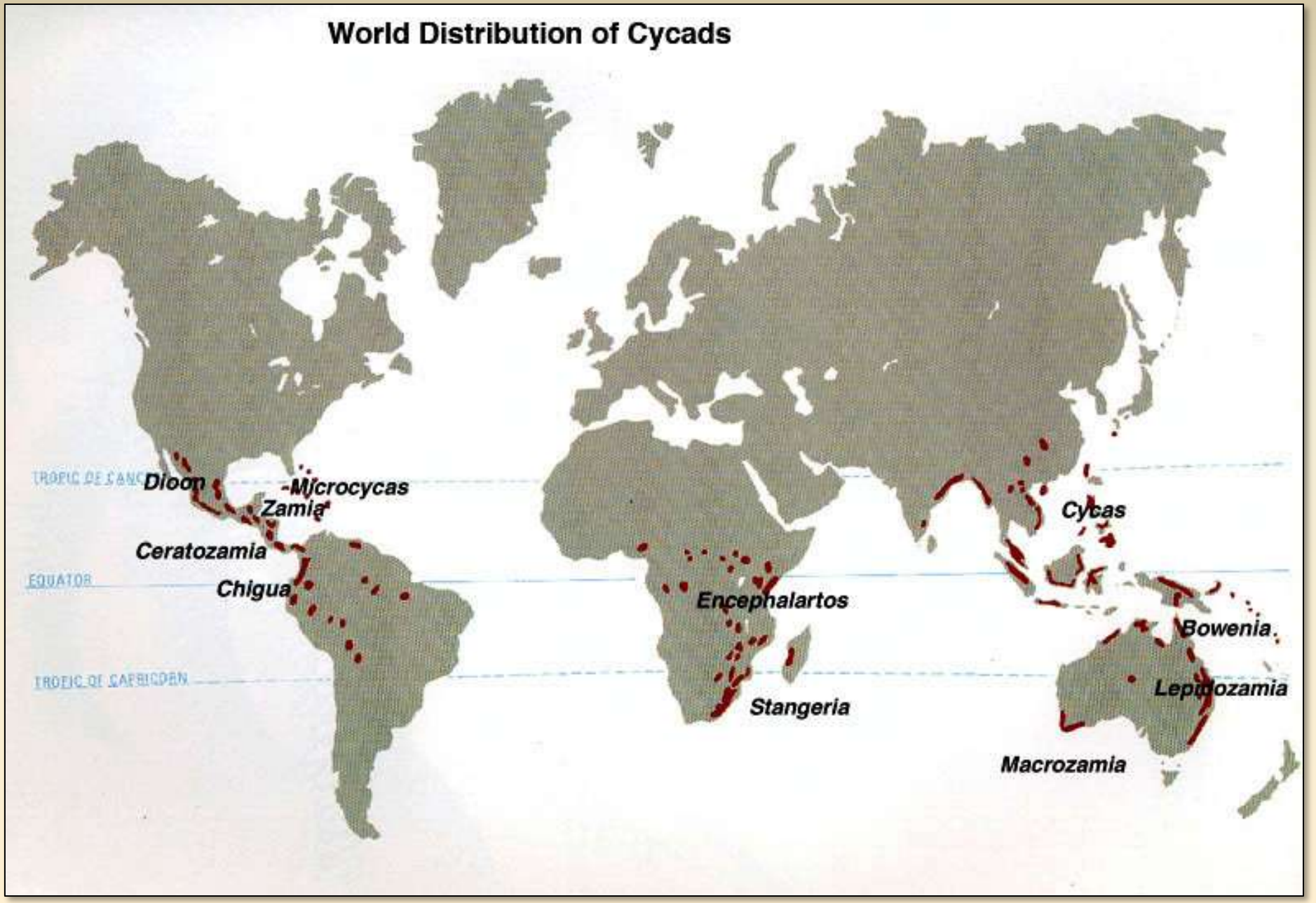
The Strange World of Cycads

Sporophylls

Fern-like Leaves

Insect Pollination

Coralloid Roots



from David Jones, Cycads of the World

Combined Data

*trn*L intron

ITS 2

*atp*B - *rbc*L spacer

*trn*S - *trn*G spacer

2405 Characters

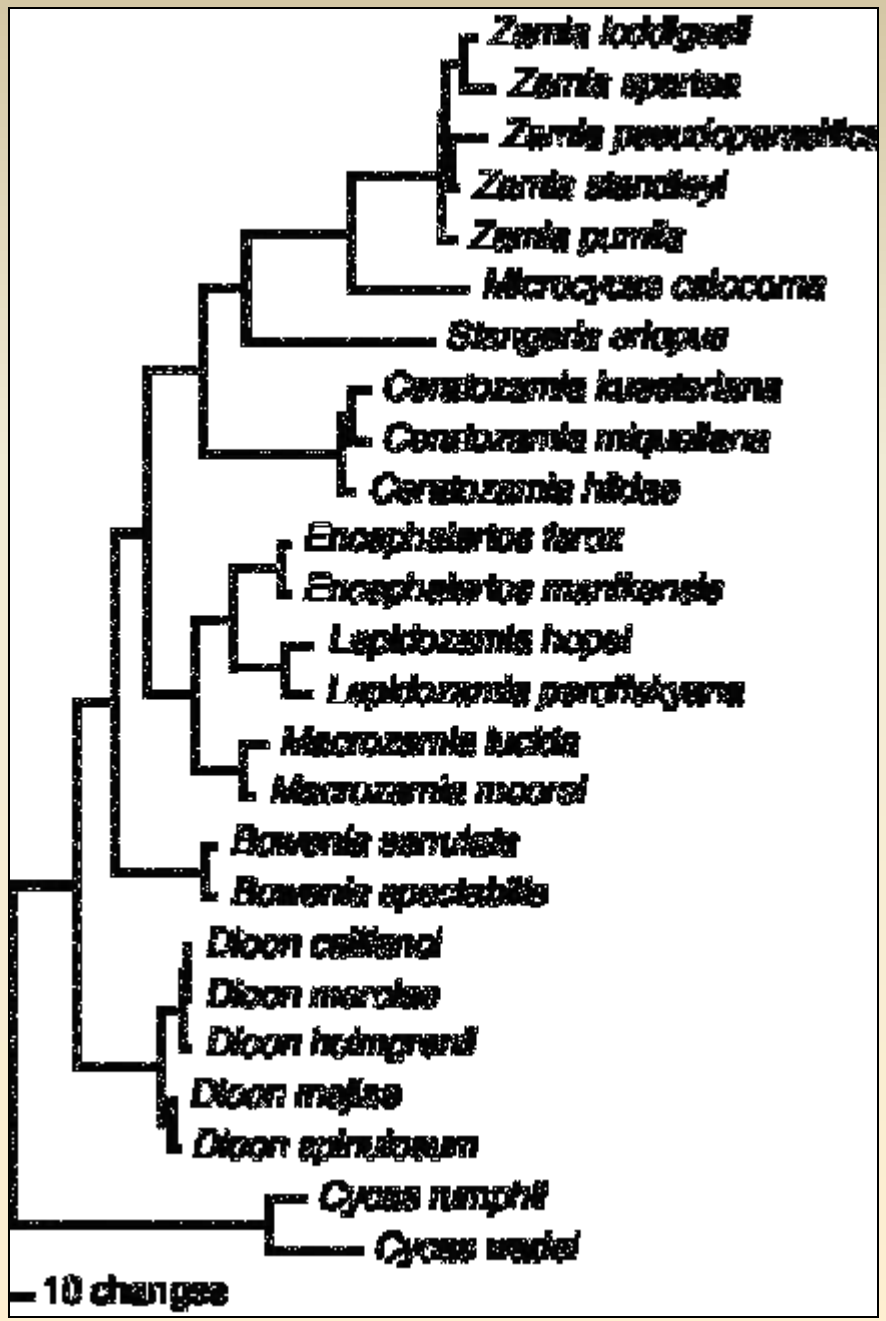
520 Informative Sites

1 Tree

CI = 0.777

RI = 0.861

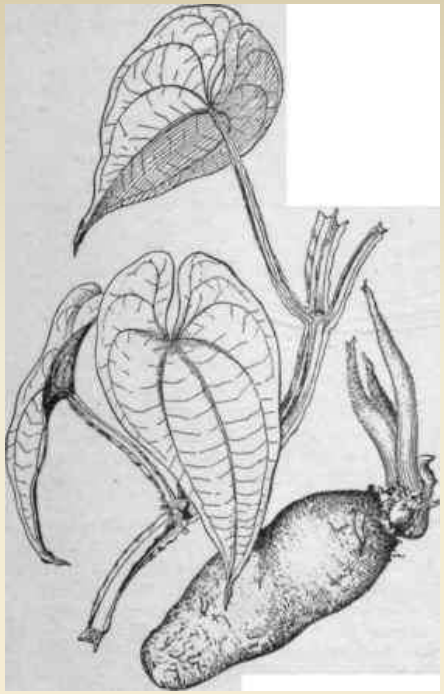
Single Most Parsimonious Tree




REVOLUCION
somos Todos

Classical Taxonomy Complex and Somewhat Subjective

Leaves alternate proximally, opposite and ultimately decussate distally, 6–16 × 4–13 cm; petiole ca. as long as blade, winged, base clasping, basal lobes stipulate, growing as extensions of wings, less than 1 mm wide; blade 5–7-veined, ovate, glabrous, base typically sagittate, margins entire, apex acute to acuminate. Staminate inflorescences axillary, 1–2 per axil, paniculate, fasciculate; panicles bearing flowers singly,bracteolate, in a zigzag pattern along rachis, internodes less than 2 mm; rachis to 25 cm, secondary axes 1–3(–6), fasciculate, less than 3 cm, each subtended by deltate-ovate bracteole shorter than 1 mm. *Pistillate* inflorescences solitary, 4–8(–20)-flowered, 6–35 cm, internodes ca. 1 cm

