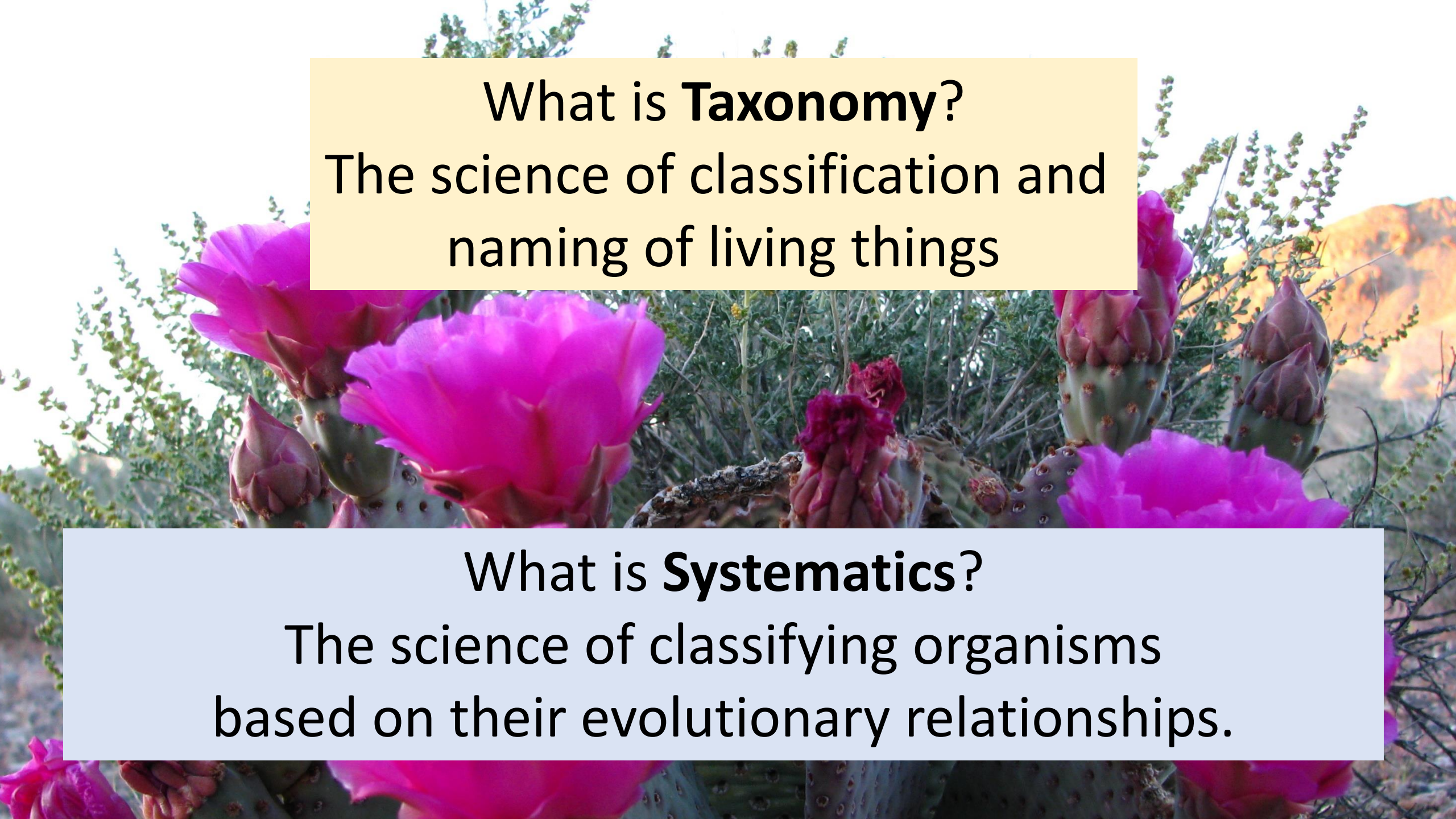




**Plant Taxonomy  
And  
Plant Identification**

## **The purpose of this lecture.....**

- What is Taxonomy, Systematics, Species?
- What is Scientific Nomenclature?
- How are plants classified?
- What parts of plants are clue to their identity?
- Describe some common plant families.
- How to look up plants in a reference book?



What is **Taxonomy**?  
The science of classification and  
naming of living things

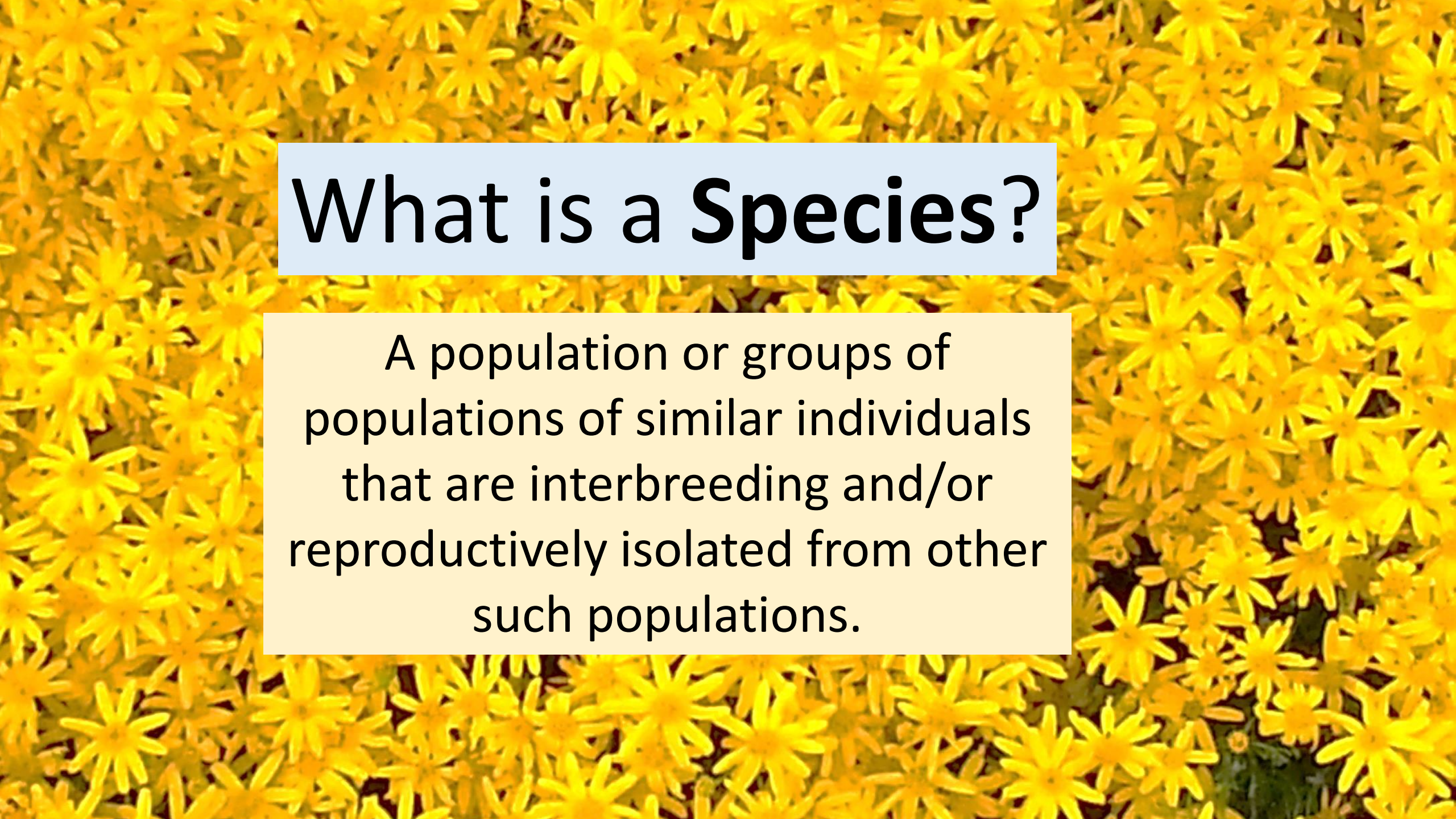
What is **Systematics**?  
The science of classifying organisms  
based on their evolutionary relationships.

# The Theory of Evolution

A **Theory** in science is  
as close to a fact as science can get.

a theory has **predictive power-**

This means you can guess  
before you know the answer  
what the answer will be.

The background of the slide is a dense field of small, bright yellow flowers, likely daisies, with dark green foliage visible between them. The flowers are in sharp focus in the foreground and become slightly blurred towards the background, creating a sense of depth.

# What is a **Species**?

A population or groups of populations of similar individuals that are interbreeding and/or reproductively isolated from other such populations.

Names of things, plants, animals, people, etc.  
are what we give them....



Since the beginning of language- people needed names  
for things in their world so they could communicate  
about them.

Genesis 2:19- Out of the ground the lord God formed every beast of the field and every bird of the sky and brought them to Adam to see what he would call them; and whatever Adam called a living thing, that was its name.

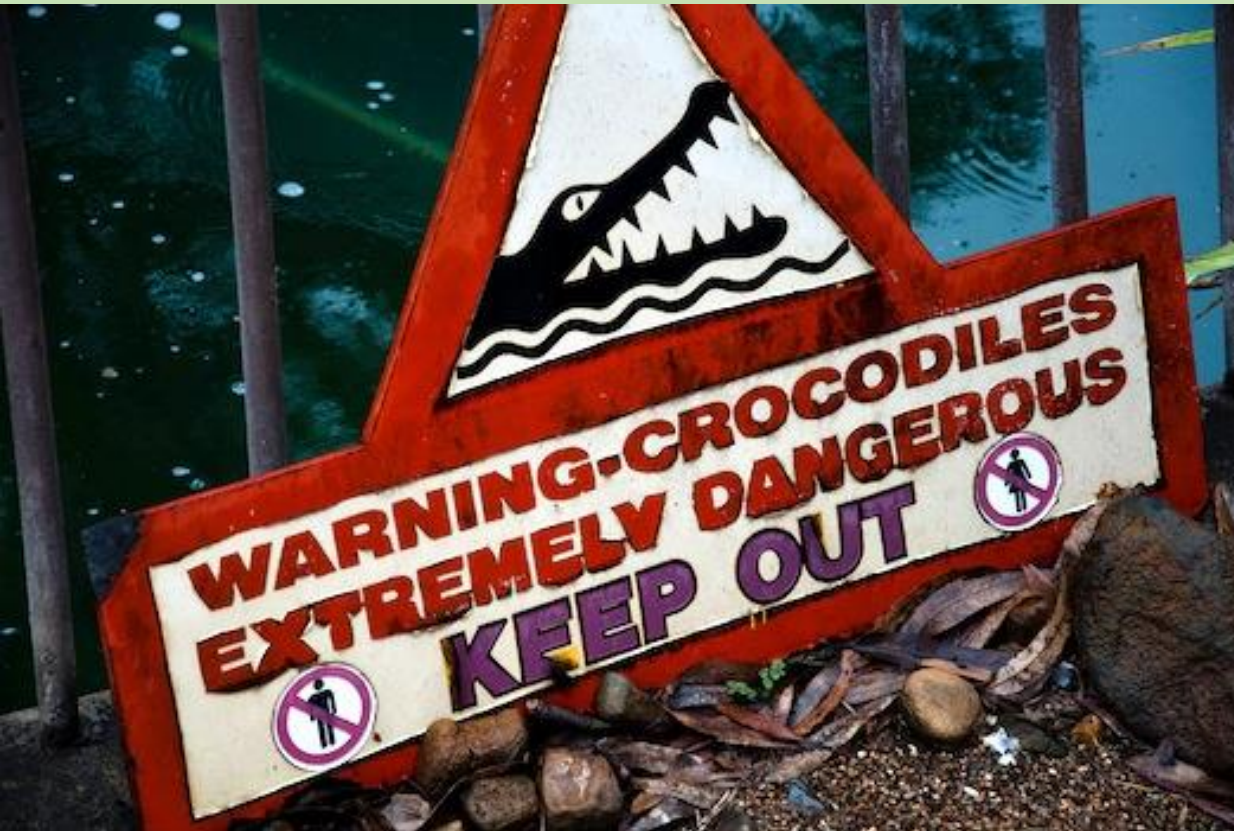


Names of plants and animals can be arbitrary or descriptive

“Look out for that big creature that swims in the river and eats people...”

VS

**CROCODILE!**





People are also natural classifiers:



**Furniture**



**Chairs**



**Rocking chair**



We also see the differences among living things Even when they are closely related- based on physical features.





**One way to decide how to name things is to look  
at features.**

**Another way is to look at relationships....**

**And categorize .....**





**Plants are a whole another challenge-**

**~ 400,000 species**

Lots of diversity

**First total list made in 2010 of all known plant names.**

[www.theplantlist.org](http://www.theplantlist.org)

**Categorizing and naming of new species of plants is ongoing!!!!**

# THEOPHRASTUS

ENQUIRY INTO PLANTS

AND MINOR WORKS ON ODOURS AND  
WEATHER SIGNS

WITH AN ENGLISH TRANSLATION BY  
SIR ARTHUR HORT, BART., M.A.  
FORMERLY FELLOW OF TRINITY COLLEGE, CAMBRIDGE

IN TWO VOLUMES

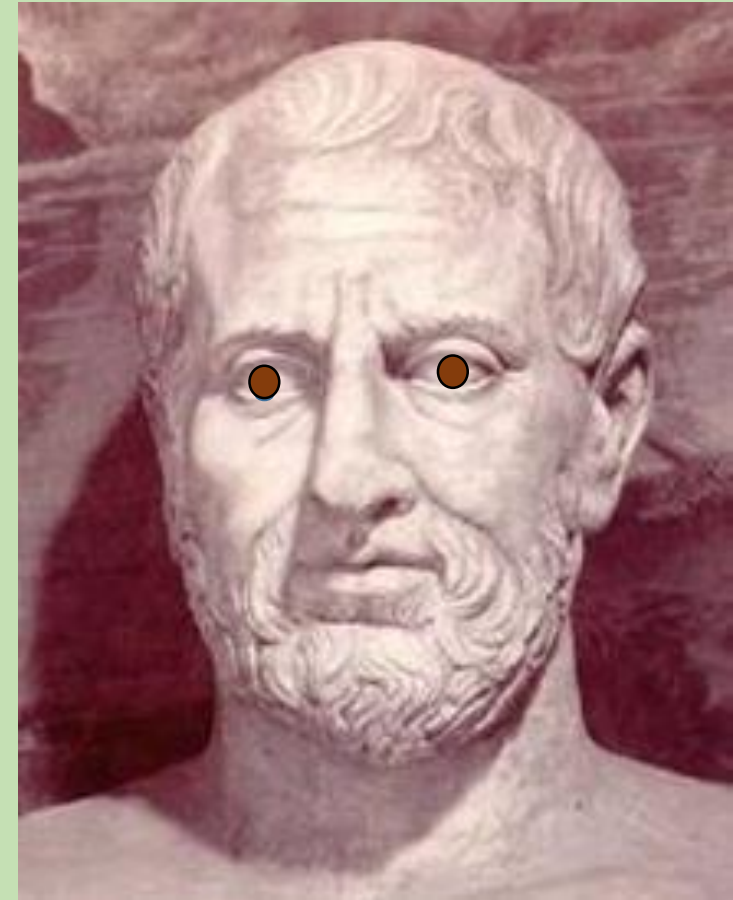
I



369406  
27.7.39

LONDON : WILLIAM HEINEMANN  
NEW YORK : G. P. PUTNAM'S SONS  
MCMXVI

Where it all start??-  
In Ancient Greece...  
With Socrates, Plato,  
and Aristotle  
And **Theophrastus**  
(371 to 287 BC)



The first known list of plants-"Inquiry into Plants"  
in which he described and categorized 480 species of  
useful plants, and named them (in Greek) based on  
their common names.



# Dioscorides

40 to 90 AD

Also a Greek

Who wrote the first herbal

“De Materia Medica”

in 65 AD

a book that was rewritten,  
translated, and illustrated  
again and again for the

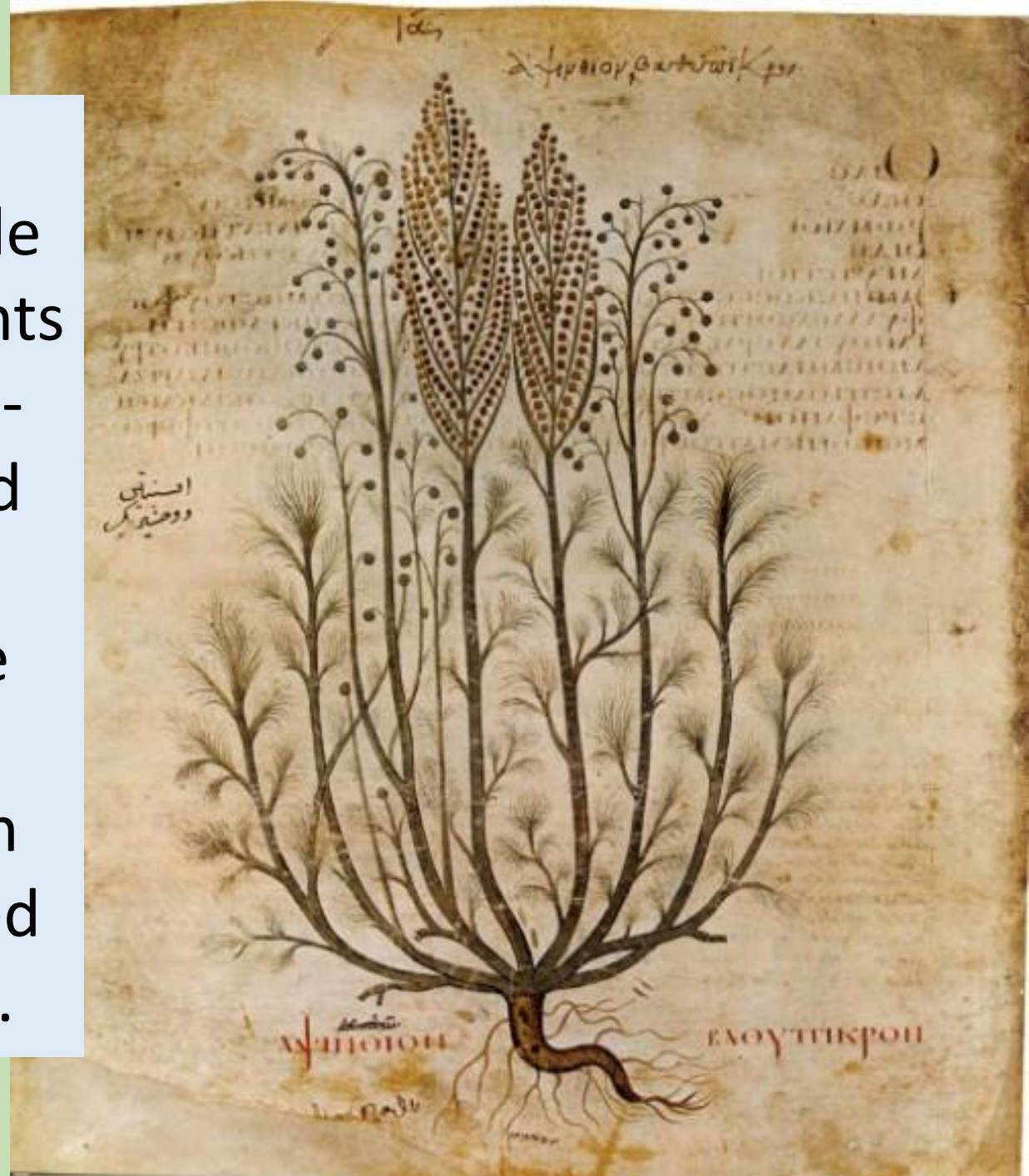
next 1500 years.

*Diocorea*- a genus of yam named after Diocorides



In 1600's, various scientists/botanists/doctors/people began writing down names for plants other than strictly medicinal ones- and started categorizing them and illustrating them!

Latin was the language of science and of educated people - so the names used were written down in Latin or Greek- using names started by Theophrastus and Dioscorides.



## Botanists of Importance



**Kaspar Bauhin**- Swiss Botanist- (1560-1624) who wrote “The Illustrated Exposition of Plants.” He use binomial nomenclature for many plants.

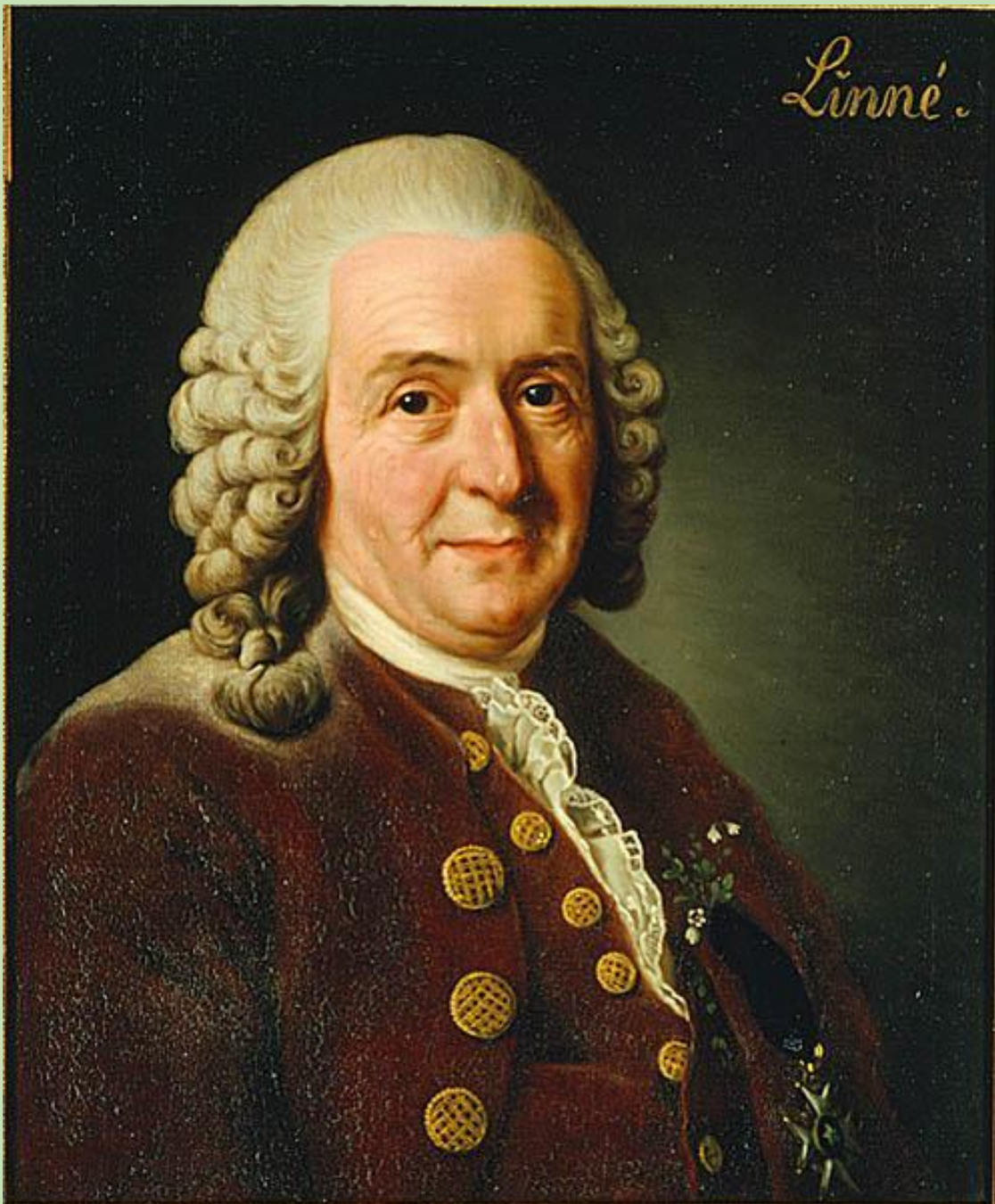
*Bauhinia*- Genus of orchidtree

**Joseph Tournefort**- French Botanist- (1656-1708) wrote “Elements of Botany.” Credited with defining Genus.

*Tournefortia*- Genus of soliderflower







Then along came...

**Carl Linnaeus**

**(1707-1778)**

The father of Taxonomy-

He standardized the System of

**Binomial Nomenclature**

giving plants 2 names-

**Genus-** (plural- **Genera**)

indicating the larger group in  
which plant occurs and **Species.**

**Each name was unique.**

He also coined a lot of our scientific  
terms used for plants.

CAROLI LINNÆI  
S. R. MDX MITIS SVEDICÆ ARCHIATRI; MEDIC. & BOTAN.  
PROFESS. UPSAL; EQUITIS AUR. DE STELLA POLARI;  
HOC DON. ACAD. IMPER. MONSPEL. BEROL. TOLOS.  
UPSAL. STOCKH. SOC. & PARIS. CORESP.

# SPECIES PLANTARUM,

EXHIBENTES

PLANTAS RITE COGNITAS,

AD

GENERA RELATAS,

CUM

DIFFERENTIIS SPECIFICIS,  
NOMINIBUS TRIVIALIBUS,  
SYNONYMIS SELECTIS,  
LOCIS NATALIBUS,

SECUNDUM

SYSTEMA SEXUALE

DIGESTAS.

TOMUS I

Com Privilegio S. R. MDX Suediæ et S. R. MDX Fœderis ac Electoris Palatini.

HOLMIÆ,  
IMPENSIS LAURENTII SALVII.  
1753.

*C. Appelgren*

Genera Plantarum & Species Plantarum Published in 1737 and 1753, is the beginning of plant taxonomy. They included 935 genera and 5,940 species of plants.

## ICOSANDRIA.

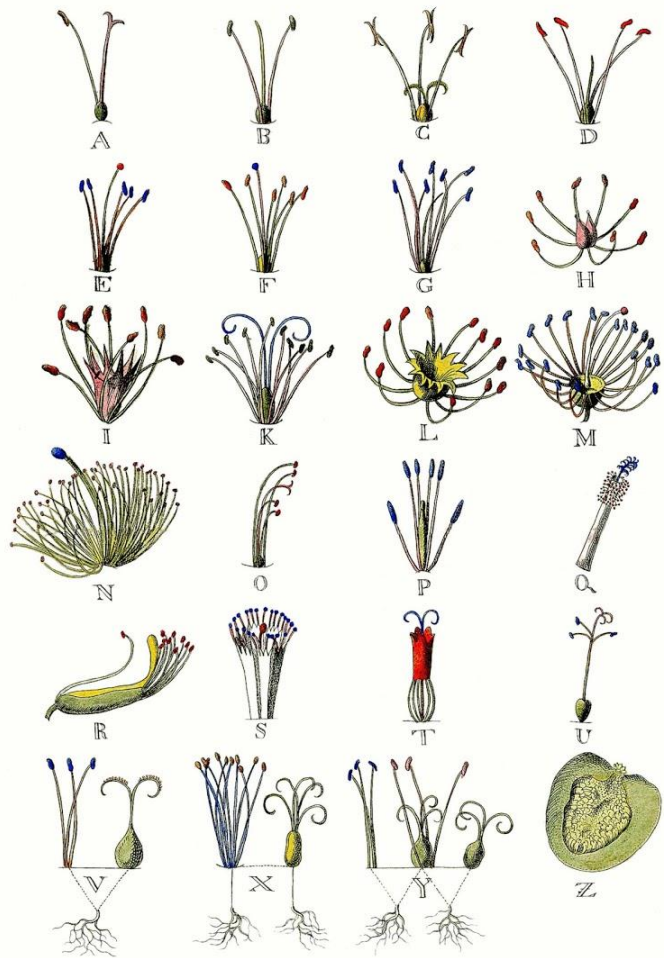
MONOGYNIA.

CACTUS.

EchinoMelocacti *subrotundi*.

- mammillaris*. 1. CACTUS subrotundus testis tuberculis ovatis barbatis. *Hort. cliff.* 181. *Hort. upf.* 119. *Roy. lugdb.* 278. EchinoMelocactus minor lactescens, tuberculis f. mammillis majoribus. *Herm. par.* 136. t. 136. Ficoides f. Melocactus mammillaris glabra fulcis carens fructum suum undique fundens. *Pluk. alm.* 148. t. 29. f. 1. Ficoides f. Ficus americana sphaerica tuberculata lactescens, flore albo. *Comm. hort.* 1. p. 105. t. 55. *Habitat in Americæ calidioris rupibus.* †
- Melocactus*. 2. CACTUS subrotundus quatuordecim-angularis. *Hort. cliff.* 181. *Hort. upf.* 119. *Roy. lugdb.* 297. (279) Melocactus indiae occidentalis. *Bauh. pin.* 384. EchinoMelocactus. *Clus. exot.* 92. t. 92. *Habitat in Jamaica, America calidiore.* †  
\* *Cerei erecti stantes per se.*
- heptagonus*. 3. CACTUS erectus oblongus septemangularis. *Hort. cliff.* 181. \* *Roy. lugdb.* 279. *Habitat in America.* †
- tetragonus*. 4. CACTUS quadrangularis longus erectus: angulis compressis. *Hort. cliff.* 181. *Hort. upf.* 119. *Roy. lugdb.* 280. *Cereus erectus minor, fructu spinoso, costarum numero varians.* *Herm. par.* 117. *Habitat in Curacao, America calidiore.* †
- hexagonus*. 5. CACTUS erectus sexangularis longus. *Hort. cliff.* 181. *Hort. upf.* 119. *Roy. lugdb.* 279. *Cereus furinamensis.* *Eph. N. C.* 3. p. 394. t. 7. 8. *Cereus erectus altissimus furinamensis.* *Herm. par.* 116. *Raj. dendr.* 23. *Habitat Surinami.* †
6. CA-

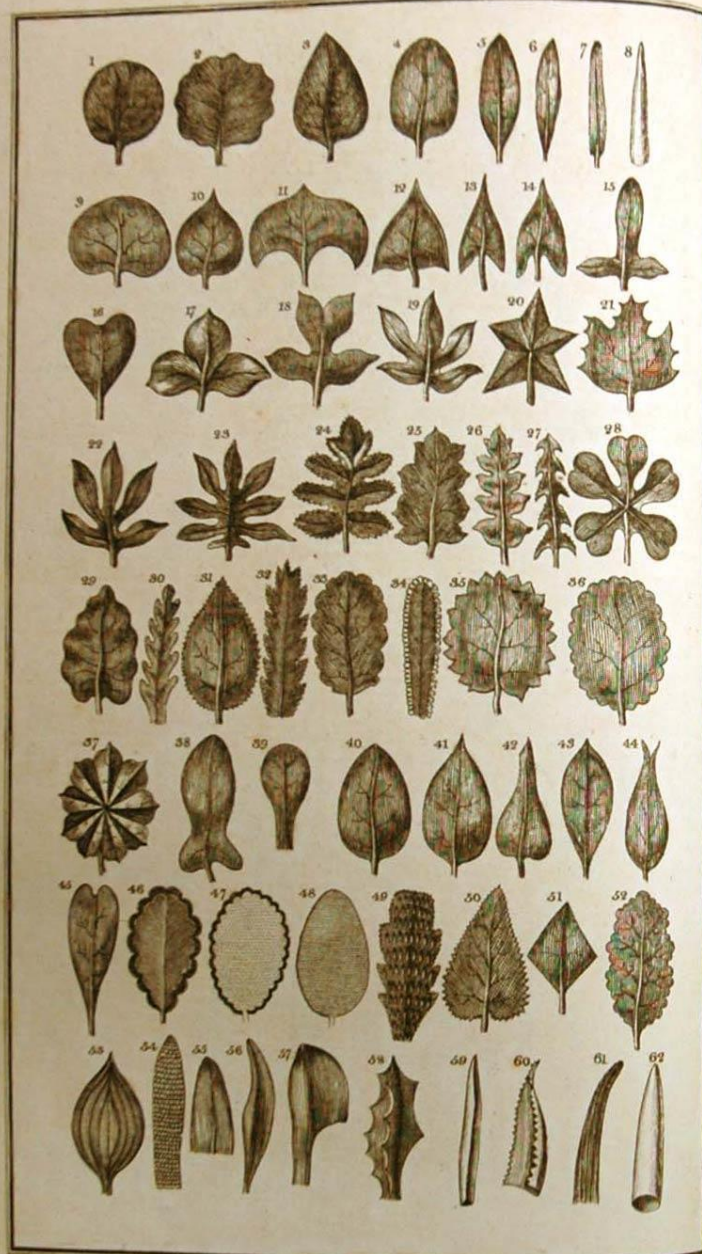
Clariss: LINNÆI. M. D.  
 METHODUS plantarum SEXUALIS  
 in SISTEMATE NATURÆ  
 descripta



G. D. EHRET. Palat. heid. b.  
 fecit & edidit

Lugd. bat. 1736

*Monandria.*  
*Diandria.*  
*Triandria.*  
*Tetrandria.*  
*Pentandria.*  
*Hexandria.*  
*Heptandria.*  
*Octandria.*  
*Enneandria.*  
*Decandria.*  
*Dodecandria.*  
*Trochandra.*  
*Polyandria.*  
*Didynamia.*  
*Tetradynamia.*  
*Monadelphica.*  
*Diadelphica.*  
*Polyadelphia.*  
*Syngenesia.*  
*Gynandria.*  
*Monoccia.*  
*Dioccia.*  
*Polygamia.*  
*Cryptogamia.*



- Fig. 1.* Orbicular.  
*2.* Roundish.  
*3.* Ovate.  
*4.* Oval.  
*5.* Oblong.  
*6.* Lanceolate.  
*7.* Linear.  
*8.* Subulate or awl-shaped.  
*9.* Reniform or kidney-shaped.  
*10.* Cordate or heart-shaped.  
*11.* Lunate or crescent-shaped.  
*12.* Triangular.  
*13.* Sagittate or arrow-shaped.  
*14.* Heart-arrow-shaped.  
*15.* Hastate or halbert-shaped.  
*16.* Obcordate or inversely heart-shaped.  
*17.* 3-lobed.  
*18.* Premorse or as if bitten.  
*19.* Lobed.  
*20.* 5-angled.  
*21.* Eroded or gnawed.  
*22.* Palmate.  
*23.* Pinnatifid or wing-cleft.  
*24.* Laciniate or jagged.  
*25.* Sinuate or indented.  
*26.* Tooth-sinuate.  
*27.* Runcinate or barbed.  
*28.* Parted or divided.  
*29.* Repand or serpentine.  
*30.* Toothed.  
*31.* Serrate.  
*32.* Doubly serrate.  
*33.* Doubly crenate or scalloped.  
*34.* Cartilaginous.

- Fig. 35.* Acutely crenate or scalloped.  
*36.* Obtusely crenate.  
*37.* Plaited.  
*38.* Panduræform or fiddle-shaped.  
*39.* Spatulate or shaped like a battledore.  
*40.* Obtuse.  
*41.* Acute.  
*42.* Acuminate or pointed.  
*43.* Obtuse with a point.  
*44.* Acutely emarginate or notched.  
*45.* Cuneiform or wedge-shaped.  
*46.* Retuse.  
*47.* Hairy.  
*48.* Downy.  
*49.* Hispid or covered with stiffish bristles.  
*50.* Ciliate or fringed.  
*51.* Rhombic.  
*52.* Veined.  
*53.* Nerved.  
*54.* Papillous or pimples.  
*55.* Parabolic.  
*56.* Acinaciform or scymetar-shaped.  
*57.* Dolabriform or hatched-shaped.  
*58.* Deltoid.  
*59.* Triangular.  
*60.* Channeled.  
*61.* Furrowed or grooved.  
*62.* Cylindrical or without angles.

Plate IV. Simple Leaves.





*Solidago sempervirens*- Seaside goldenrod

878 SYNGENESIA: POLYGAM. SUPERFLUA.

SOLIDAGO.

*sempervirens* 1. SOLIDAGO foliis lanceolatis subcarnosis glaberrimis margine scabriusculis, paniculacorymbosa.

Solidago panicula corymbosa, racemis reflexis, floribus adscendentibus, foliis glaberrimis. *Gron. virg.* 97.

Solidago maxima. *Corn. canad.* 168.

Virga aurea noveboracensis glabra, caulibus rubentibus, foliis angustis glabris. *Herm. flor.* 26.

Virga aurea canadensis, foliis carnosis non serratis: latioribus s. angustioribus. *Moris. hist.* 3. p. 124. f. 7. t. 23. f. 15.

Virga aurea f. Solidago procerior americana, caule multiplici. *Pluk. alm.* 389. t. 235. f. 5.

*Habitat in* Noveboraco, Canada. 4

*Notabilis* Caule rubro, homine altiore, Foliis glaberrimis, subcarnosis, margine parum scabris, tota hyeme persistentibus; tempore florendi nimis sero, ut apud nos hyems sepiissime flores suffocet.



Latin is now considered a “dead” Language  
Not even the Catholic Church- (the last holdout)  
does everything in Latin anymore.

How far we have come.....  
How far we have to go.....

A dense field of white daisies with bright yellow centers, interspersed with green foliage and some unopened buds. The flowers are scattered across the frame, creating a vibrant and natural background.

Why don't we use Common names  
for plants??