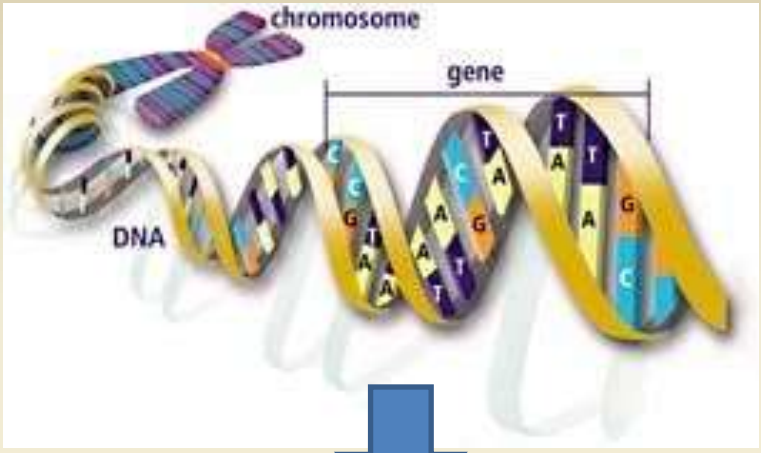


DNA Barcode Simpler (A,T,G,C) and More Objective

>Dioscorea alata (matK) gene, partial

ATTTAAATTATGTGTCAGATATATTAATACCCCATCCCATCCATCTGGAAATCCTGGTTCAAATA
CTTCAATGCTGGACTCAAGATGTTTCCTCTTTGCATTTATTGCGATTCTTTCTCCACGAATATC
ATAATTCGAAT AGTTTCATTACTCCGAAAAAACCTATTTACGTGATTTCAATTTCAAAAGAAA
ATAAAAGATTTTTTCGATTCCTATATAATTCTTATGTATTTGAATGTGAATTTGTATTAGTTTTTT
TTCATAAGCAATCCTCTTATTT ACGATCAA

Goal of DNA Barcoding: Identify species from DNA alone

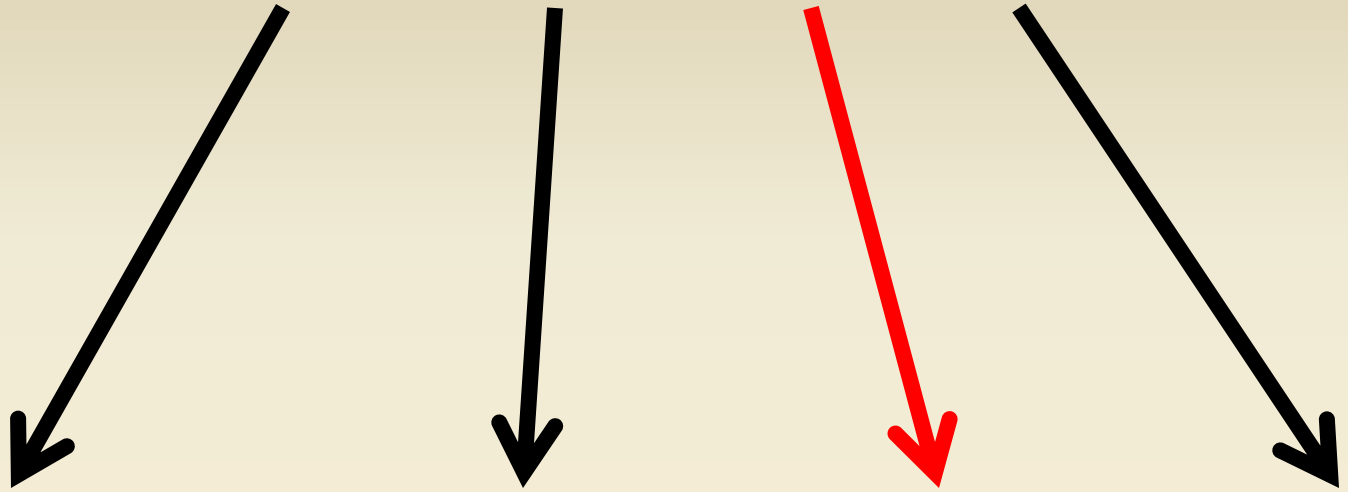


ATGTTGAATCTGTGTCATGCTCTTCGAGGCGTAC
AAAGTGAAATGTGCGTCATGTTCCATAAAACTAC
TATTATACGAAGCCAAAAAGTCTACCCGACTCAA
AAGTATTTGCTATTCAGTCAAGACATACAGCTCT
GACCTCAAAACCAAAAGAGATTTACTATTGAGAG
CTTCATCATAACAATTATAACCCGGAAGAGTTTC
AACTACGTCCCCAGAGGCTCAAATGTTATGCATA
CATTTAGACCCCAATGTTTTGAAACGAAATGATT