With Plants- we know what plant we are talking about when we say:



Pepper



Peas



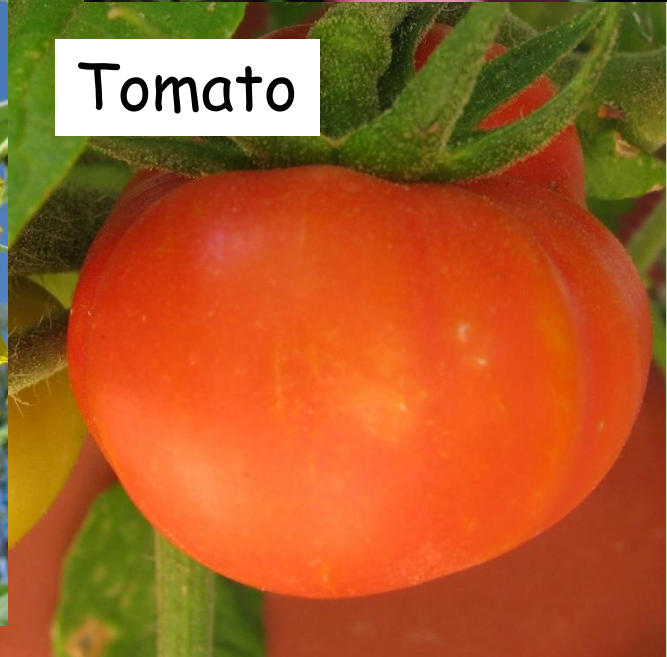
Rose



Mint



Sunflower



Tomato



Daffodil



But now what do we do??  
These are ALL "Daisy?"



# Common names of plants- are not (yet) standardized.

Unlike with Birds:

With birds- the name –

“American Robin” is only one  
species also called by its scientific  
name: Turdus migratorius

You don't have to remember the  
scientific name, unlike for plants.



A man and a woman are sitting in a field of yellow wildflowers. The man is wearing a blue and white plaid shirt, a brown cap, and sunglasses. The woman is wearing a white long-sleeved shirt, a black cap with 'PEDROS' on it, sunglasses, and a light blue scarf. They are both smiling. The background shows a vast field of these yellow flowers stretching towards a rocky, hilly landscape under a clear sky.

In Death Valley National Park this wildflower is called "Desert Gold"

*Geraea canescens* A. Gray

At Lake Mead NRA  
We called this plant  
"Desert Sunflower"



In Lake Mead  
National Recreation  
Area, this plant is  
called  
**Desert Gold**

*Linnathus aureus* (Nutt.) E. Greene

# A "Sunflower" is also called



- **Girasol (Spanish)**
- **Tournesol (French)**
- **Sonnenblume (German)**
- **Solsikke (Norwegian)**
- **Slunecnice (Czech)**
- **Bunga matahari (Indonesian)**
- **Alizeti (Swahili)**

What we call “Sunflower” is in scientific lingo used worldwide :



***Helianthus annuus* L.**

**Helianthus annuus L.**

Helianthus= **Genus** - Capitalized  
annuus= **species** – lowercase

Both either italicized or underlined

(which indicates it is a word in a foreign language)

**L.**= Linneaus- the author of this  
name.



## ***Helianthus annuus***

**This is its “scientific”  
name- which is a combo  
of Greek and Latin that  
means:**

**Helio= Sun**

**anthus= flower**

**annuus= annual**

# *Strychnos nux-vomica* L.

Strychnos= A kind of nightshade

nux= nut

vomica= emetic

This plant has a  
poisonous seed



Strychnine tree



# *Tribulus terrestris* L.

Tribulus= Caltrop

terrestris= Of the earth



Caltrop- is a device used to lame horses- used by Roman armies. Also used to stop vehicles in road blocks

“Puncture vine”

“Goatheads”



Food of the gods

*Theobroma cacao* L.

Kakaw=Common name  
of the plant in Mayan.





“Yarrow”

***Achillea millefolium* L.**

**After Achilles- the hero of the Trojan War-  
immortalized in Homer’s “Iliad”**

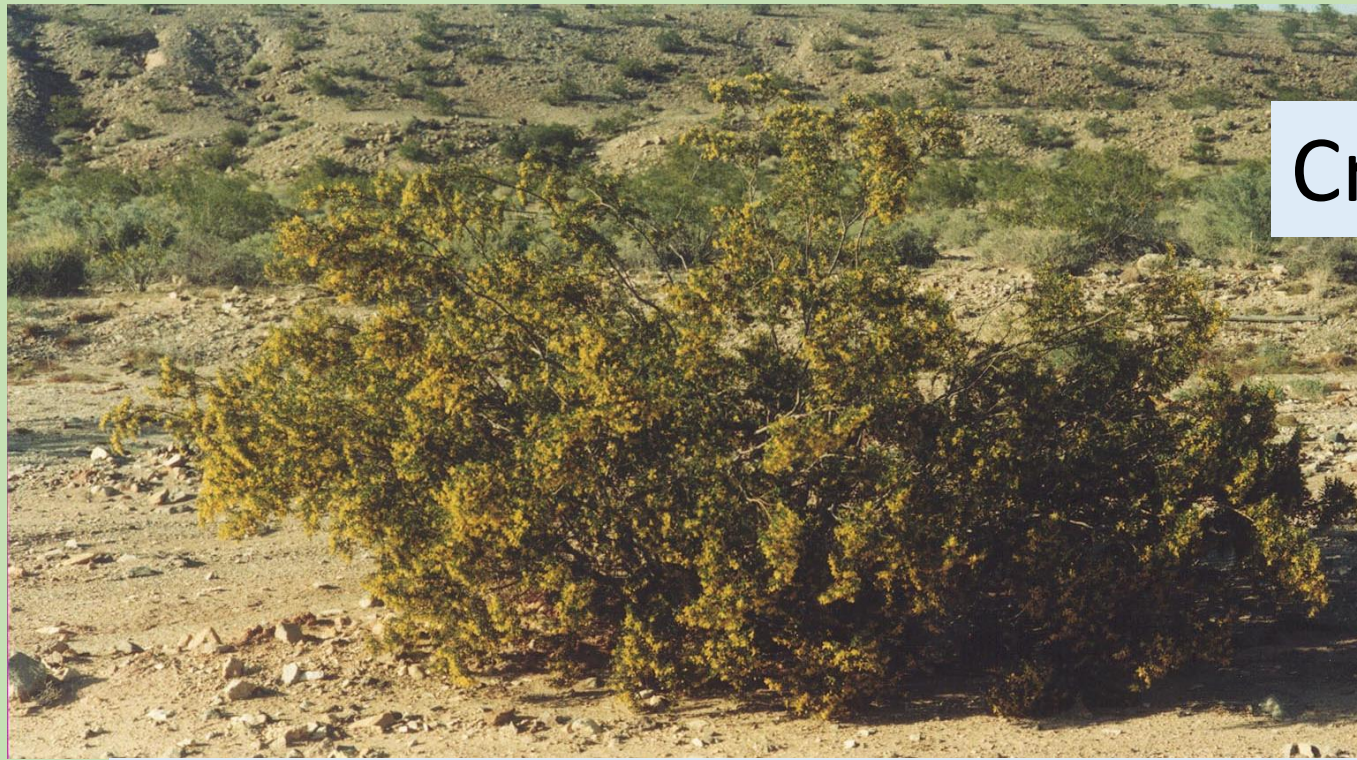




“Lychee”

*Litchi chinensis* Sonn.  
(Sonnaret)

**Fruit from china**



Creosotebush



*Larrea tridentata* Cav. (for Cavanilles)

Named for Juan Antonio Perez Hernandez de Larrea-a Spanish bishop  
tridentata- Latin for “3 teeth”- referring to the leaves.

Plants are also named after people- usually botanists, or explorers.

**David Douglas-** a Scottish botanist who explored the Pacific Northwest and Hawaii- has 80 plants named after him.

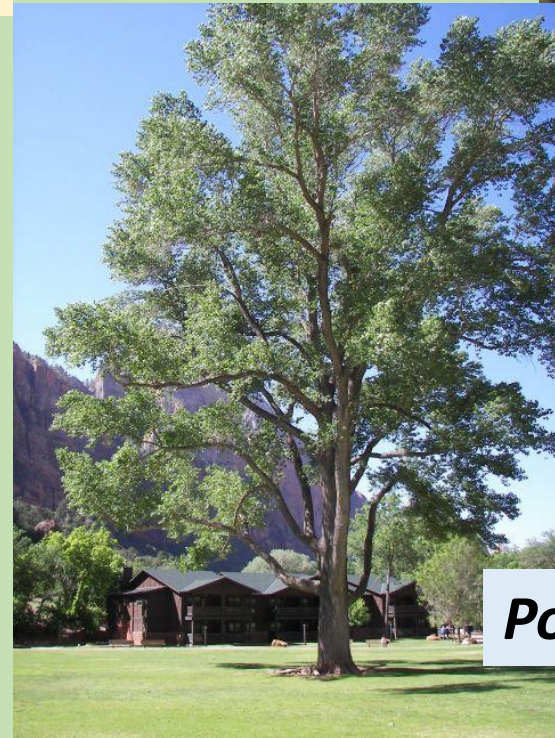
**John C. Fremont-** Explorer of the Southwest has a number of plants named after him



*Chaenactis douglasii*



*Quercus douglasii*



*Populus fremontii*



*Chaenactis fremontii*

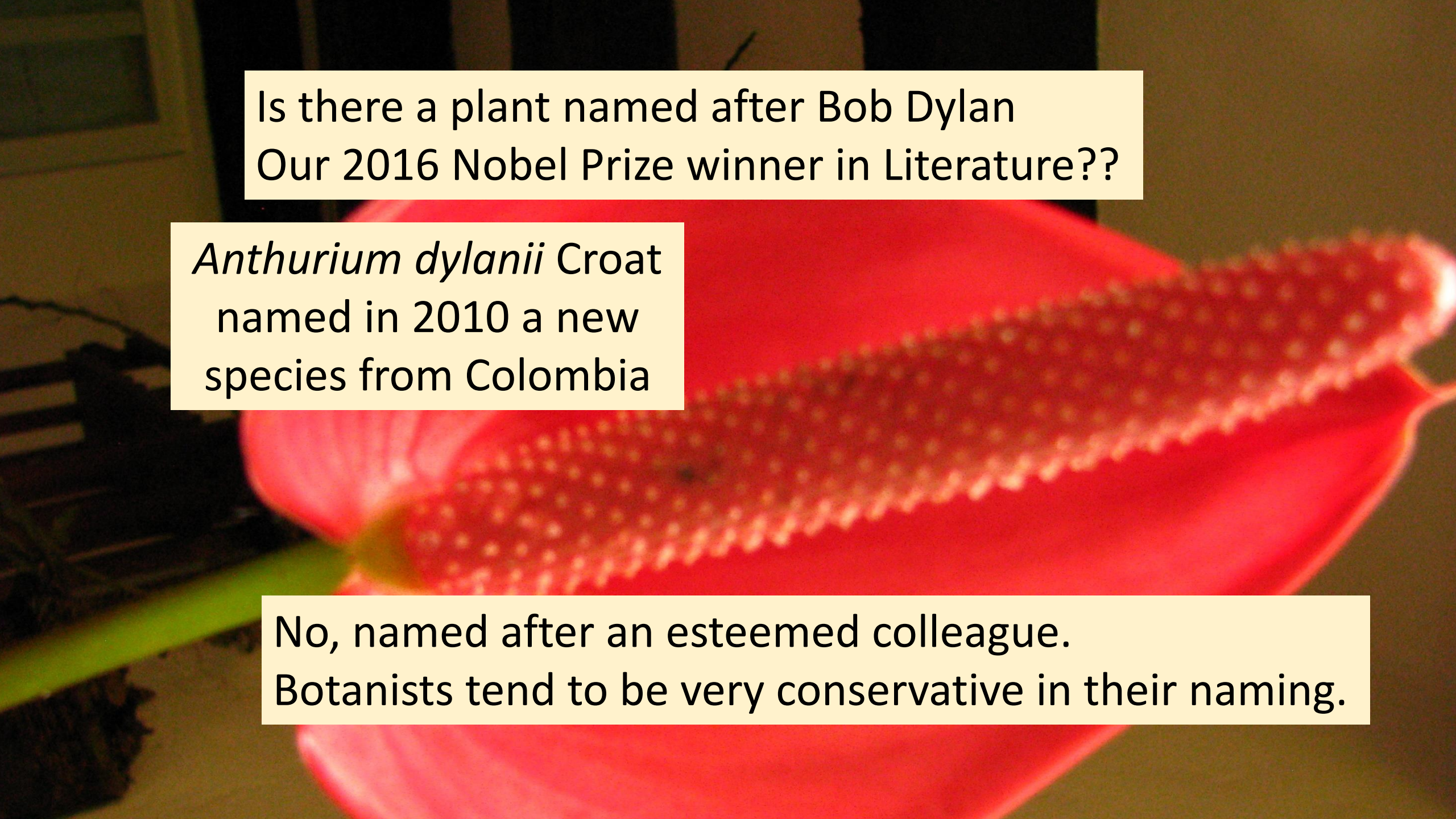
*Fremontodendron californicum* (Torr.) Coville



Flannelbush



Journal of the California Native Plant Society



Is there a plant named after Bob Dylan  
Our 2016 Nobel Prize winner in Literature??

*Anthurium dylanii* Croat  
named in 2010 a new  
species from Colombia

No, named after an esteemed colleague.  
Botanists tend to be very conservative in their naming.



HOWEVER THERE IS-  
An Orchid named  
*Dracula vampira*



This genus of  
orchid has about  
118 species in it!

*Dracula exasperata*



*Dracula nosferatu*



Entomologists (people who study insects)  
are famous for funny species names.....

Some genera have so many species that  
Taxonomists run out of names  
To give them all so that each name is unique-  
and some just have a sense of humor about it all



One entomologist named a new genus of flies: *Pieza*.  
Species named *Pieza pi*; *Pieza kake*; *Pieza rhea*  
Another one named a new genus of beetles: *Agra*  
Species named :*Agra phobia*; *Agra vation*; *Agra cadabra*

[www.Curioustaxonomy.net](http://www.Curioustaxonomy.net)

Creatures new to science has been named after fictional characters; living people either to honor or dishonor them; and artists, musicians, politicians, actors, personalities, Kings and Queens, authors, philosophers, etc.



*Rheidole drogon* – an ant named after the dragon in Game of Thrones  
*Baraktrema obamai* – a fluke named after our ex-president  
*Aleiodes gaga*- A wasp named after Lady Gaga  
*Bumba lennoni*- a spider named after John Lennon

# The International Code of Nomenclatures for algae, fungi and plants *Says that:*

- There is only one valid name per species-  
all other names are invalid- called synonyms.
- First name published is the valid name (except in certain cases).
- A type specimen must be placed in a public herbarium.
- (A collection of preserved plant specimens- ~2,600 in the world)
- Published name must have a description in Latin  
(or English- new in 2011!)
- Name must be Latinized regardless of origin.

What do you think? Are we getting into the modern world yet?

# What does this mean for us??

**Names get changed- but still there is only ONE correct and unique name for each species of plant:**

Example: “Winterfat”

*Eurotia lanata*

*Ceratoides lanata*

(now) *Krascheninnikovia lanata*

*3 names in the space of 30 years!*



# Why names get changed.....

## 1. There is a valid prior published name.

Krascheninnikovia was found to be the first name published for the species-in 1772 and since it was published in an obscure journal- it was not discovered until recently- this made every other name given that plant over the last 240+ years invalid.



## 2. Taxonomic Revisions-

Moving the species to a different genus or up or down a rank.

A subspecies may become a species or a species may become a subspecies.

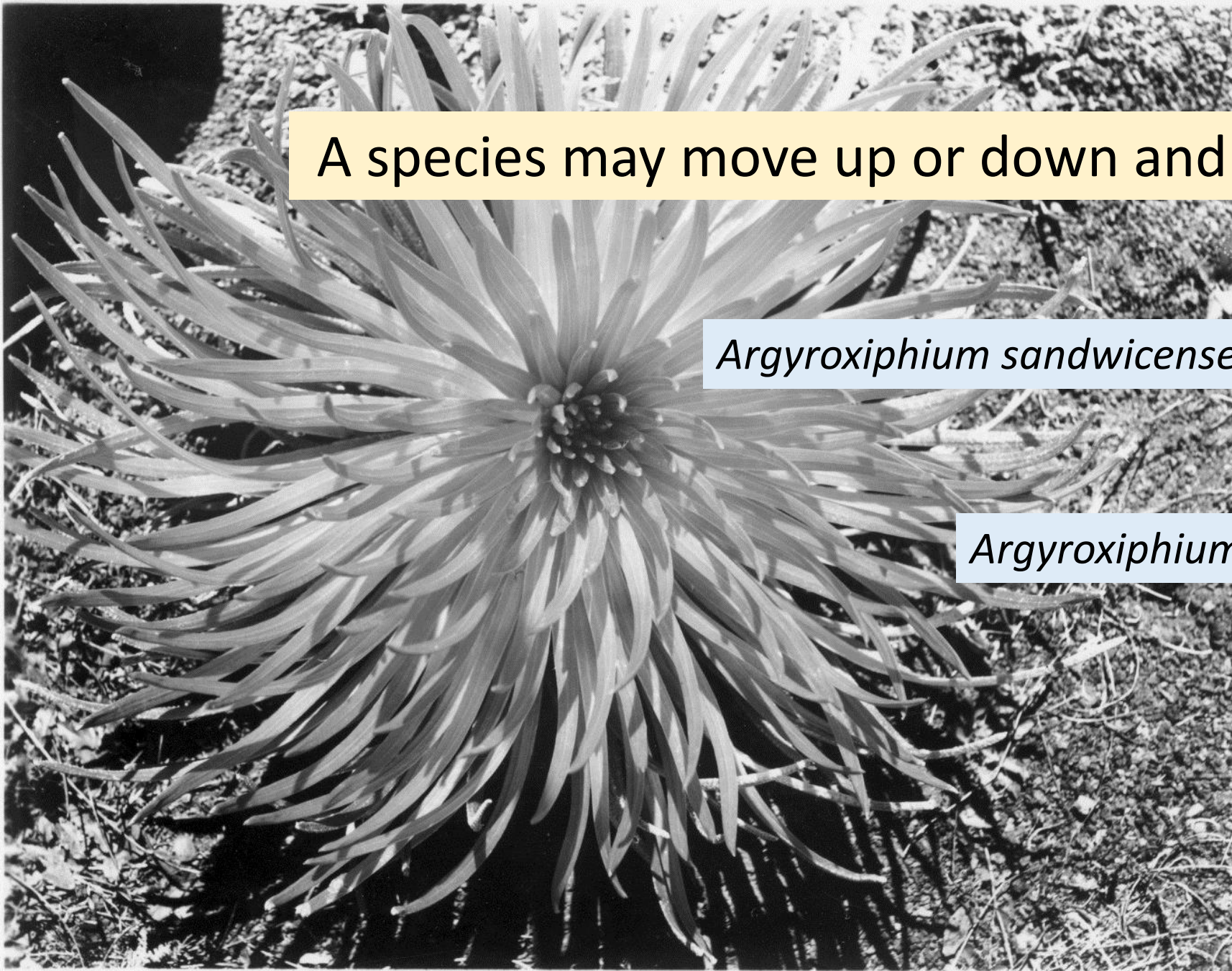
A species may move up or down and category/rank....


*Argyroxiphium sandwicense* ssp. *macrocephalum*



*Argyroxiphium macrocephalum*

**Haleakala silversword**



A close-up photograph of several pink lily flowers with green leaves, serving as the background for the text.

A Little Latin- names you are likely to encounter

**Common use**

Domesticus = Domesticated

Officinalis = Medicinal

Esculenta = Edible

Sativa = Cultivated

Occidentalis = Western

Orientalis = Eastern

Edulis = Edible

Vulgaris = Common

Utilis = Useful

Ornata = Ornamental

Oleraceus = a vegetable



# A Little Latin- names you are likely to encounter

## Numbers

**Uni, mono-= one**

bi, di= two

Tri= three

quadri, tetra= four

quinque, penta= five

sex, **hexa= six**

septem, hepta= seven

octo= eight

Novem, ennea= nine

Decem, deca= ten

**Phyllum (a)= Leaf (leaves)**

Folius = Leaves

Anthus, **flora = Flowers**

Petalus = Petals

**Andrus = Stamens**

Frutescens = Shrubby

Arborescens = Tree-like

## Colors

**Alba= white**

Flaven= yellow

Cynaceum= blue

Aureus= golden

Viridi= green

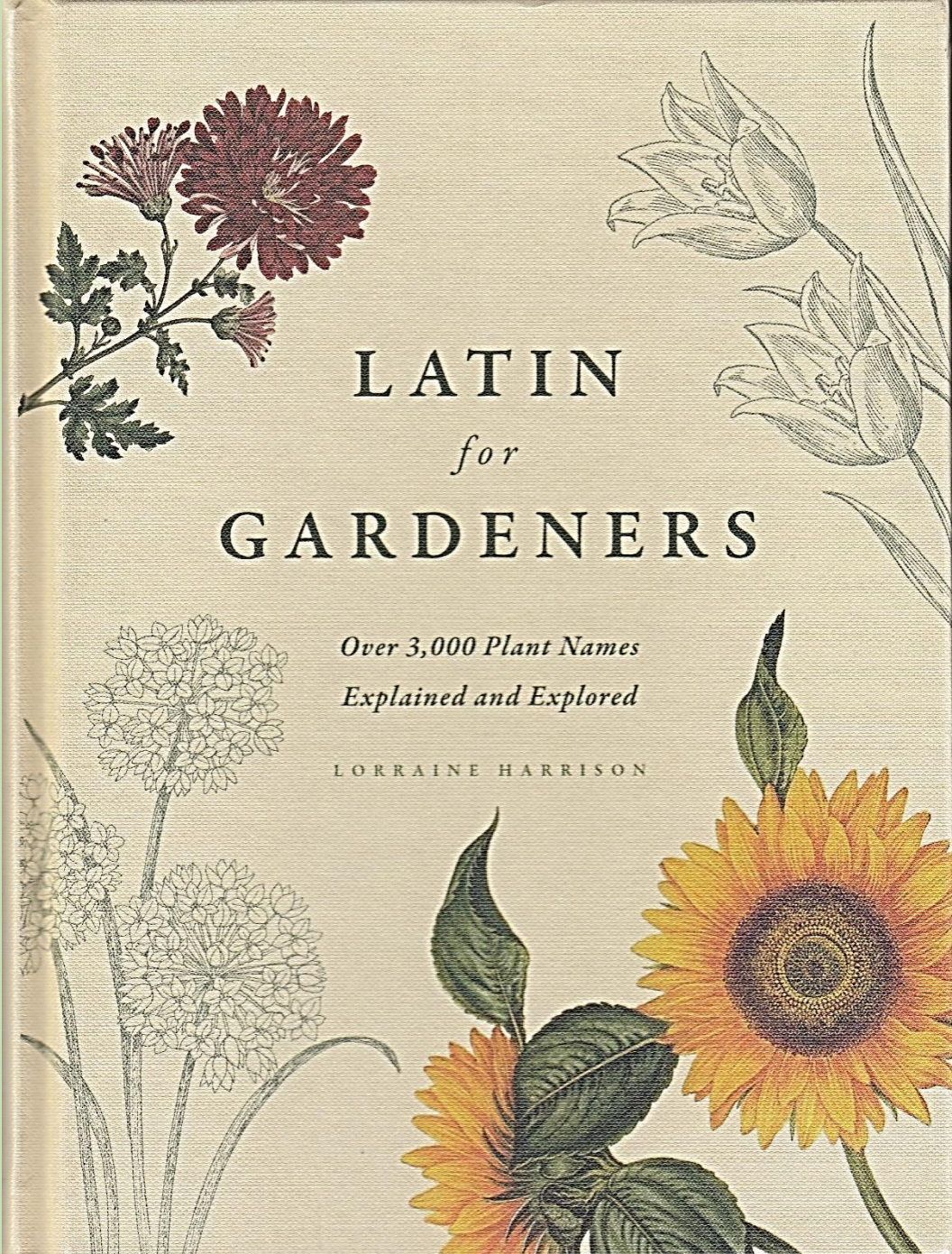
Niger= black

Cardenalis= red

what does *mono-phylla* mean?

**SO** What does *alba-flora* mean?

What does *hex-andrus* mean?



If my Latin lesson wasn't enough  
For you-  
try this book.....

By Lorraine Harrison  
2012- Quid Publishing  
University of Chicago Press  
~\$25.00

# Abbreviations

*Helianthus* **sp.** = some unknown or uncertain species

*Helianthus* **spp.** = more than one species.

*Helianthus annus* **ssp.** (or **subsp.**) *annus* = Subspecies

*Helianthus annus* **var.** *texanus* = Variety

*Helianthus annus annus* = third name is subspecies

*H. annus* **H.** = *Helianthus*.



International Code of Nomenclature for Cultivated Plants:  
**Plants which exist as a result of human activity.**

That is- plants that have been created in cultivation by human selection for use in cultivation: hybrids, GMOed plants, clones, etc..

**Cultivar** is defined as-  
assemblage of plants selected for a particular character or combination of characters and is distinct, uniform and stable and when propagated by appropriate means retains those characters.

In past- we'd designate cultivars  
*Helianthus annuus cv. aureus*  
**But now we would use**  
*Helianthus annuus 'Golden'*

**Single quotes and no italics and NO LATIN!**

# International Code of Nomenclature for Cultivated Plants 1953-2016

- Name must be published on printed material and accessible in a library
- Names must be unique.
- Names cannot cause confusion- cannot be too similar to another name

[http://www.actahort.org/chronica/pdf/sh\\_10.pdf](http://www.actahort.org/chronica/pdf/sh_10.pdf)

Free downloadable 2009 version



International Code  
of Nomenclature for  
Cultivated Plants

Ninth Edition

*A Publication of the International Society  
for Horticultural Science*

Also, there is the  
**International Cultivar  
Registration Authority-** But  
listing your new cultivar is,  
as of now, voluntary.

If a plant has been created by multiple hybridization events, it might be called:

*Helianthus* 'Golden Lady'

Or if the plant is a stable hybrid like this:

*Helianthus x multiflora*

multiflora is a new name given this stable hybrid

If the plant is the result of the hybridization of two genera- Its name may appear like this:

x *Helianthus*



Or if a species has been selected for special features indicating a cultivar, it might be called:

*Malus domestica* 'Beauty of Bath'

Or even

Apple 'Beauty of Bath'

There is actually some well-known plants that go by their common names! Apple is one of them.

If the plant has a special trade name it might look like this:

*Malus domestica* "ANN'S TREASURE"





# JUNIPERUS

NAME	ZONES	HEIGHT	WIDTH	COMMENTS
<b>J. procumbens</b> JAPANESE GARDEN JUNIPER	1-24	1-2½ ft.	To 12 ft.	Feathery yet substantial blue-green foliage on strong, spreading branches
<b>J. p. 'Green Mound'</b>	1-24	To 8 in.	To 6 ft.	Mounding habit; will trail over walls. Light green foliage
<b>J. p. 'Nana'</b>	1-24	To 1 ft.	To 6 ft.	Curved branches radiating in all directions. Shorter needles and slower growth than <i>J. procumbens</i> . Can be staked into upright, picturesque shrub. Give it some protection from sun in hot climates
<b>J. rigida conferta</b> SHORE JUNIPER	3-9, 14-24; H1, H2	To 1 ft.	6-8 ft.	Native to Japan. Prostrate and trailing, with soft bluish green needles. Excellent for seashore but will stand warmer climates if given moist, well-drained soil
<b>J. r. c. 'Blue Pacific'</b>	3-9, 14-24	To 1 ft.	6-8 ft.	Denser, bluer, more heat tolerant than <i>J. r. conferta</i>
<b>J. r. c. 'Emerald Sea'</b>	3-9, 14-24	To 1 ft.	6-8 ft.	Bright green-leaved form of <i>J. r. conferta</i>
<b>J. sabina 'Arcadia'</b>	1-24	To 1 ft.	6-8 ft.	Lacy bright green foliage
<b>J. s. 'Blue Danube'</b>	1-24	To 1½ ft.	To 5 ft.	Blue-green foliage
<b>J. s. 'Broadmoor'</b>	A2, A3; 1-24	2-3 ft.	To 10 ft.	Dense, mounding habit. Soft bright green leaves
<b>J. s. 'Buffalo'</b>	A2, A3; 1-24	8-12 in.	To 8 ft.	Soft, feathery bright green foliage
<b>J. s. 'Calgary Carpet'</b>	A2, A3; 1-24	6-9 in.	10 ft.	Soft green foliage

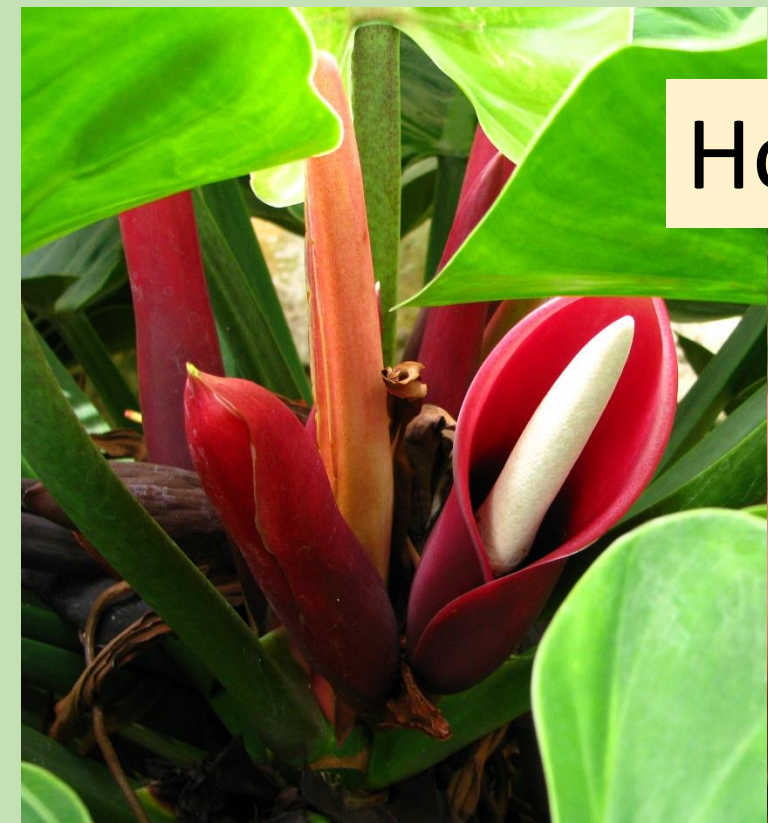
A page  
from your  
Western  
Garden  
Book

A close-up photograph of a large, vibrant pink cactus flower in full bloom. The flower has numerous layers of delicate, light pink petals and a dense center of bright yellow stamens. The background is softly blurred, showing a wooden fence and another cactus flower in the upper right corner. Two white speech bubbles with blue outlines are overlaid on the image. One is on the left, pointing towards the center of the flower, and the other is on the right, pointing towards the lower right edge of the flower.

Gimme a Break!

Questions?

# How do we classify plants?



Based on relationships-  
How closely they resemble  
each other  
In all their features-  
Especially features that control reproduction



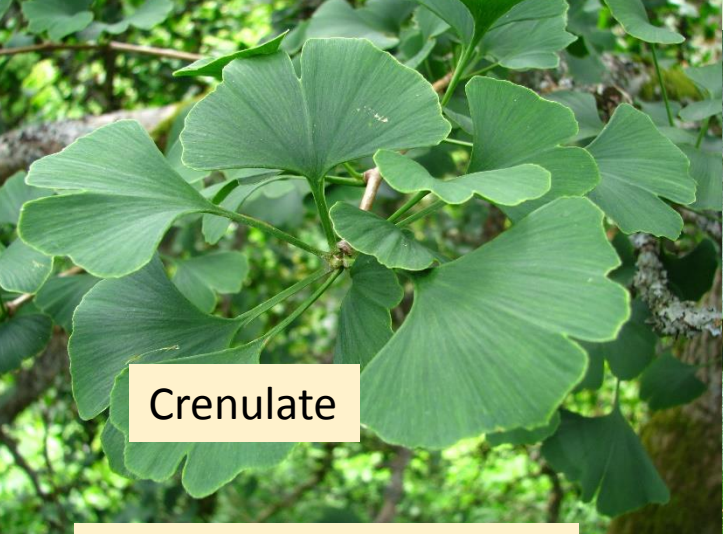


The features of plants that we look at  
(*Morphology*)

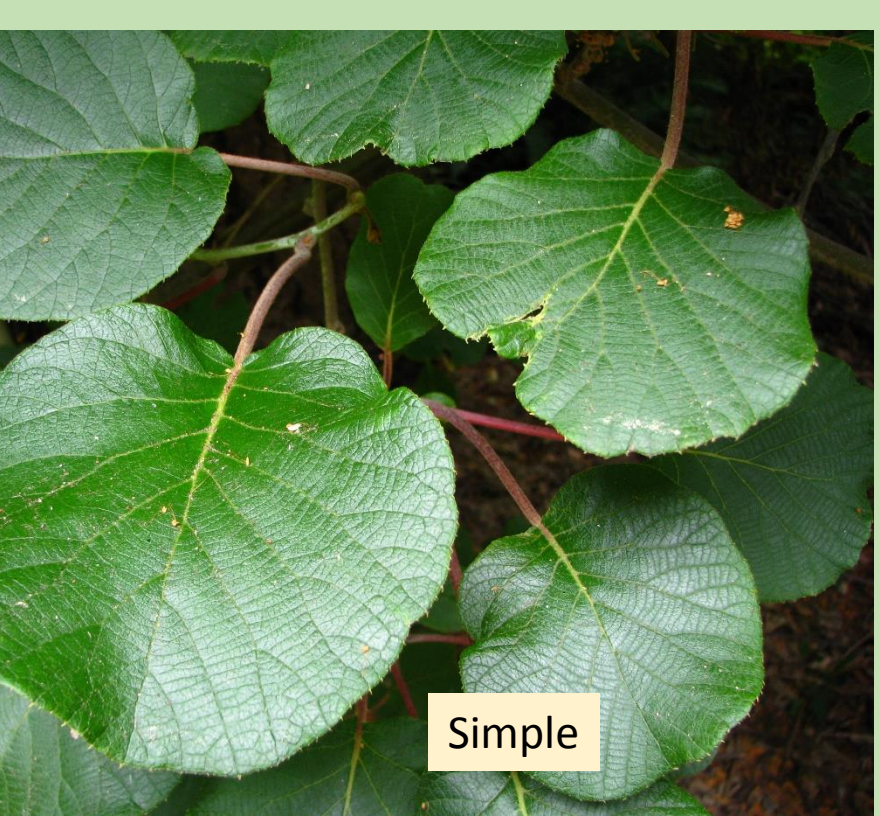
- Leaves- shape and margins.
- Stems, Leaf arrangement on stems.
- Flower- reproductive parts- how many, how they are attached.
- Kind of inflorescence/cone/sporangia.
- Where ovary is located in relation to petals.
- Type of Fruit.
- Characteristics of seeds, pollen.