ID Family, Genus, Species

Plant DNA Barcoding Applications

Plant Systematics



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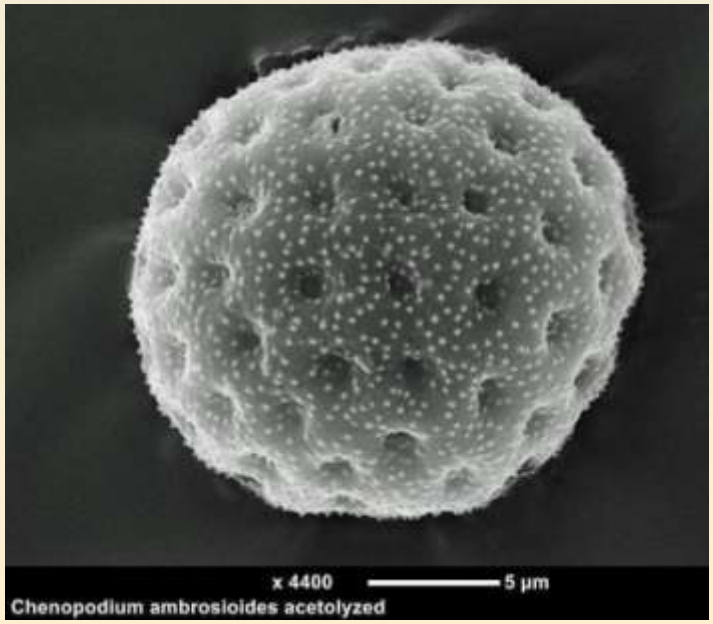
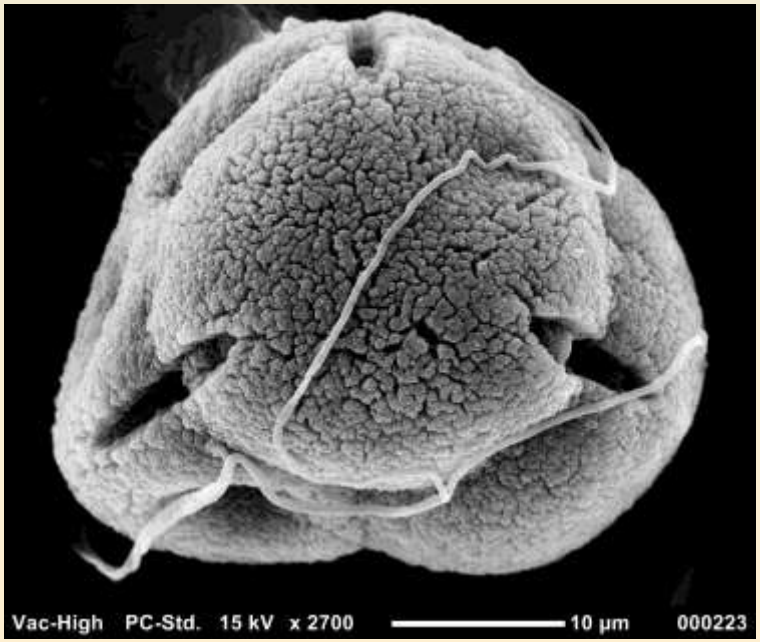
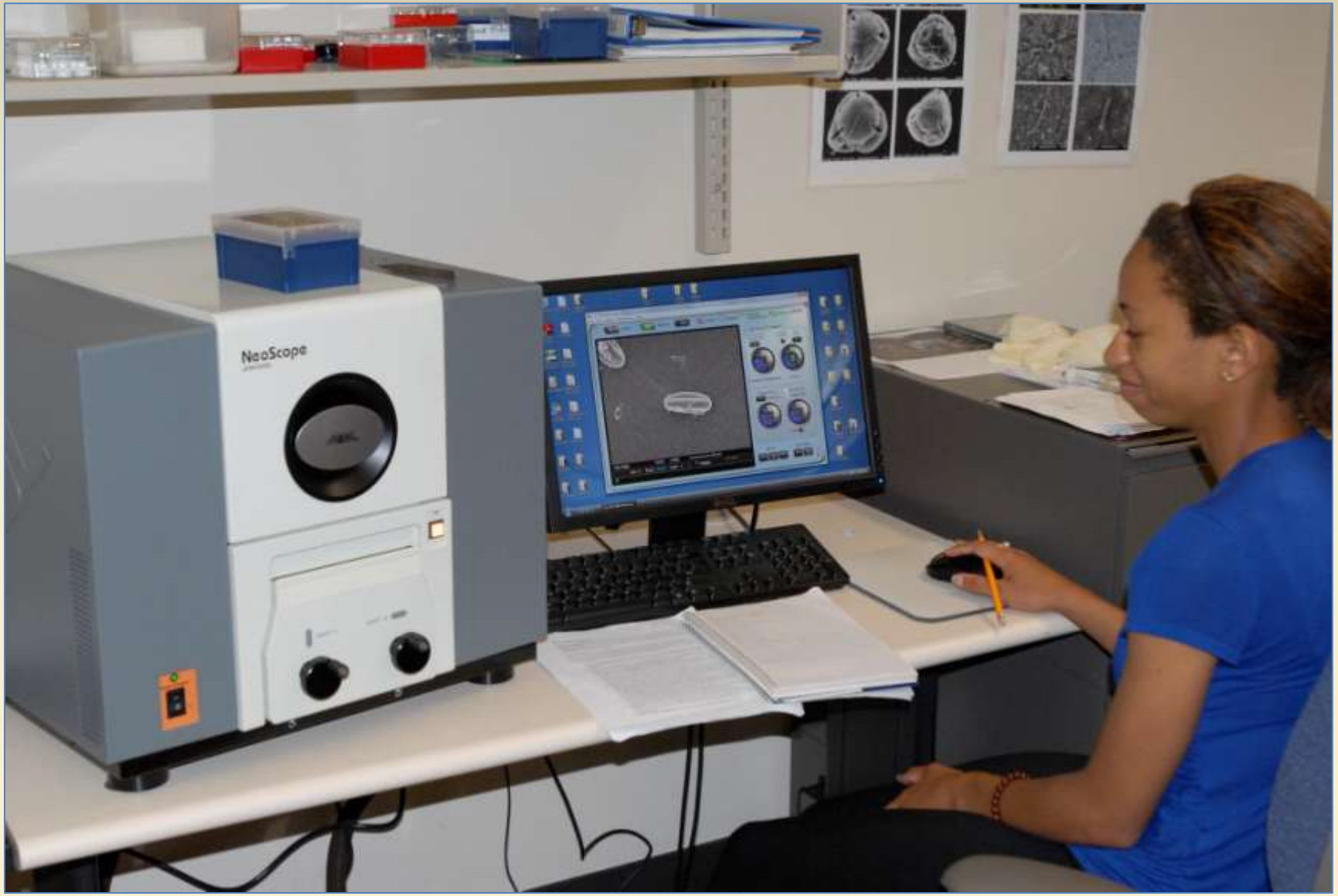
Pollen Morphology





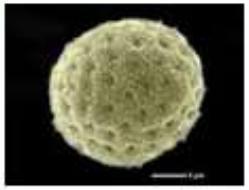
SEM – Scanning Electron Microscopy



Welcome to the Missouri Pollen Project (MPP). Here you will find illustrations, descriptions, and keys to identification of pollen grains from plants of Missouri and much of the Midwestern United States. The goal is to provide a means of identifying pollen, as well as summarizing what is known about pollination biology of Missouri plants. The MPP is part of a larger long-term project to develop baseline data on pollen and pollinators in natural and altered communities, information that may be useful in a changing world. The keys and images will also be useful to botanists, entomologists, archeologists, paleobotanists, allergists and many others.