Compound

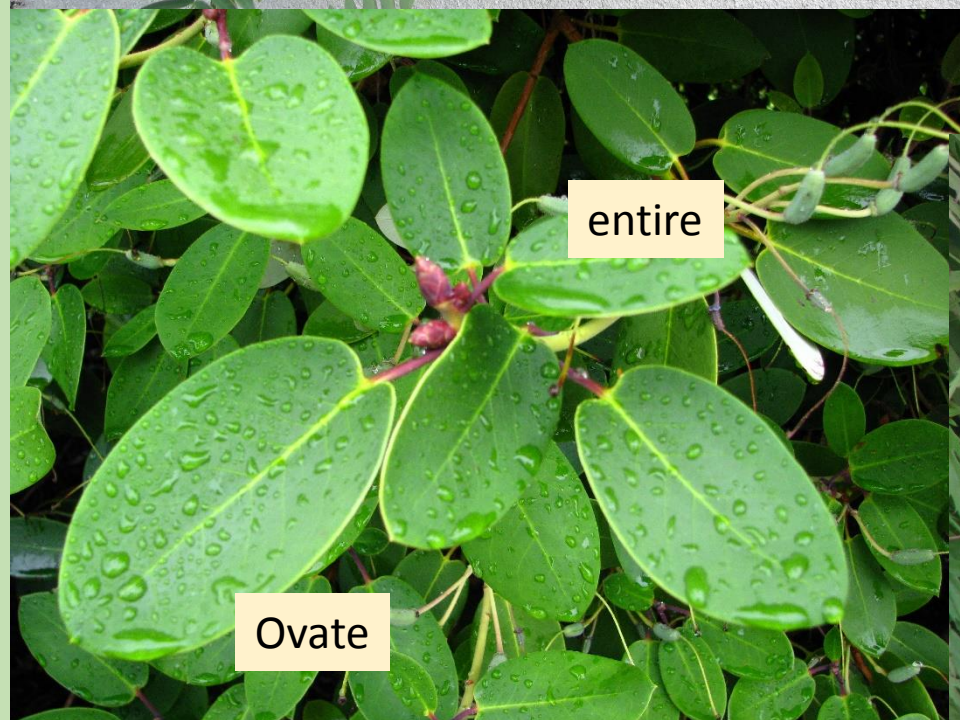


Crenulate



Simple

The variety of leaf shapes and margins  
Are described by  
some technical  
language

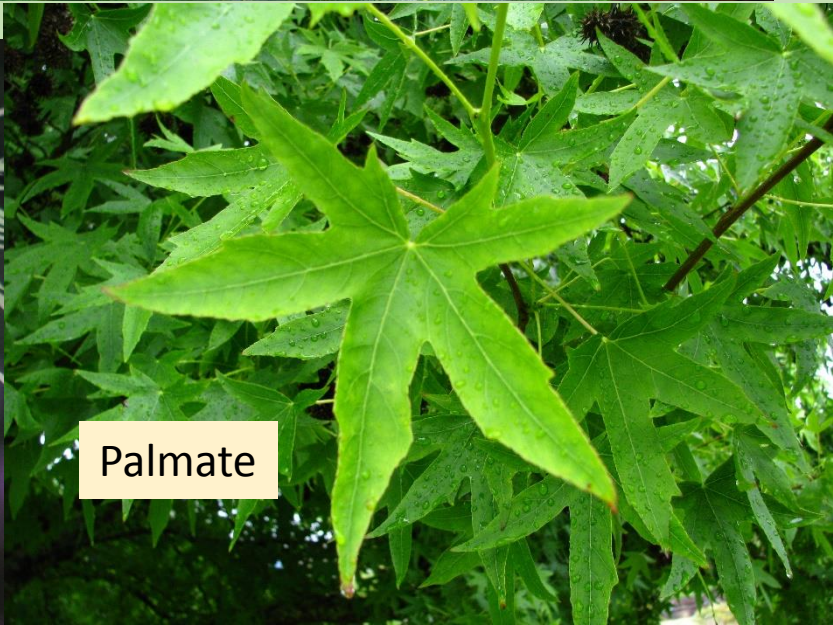


entire

Ovate



Dentate



Palmate



whorled



alternate

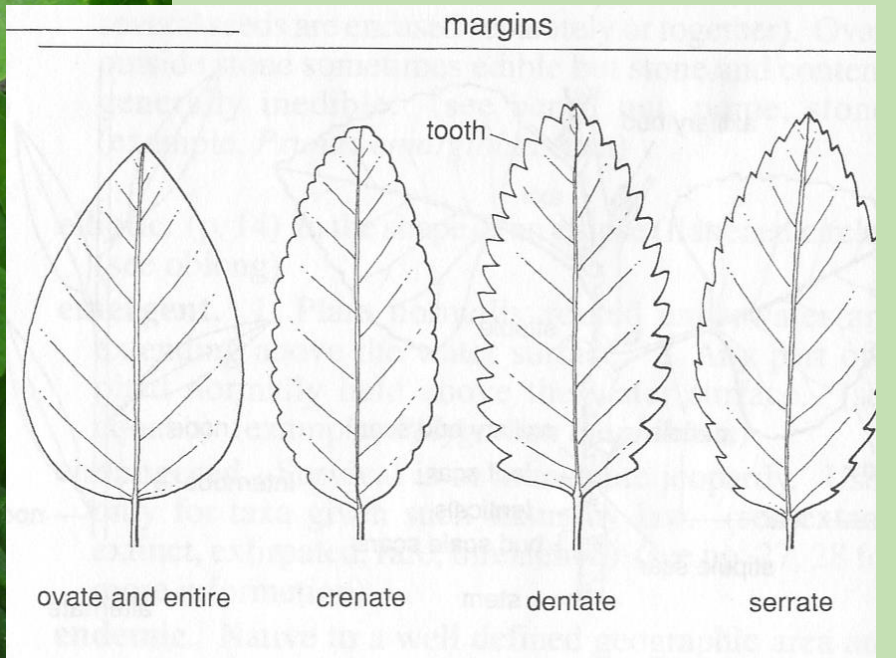
**Leaf arrangement**



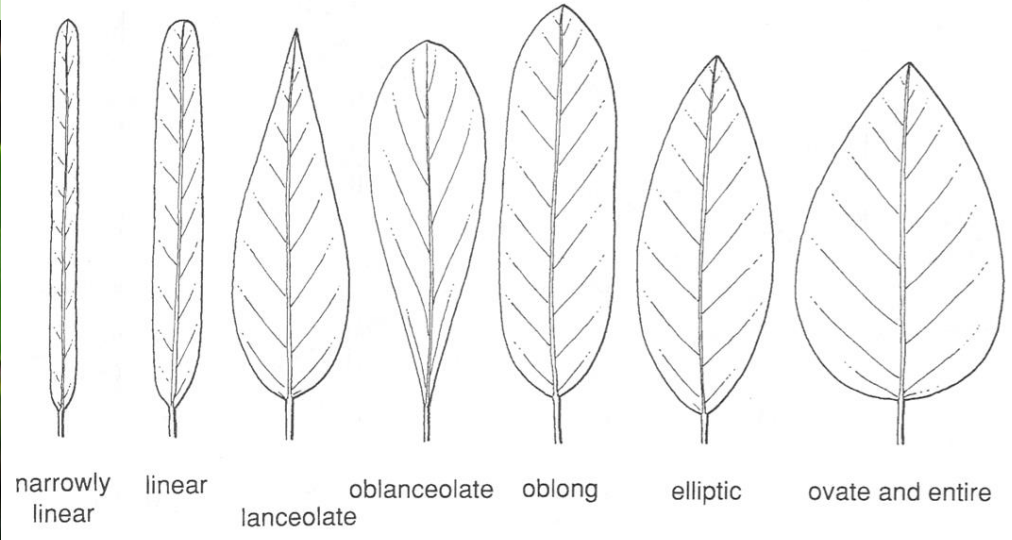
opposite



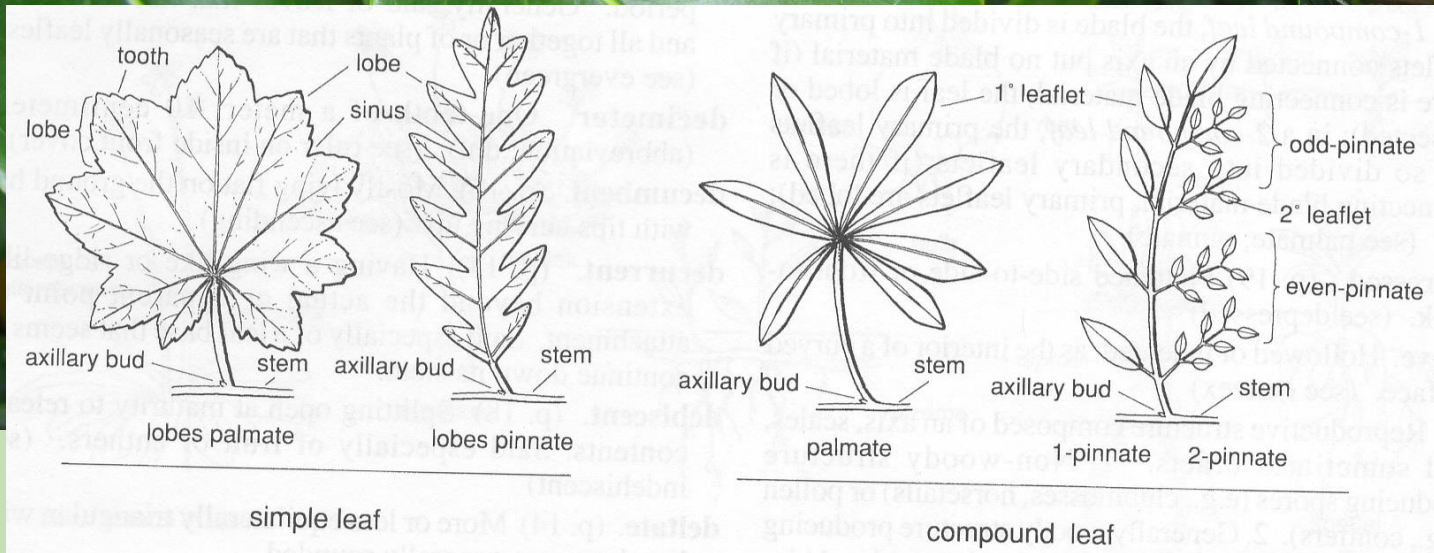
# Leaf margins



# Shape



# Simple or compound







Grey/silver



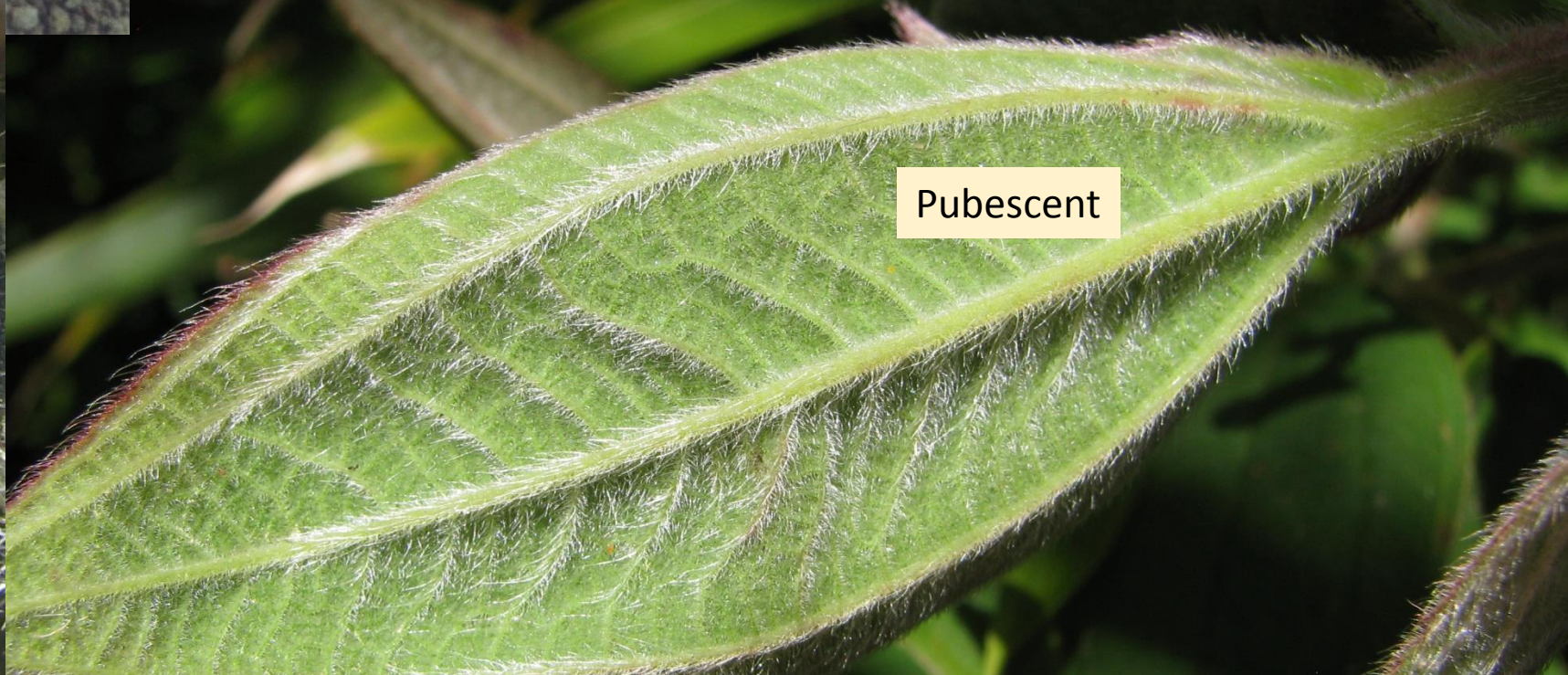
acute

Color of leaf, leaf hairs, and tip are important



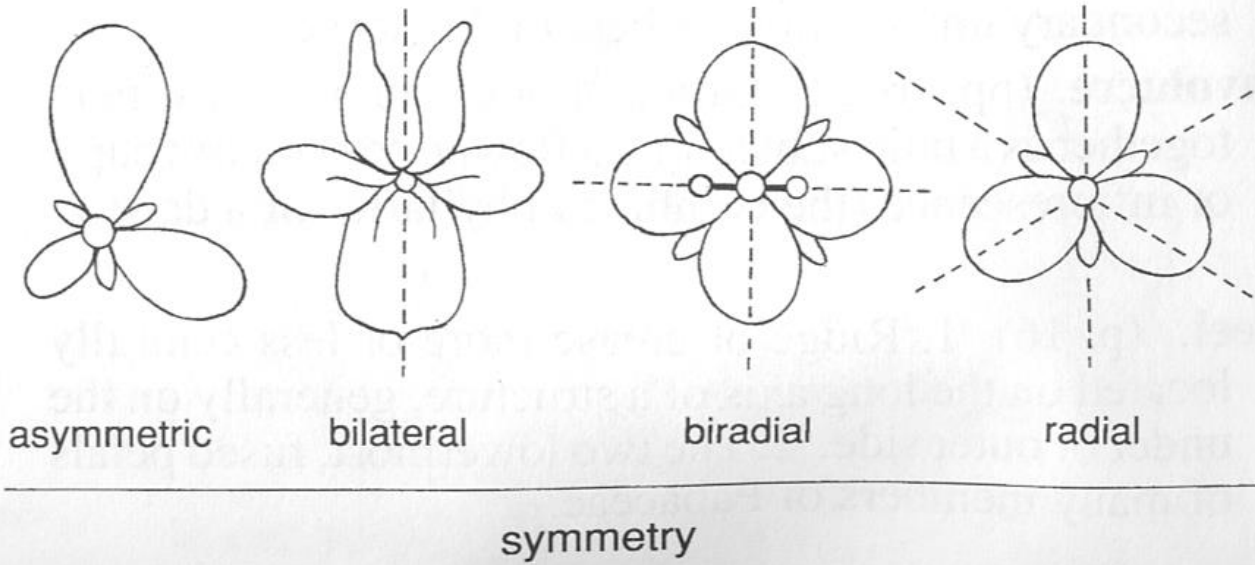
glandular

Rock nettle

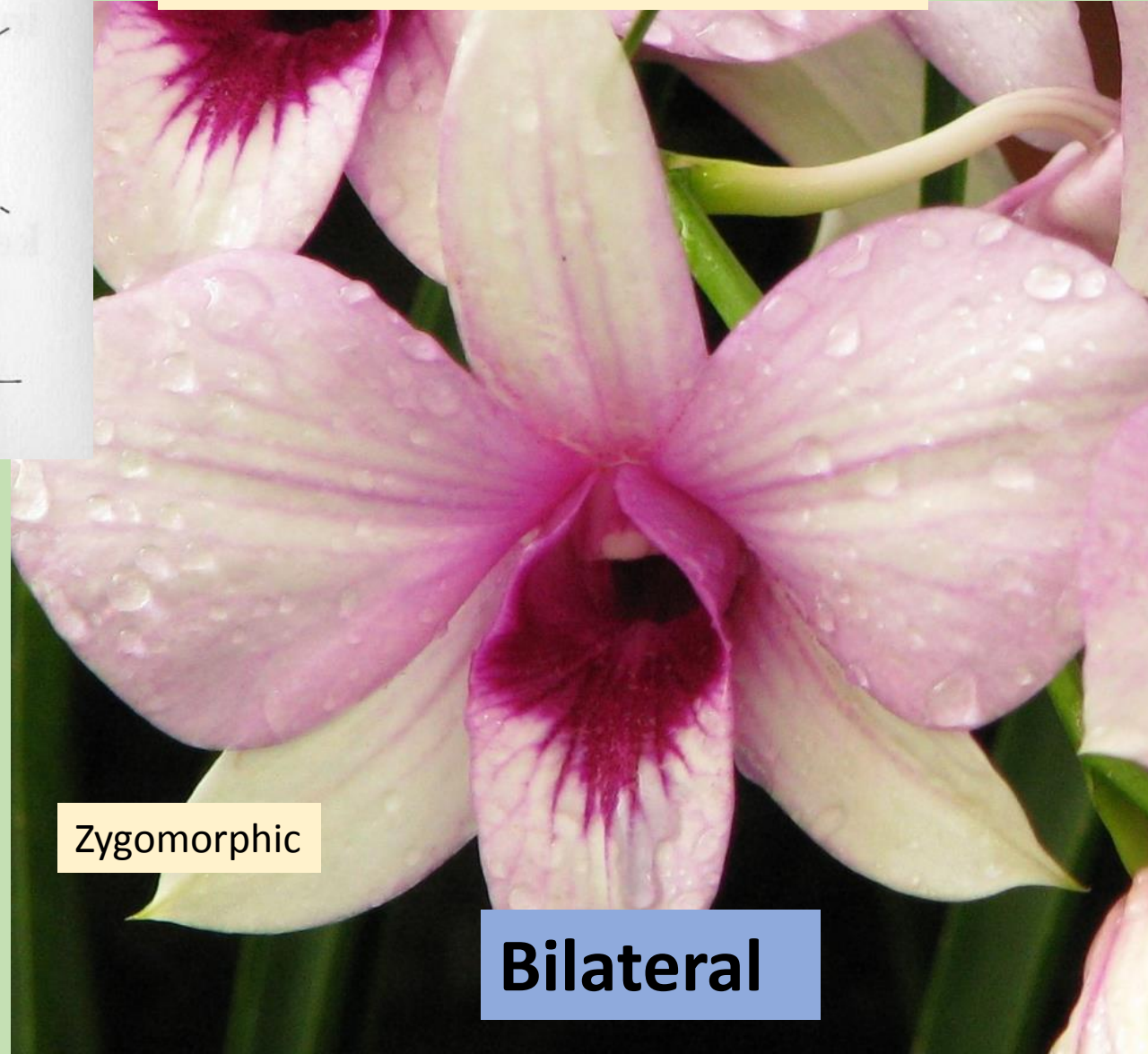


Pubescent

# What kind of flower is it?



# What is its symmetry?



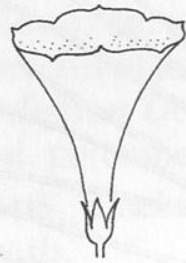
**How many petals, sepals, stamens does it have? How is the stigma shaped?**

**Over 10 is “many”**



**What color are petals?  
Do they have markings?**

# What is the shape of the flower?



funnel-shaped



salverform



rotate



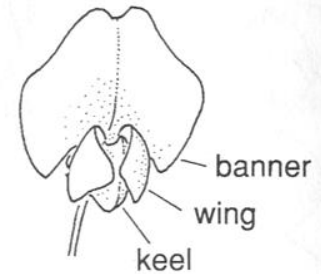
bell-shaped



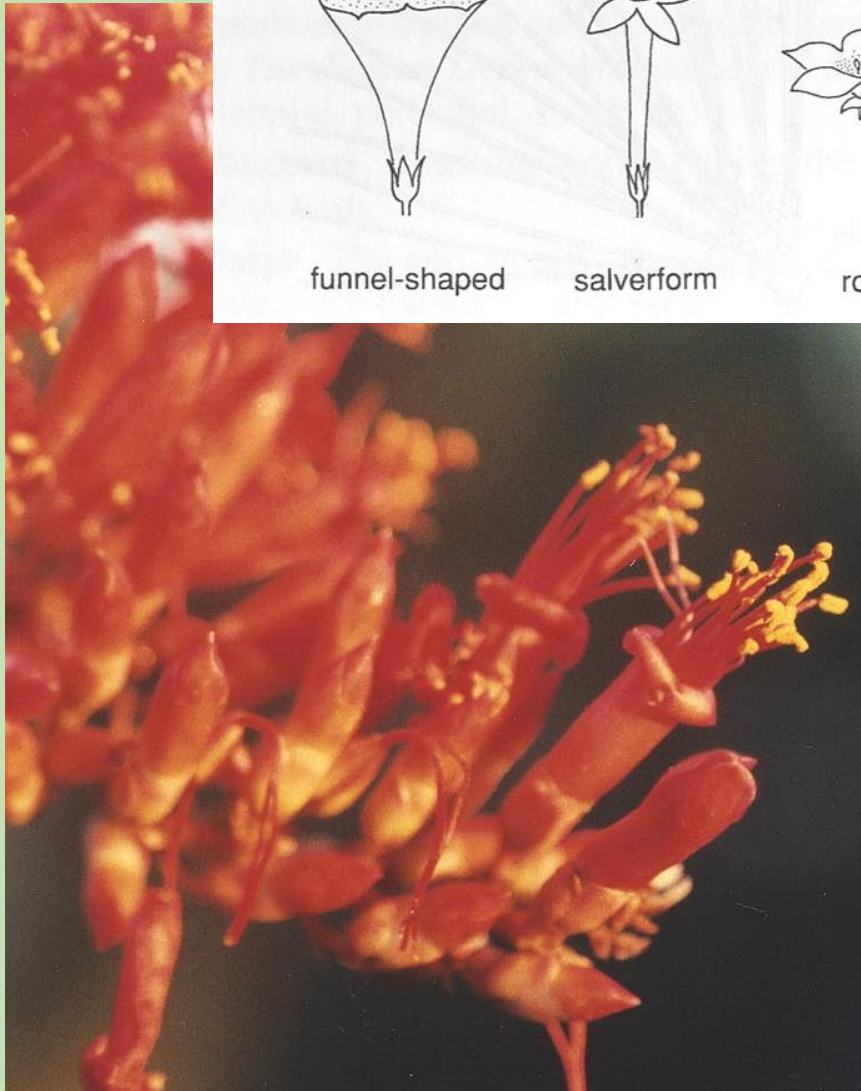
urn-shaped



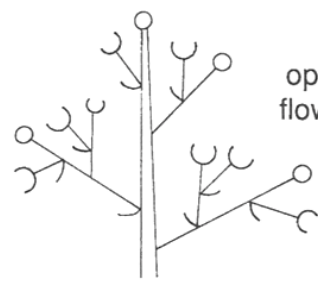
2-lipped



pea-like



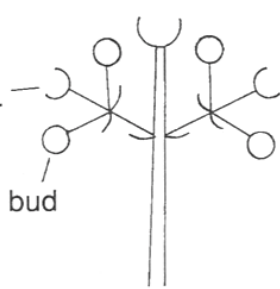
# Are flowers arranged in an inflorescence?



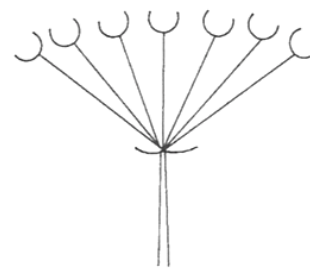
panicle

open flower

bud



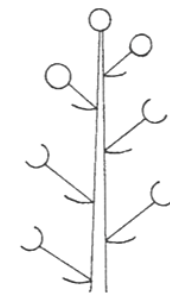
cyme



umbel



head



raceme



spike

# Grasses

Special groups have special features

Florets with special parts

GRASSES OF SOUTHWESTERN UNITED STATES

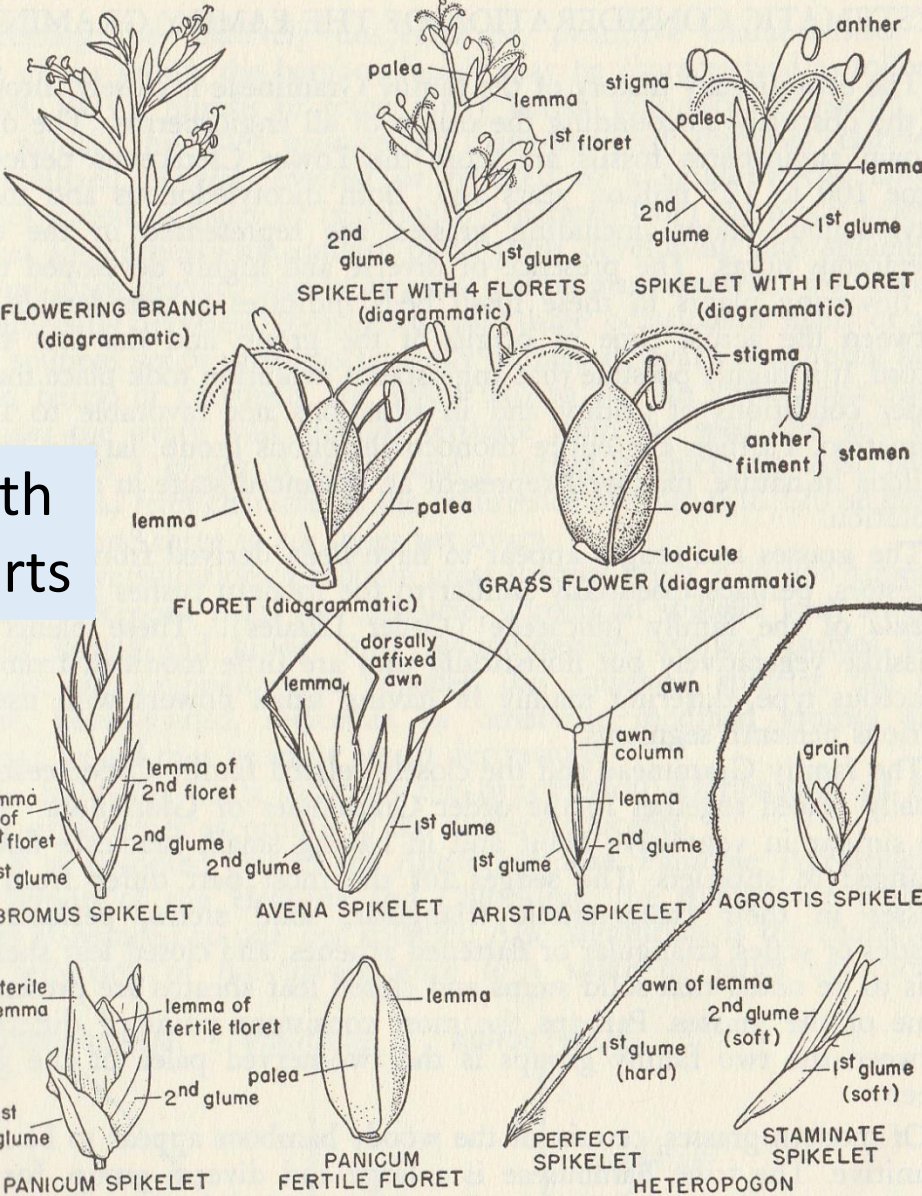
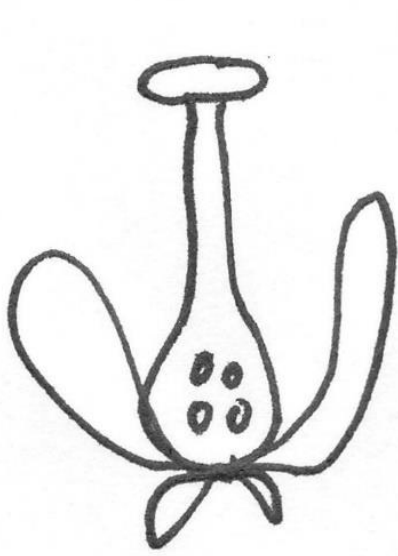
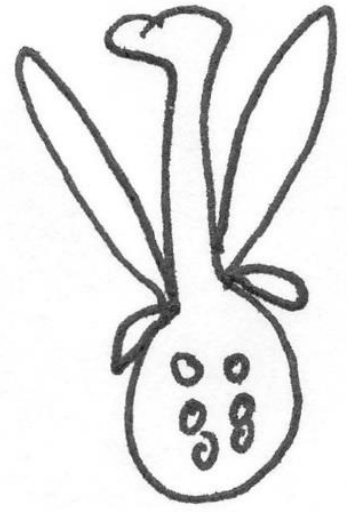


Figure 5.—Flowers, florets, spikelets.

**Where does the ovary sit in relation to the petals and sepals?**

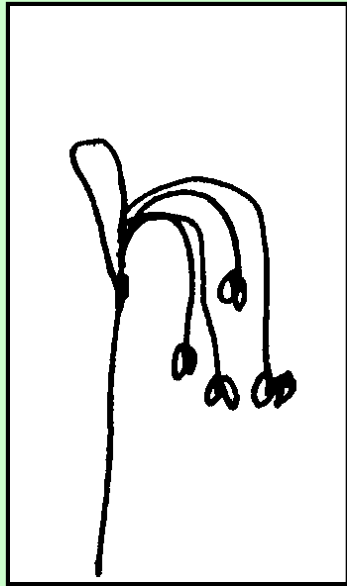


Superior

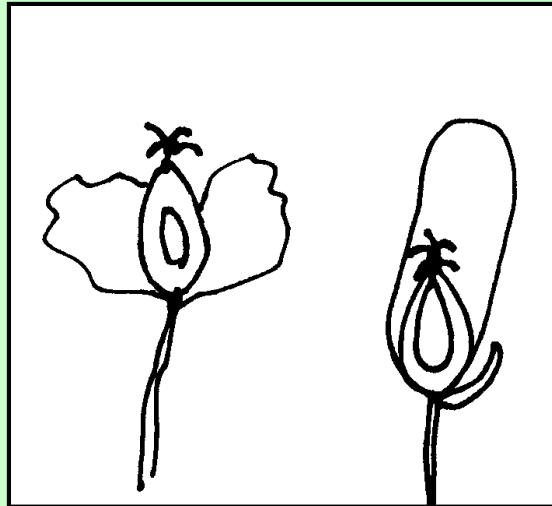


inferior





male flower

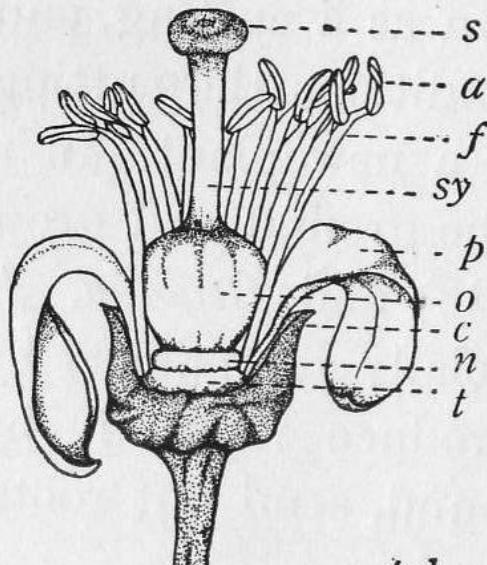


female flowers

Unisexual flowers



Imperfect Flower= missing a part

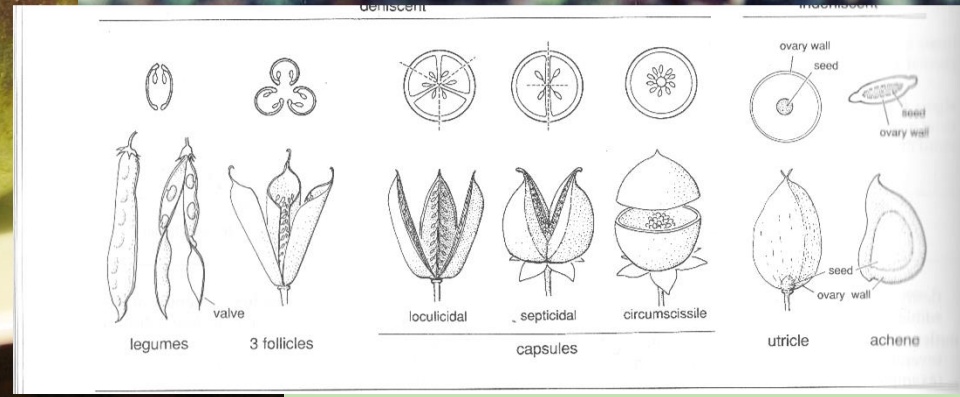


Male and female parts in the same flower- **Bisexual**





**Can't find a flower?  
Look for a fruit...**



**What kind of fruit  
does it have?**





**Do the leaves, whole plant,  
or flowers have an odor??  
Like mint? Onion?  
Cabbage? Sweetish?  
Turpentine?**

Tasting?- A little more tricky.  
Don't taste a poisonous plant!

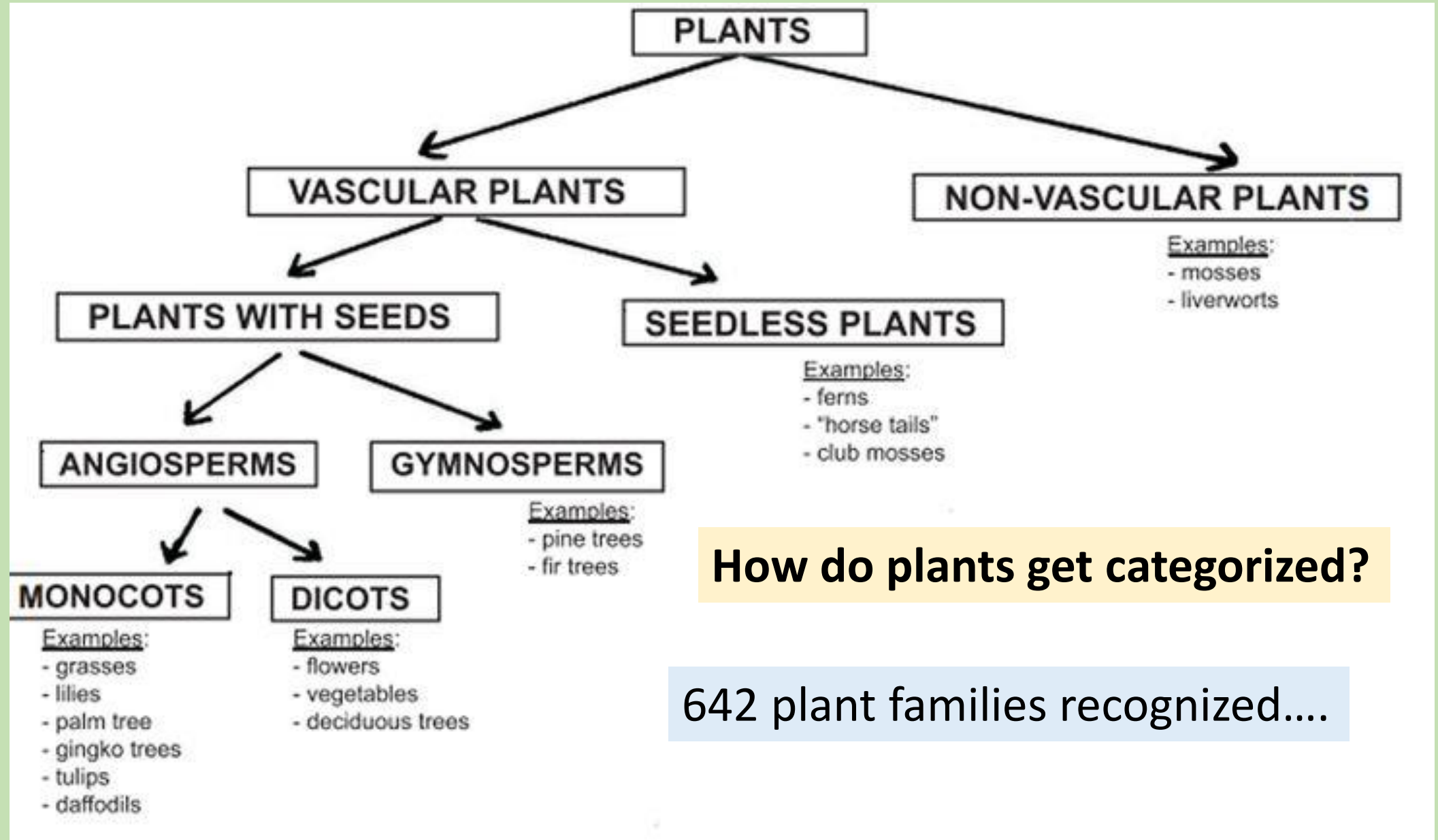


All features of a plant:

- Life form
- Where it grows
- What it looks like
- Basic ecology

Matters for identification

# A simple classification of Plants



How do plants get categorized?

642 plant families recognized....

How we categorize ourselves

# Humans



**Kingdom**= Animalia (*We are animals- heterotrophs that move around*)

**Phylum**= Chordata (*We have a nerve cord that runs down our back*)

**Class**= Mammalia (*We have mammary glands- females do anyway*)

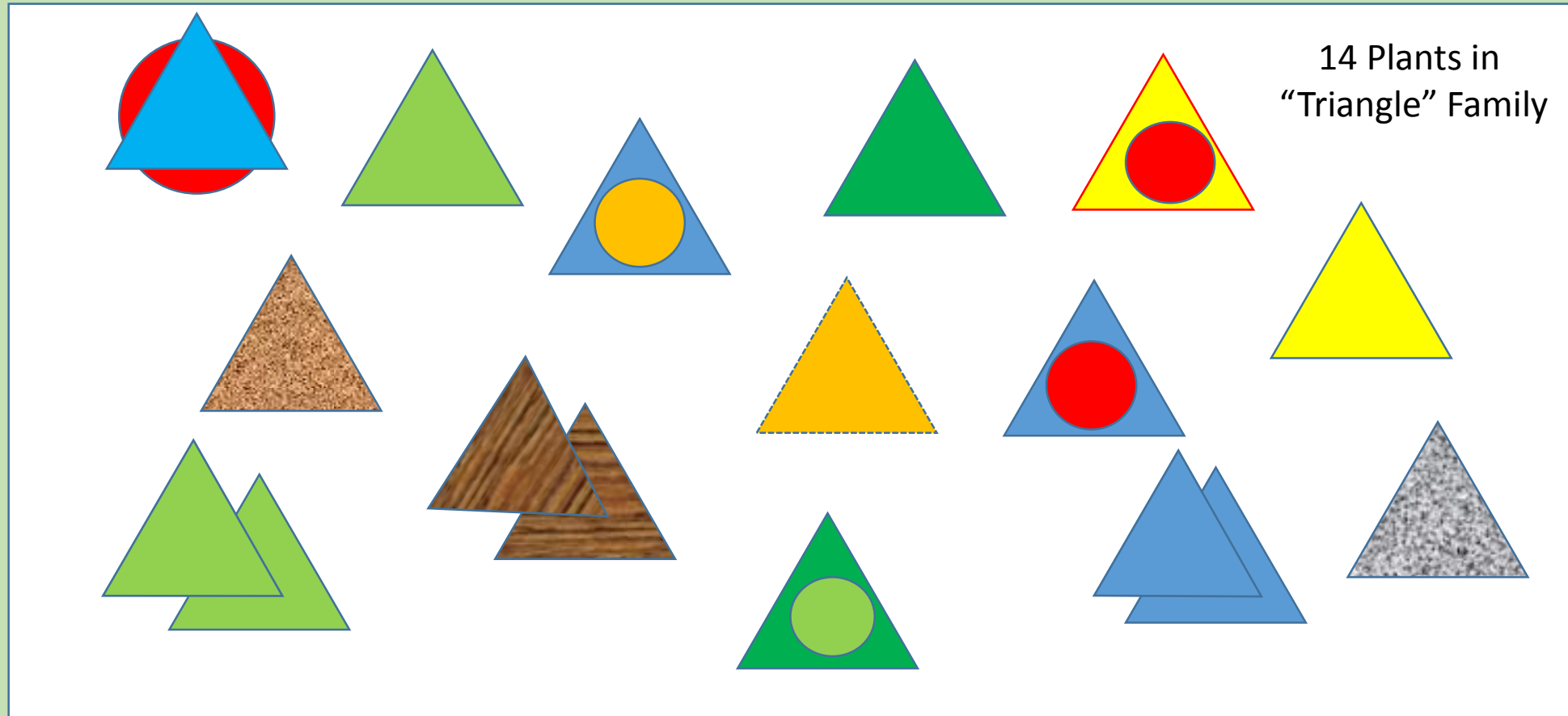
**Order**= Primates (*stereoscopic 3-color vision, opposable thumbs, two sexes, live in trees- or used to*)

**Family**= Hominidae (*Chimps, Apes, Orangutans, and People*)

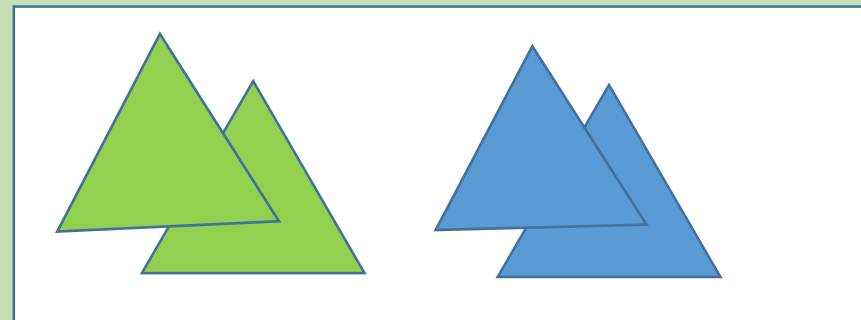
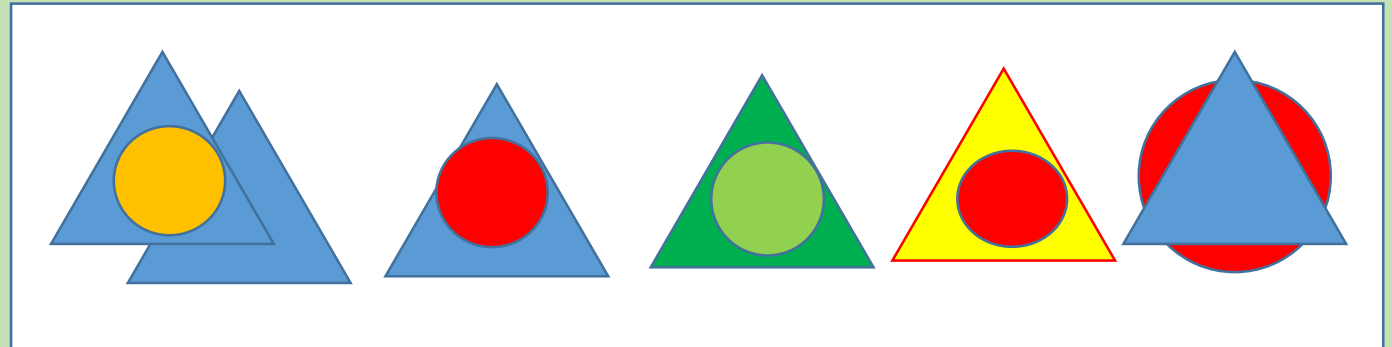
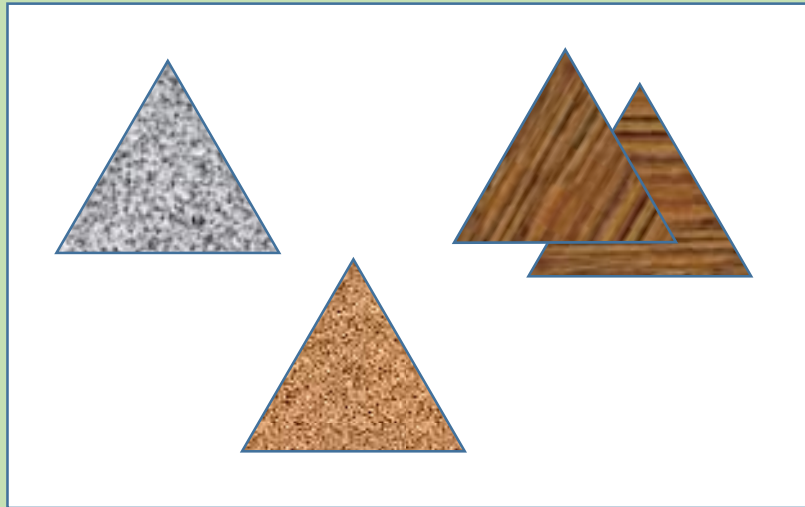
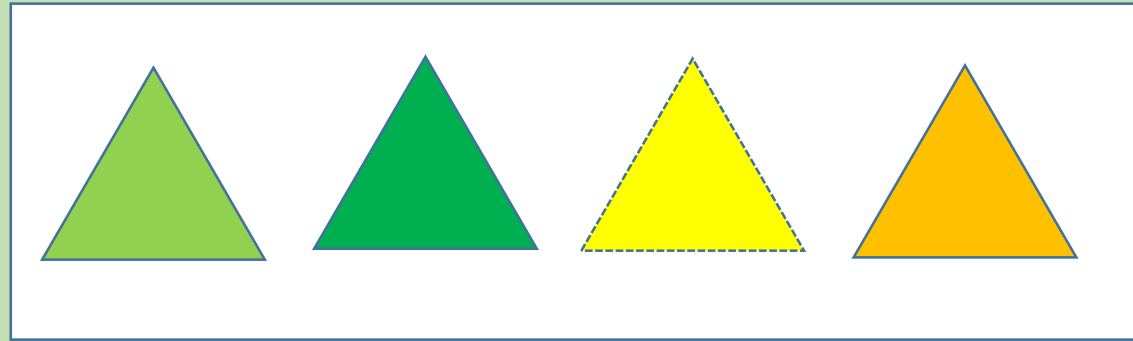
**Genus**= Homo (*Just those we consider human- extant and extinct*)

**Species**= sapiens (*Just our smarty pants brand of human- the extant one*)

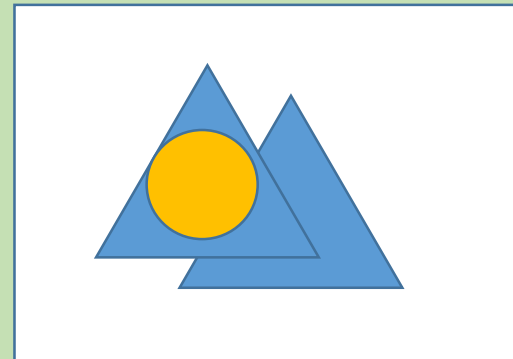
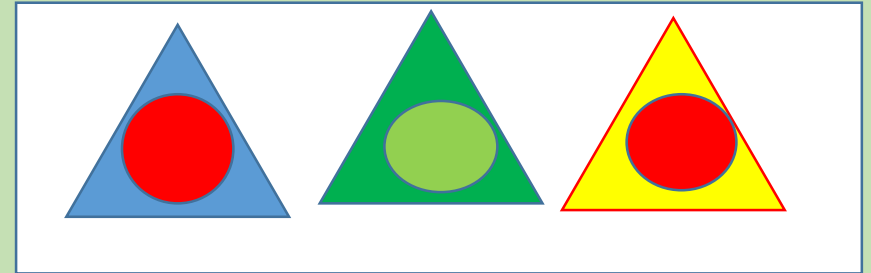
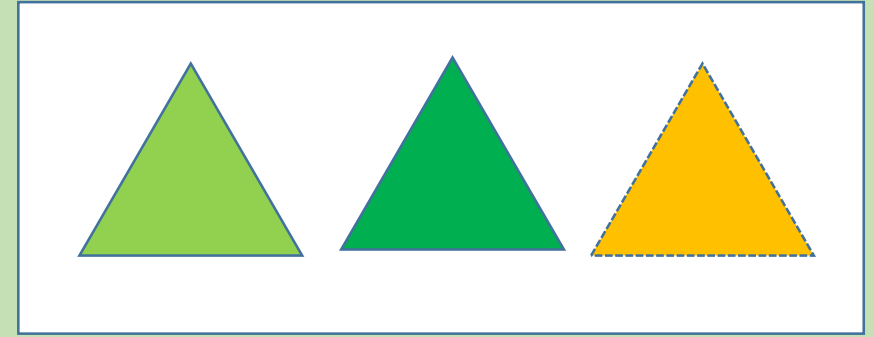
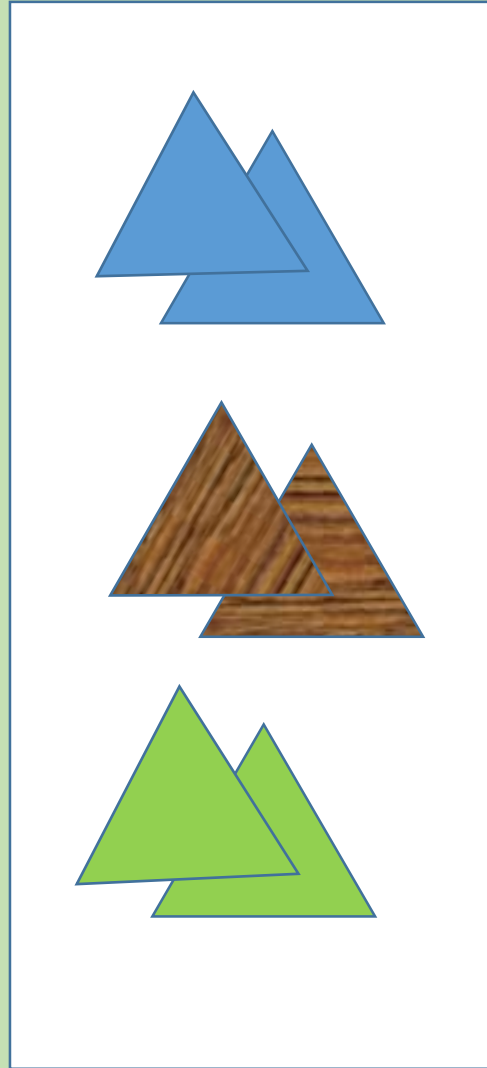
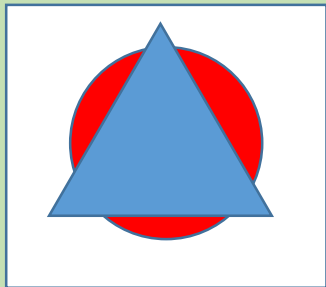
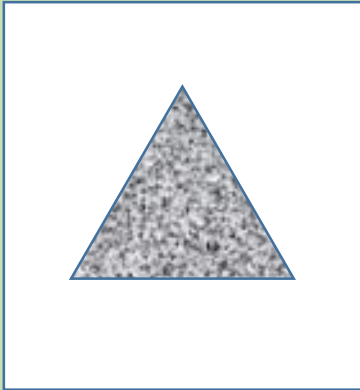
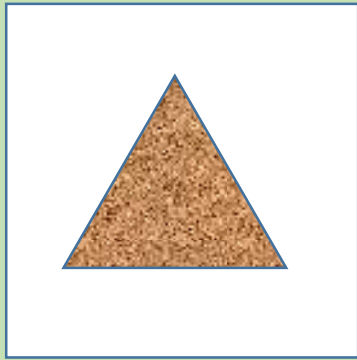
How species are placed in one group or category or another can be a matter of opinion of the person doing the categorization!



One possible  
Arrangement= 4 genera

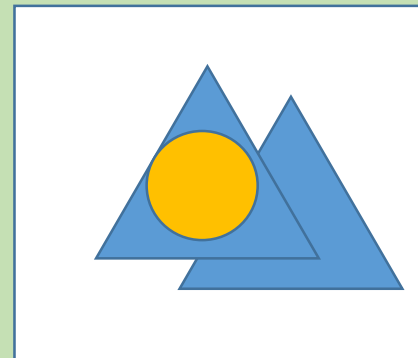
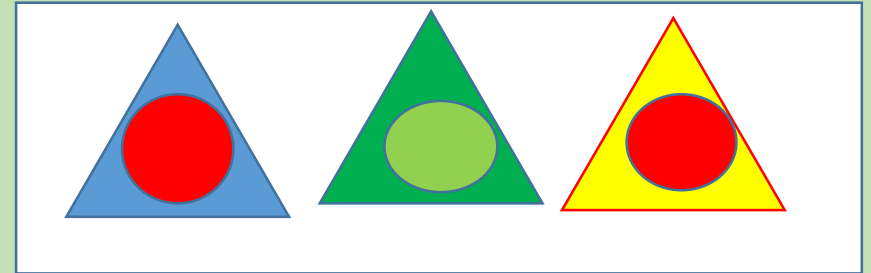
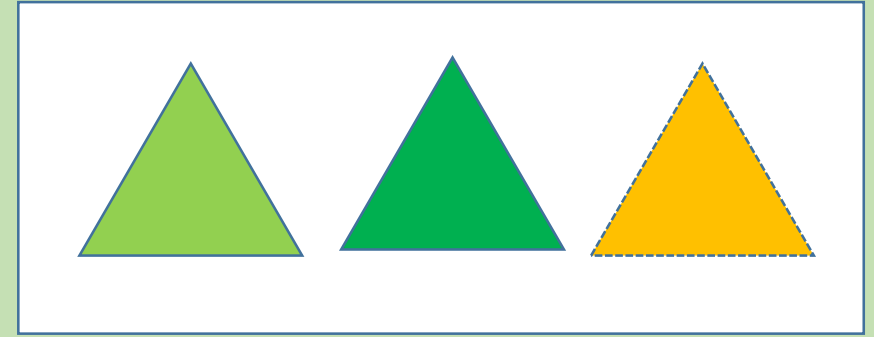
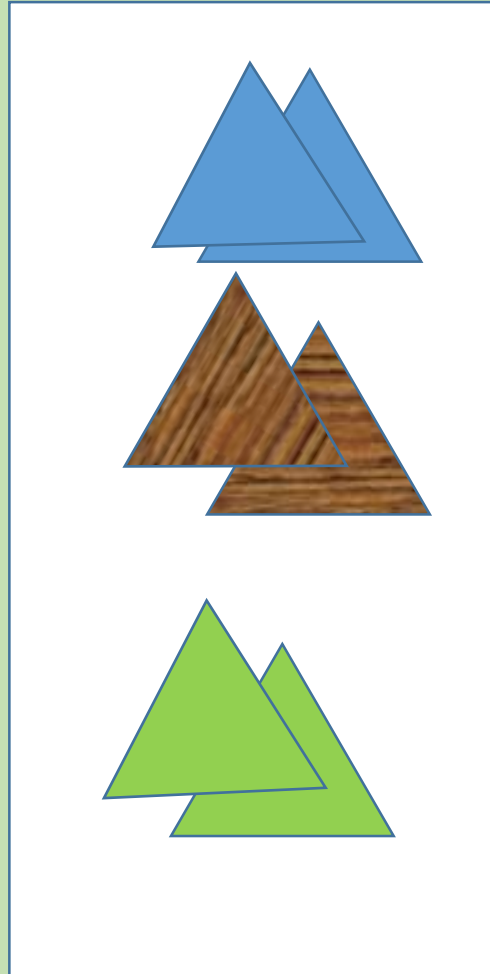
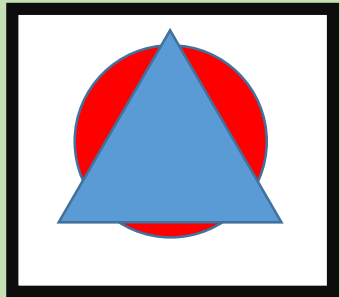
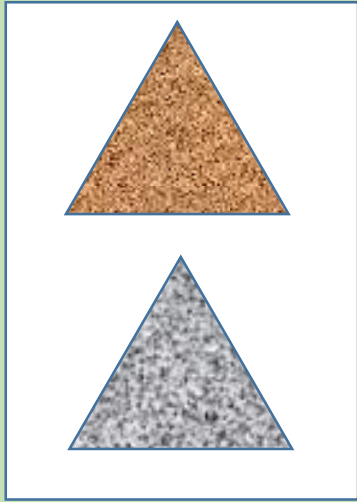


Another possible arrangement= 7 genera





Another possible arrangement= 5 genera  
And 1 new family





A Taxonomy has to be accepted  
By other scientists to be useful

Therefore, it depends on who looked at the material as to how it was categorized and **Taxonomy** has been- and will probably remain- a subjective science/art

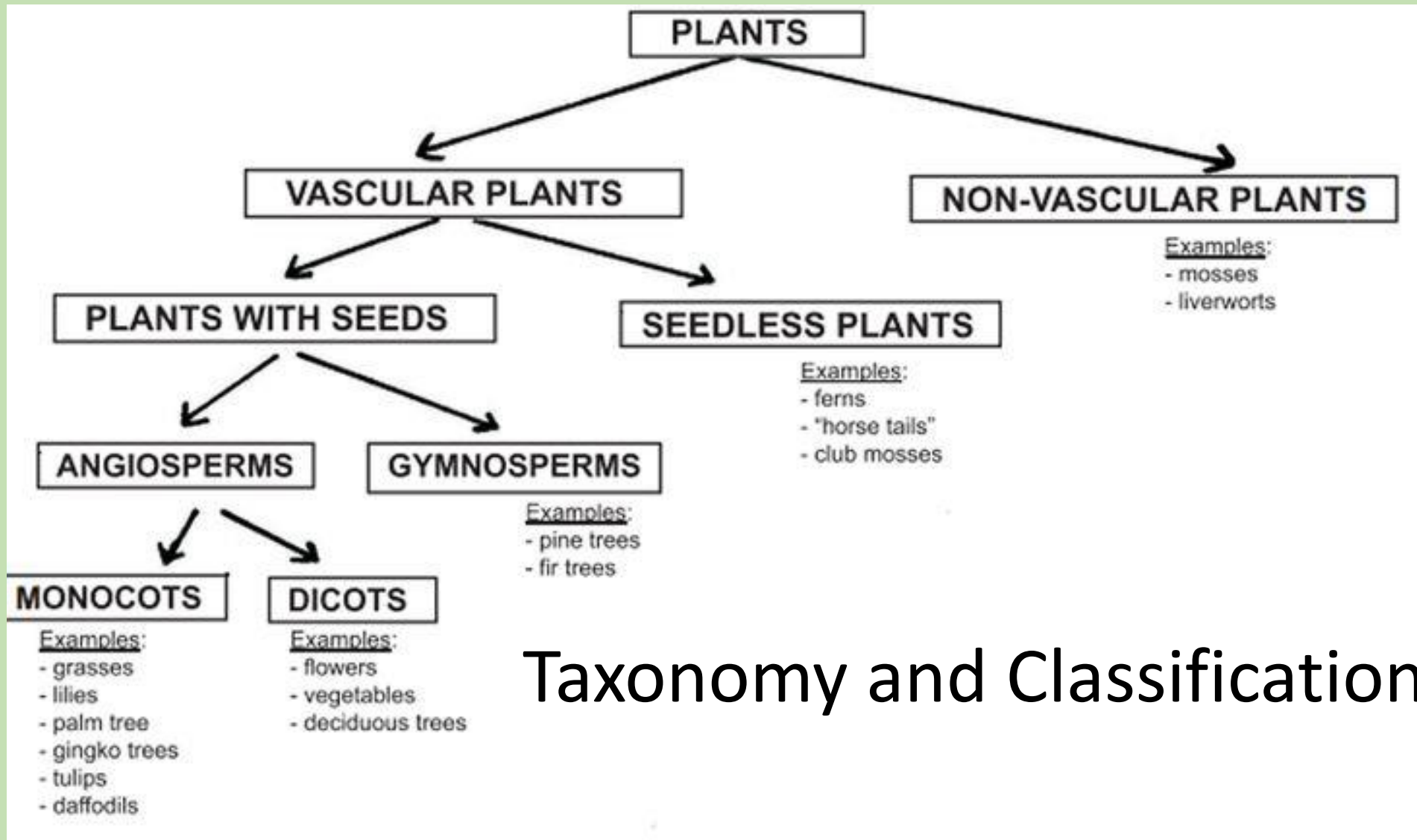


**Taxonomy** has been married to **Systematics**-

That is- the way things are classified is SUPPOSED to represent how they evolved.

Relationship are SUPPOSED to represent evolutionary relationships.

So, taxonomists look at all features of plants and try to figure out what features are basic to a group – that is “**Conserved**” – tend to not change rapidly- and which are **Derived**- that is, newly evolved.

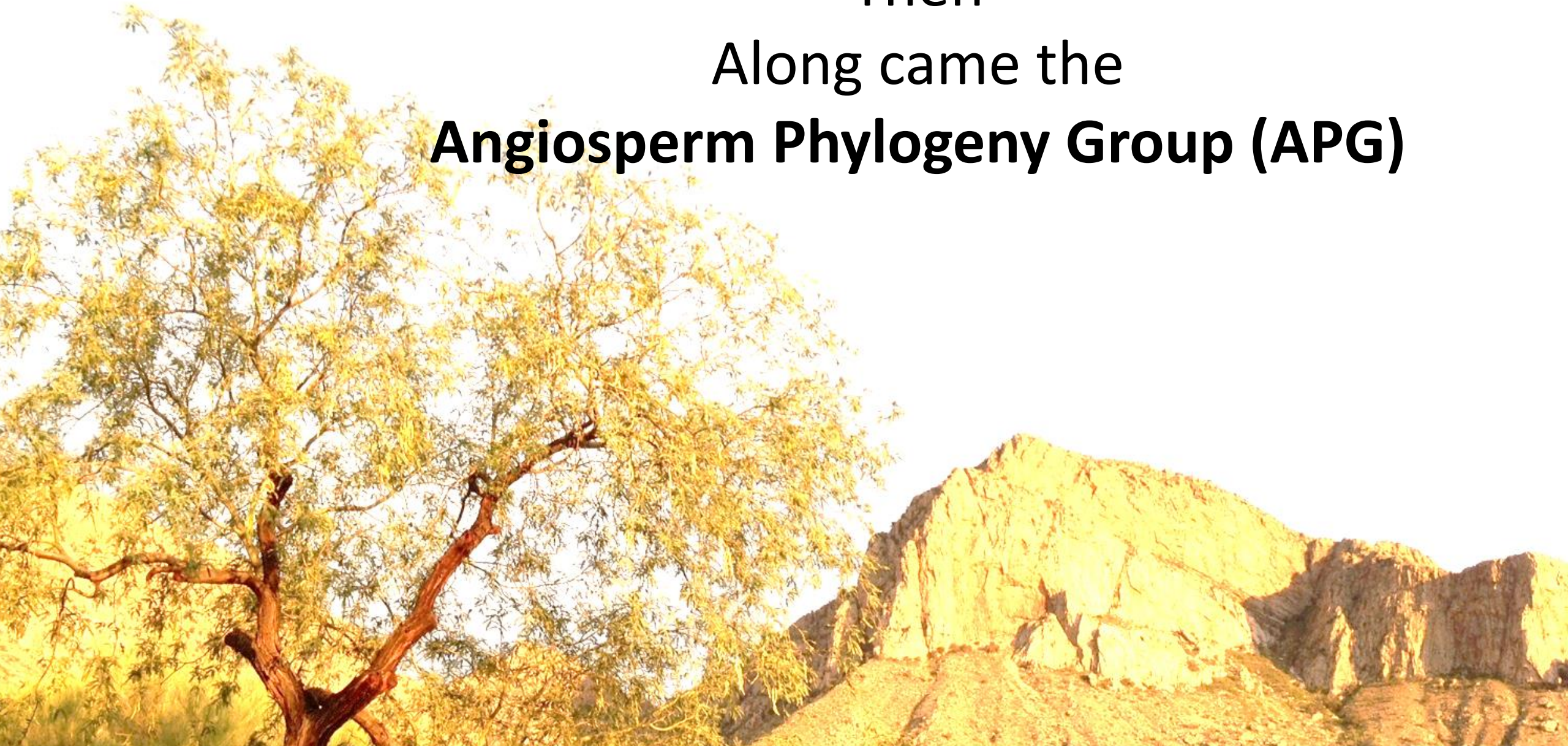


## Taxonomy and Classification since 1968

Sweet and easy!

**BUT.....**

Then  
Along came the  
**Angiosperm Phylogeny Group (APG)**



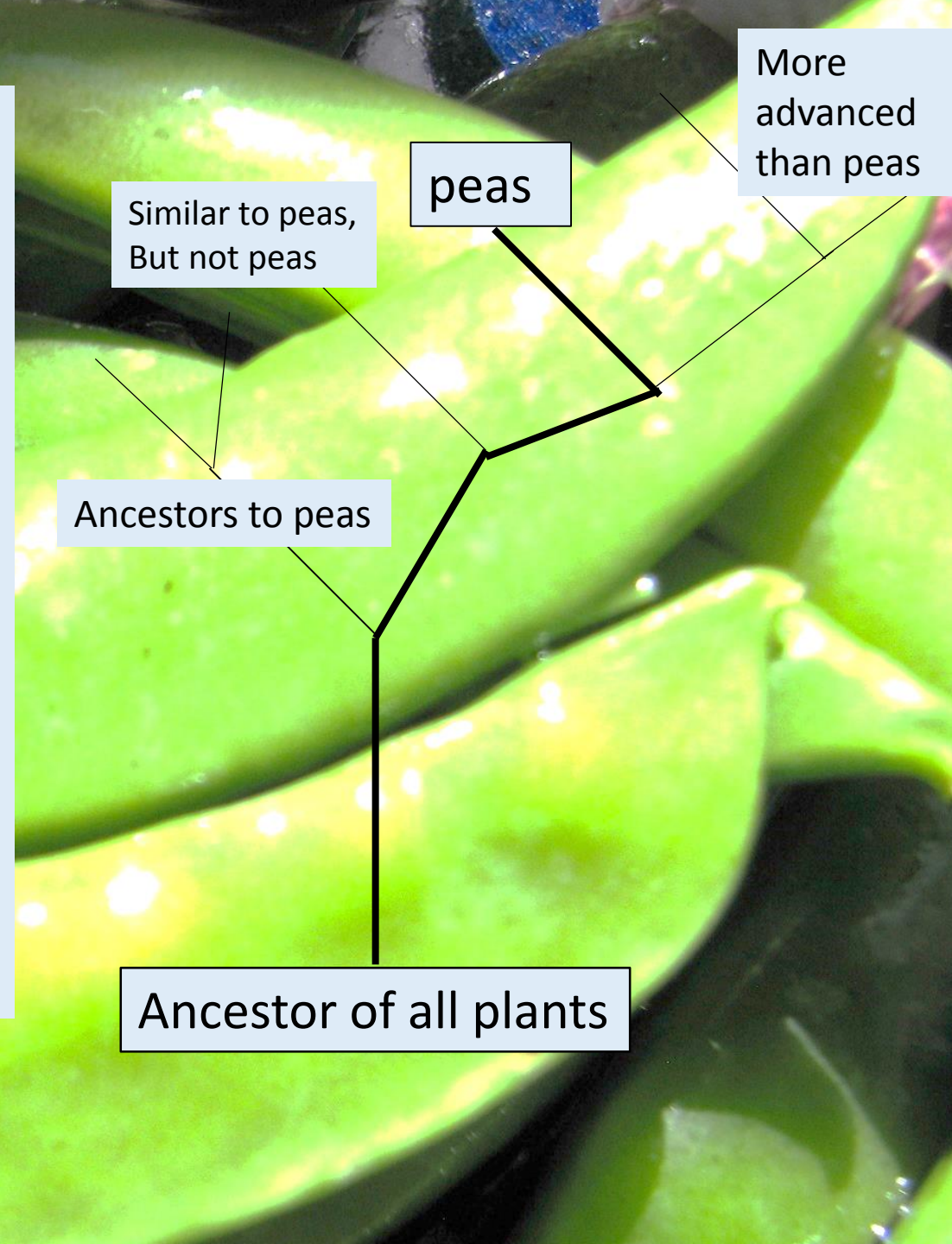
The APG is a group of scientists (Plant Systematists) from Harvard University, prestigious Kew Gardens in England, Academy of Science in Sweden, Cornell University, Missouri Botanical Gardens, University of Florida, etc. who have shaken up the taxonomic world in 1998, 2003, 2009, and 2016.

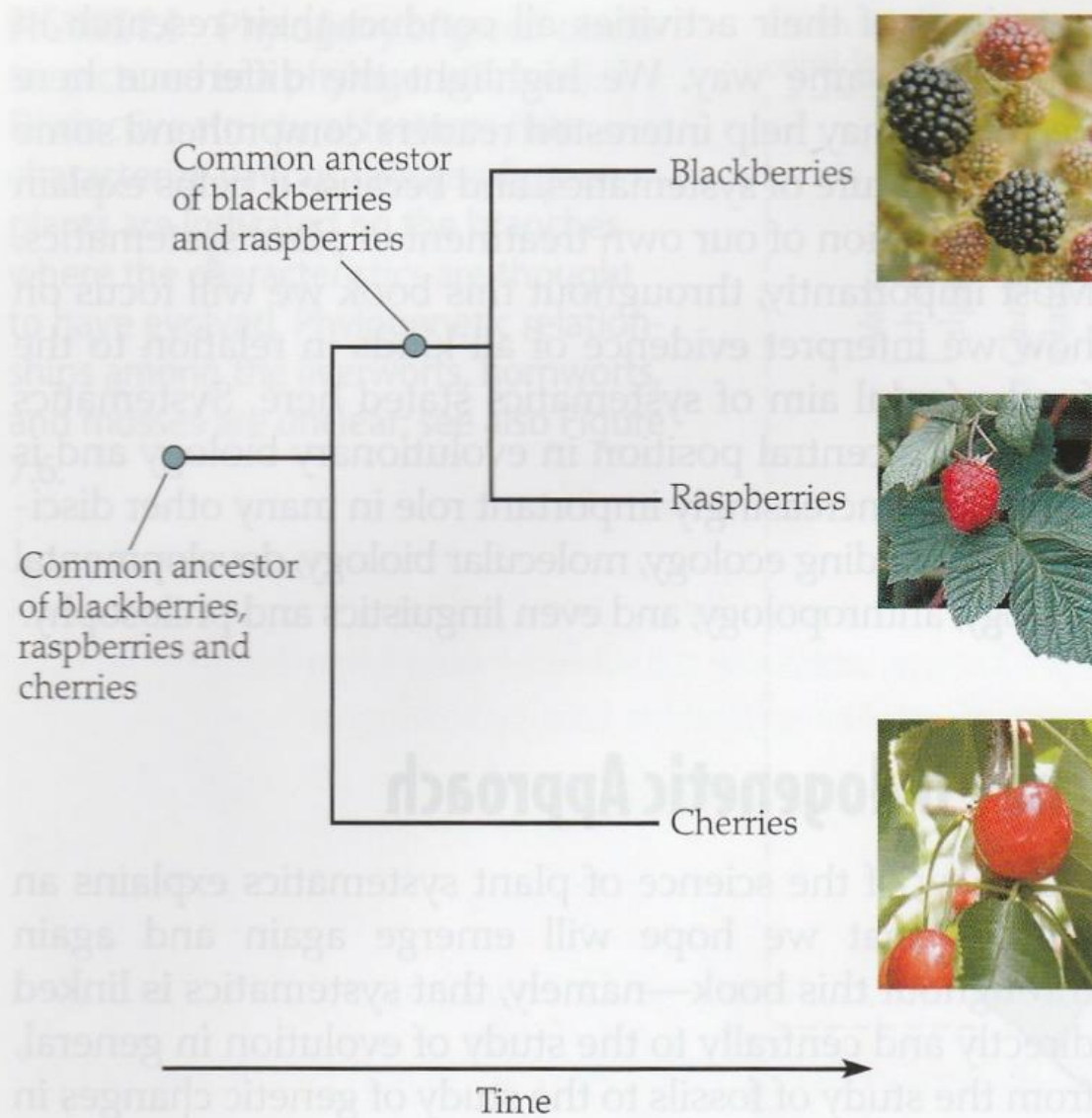


At least they are trying to stay under 500 families.

They decided that our old classification system does not use new genetic and molecular data and needs to be revised so that it is **monophyletic**.

That means that everything lines up with evolution in a tidy tree that branches **once** each time a major evolutionary change occurs.





## A simple phylogeny

A each split, the population became isolated or had a genetic change that created a new species.

**FIGURE 1.2** A simple phylogeny of three groups in the rose family.

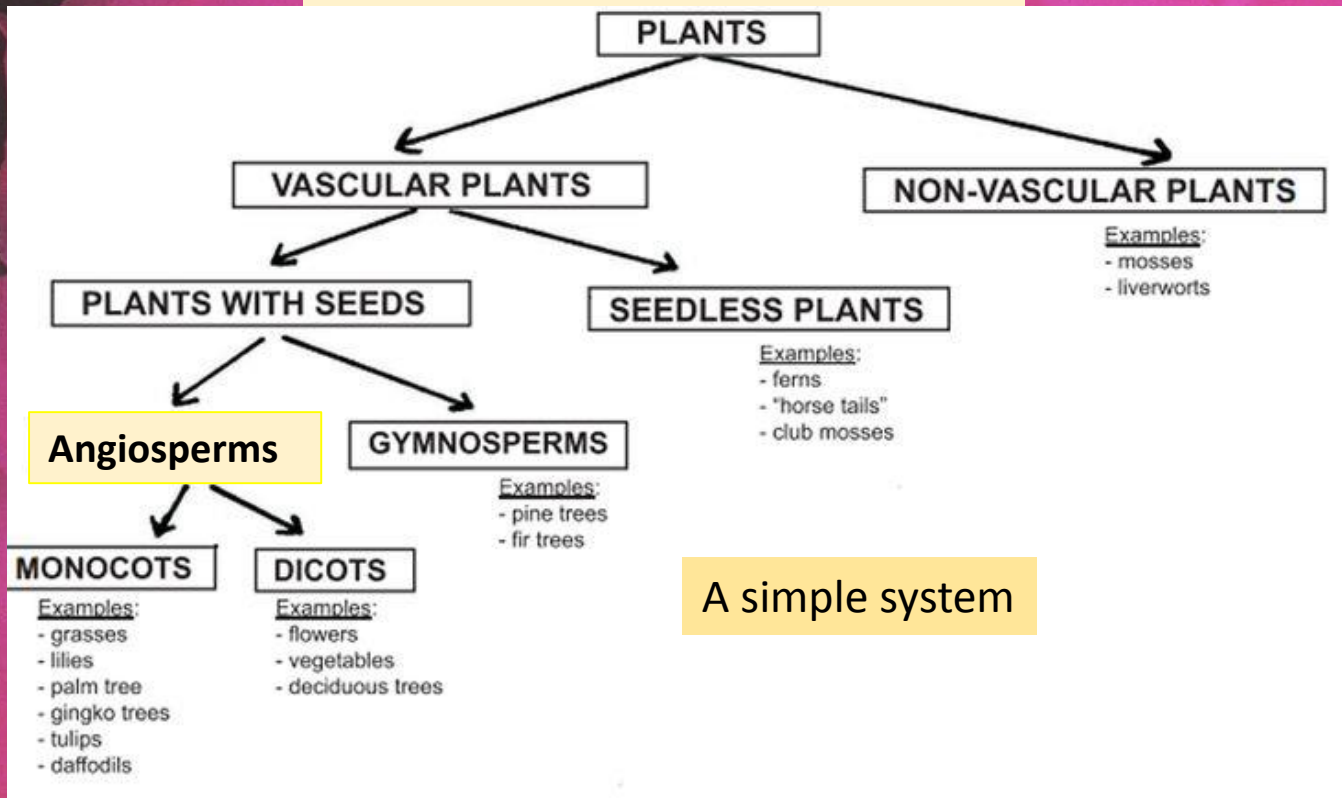


A close-up photograph of a plant with numerous thin, green, woody stems and small, bright yellow flowers. The flowers are clustered along the stems and appear to be in various stages of bloom. The background is blurred, showing more of the same plant and some brownish ground.