Navigating the MPP pages is quite simple. Individual pages for each genus are accessed through the **Interactive Pollen Key** . Here you will find a list of pollen characters on the left and a list of plant taxa on the right. You may scroll down the list of taxa to access the page for a particular genus. If you are trying to identify an unknown pollen grain you simply check the boxes of one or more characters and press the Matching Taxa button at the top. The list of possible taxa on the right is reduced to only those matching those characters. The list of potential characters is also revised to correspond to the remaining taxa. The Best button will show how many of the taxa share each character. A **Glossary of Pollen** terms is provided to refresh your memory about terminology. A brief collection of websites and references to **Pollen Resources** is provided to assist in finding additional information. A larger version of the images can be seen by clicking on them with the mouse.

New Arrivals



Chenopodium

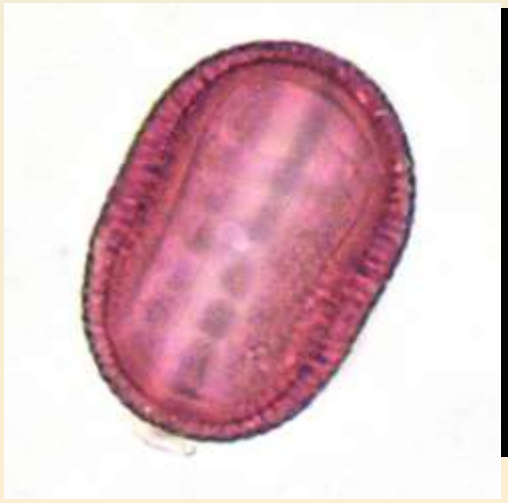
click t

Celastrus

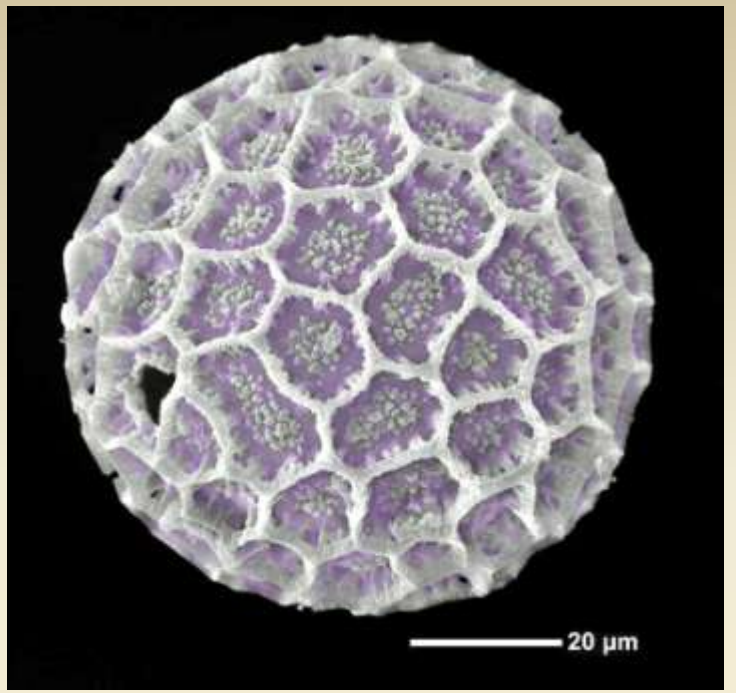
Passiflora

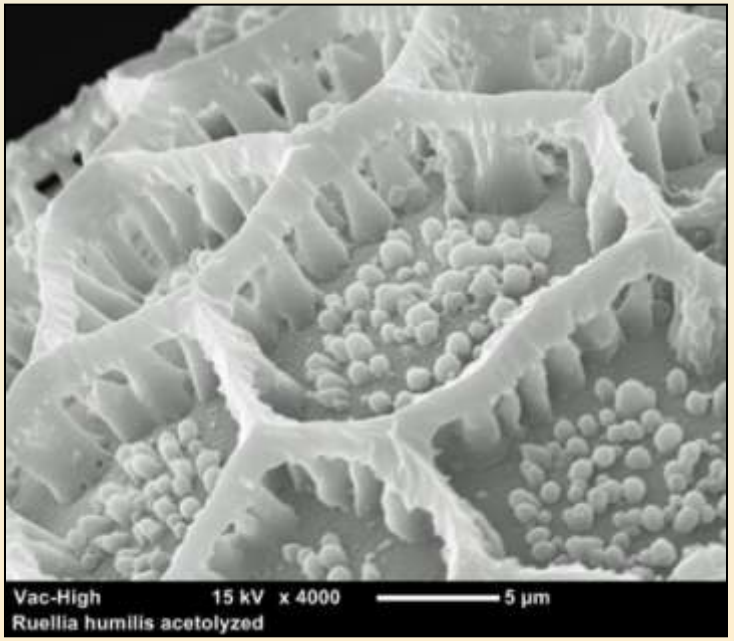
Opuntia

Water Willow - *Justicia americana*



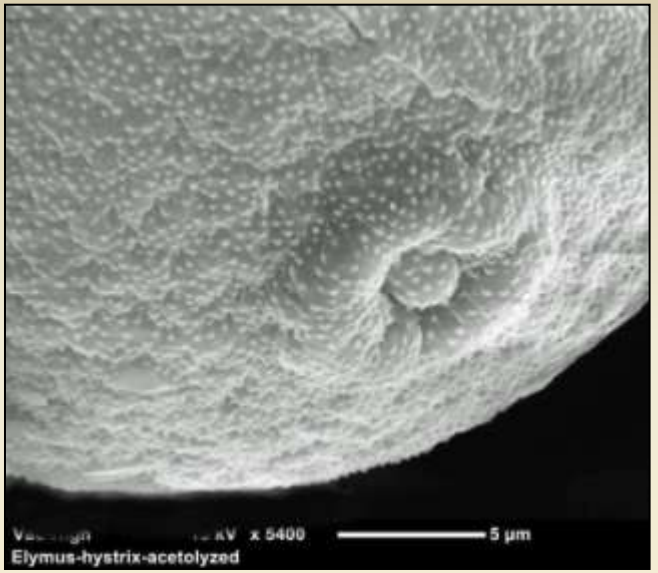
Ruellia humilis – Wild Petunia



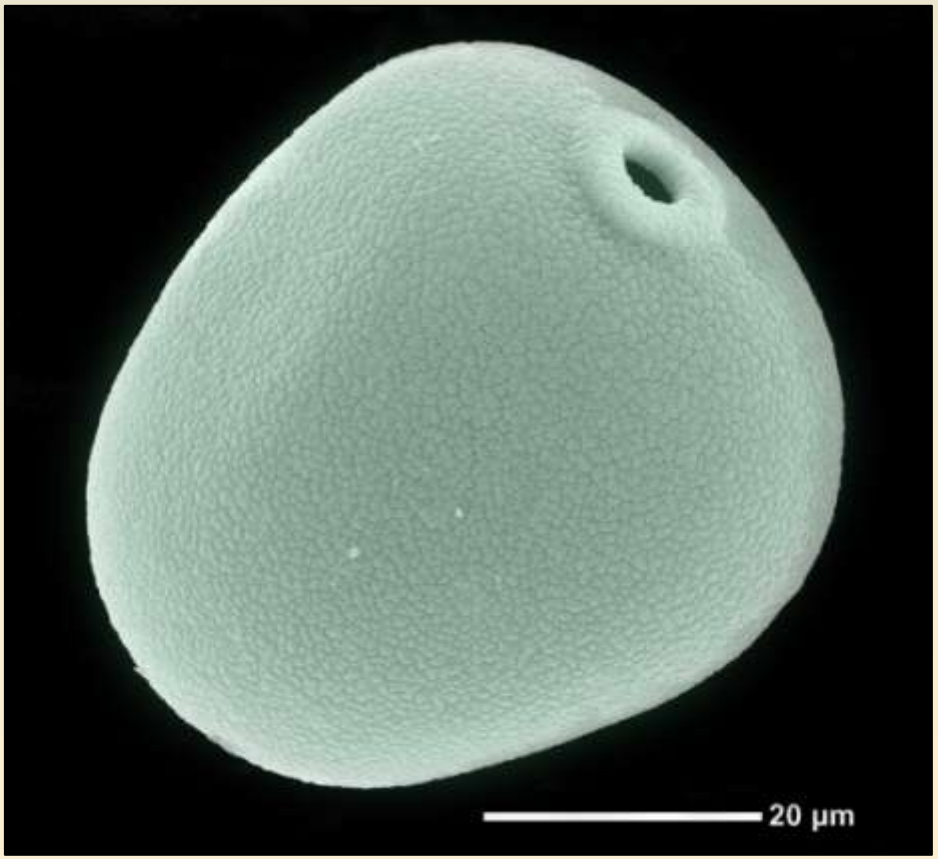


Grass Pollen

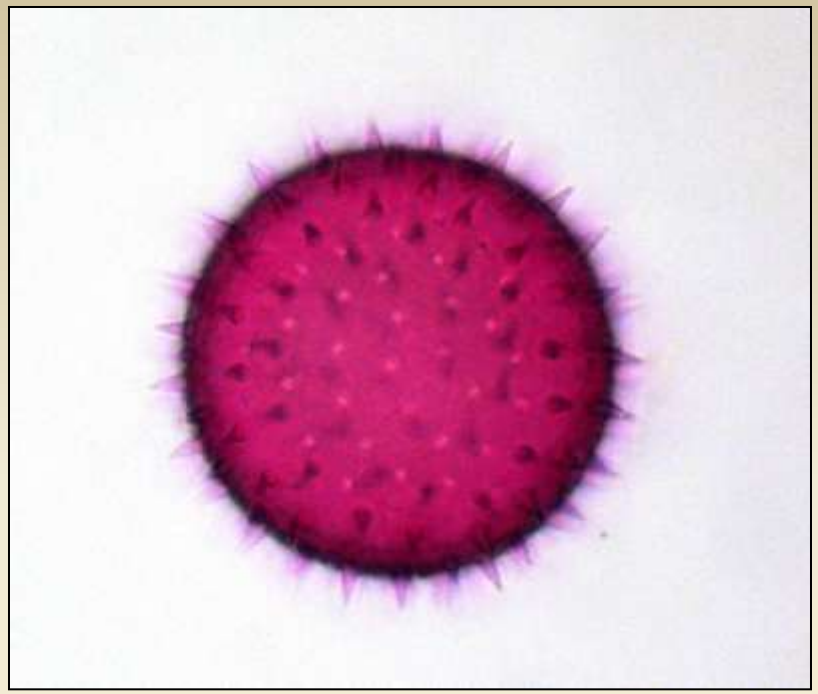
Elymus hystrix

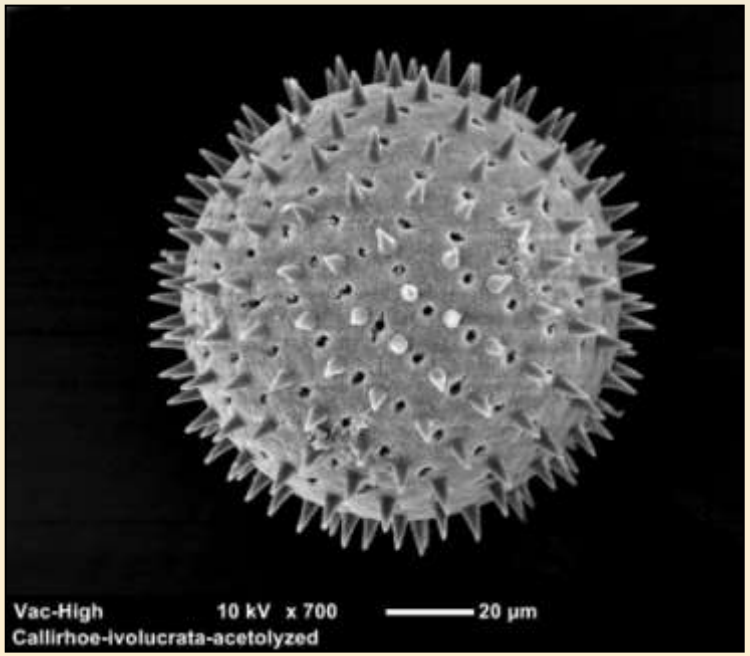


Phleum pratense

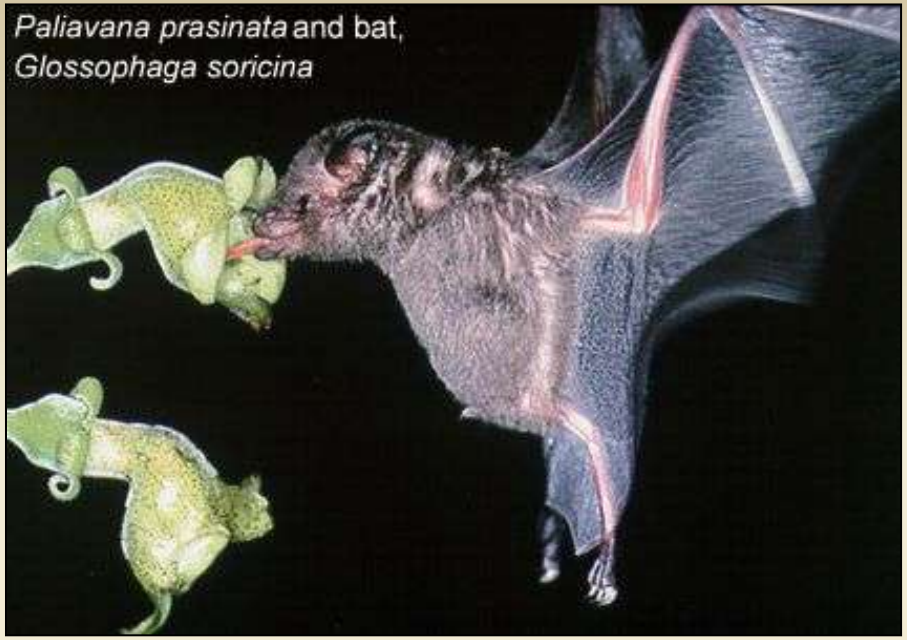


Callirhoe involucrata

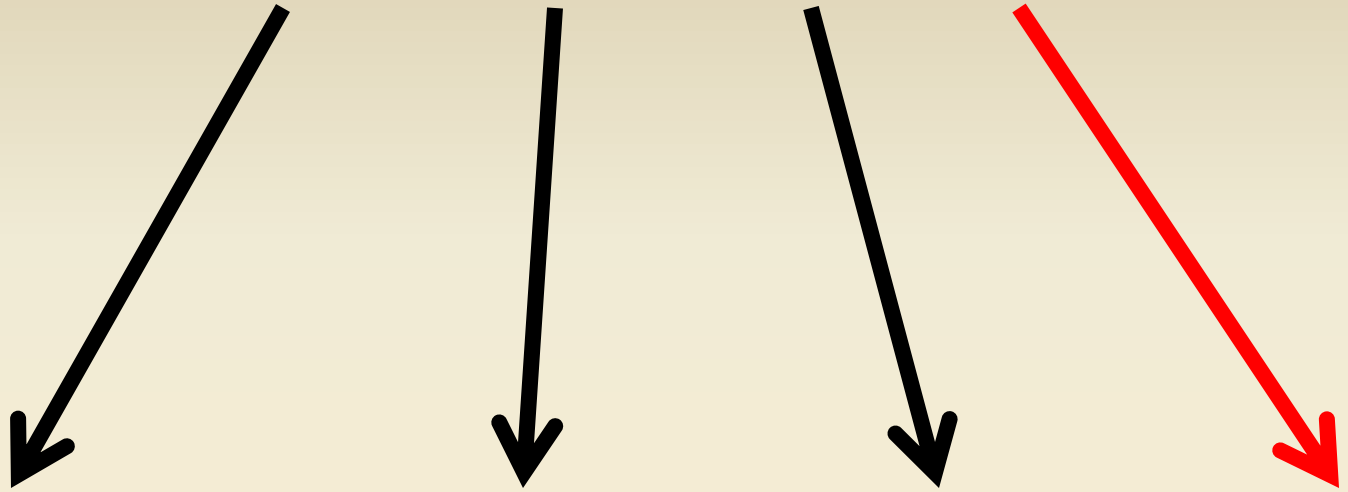




Pollination Biology


Paliavana prasinata and bat,
Glossophaga soricina