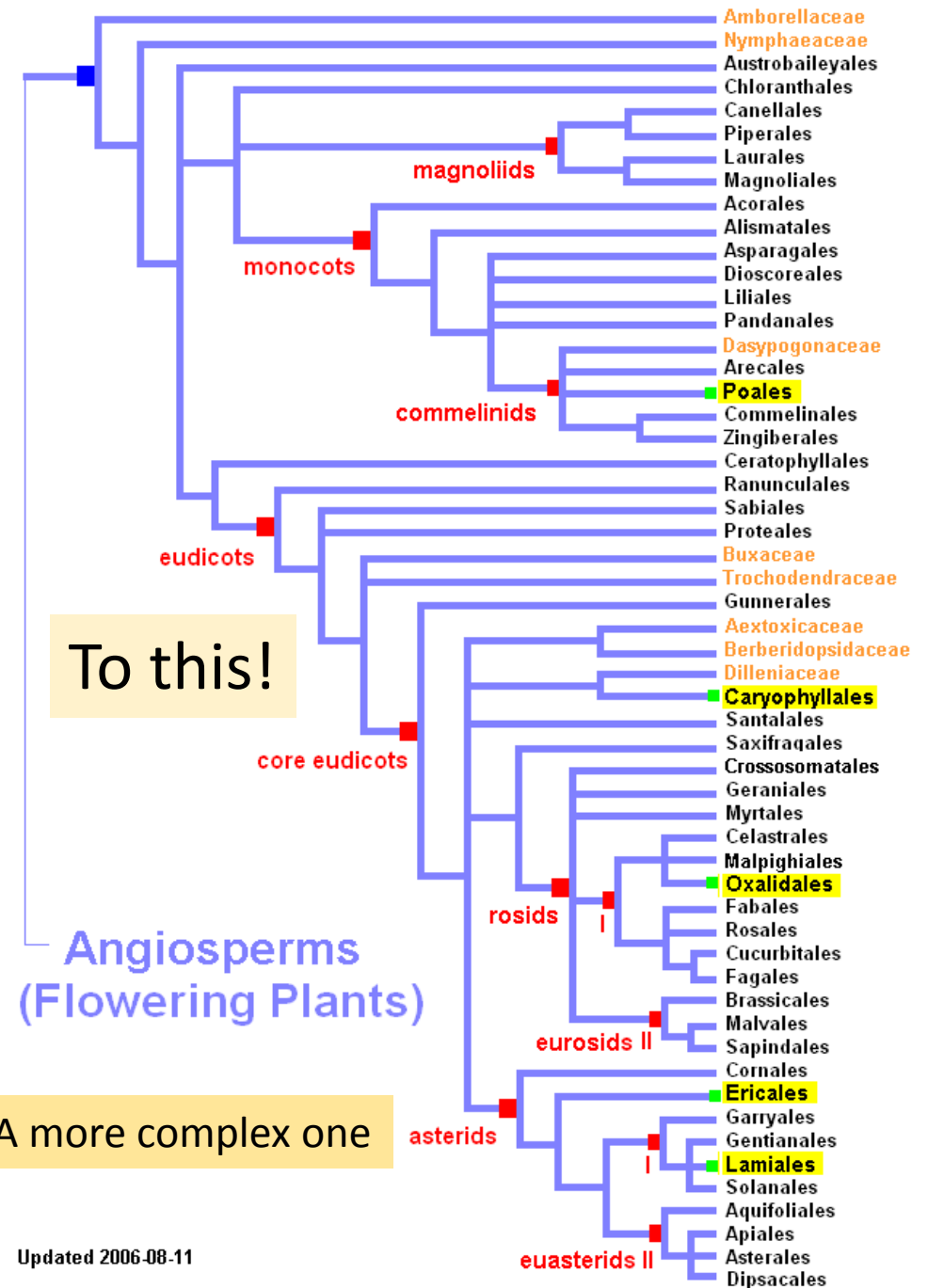
Why am I telling you this??

Because our Western Garden Book is using the new taxonomy as are many major Herbaria and the next thing that will happen is that our guide books to plants will use it and our floras will use it!

So, we went from this

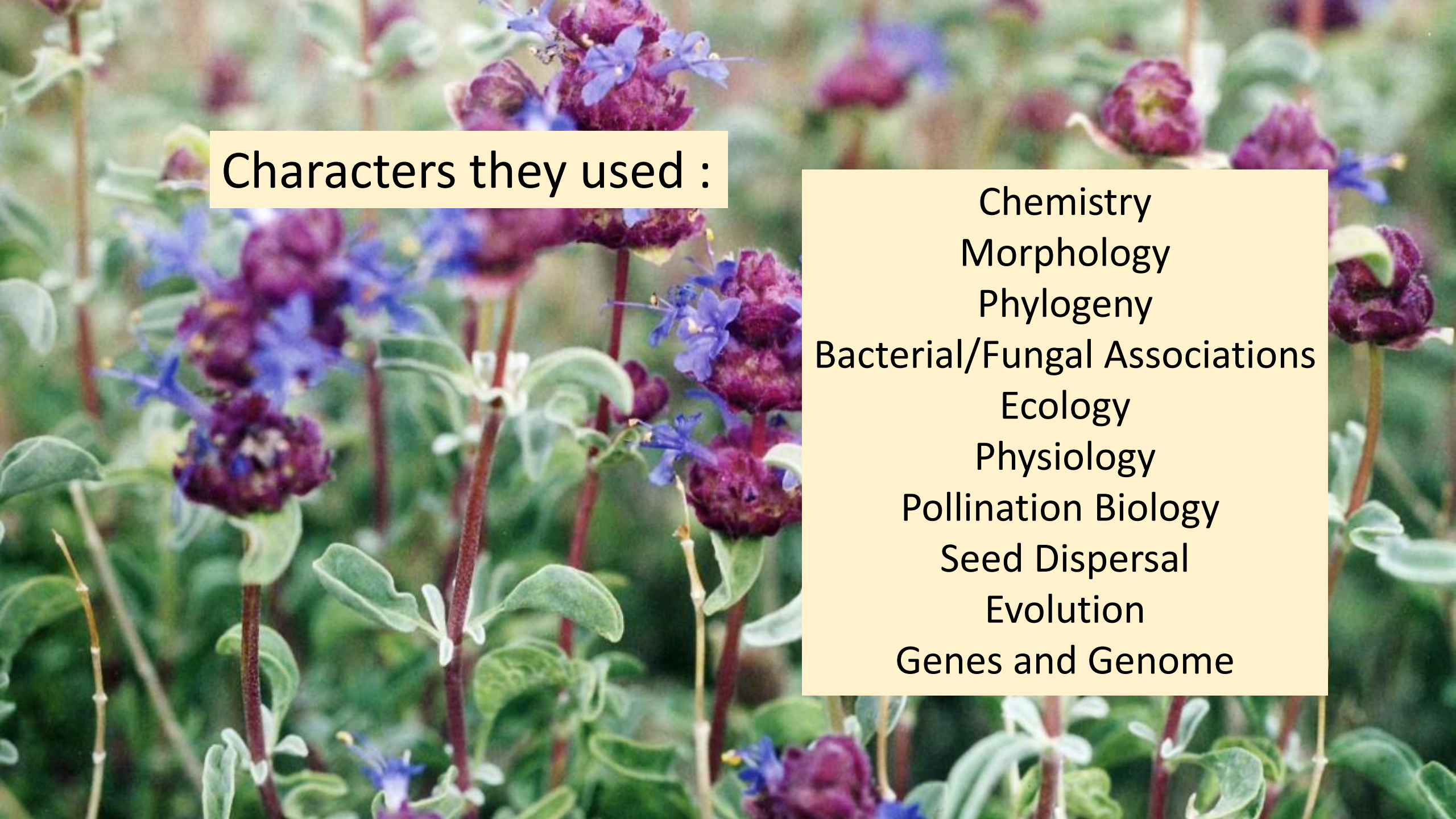


A simple system



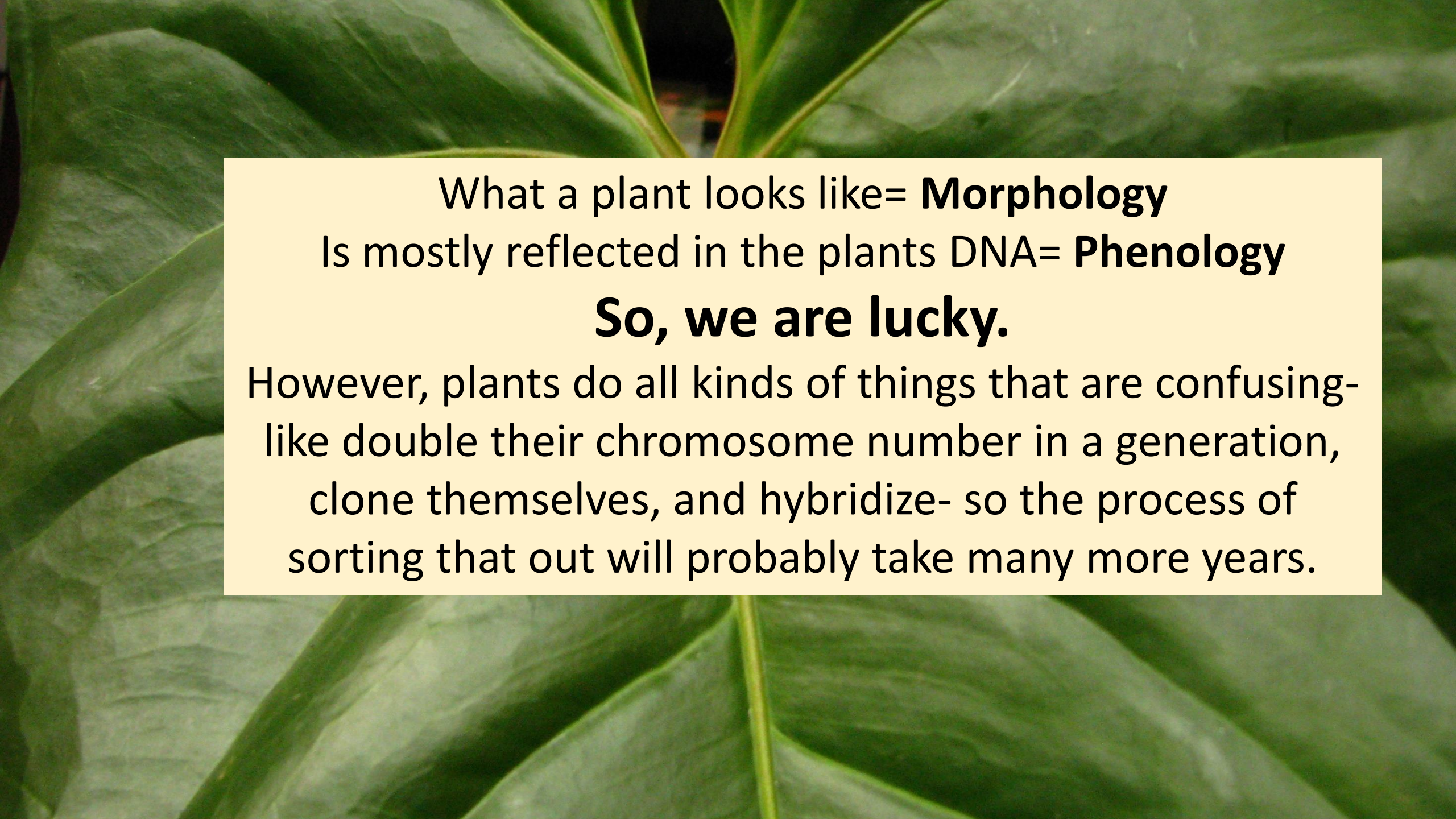
To this!

A more complex one



Characters they used :

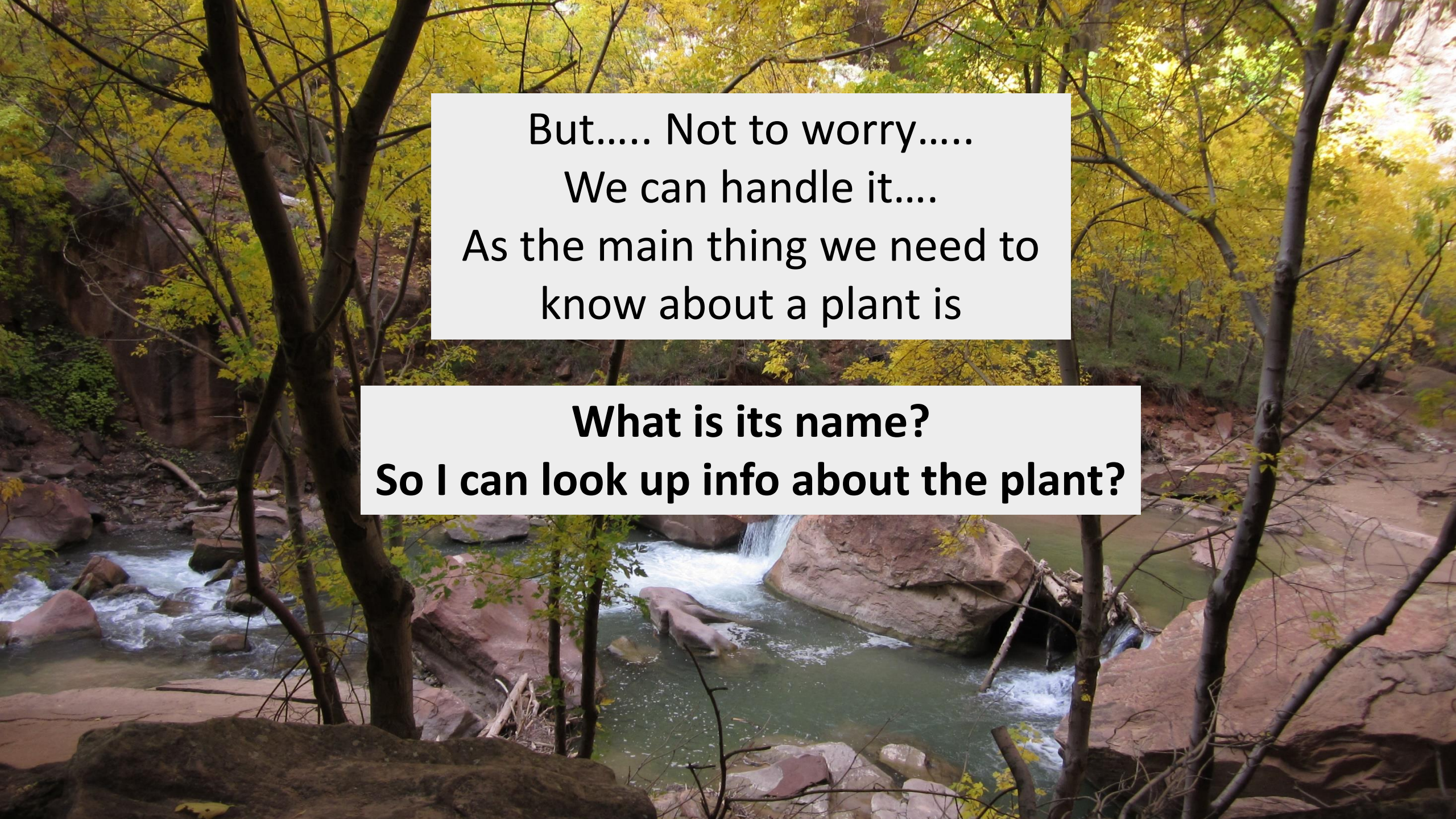
Chemistry  
Morphology  
Phylogeny  
Bacterial/Fungal Associations  
Ecology  
Physiology  
Pollination Biology  
Seed Dispersal  
Evolution  
Genes and Genome

A close-up photograph of several large, vibrant green leaves with prominent veins, filling the background of the slide.

What a plant looks like= **Morphology**  
Is mostly reflected in the plants DNA= **Phenology**

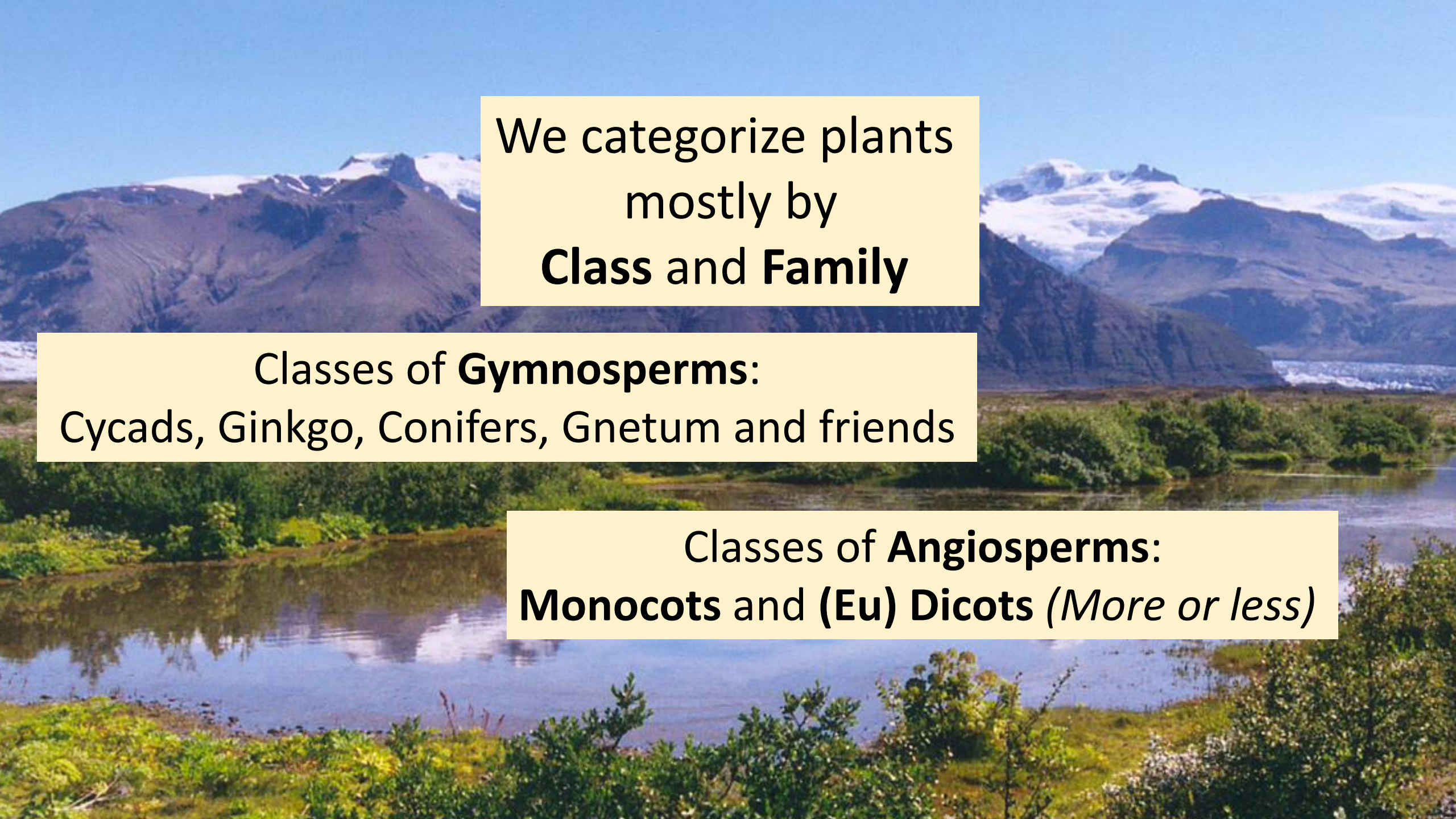
**So, we are lucky.**

However, plants do all kinds of things that are confusing- like double their chromosome number in a generation, clone themselves, and hybridize- so the process of sorting that out will probably take many more years.



But..... Not to worry.....  
We can handle it....  
As the main thing we need to  
know about a plant is

**What is its name?**  
**So I can look up info about the plant?**

A scenic landscape featuring snow-capped mountains in the background, a river in the middle ground, and lush green vegetation in the foreground. The sky is clear and blue.

We categorize plants  
mostly by  
**Class and Family**

Classes of **Gymnosperms**:  
Cycads, Ginkgo, Conifers, Gnetum and friends

Classes of **Angiosperms**:  
**Monocots and (Eu) Dicots** (*More or less*)

A general rule for understanding classification:  
The endings

Kingdom= <b>-ae</b>	<i>Plantae</i>
Division= <b>-ophyta</b>	<i>Spermatophyta</i>
Class= <b>-opsida</b>	<i>Magnoliopsida</i> <i>(used to be Dicotyledonaeae)</i>
Order= <b>-ales</b>	<i>Asterales</i>
Family = <b>-aceae</b>	<i>Asteraceae</i>





The Sunflower family  
is: **Asteraceae**  
**Aster-aceae**  
Based on the genus  
with the most  
species- the **Aster**  
genus





**DON'T PANIC**

Sit back and relax  
For the 22 plant Families that  
You will now learn.....  
Just absorb the diversity....



# Major families of Gymnosperms



**Gnetaceae**



**Ephedraceae**



**Ginkgoaceae**



**Cycadaceae  
Zamiaceae**



**Welwitschiaceae**





**Conifers**  
**About 550 species**

2 families of importance

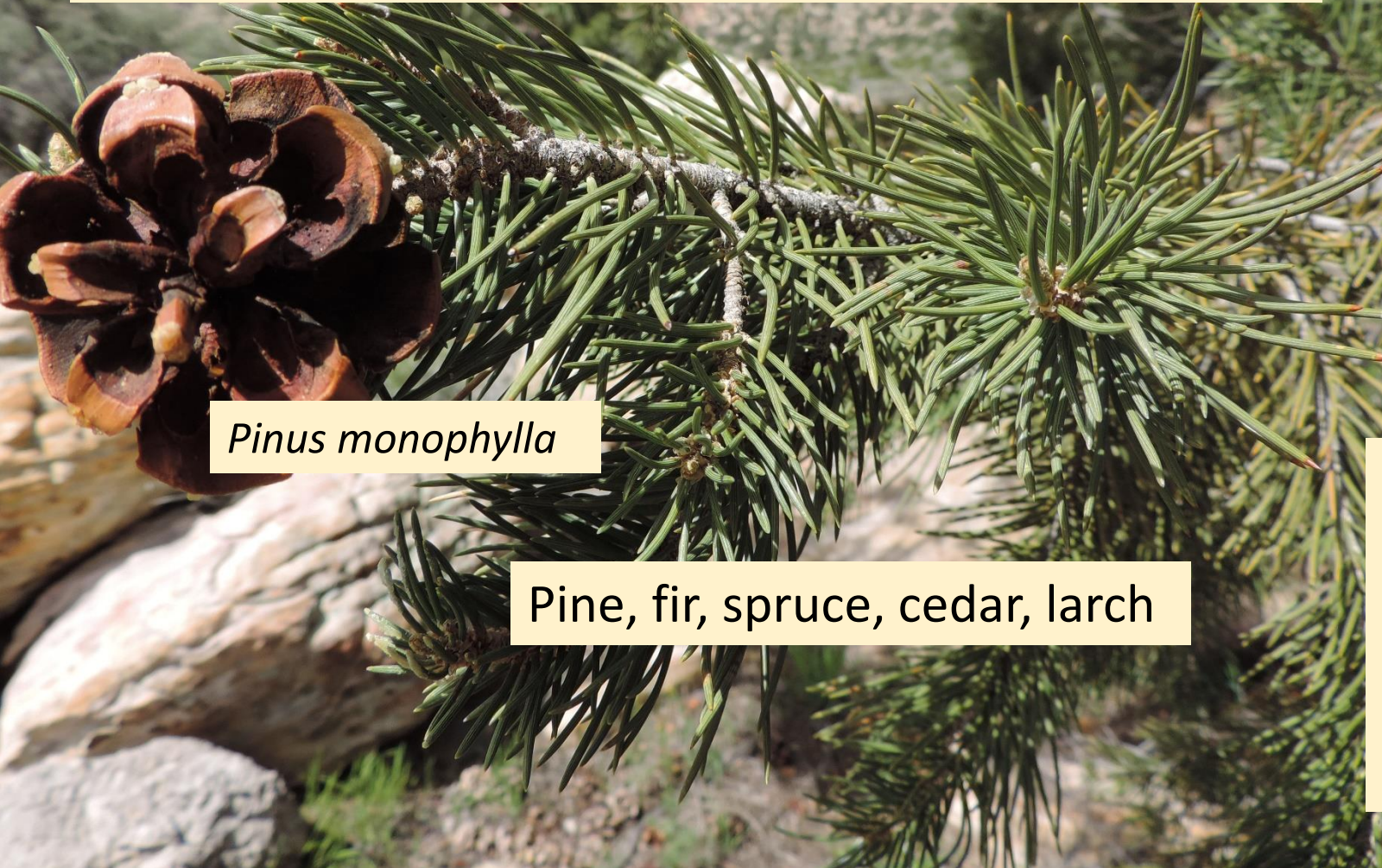
**Pinaceae- pines**

**Cupressaceae- junipers, cypress**



**pines, spruces, firs, larch,  
yews, redwoods, junipers,  
cypress, araucaria, etc.-**

**Pinaceae-** Needle like leaves  
(usually) in groups attached to the stem.  
Pine cones.




*Pinus monophylla*

Pine, fir, spruce, cedar, larch



Juniper, redwood,  
cypress, arbovitae

**Cupressaceae-** Small flat  
needles that are shed  
with the branches. Little  
leathery cones



# Angiosperms- The Flowering Plants

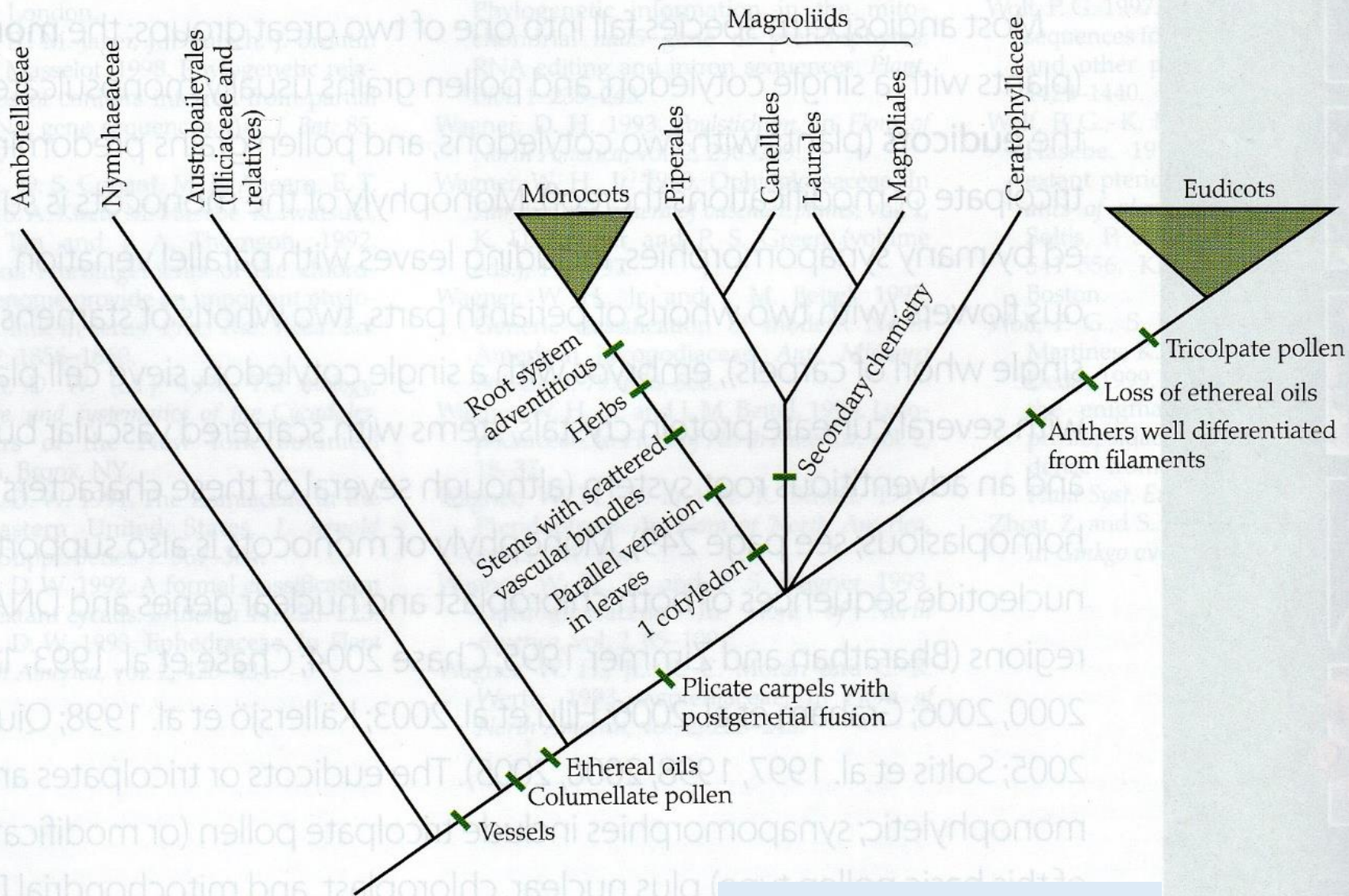
~80% of all plants



**Major Classes of flowering plants:  
Monocots and (Eu)Dicots**

**65,000+ species  
22%**

**170,000+ species  
75%**



The two major classes of angiosperms, with the likelihood that there will be 3 more classes of plants that are more primitive than the two major classes.....

**FIGURE 9.1** Cladogram of major angiosperm groups based on Soltis and Soltis (2004), showing selected morphological synapomorphies.

A simple phylogeny of angiosperms

**Basal Angiosperms:** plants that used to be considered dicots, but now are thought to be a more ancient lineage than both monocots and true dicots (eudicots).

Water lilies, Avocados, Bay, Cinnamon, Magnolias, Aristilochias, Pipers (Black pepper), Sour sops (Guyabana, custard apples), Star Anise, Lizard tail.





# Magnolia



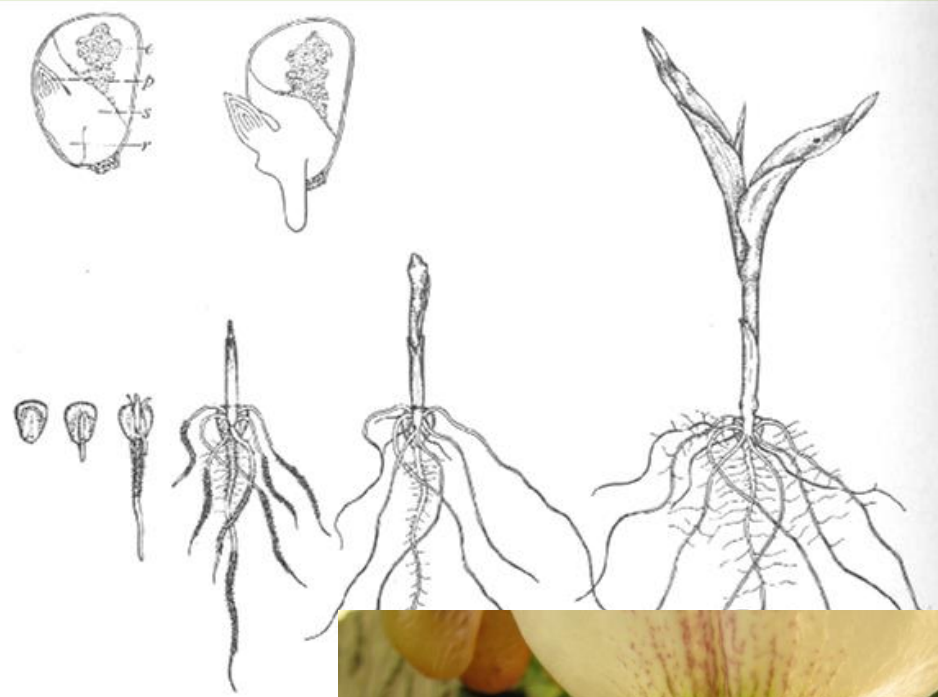
**FIGURE 9.7** Magnoliaceae. (A–I) *Magnolia virginiana*: (A) branch with terminal flower ( $\times 0.3$ ); (B) androecium (part removed) and gynoecium, on elongate receptacle ( $\times 3.5$ ); (C) stamens, adaxial surface ( $\times 4$ ); (D) stamens, in cross section ( $\times 6$ ); (E) gynoecium in longitudinal section, note two ovules in each carpel ( $\times 5$ ); (F) nearly mature fruit ( $\times 0.75$ ); (G) mature fruit with pendulous seeds ( $\times 0.75$ ); (H) seed in longitudinal section, note copious endosperm and minute embryo ( $\times 2.5$ ); (I) seed, with fleshy outer seed coat removed ( $\times 2.5$ ). (J–L) *M. grandiflora*: (J) flower bud ( $\times 0.75$ ); (K) floral receptacle with androecium (half of stamens removed) and gynoecium ( $\times 2$ ); (L) stamen, adaxial surface ( $\times 4$ ). (M) *M. tripetala*: stamen, adaxial surface ( $\times 4$ ). (N–Q) *M. acuminata*: (N) branch with terminal flower ( $\times 0.3$ ); (O) opening flower bud ( $\times 0.3$ ); (P) stamen, adaxial surface ( $\times 4$ );

What makes a basal angiosperm a basal angiosperm?

Primitive features of the fruit and flower:

- Tepals- not petals and sepals.
- Fruits like a cone, and seeds not totally enclosed.
  - Primitive pollen
- Stamens not well defined into anther and filament.

# Monocots



- Grasses, palms, lilies, iris, cereal grains (wheat, rice, corn, rye, oats...)
- One cotyledon (baby leaf)
- Parallel or penni-parallel leaf venation
- Flower parts in 3's
- No secondary growth (don't make wood)
- Fibrous root system
- Most advanced: Orchid family



# Some important **Monocots**:

*gingers, cannas, bamboos, palms, grasses & grains, orchids, Irises, agaves, yuccas, aroids, yams, sedges, rushes, onions, bromeliads, amaryllis, & lilies.*

## Monocot Families that we should know:

Arecaceae- Palm Family

Poaceae- Grass Family

Orchidaceae- Orchid Family

Asparagaceae- Agaves & Yuccas

Liliaceae- Lilies

Iridaceae- Irises

Araceae- Aroids



# Areceae- The Palm Family (Palmae)



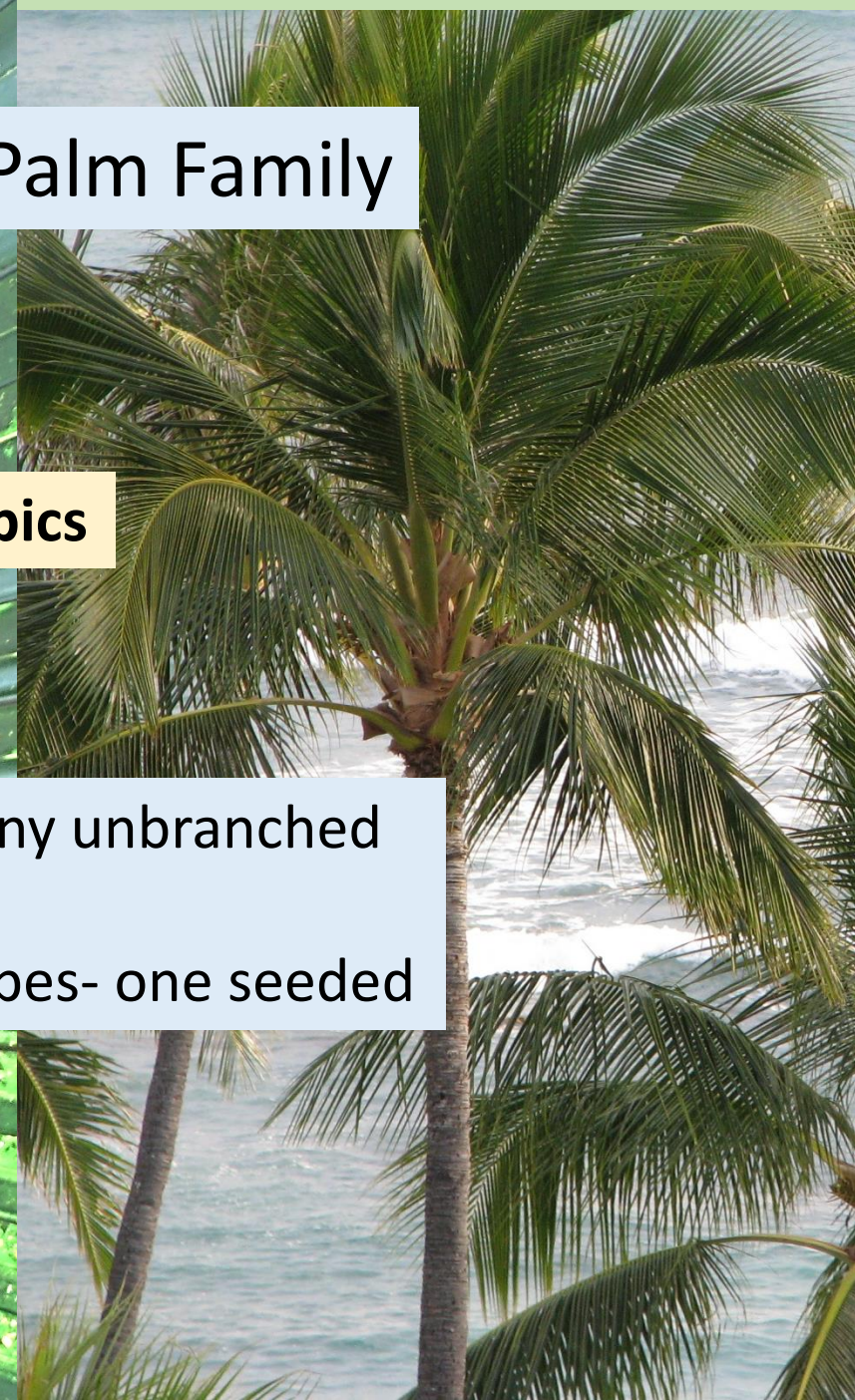
Here is a plant family that you can ID at 60 MPH at sunset



## The Palm Family

**About 2,000 species- warm tropics**

- Perennials- tree like, many unbranched
- Pleated large leaves
- Fruits are generally- drupes- one seeded





*Phoenix dactylifera* = date palm



A famous member  
*Cocos nucifera* = coconut palm




*Washingtonia filifera*=  
California fan palm

*Washingtonia robusta*=  
Mexican fan palm



Largest seed in the world  
Coco de mer  
*Lodoica maldivica*  
From Seychelle Islands



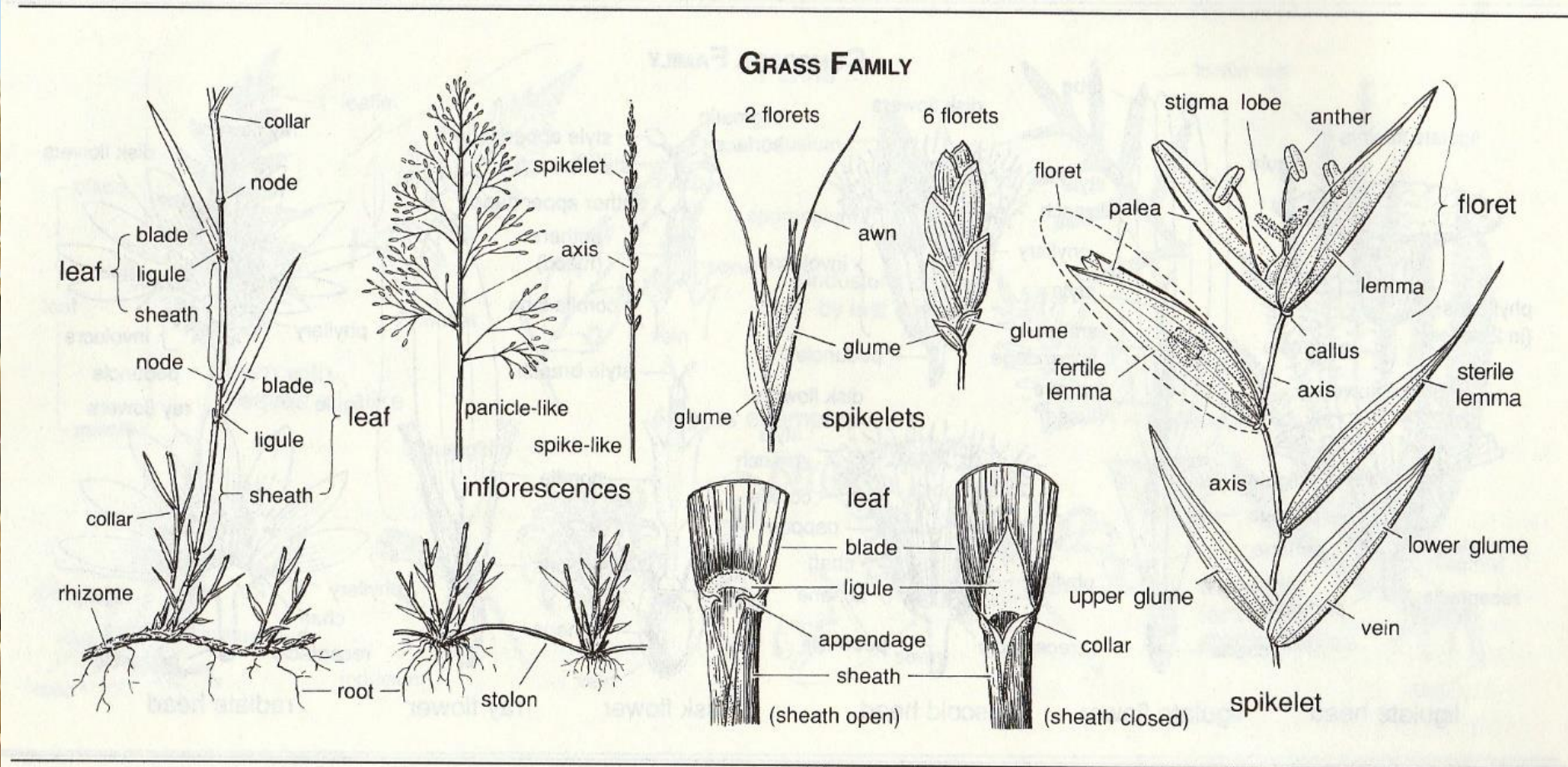
**Poaceae- Grass Family (Graminae)- large family**

**~9,500 spp. world wide**

Our grains are in this family- as are most of the plants we call “grass”

No showy flowers;  
Specialized floral features that are diagnostic.





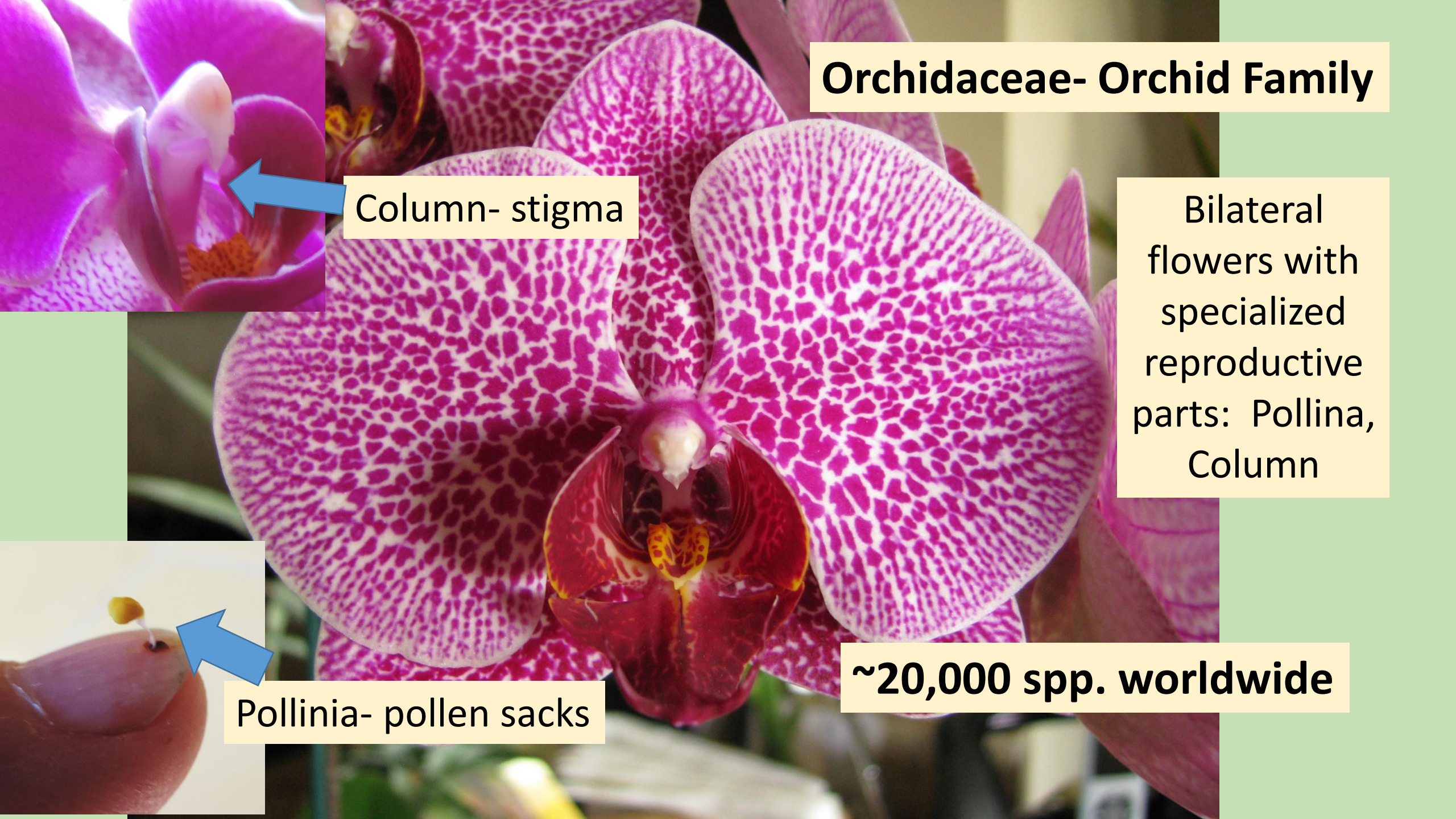
- Perennial or annual-
- Sheathing leaves
- Specialized flowers for wind pollination
- Fibrous root system



## Famous Members:

*Oryza sativa*

Rice  
Wheat  
Corn  
Barley  
Rye  
Millet  
Oats



## Orchidaceae- Orchid Family

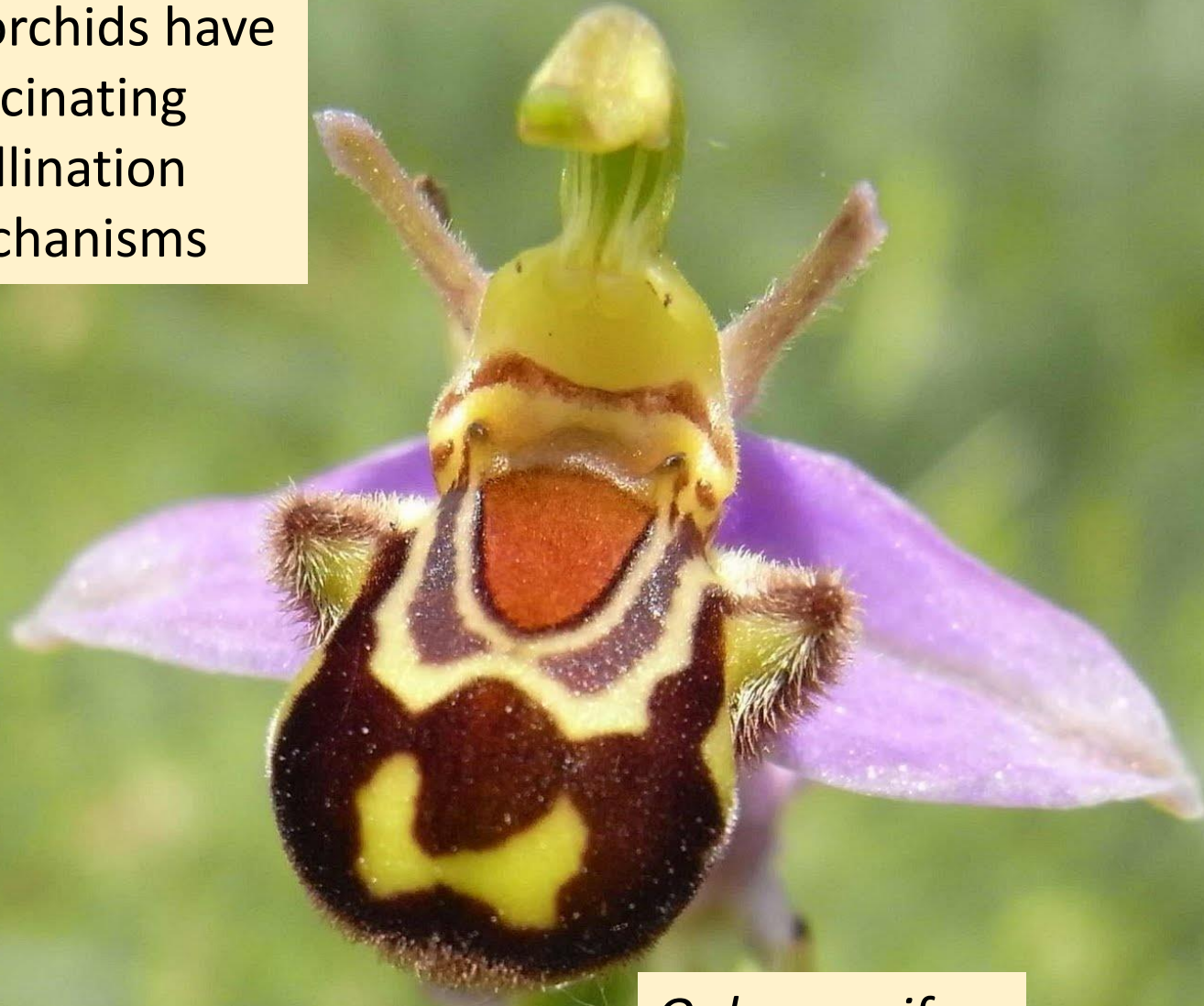
Column- stigma

Bilateral  
flowers with  
specialized  
reproductive  
parts: Pollinia,  
Column

Pollinia- pollen sacks

~20,000 spp. worldwide

Some orchids have  
fascinating  
pollination  
mechanisms



*Ophrys apifera*



*Phalaenopsis* spp.



*Cymbidium* spp.



Devil's Head Orchid  
*Teliopogon diabolicus* Kolan.  
(Kolanowska)

A new species from Colombia  
Name published in July 2016

# Liliaceae- Lily Family

Amaryllidaceae- Amaryllis Family

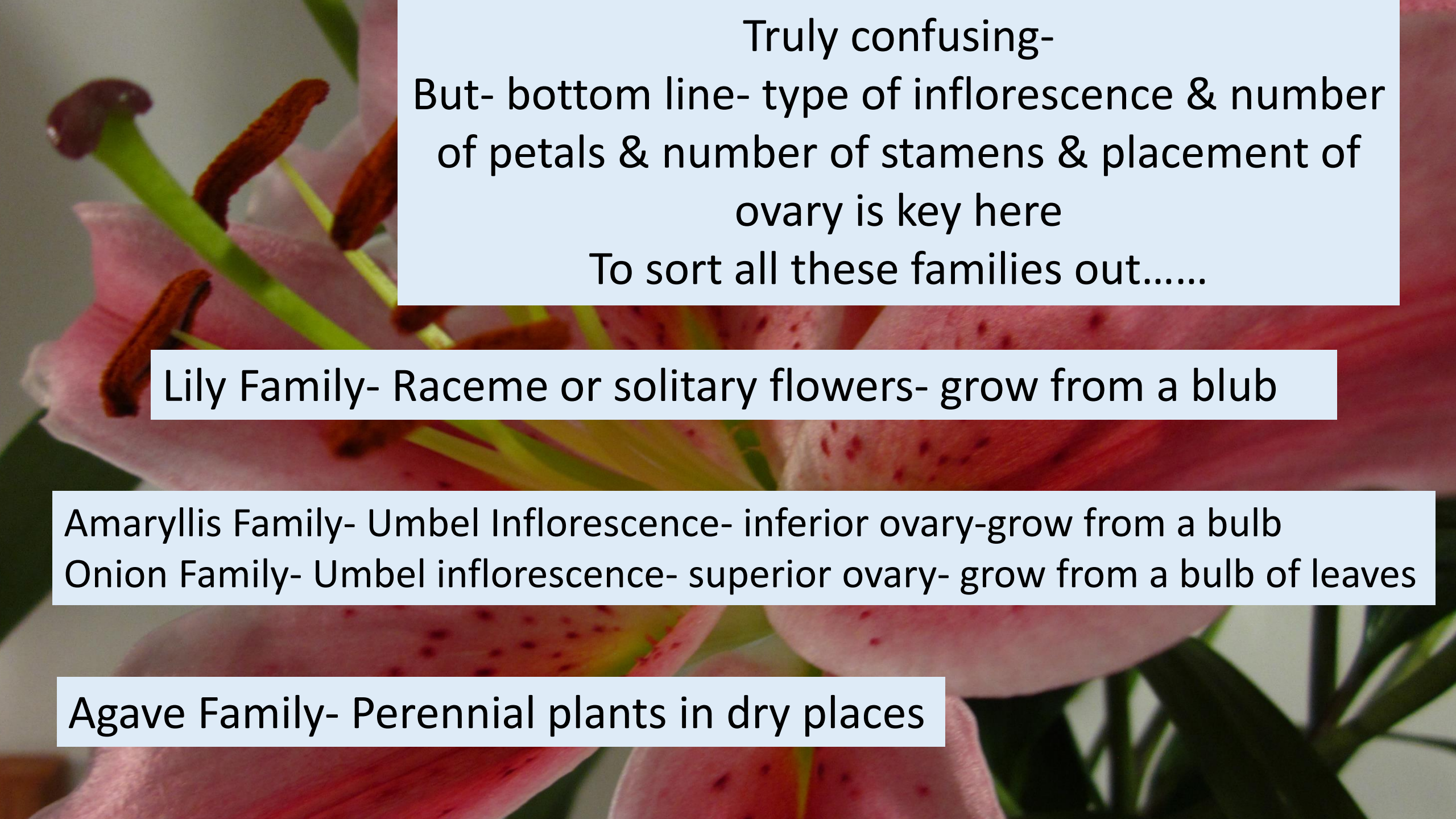
Alliaceae- Onion Family

Agavaceae- Agave and Yucca Family

Asphodelaceae- Aloe Family

Asparagaceae- Asparagus Family





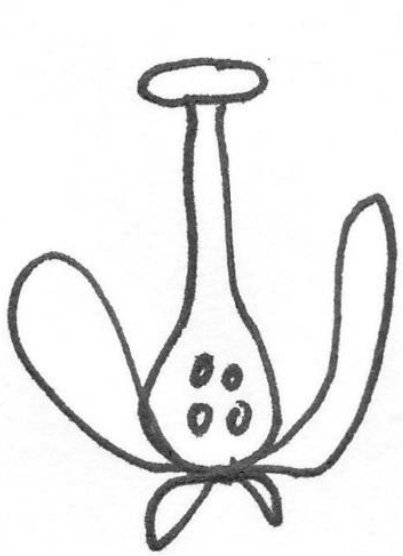
Truly confusing-  
But- bottom line- type of inflorescence & number  
of petals & number of stamens & placement of  
ovary is key here  
To sort all these families out.....

Lily Family- Raceme or solitary flowers- grow from a bulb

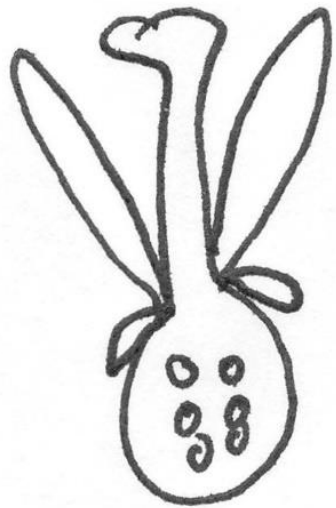
Amaryllis Family- Umbel Inflorescence- inferior ovary-grow from a bulb

Onion Family- Umbel inflorescence- superior ovary- grow from a bulb of leaves

Agave Family- Perennial plants in dry places

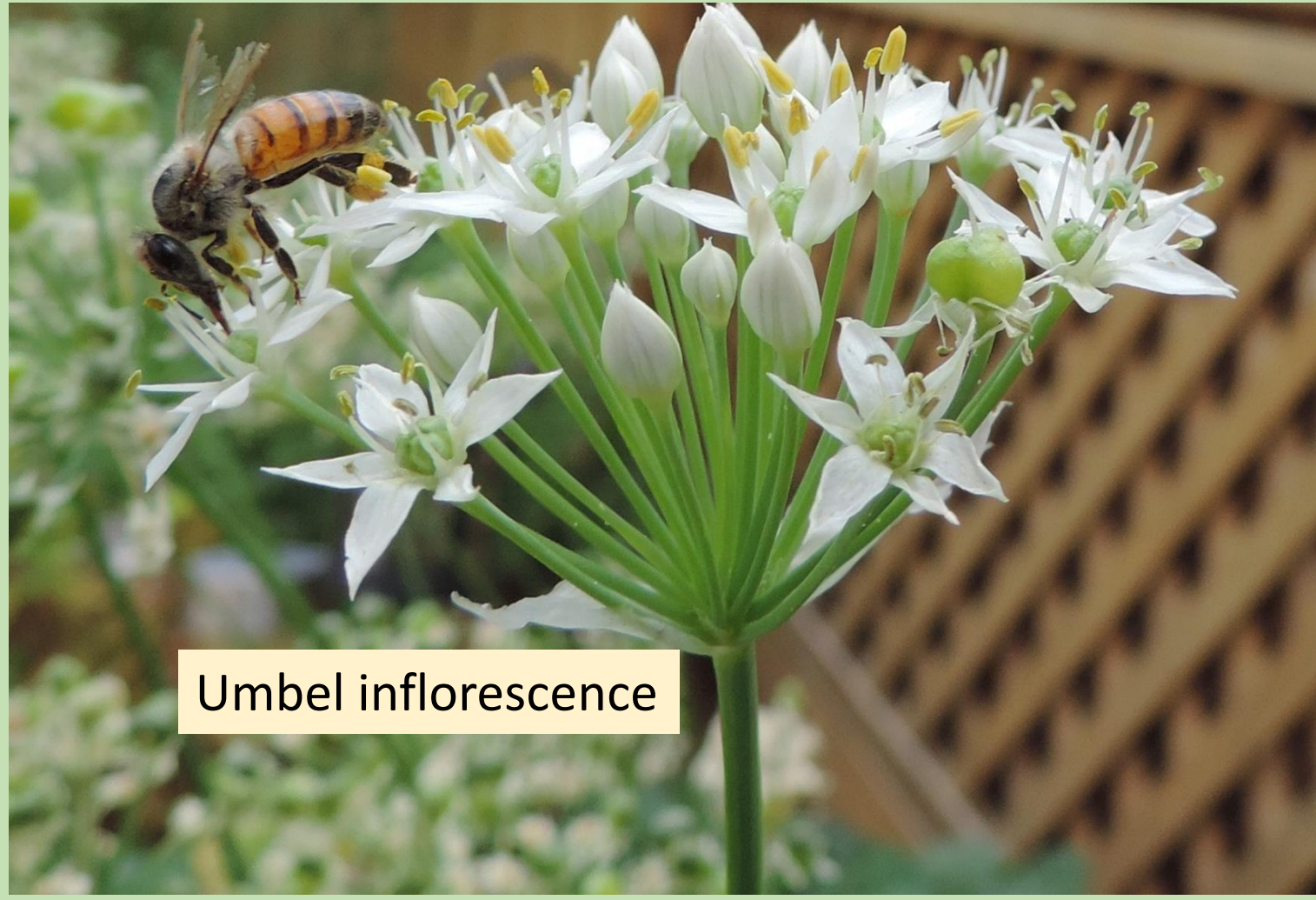


Superior



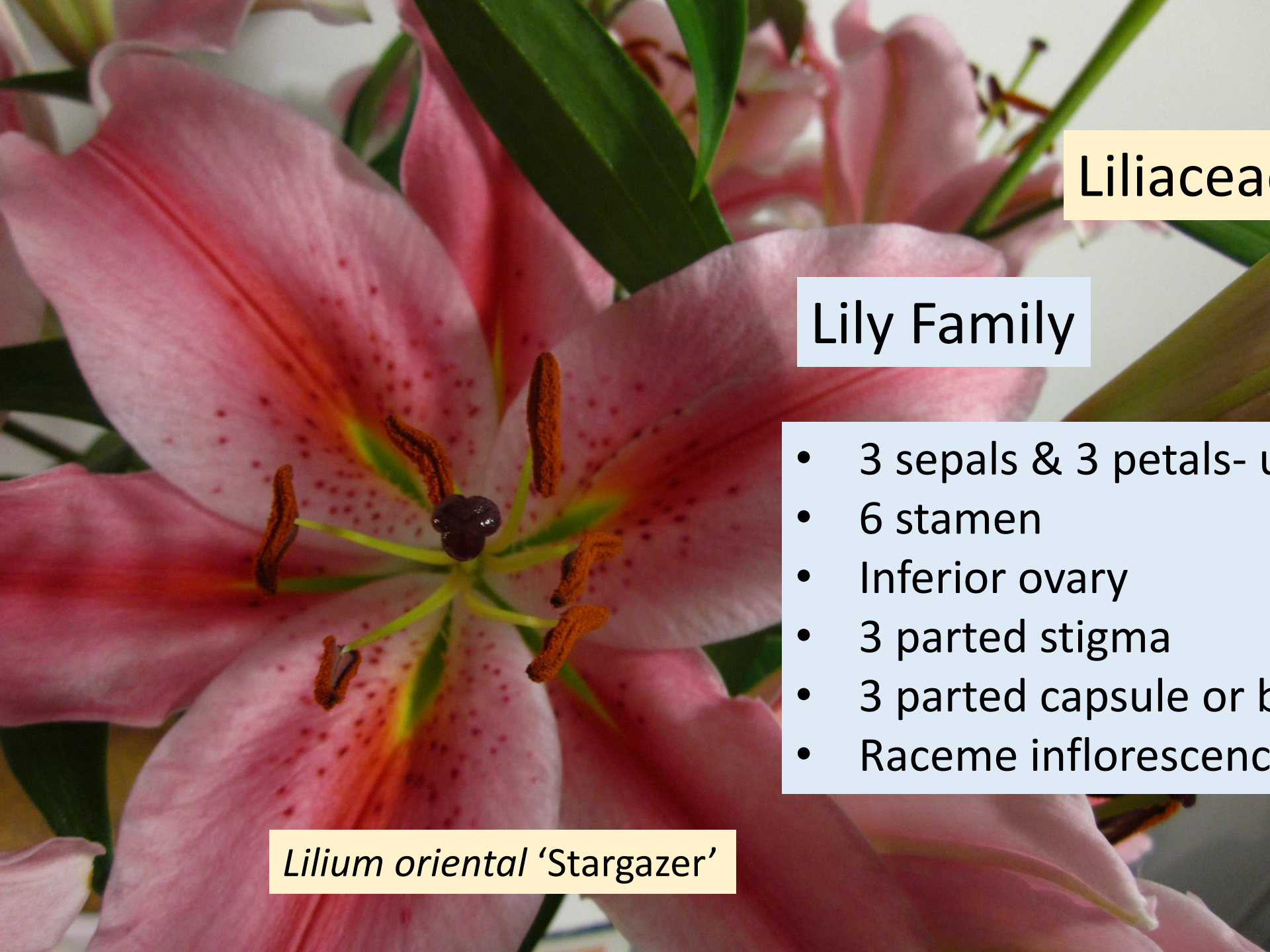
inferior

Mostly 6 petals or 3 petals and 3 sepals  
And 3 or 6 stamens



Umbel inflorescence



A close-up photograph of a pink lily flower, likely a Stargazer variety, showing its six petals and six stamens. The petals are a vibrant pink with darker spots near the center. The stamens are a rich brown color. The background is a soft, out-of-focus green.

Liliaceae

Lily Family

~600 species  
Mostly Asia

- 3 sepals & 3 petals- usually look alike
- 6 stamen
- Inferior ovary
- 3 parted stigma
- 3 parted capsule or berry fruits
- Raceme inflorescence or solitary

*Lilium oriental* 'Stargazer'

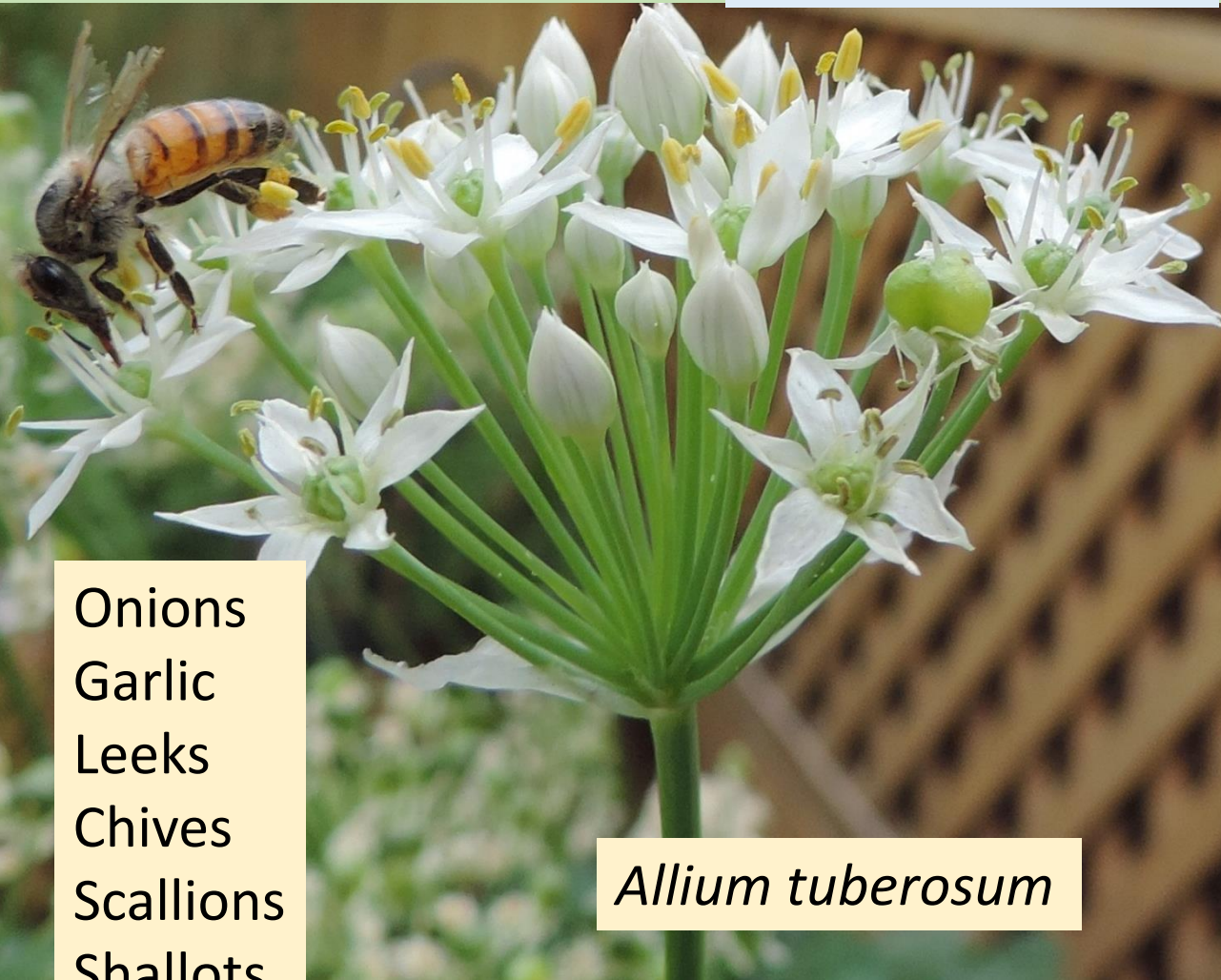
# Alliaceae

Onion Family

About 600 species  
worldwide



- Umbel inflorescences
- Superior ovary
- Onion like bulb
- Onion or garlic smell to leaves



Onions  
Garlic  
Leeks  
Chives  
Scallions  
Shallots

*Allium tuberosum*

# Amaryllidaceae

## Amaryllis Family

about 850 species  
worldwide



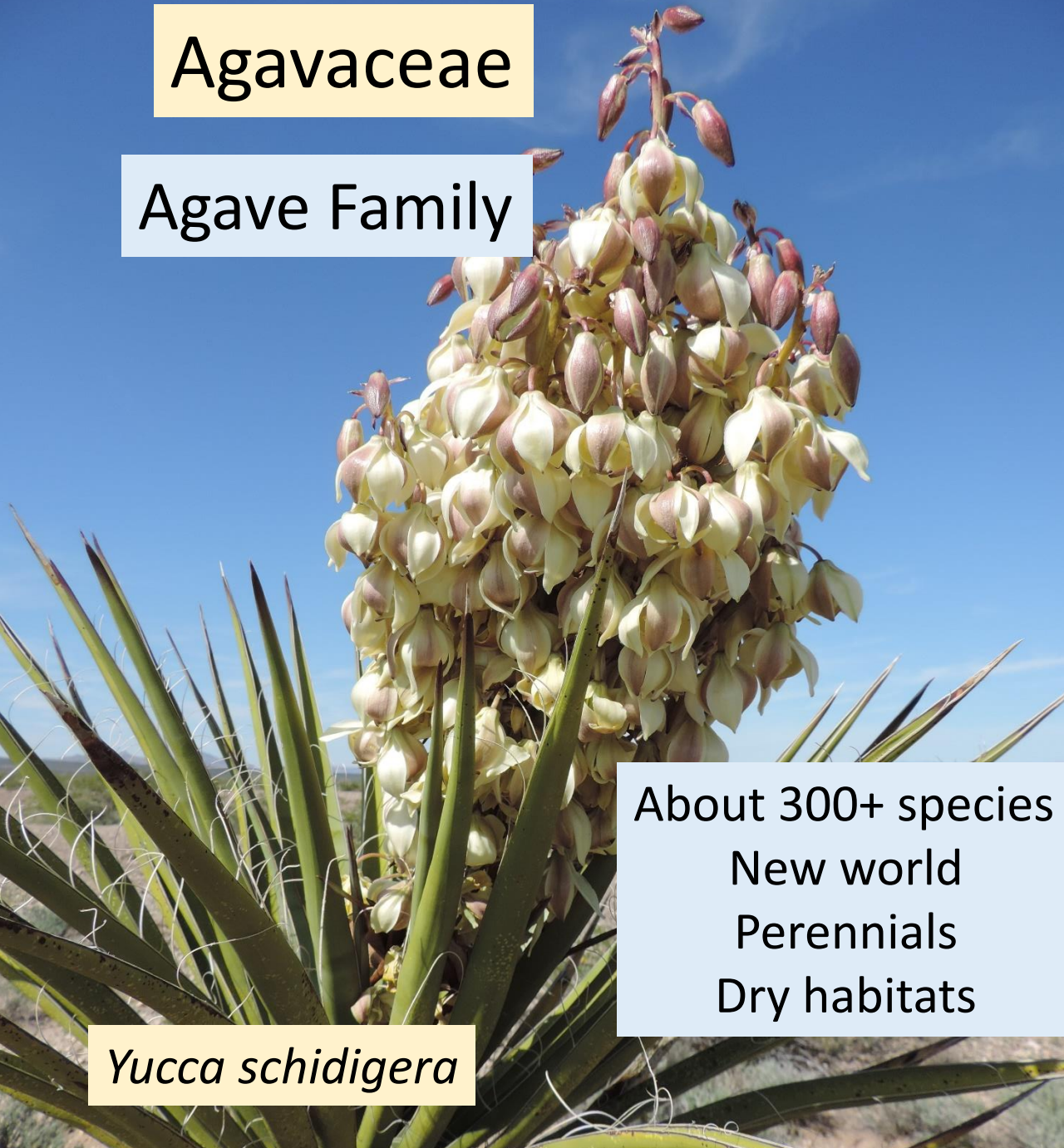
*Narcissus* spp.



Umbel inflorescence  
Inferior ovary

Agavaceae

Agave Family



About 300+ species  
New world  
Perennials  
Dry habitats

*Yucca schidigera*

Asphodelaceae

Aloe Family

About 780 species  
Africa  
Succulent leaves



*Aloe* sp.