Plant Systematics



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MBG NSF Research Experiences for Undergraduates (REU)

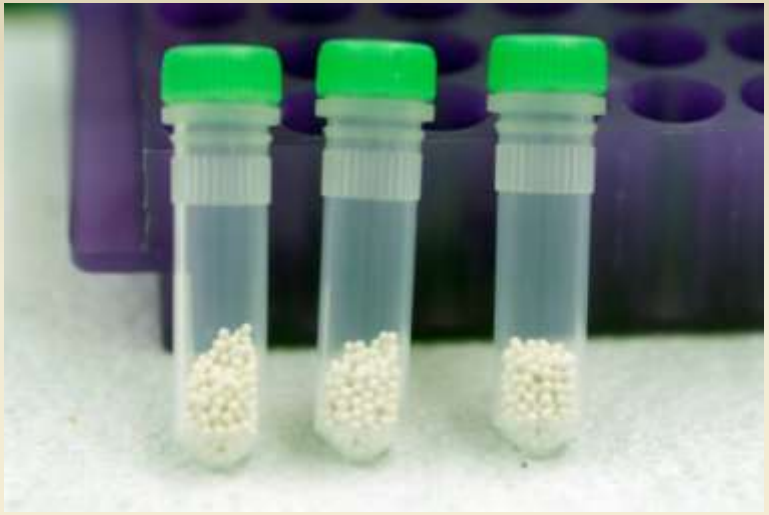
Mounting
and
Filing

Mounting and Filing

Collecting Specimens
Pressing the Plant for Voucher

Livingstone Nganga, UMSL Undergraduate
2012 REU

Extracting DNA from Leaf Samples



FastPrep DNA Extraction Kit

Livingstone Nganga

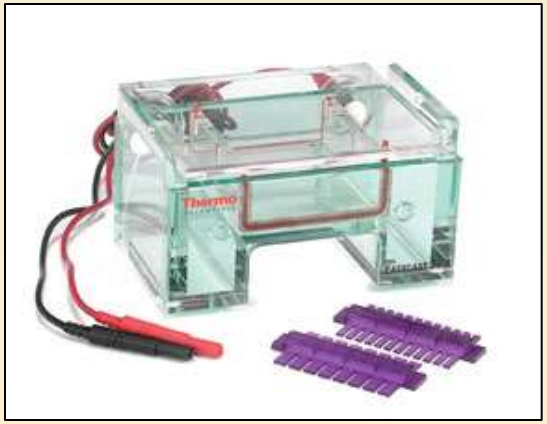

ALVITA
Caffeine free
ECHINACEA
(ANGUSTIFOLIA & PURPUREA)
TEA BAGS
24 TEA BAGS
NET WT. 1.69 OZ. (48g)

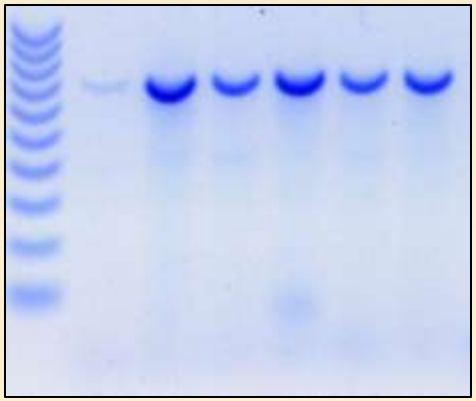

PREMIUM
Nature's Way
HERBAL
Echinacea
Purpurea Herb
IMMUNE SUPPORT*
180 Capsules / Certified 400 mg
DIETARY SUPPLEMENT


Licorice Root
CERTIFIED ORGANIC
Echinacea Angustifolia
Root

DNA Barcode Amplification: PCR

Kelsey Huisman, 2013 REU





PCR Product Gel Electrophoresis – check size

Sequencing Facility

REU Students 2014

From left: Robbie Wood, Joel Swift, Anni Poetzl, Rachel Becknell, Cassandra Kitchen, Megan Ruffley, Chelsea Pretz, Nicolas Correa, Joseph Bradley, Ben Durrington, Sofia Wolfson

REU 2014 Huzzah Float Trip

Conservation Genetics of Tall Larkspur (*Delphinium exaltatum)*

During summer 2009, the National Park Service Ozark Highlands fire ecology crew discovered the largest population of the nationally-rare tall larkspur (*Delphinium exaltatum*) in a prescribed fire management unit anywhere. A population of 2,481 tall larkspur plants was found at Ozark National Scenic Riverways (ONSR), near the park's famous Alley Spring.

Conservation Genetics of Tall Larkspur (*Delphinium exaltatum)*

U.S. Distribution

Shannon Co., Missouri