*Asparagus officinalis*



## Asparagaceae- Asparagus Family

- About 350 species, worldwide
- Fern-like feathery leaf-like branches
- Fruit a berry



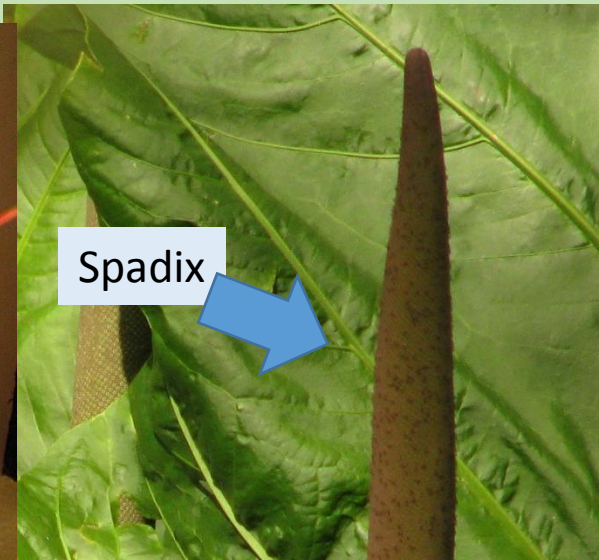
# Iridaceae Iris Family

About 1750 species  
Worldwide/Africa



3 stamens

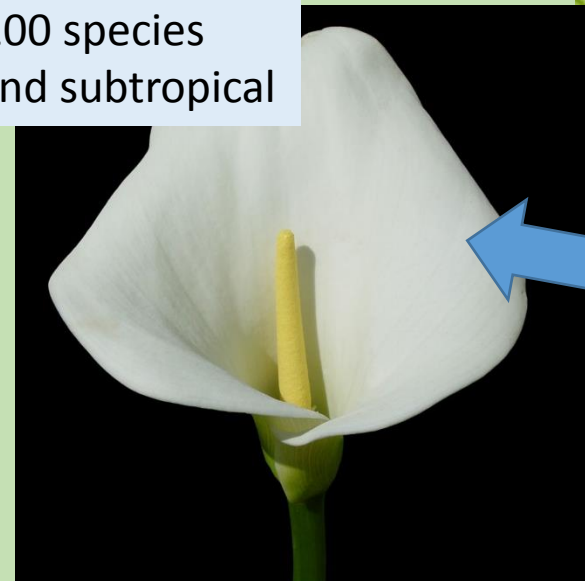
*Iris x hollandica*



Spadix


# Araceae- Arum Family

About 3,200 species  
Tropical and subtropical



Spath

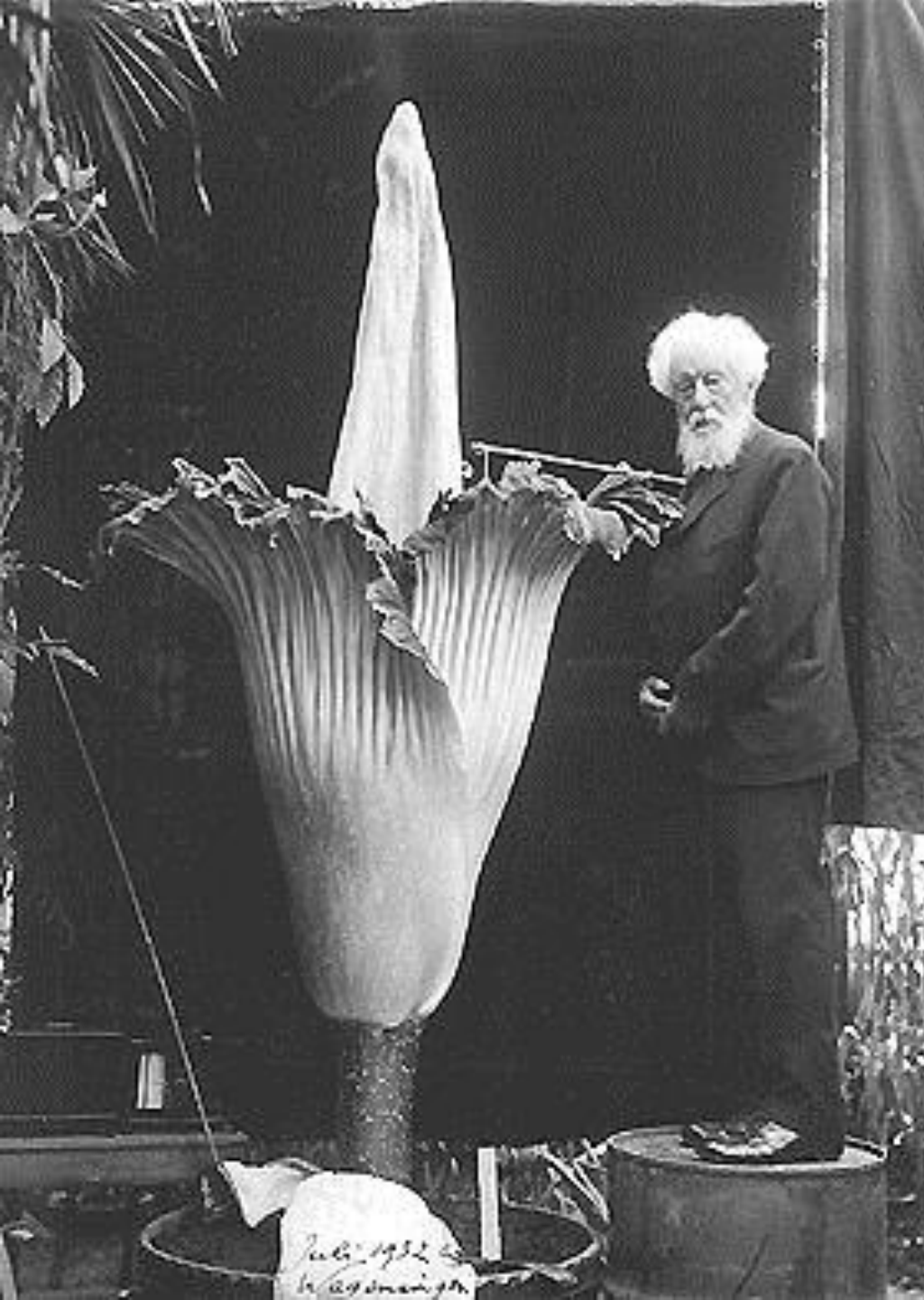
*Zantendeschia aethiopica*



Pothos  
Spathiphyllum  
Peace Lily  
Philodendron

Many of our favorite and  
hardy houseplants are in the  
**Araceae Family**



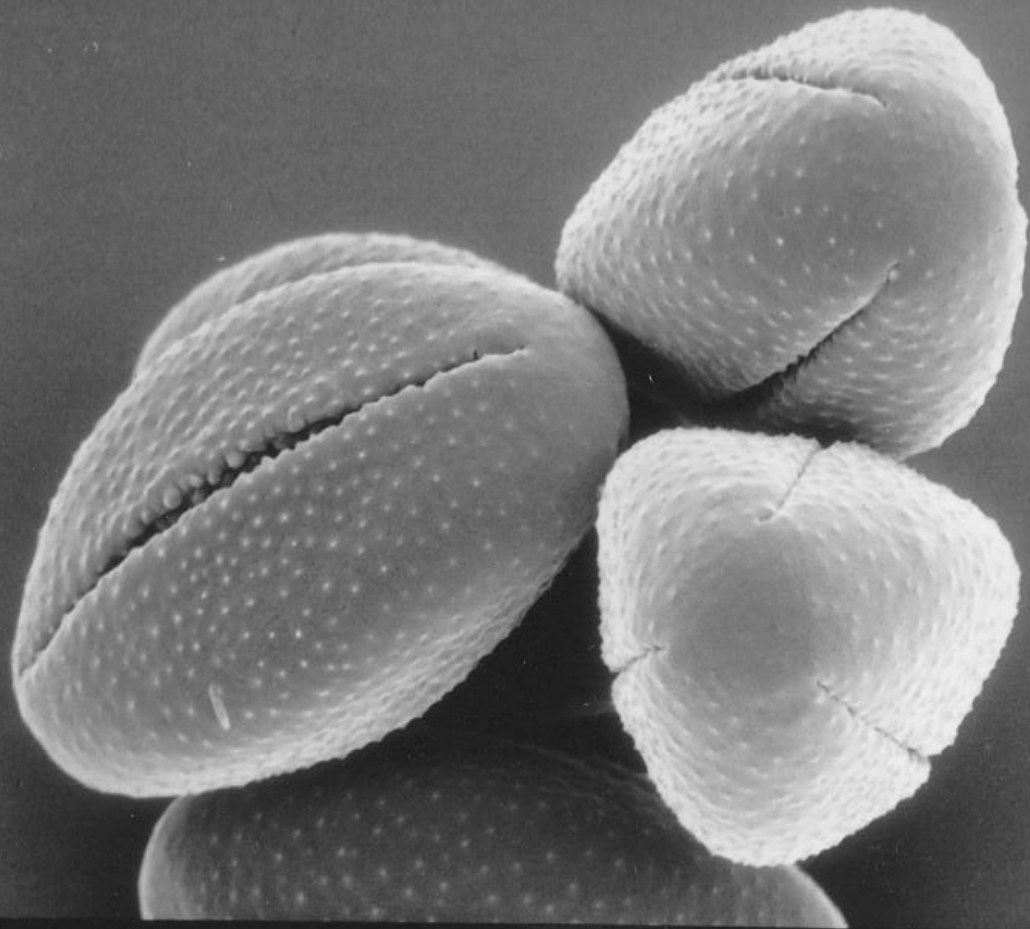


Hugo De Vries- Famous Dutch  
Botanist in 1932  
Standing next to  
The largest inflorescence in the world  
*Amorphophallus titanum*  
Also known as  
Titan arum  
or  
Corpse flower  
For its horrible smell



# What defines the Eudicots??

3 pore pollen-  
a feature we can't see  
except with an  
Electron microscope



10KV X2000 10U 005 00017 URC

# Eudicots

- **Netted leaf venation**
- **Flower parts in multiples of 4 or 5**
- **Two cotyledons**
- **Tap root system**
- **Secondary growth-wood**
- **Most advanced: Sunflower family**



# Some important **Eudicots**:

*Roses and Apples; Mints; Daisies; Mallows and Hibiscus; Peas and beans; Cactus; Succulents; Citrus; Gourds and melons; Tomatoes and peppers; Broccoli and other mustards; Celery and carrots; etc.*

## Major food families for gardeners

Fabaceae  
Lamiaceae  
Brassicaceae  
Rosaceae  
Apiaceae  
Solanaceae  
Rutaceae  
Cucurbitaceae

## Major families of other plants we grow

Asteraceae  
Scrophulariaceae/Plantaginaceae  
Cactaceae  
Crassulaceae  
Euphorbiaceae  
Malvaceae

# Asteraceae- Sunflower Family

(Compositae)

Flowers in “heads”

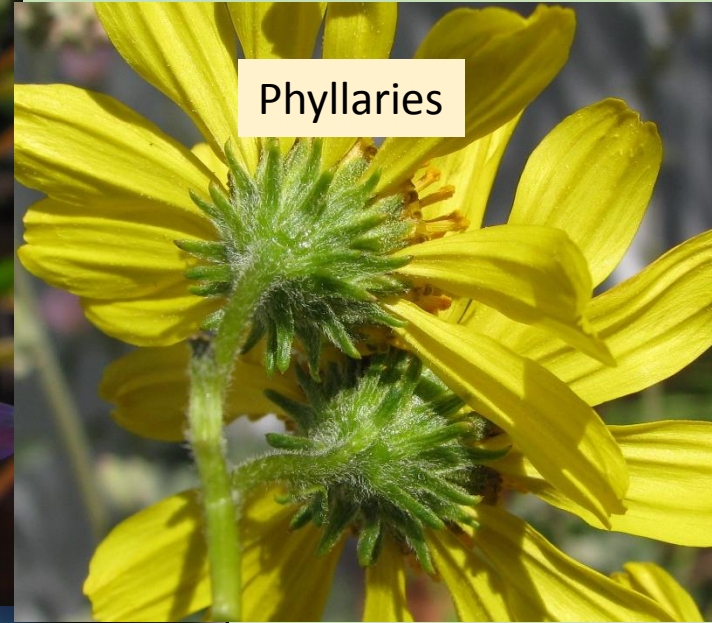
Ray and Disk Flowers

Or only ray or only disk

fruits are “**achenes**”- 1 seed

Sepals are called “**phyllaries**”

Seeds often have “**pappus**”





**Looking closely**

**Two kinds of flowers-  
Rays and disks  
1 kind of fruit- achene-dry,  
one seeded  
(Like a sunflower seed...)**







**Phyllaries**





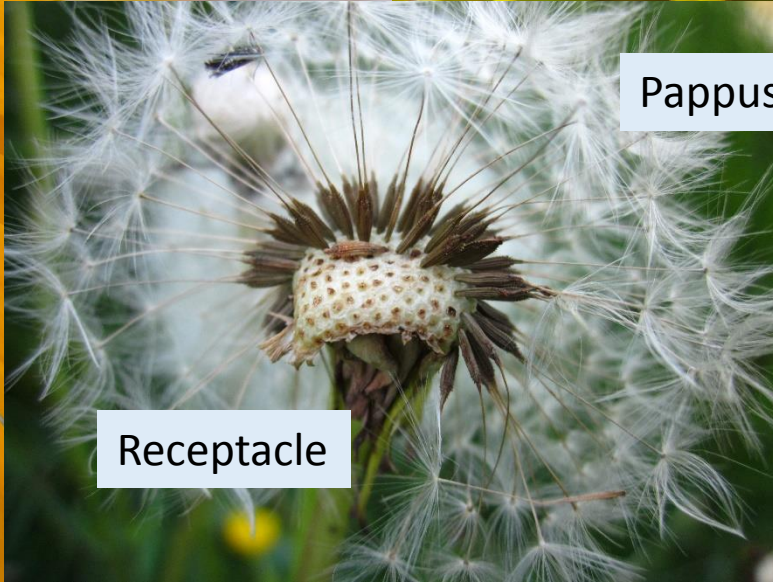




Flower open from outside edge to center



Achenes under the flowers



Pappus

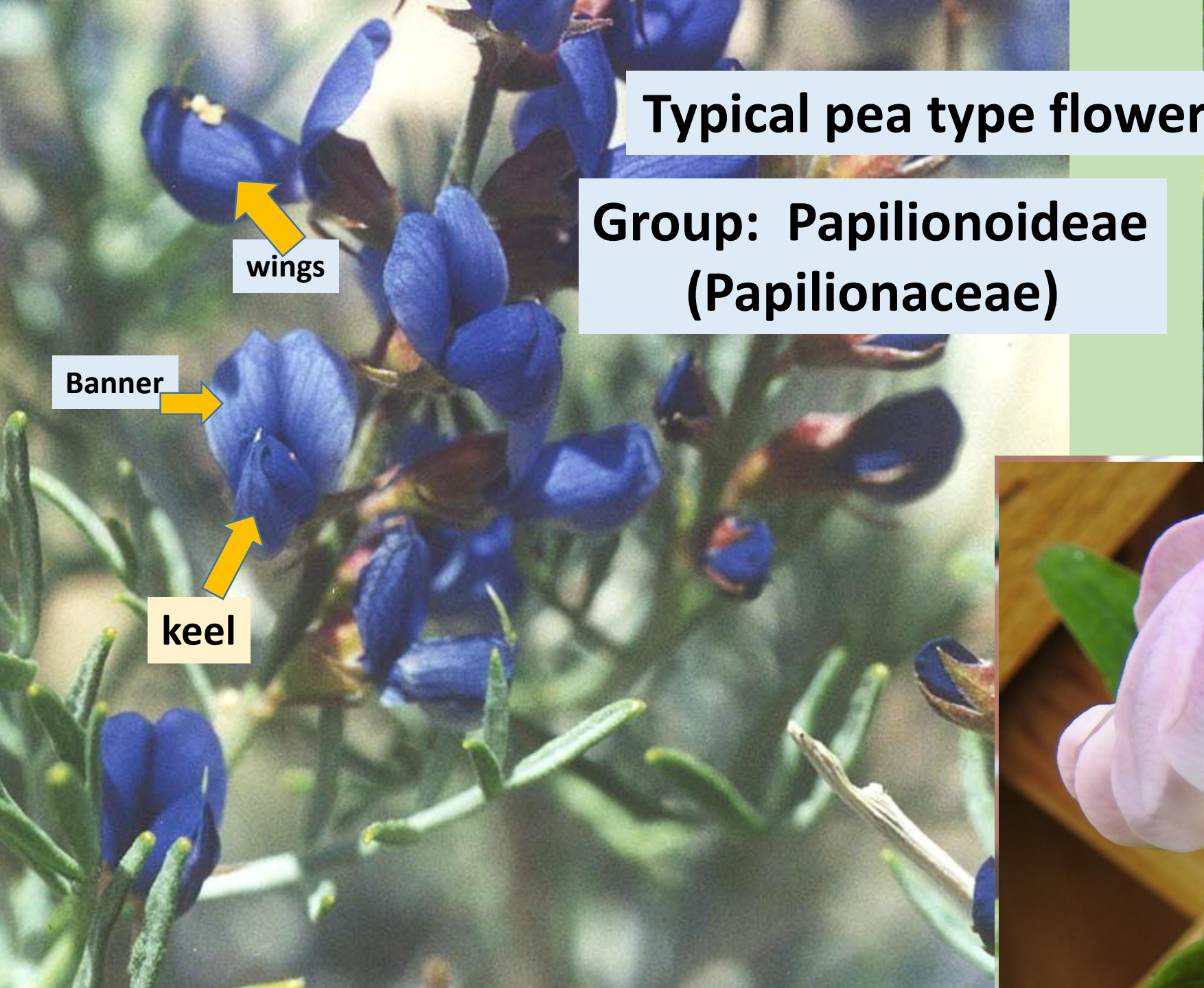
Receptacle

# Fabaceae- Pea or Bean Family

(Leguminosae)

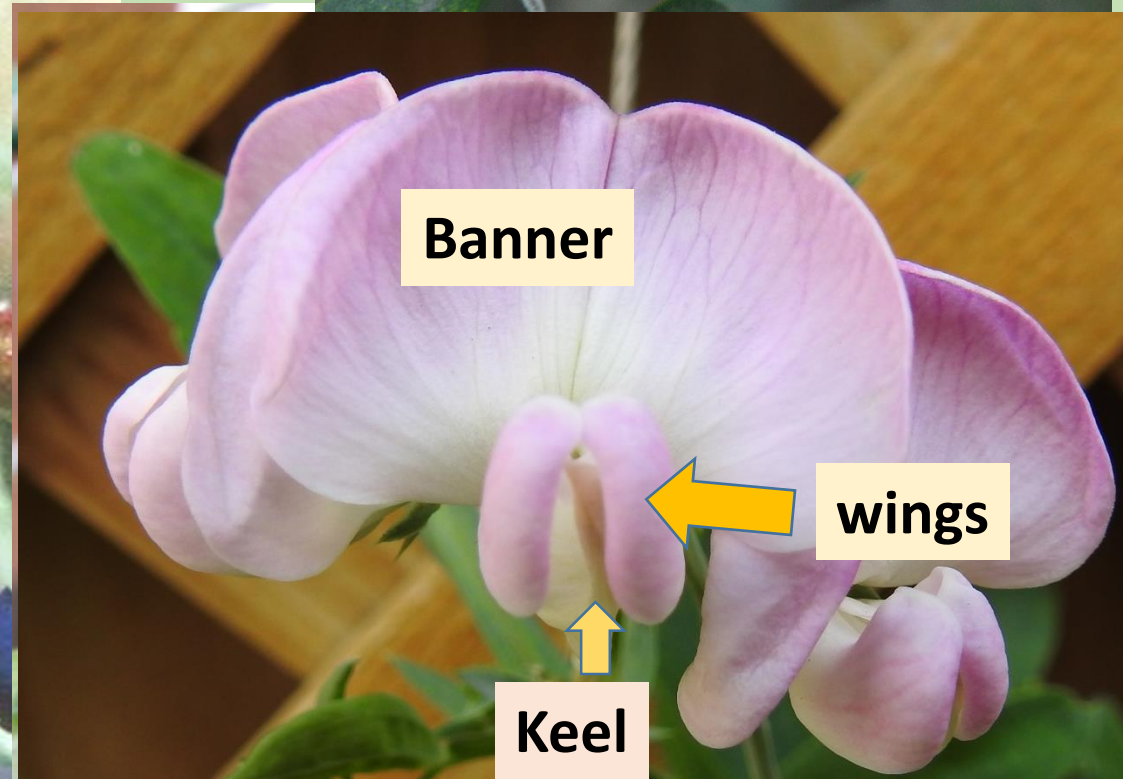
- 3 kinds of flowers
- Fruit is always a “legume”
- Two halves split and seeds are inside.
- Leaves usually compound
- Many are nitrogen fixing





**Typical pea type flower**

**Group: Papilionoideae  
(Papilionaceae)**



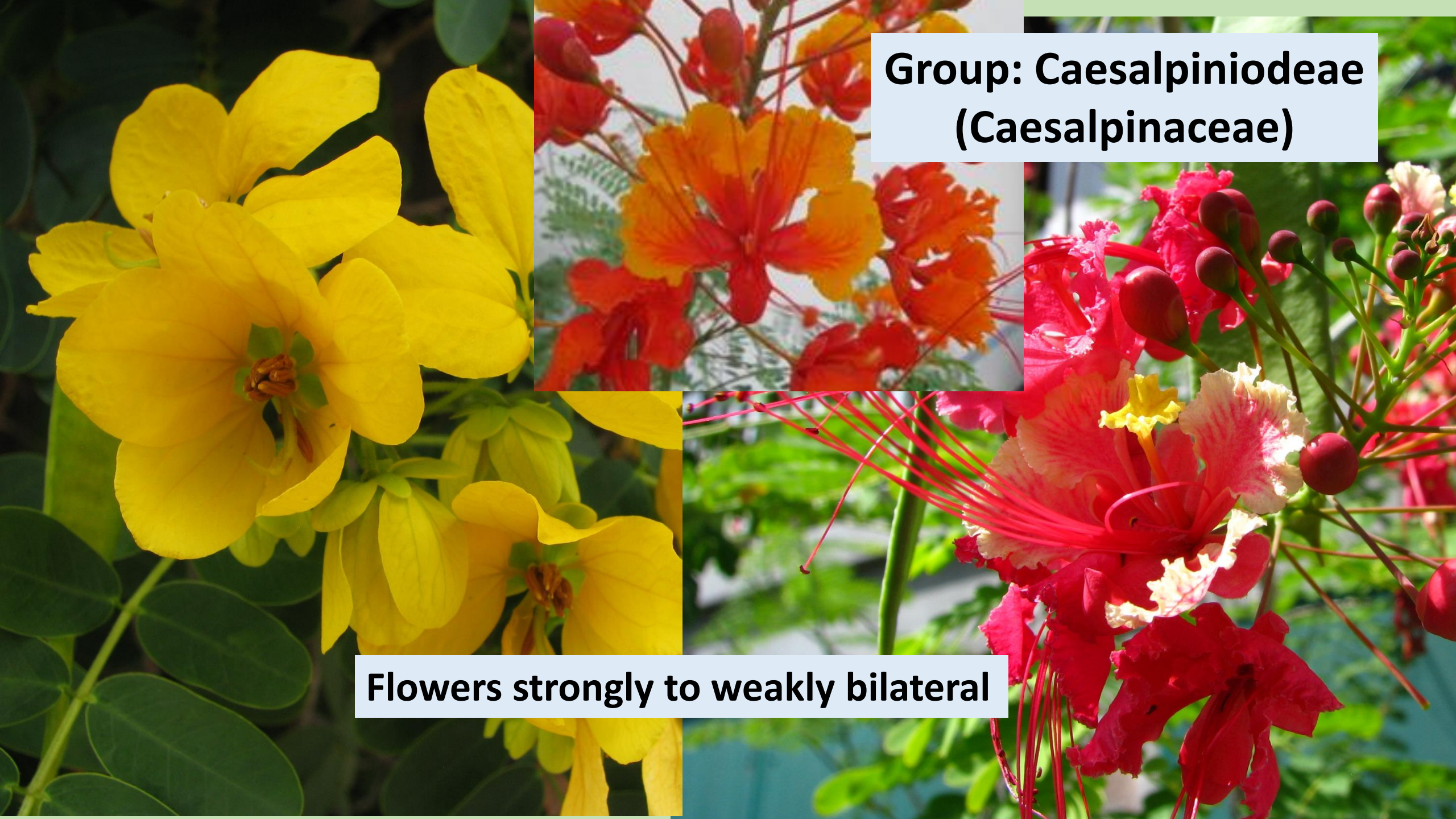


**Group: Mimosoideae (Mimosaceae)**



**Flowers have radial symmetry  
Stamens 10- many and exerted**





**Group: Caesalpinioideae  
(Caesalpinaceae)**

**Flowers strongly to weakly bilateral**



# Crescent milkvetch

*Astragalus amphioxys*

*Astragalus*- a genus in Fabaceae  
Has the largest number of species  
Of any plant genus... about 3,000.



# Cactaceae- Cactus Family

- Areoles of spines and glochids
- Flowers with many petals and stamens
- Inferior ovary
- CAM photosynthesis
- About 1,200 to 1,500 species new world
- Dry habitats



*Opuntia basilaris*



# Euphorbiaceae- Spurge Family



The “spines” are actually stipules  
Flower has no petals- has bracts and nectar glands  
Produces latex when injured  
~6,300 species- old world only



*Euphorbia pulcherrima*



# Crassulaceae- Stonecrop Family

- Succulent
- CAM photosynthesis
- Superior ovary
- Dry habitats

~1,380 species worldwide



*Aeonium* spp.

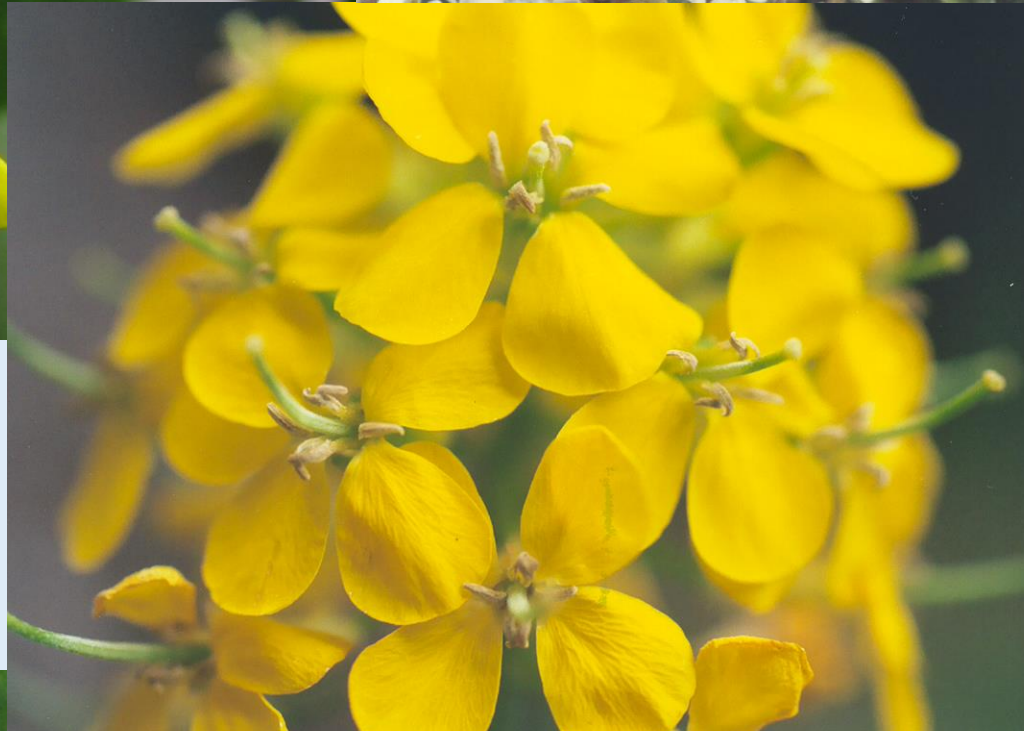



# Brassicaceae- Mustard or Cabbage Family

(Cruciferae)



**Four petals arranged in a cross**  
**Six stamens- 4 long and 2 short**  
**Odor of cabbage/radish**  
**3,000 species worldwide**





*Brassica oleracea*

**Famous**

**Members:**

**Cabbage**

**Radish/Daikon**

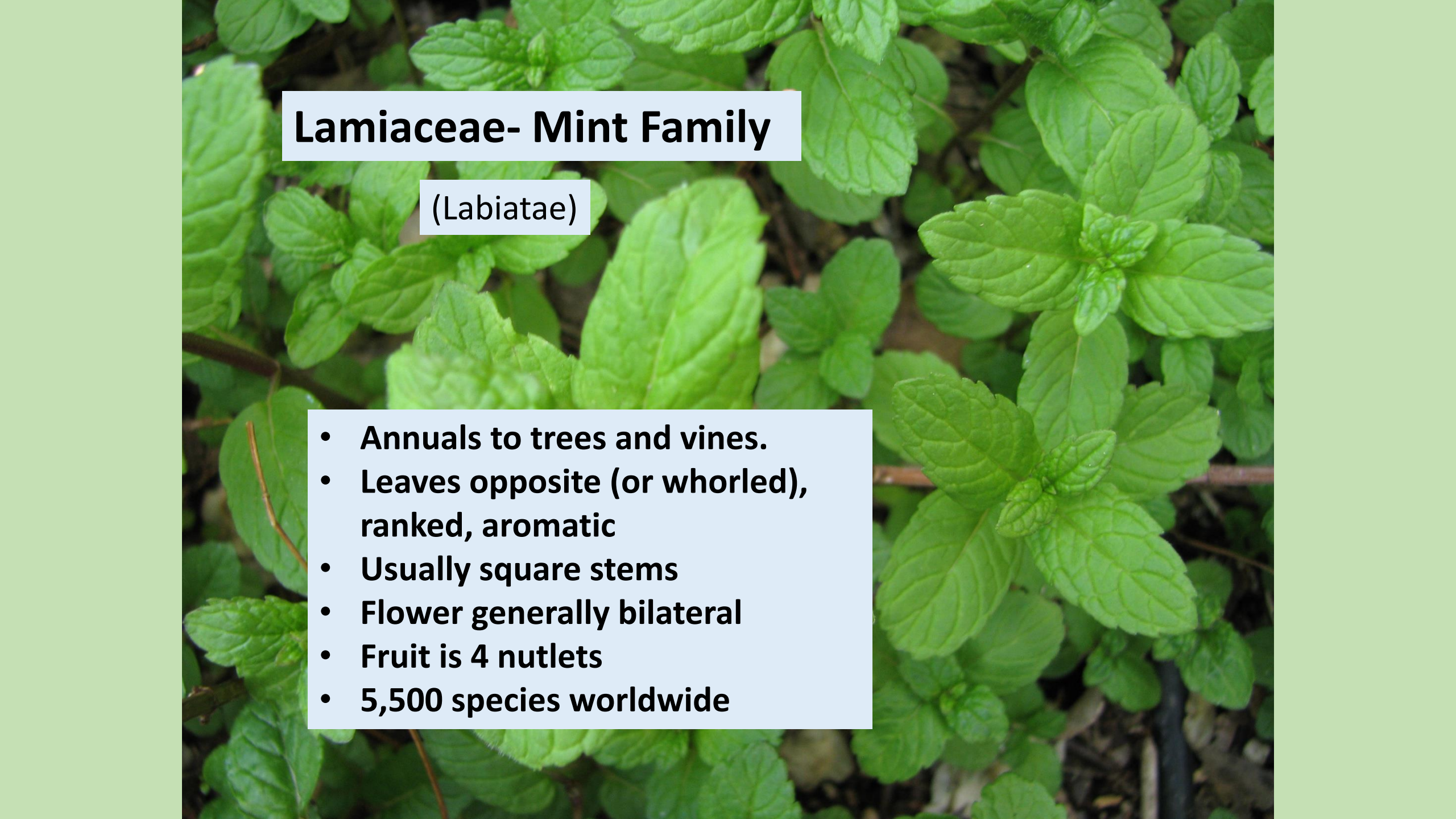
**Broccoli**

**Cauliflower**

**Mustard**

**Bok Choy**

**Brussel sprouts**



## **Lamiaceae- Mint Family**

(Labiatae)

- **Annuals to trees and vines.**
- **Leaves opposite (or whorled), ranked, aromatic**
- **Usually square stems**
- **Flower generally bilateral**
- **Fruit is 4 nutlets**
- **5,500 species worldwide**



- Bilateral flowers, often whorled
- Opposites leaves
- Square stems
- Often Fragrant leaves- with ethereal oils
- Fruit is 4 nutlets

Four nutlets





## Famous Members

**Rosemary**

*Rosmarinus officinalis*

**Peppermint**

*Mentha* spp.

**Sage**

*Salvia* spp.

**Basil**

*Ocimum* spp.

**Oregano**

*Origanum* spp.

**Thyme**

**Marjoram**

**Lavender**

*Lavandula* spp.

**Horehound**

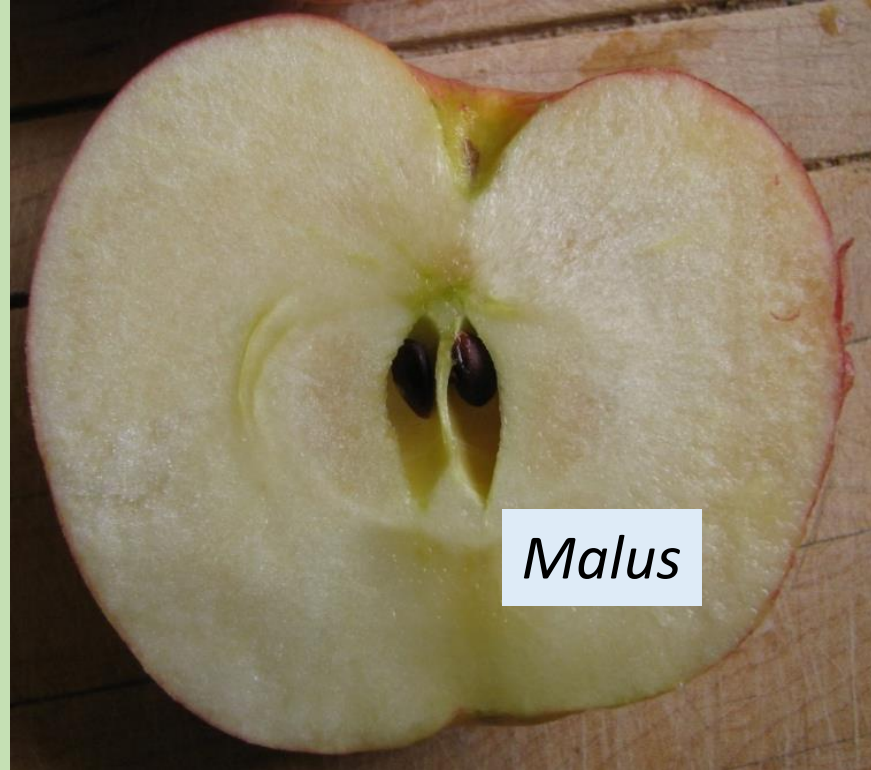
*Marrubium* spp.

# Rosaceae- Rose Family

- 2,500 to 3,000 species worldwide
- Leaves alternate- simple or compound
- Petals usually 5 to many fused in a “hypanthium”
- Stamens 5 to many
- Fruit variable
- Ovary superior or inferior- 1 to many







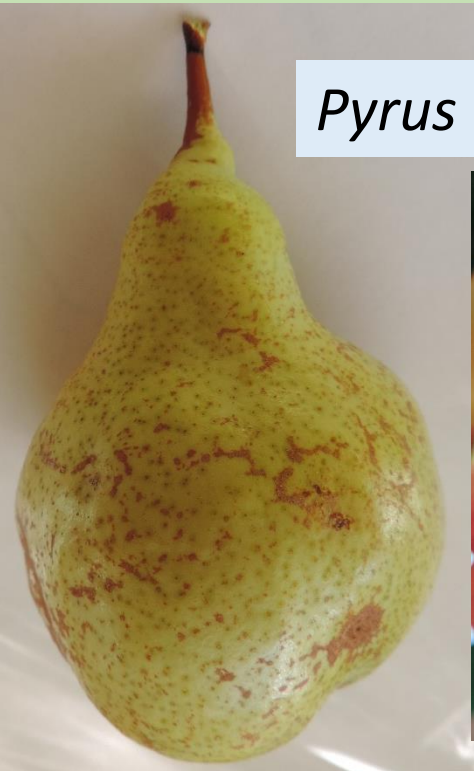
*Malus*



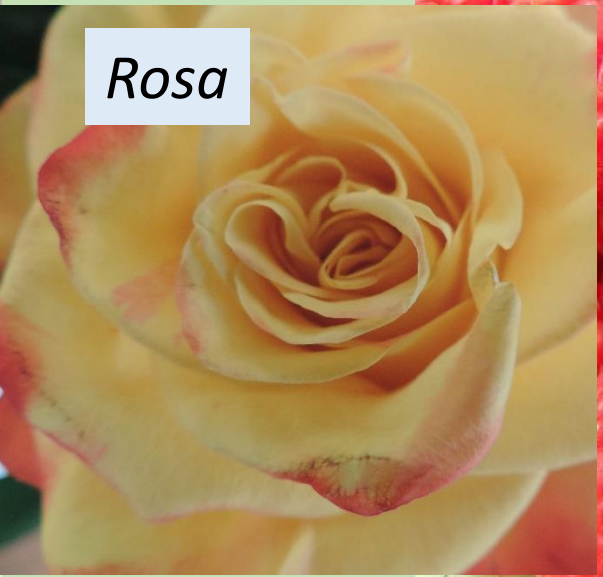
*Prunus*



*Fragaria*



*Pyrus*



*Rosa*



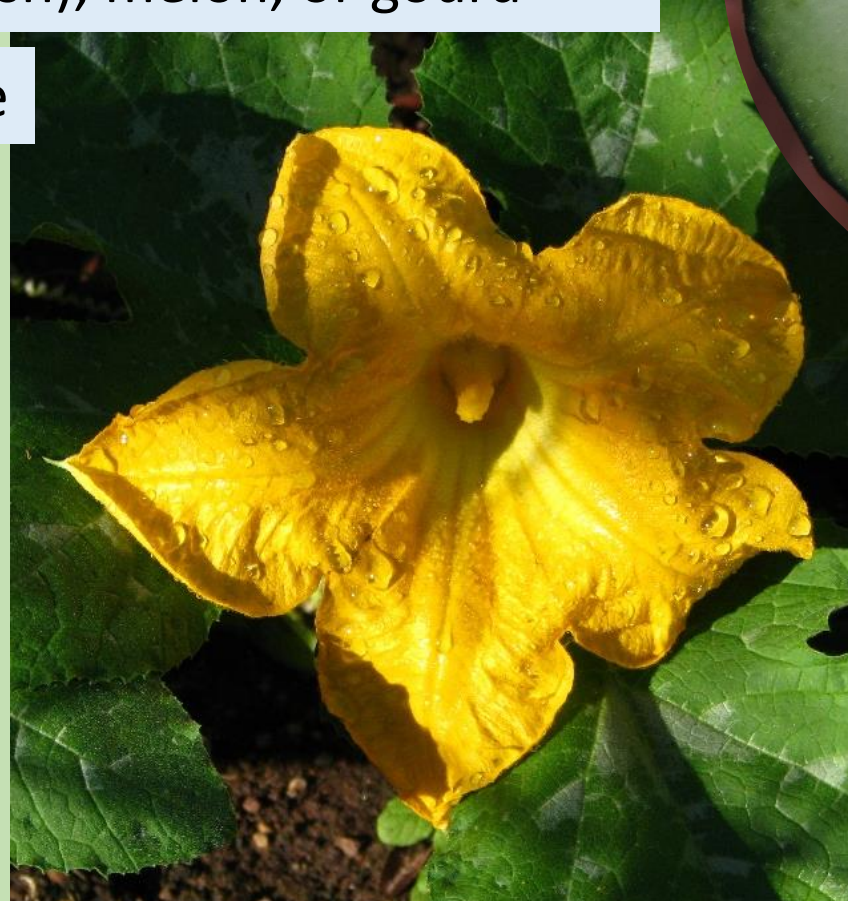
*Rubus*

# Cucurbitaceae- Cucumber or Gourd family

*Cucumis sativa*

- Palmately veined leaves
- Flowers unisexual, solitary, petals fused with 5 lobes
- Inferior ovary
- Fruit is usually a pepo (squash), melon, or gourd

900 species, worldwide



# Apiaceae- Celery or Carrot Family

(Umbelliferae)

- Inflorescence is a compound umbel
- Leaves usually pinnate, bases overlap
- Inferior ovary
- Fruit is a schizocarp-2 halves that split apart

*Daucus carota*



Parsley  
Dill  
Fennel  
Cilantro  
Hemlock



3,500 to 3,780  
species worldwide

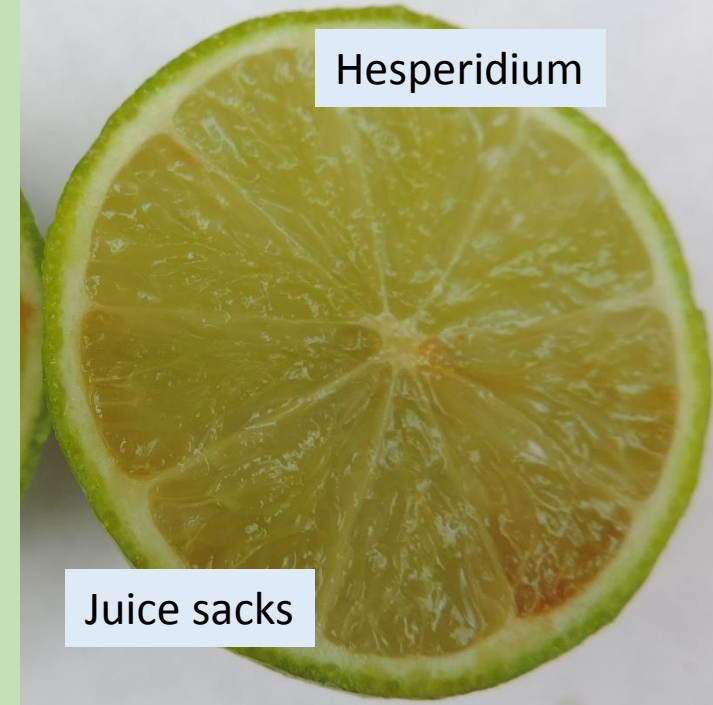
# Rutaceae- Citrus Family

*Citrus* spp.



- Glands on fruits or leaves containing ethereal oils
- 5 petals, 8-10 stamens
- Superior ovary
- Variable fruits and hesperidium fruit

Hesperidium



Juice sacks



1,800 to 1,900  
species  
worldwide



glands



Trivia Question:

What state has a plant in the Rutaceae as its State Flower???



*Citrus sinensis*

# Solanaceae- Nightshade Family

- About 2,450 species worldwide
- Radial flowers with fused petals
- Superior ovary
- Alkaloids- Many are poisonous



*Capsicum* spp.

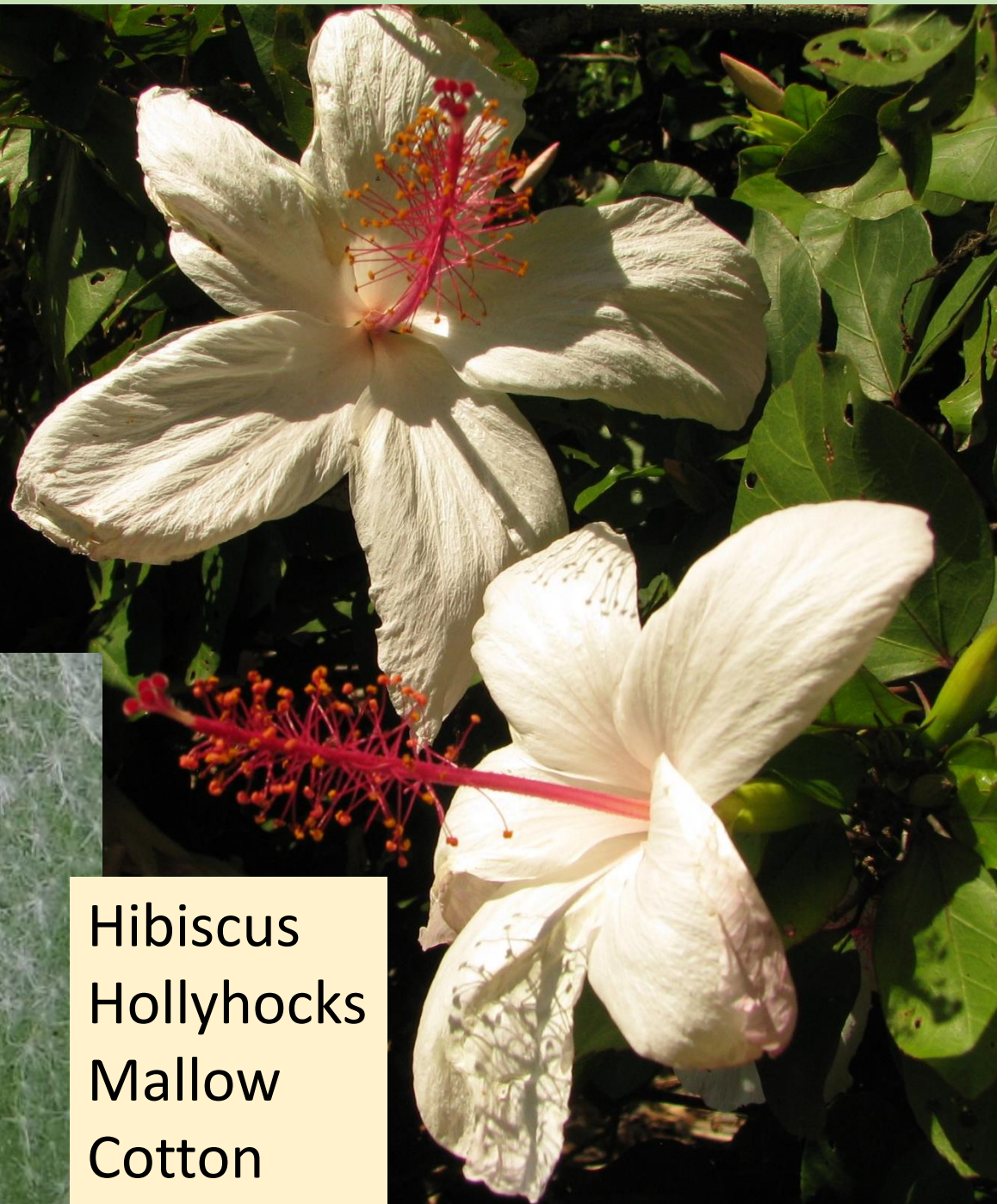
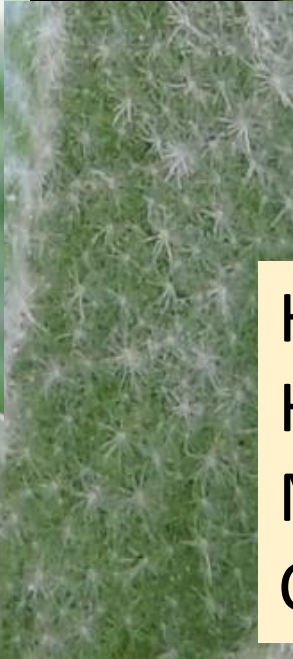


Tomatoes, eggplant, peppers, potatoes, petunia



# Malvaceae- Mallow Family

- 4,200 species worldwide
- Stamens fused into a tube around style
- 5 petals
- Stellate hairs on leaves- need a hand lens to see.



*Gossypium* spp.



Hibiscus  
Hollyhocks  
Mallow  
Cotton

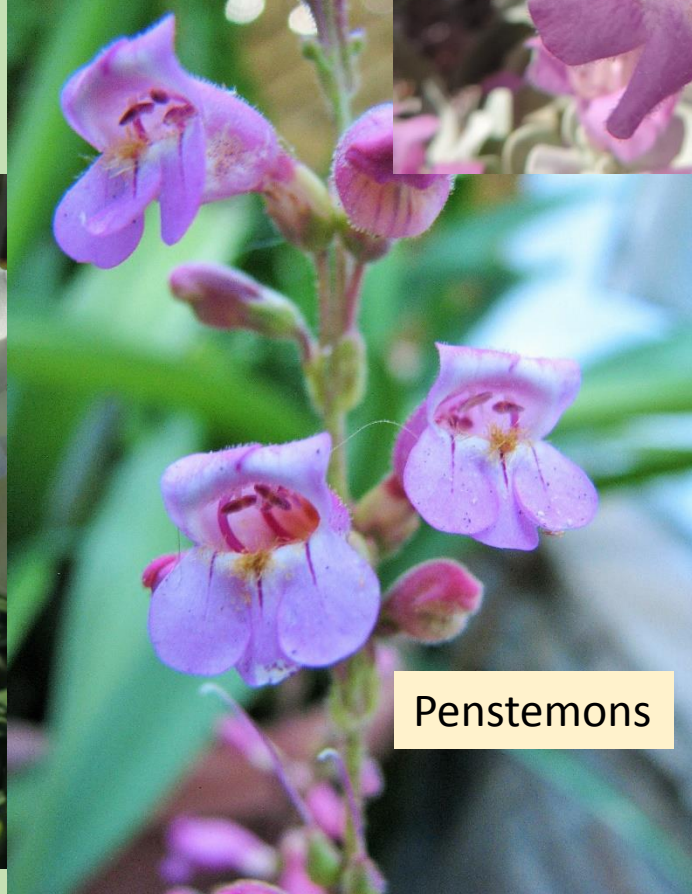
# Scrophulariaceae- Figwort Family □

# Plantaginaceae- Plantain Family □

- Bilateral flowers
- Superior ovary
- Hard to separate these families-
- Difference based on capsule and hair features.
- Each about 1,700 species worldwide



Texas Ranger



Penstemons



Plantain



mullein




snapdragon



Water figwort



A close-up photograph of numerous white and yellow chrysanthemum flowers. The flowers are densely packed, with some in full bloom and others as buds. The background is dark, making the light-colored petals stand out. Three light blue speech bubbles with black outlines are overlaid on the image. The first bubble, at the top center, contains the text "Are we done yet?". The second bubble, to the right, contains "Just a tad more....". The third bubble, at the bottom left, contains "I'm hungry".

Are we  
done yet?

Just a tad  
more....

I'm  
hungry

A close-up photograph of a green leaf, showing its intricate vein structure. The leaf is the central focus, with its veins radiating from the base. The background is slightly blurred, showing other parts of the plant and some light-colored structures.

# **How to Identify plants**

- **Ask someone who knows**
- **Use a picture book**
- **Use a flora and keys**
- **Use the herbarium**
- **Use an app/internet**

**1.**

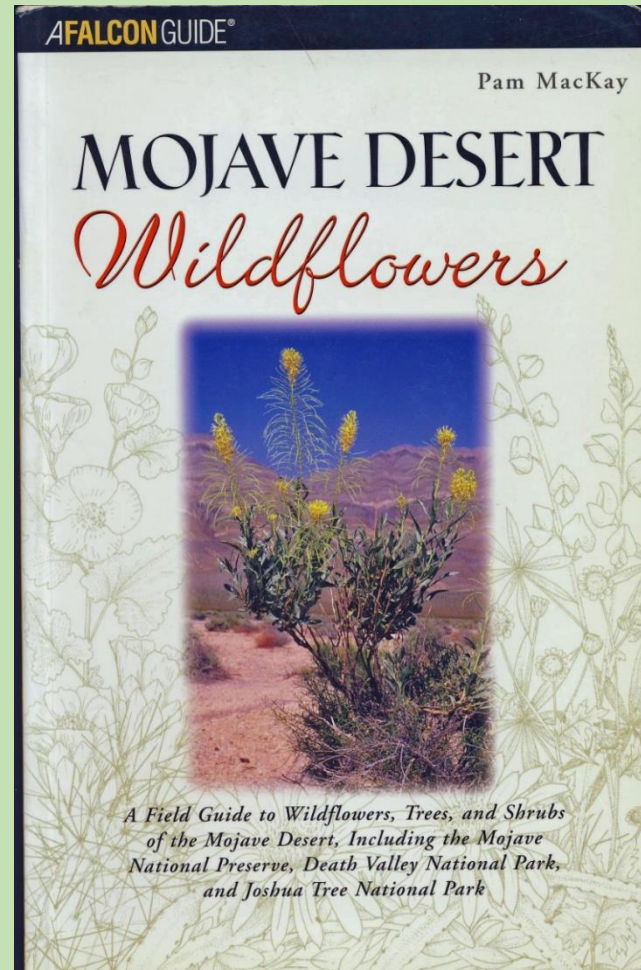
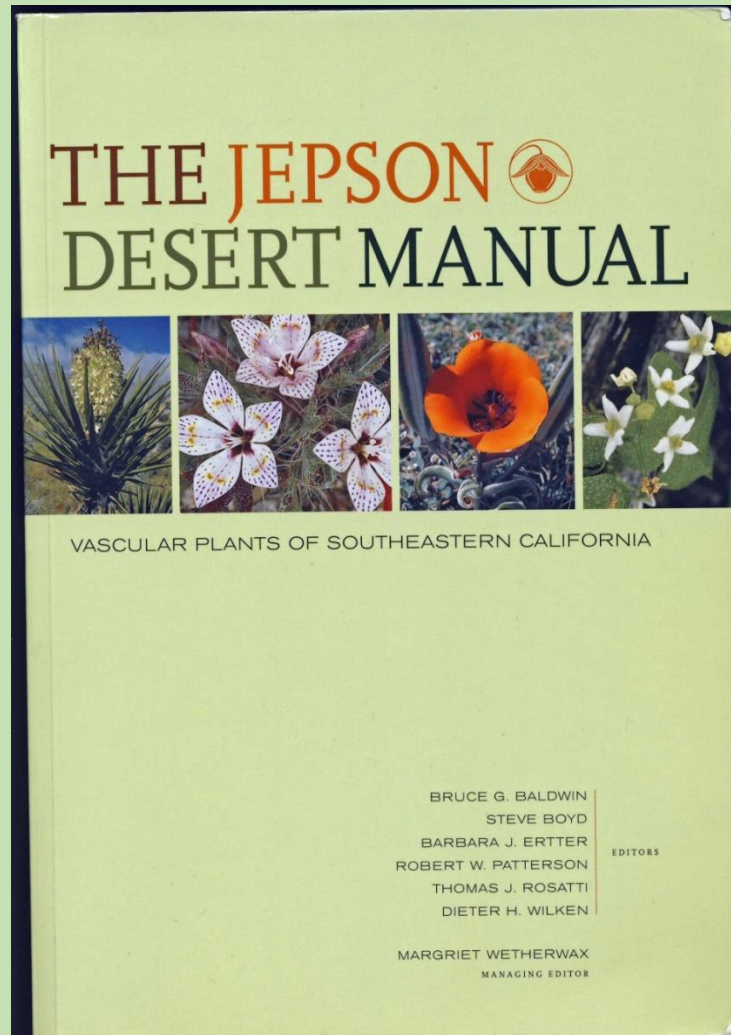
**Ask someone who knows**

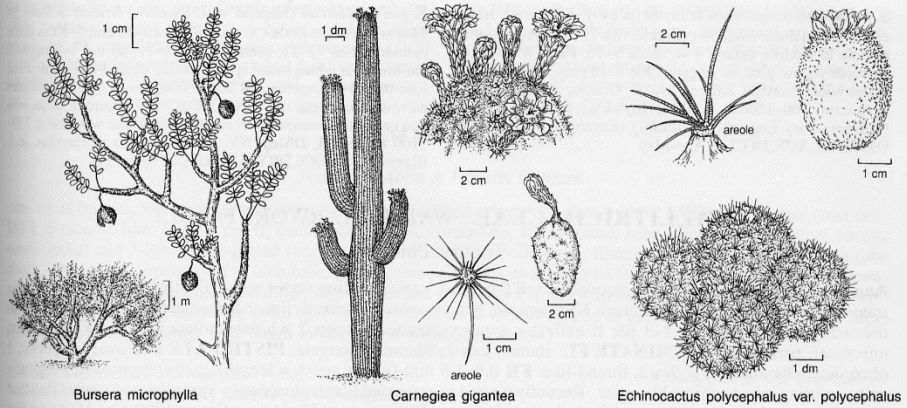


**Take them a good specimen-  
That is- a whole plant or at least  
A branch with  
flowers, fruits  
and leaves.**

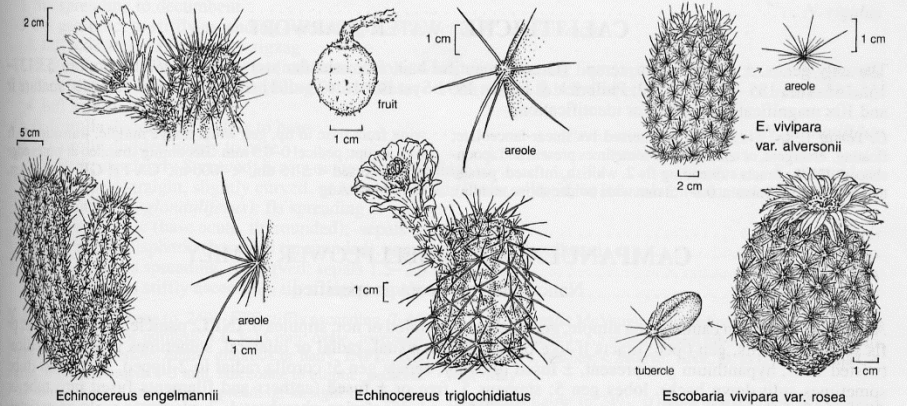
# If you are looking at native or naturalized plants-

## 2. Use a Flora or a Field Guide

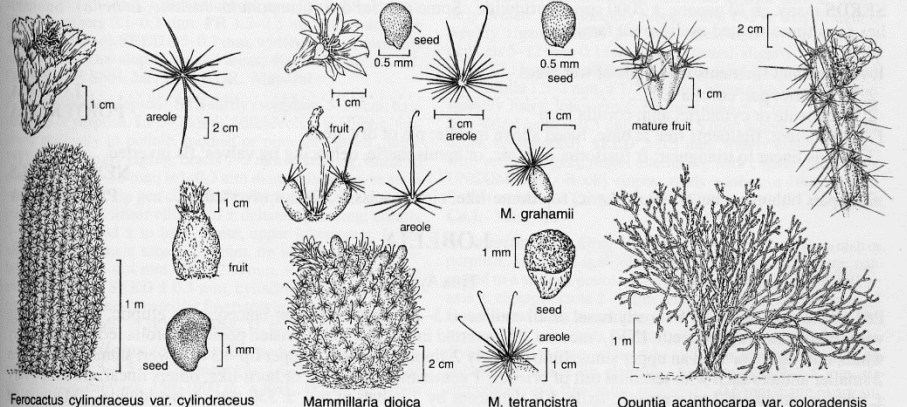




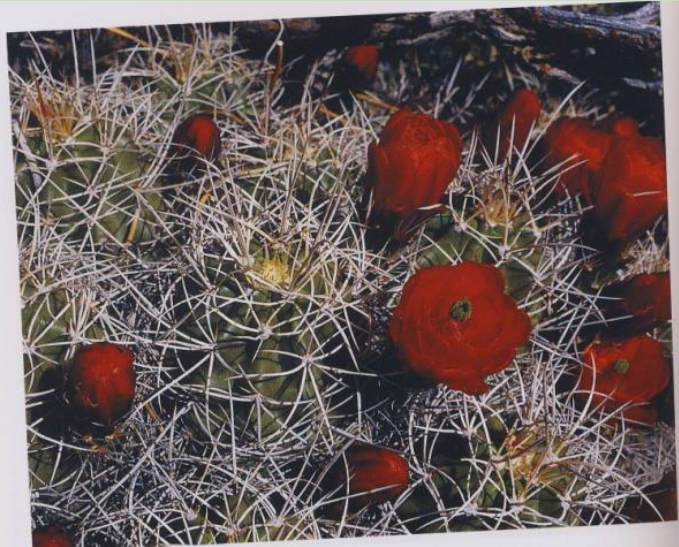
Burseraceae *Bursera microphylla* Cactaceae *Carnegiea gigantea* *Echinocactus polycephalus* var. *polycephalus*



*Echinocereus engelmannii* *Echinocereus triglochidiatus* *Escobaria vivipara* var. *rosea*



*Ferocactus cylindraceus* var. *cylindraceus* *Mammillaria dioica* *M. tetrancistra* *Opuntia acanthocarpa* var. *coloradensis*



Mojave Mound Cactus

**MOJAVE MOUND CACTUS**  
*Echinocereus triglochidiatus* Engelm.  
Cactus Family (Cactaceae)

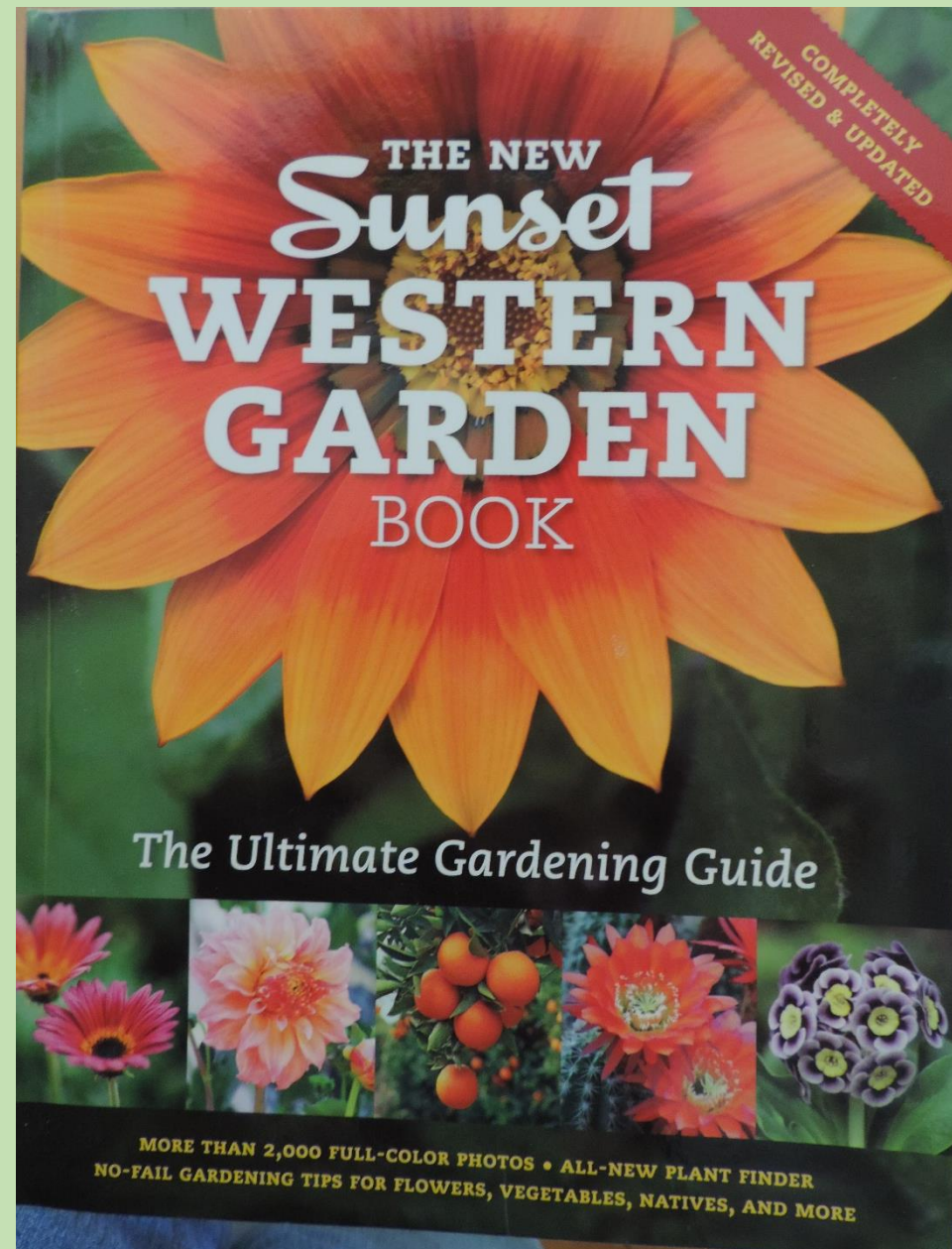
**Description:** The Mojave Mound Cactus is named for the large circular mounds formed by clusters of rounded, light green stems. Some mounds can be 9' across with hundreds of stems, but most are smaller. Each stem is usually 4-8" tall with 10-12 ribs. The youngest reddish or yellowish spines appear on the stem tops, while older gray spines arise lower on the stems from areoles with cobwebby hairs. The 1-2 central spines are often twisted but not flattened. Narrow, scarlet, 2" long flowers with pink to light purple anthers are produced singly at areoles, followed by 1" long, oblong, reddish fruits with black seeds.

**Flowering Season:** April to June  
**Habitat/Range:** Mojave Mound Cactus is found among rocks on slopes in Creosote

Bush scrub, Joshua Tree woodland, and Pinyon-Juniper woodland, often on limestone. It occurs from the Inyo and White Mountains south to Riverside County, California, and east to Utah and Arizona.

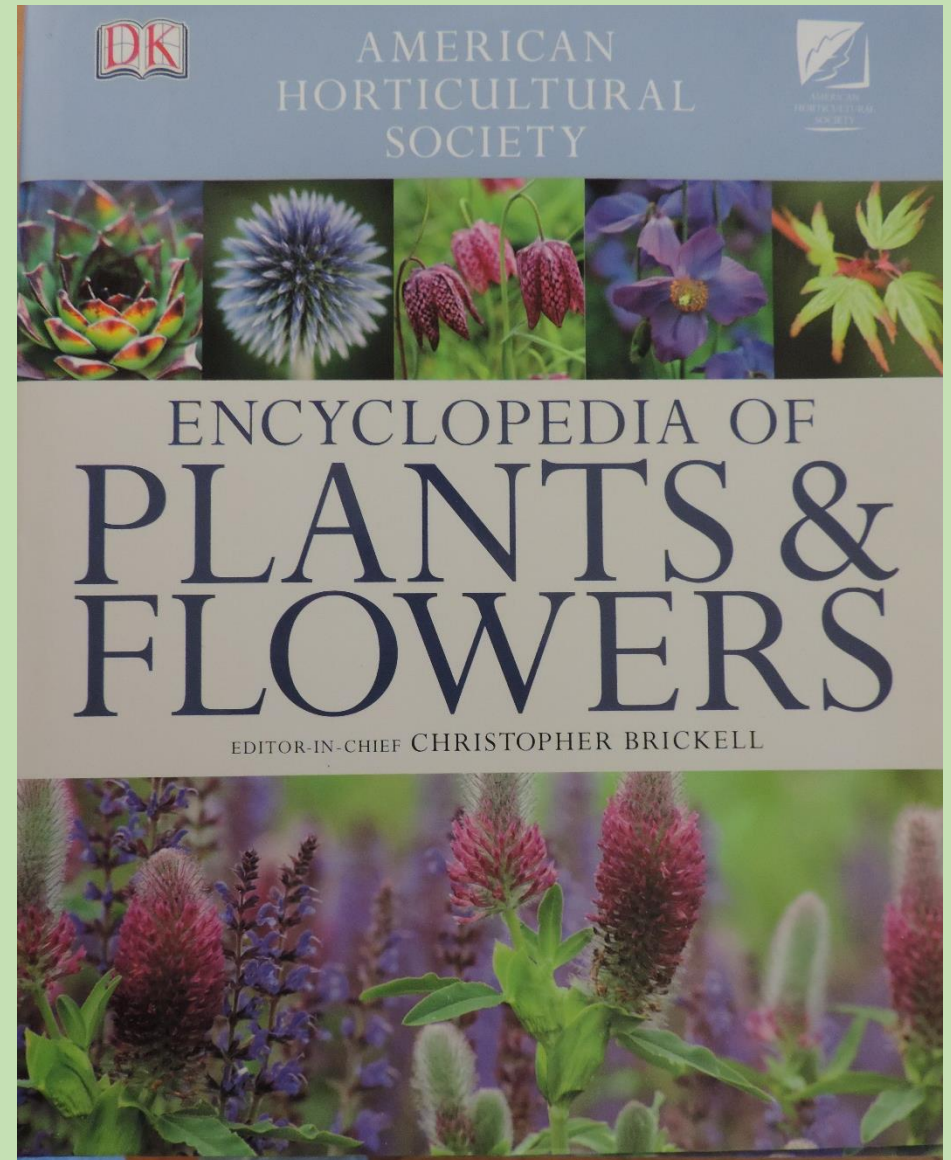
**Comments:** The flowers of Mojave Mound Cactus remain open at night, while the flowers of its relative, the Hedge-Hog Cactus (*Echinocereus engelmannii*), close at night. Some botanists recognize var. *melanacanthus*, with shorter flowers and 1-3 spreading central spines. It is found in Joshua Tree National Park, Cushenberry Canyon in the San Bernardino Mountains, and Clark Mountain.

**Pictures and drawings are very helpful**



3. Use a gardening or horticulture book for those plants that are horticultural, garden plants.

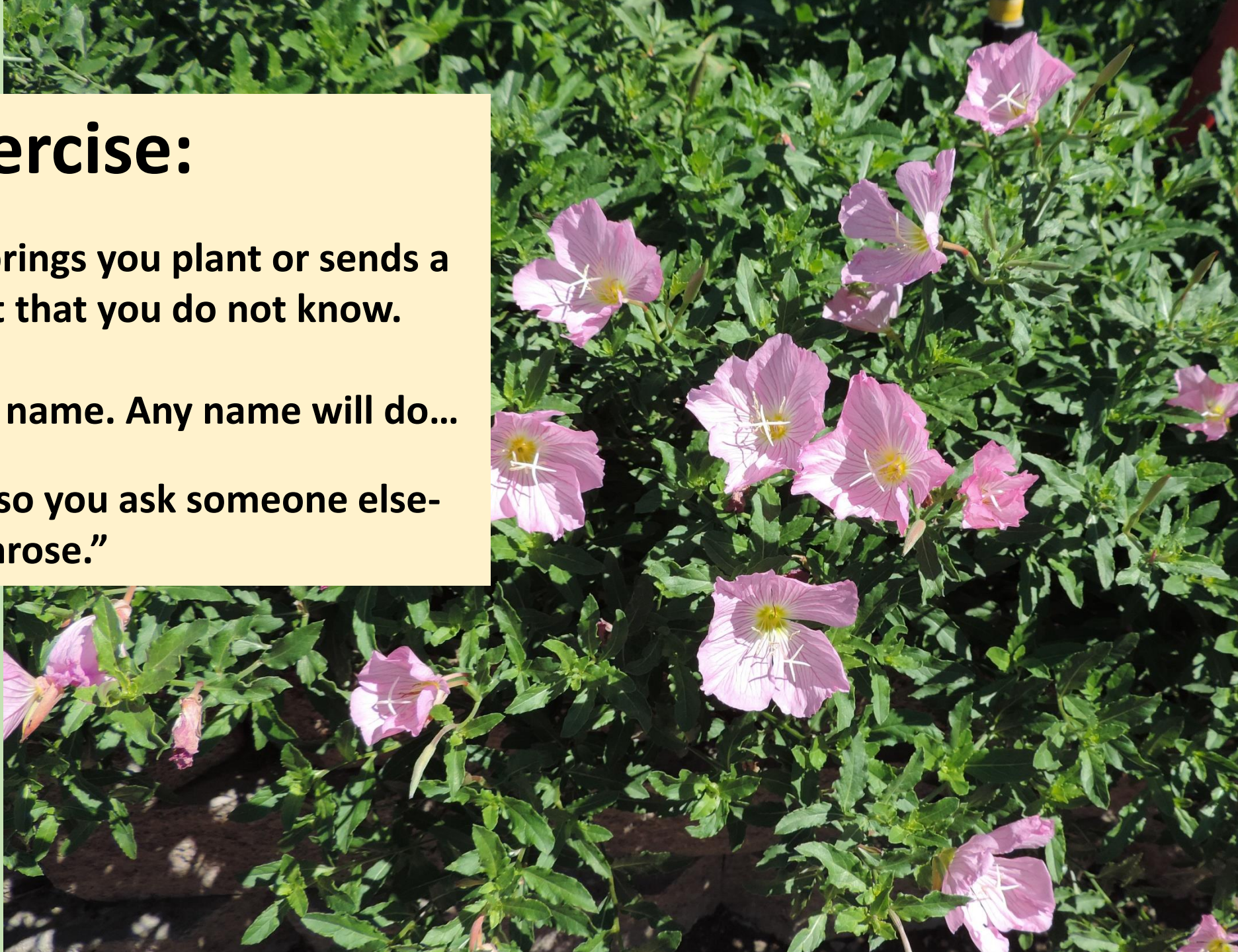
Make sure there are pictures!



# Exercise:

Imagine someone brings you plant or sends a picture of a plant that you do not know.

1. Ask for the plant's name. Any name will do...
2. They don't know- so you ask someone else- they tell you "Primrose."



## Primula

PRIMROSE  
Primulaceae  
PERENNIALS; SOMETIMES GROWN  
AS ANNUALS

ZONES VARY BY SPECIES OR TYPE

FULL SUN IN COOLER CLIMATES ONLY

REGULAR WATER, EXCEPT AS NOTED



Primula

Most primroses are native to the Himalayas and cool regions of Southeast Asia and Europe. Cherished for their colorful flowers. Plants form a foliage rosette; at bloom time, typically circular, sometimes fragrant flowers with five petals rise above the leaves. Blossoms may be borne on individual stems, in clusters at stem ends, or in tiered, candelabra-like clusters along the stem. Most primroses are spring blooming, but some start flowering in mid- to late winter in mild climates, and a few bloom in early summer. Some go dormant in late fall or winter; mark their location before they disappear. Nearly all are good plants for the woodland garden.

Most primroses flourish in the cool, humid Pacific Northwest; if given the right amount of moisture and dappled shade, they can be grown successfully in somewhat warmer, drier regions. Most are quite hardy; many thrive east of the Cascades and in intermountain regions. Where the climate is less than favorable, they are sometimes treated as annuals. Some will grow indoors.

**P. alpicola.** MOONLIGHT PRIMROSE. Zones 3–6, 17. Grows 20 in. high, 1 ft. wide, with wrinkled, medium green

leaves and clusters of sulfur yellow (sometimes white or purple), bell-shaped blossoms in summer. Powerfully fragrant. Somewhat tender in coldest zones.

**P. auricula.** AURICULA. Zones A2, A3; 1–6, 15–17, 22–24. To 6–8 in. high and 1 ft. wide. Evergreen. Broad, leathery gray-green leaves, sometimes with mealy, powdery coating that spots and runs in rain. In early spring, bears clustered blooms in white, cream, yellow, orange, pink, rose, red, purple, blue, or brownish, with a white or yellow eye. Usually grown in pots for display. Many named varieties are offered; some have green or near-black flowers rimmed in mealy powder or in a contrasting color.

**P. beesiana.** Zones 3–6, 15–17. To 2 ft. high and wide, with medium green leaves to 14 in. long. In mid- to late spring, bears tiered blossoms with 2 to 8 dense whorls per stem. Color is variable but usually reddish purple with yellow eye. Very deep rooted. Provide regular water with deep soakings.

**P. bulleyana.** Zones 3–6, 15–17. Grows to 2 ft. high and wide. Resembles *P. beesiana*, but leaves have reddish midribs. Mid- to late spring production of tiered flowers with 5 to 7 whorls per stem. Blossoms are bright yellow, opening from orange buds.

**P. denticulata.** DRUMSTICK PRIMROSE. Zones A2, A3; 1–6. To 1 ft. high and wide, with spoon-shaped, medium green leaves. Dense, ball-shaped flower clusters are held on stout stems in early spring. Color ranges from blue-violet to purple. Pinkish, lavender, and white varieties are available.

**P. florindae.** Zones A2, A3; 3–6, 15–17. Grows 3 ft. high, 2 ft. wide, with long-stemmed medium green leaves. Yellow, bell-shaped, nodding flowers are carried in clusters of up to 60. Hybrids have red, orange, or yellow flowers. The most fragrant primrose. Plants are late to appear in spring and are among the latest primroses to bloom (late spring or summer). Provide ample water; will even grow in a few inches of running water or in damp, low spot.

**P. japonica.** Zones A3; 2–6, 15–17. To 2½ ft. high and 1½ ft.



CLOCKWISE FROM TOP: Primula obconica; P. veris; P. auricula; Wanda

wide, with spoon-shaped, light green leaves to 9 in. long. Blooms in late spring or early summer. Tiered blossoms are purple with a yellow eye; up to 5 whorls on each stout stem. Among the best varieties are 'Alba' (white), 'Apple Blossom' (pale pink with a red eye), 'Miller's Crimson' (red), and 'Postford White' (white with red eye). Needs ample water; will grow at edge of pond, even in very shallow water

**P. juliae.** JULIANA PRIMROSE. Zones 2–6, 14–17, 20–23. Grows just 3–4 in. high and 10 in. wide, with rounded, bright green leaves. Magenta, yellow-eyed flowers are borne singly on a long stalk in early spring. Excellent for edging, woodland, flower bed, or rock garden. 'Wanda' is an old-time favorite. A white-flowered form is sometimes offered.

**P. malacoides.** FAIRY PRIMROSE, BABY PRIMROSE. Zones 8, 9, 12–24. Grows to 8–15 in. high and 1 ft. wide. Evergreen. Perennial in mild-winter areas of California and Arizona, though often grown as annual there. Treated only as annual, potted plant, or houseplant elsewhere.

Soft, pale green leaves are carried on long stalks. Tiered blossoms appear in loose, lacy whorls along many upright stems in midwinter to late spring. Blossoms are white, pink, rose, red, or lavender. Good under high-branching trees, with spring bulbs, in flower beds. Tolerates light frost.

**P. obconica.** Zones 4–9, 14–24. Grows to 1 ft. high and wide. Perennial, but best treated as annual. Soft, hairy, roundish leaves have hairy leaf stalks; these hairs (except on Freedom and Libre strains) may irritate skin. Produces large, broad clusters of 1½–2-in.-wide blooms in white, pink, salmon, lavender, or reddish purple in winter and spring; nearly ever-blooming in cool-summer areas. Use for bedding where winters are mild, as a houseplant in colder regions.

**P. Polyanthus group.** POLYANTHUS PRIMROSE, ENGLISH PRIMROSE. Zones 1–24. To 8–12 in. high, 9 in. wide, with fresh green, tongue-

1. Look up “primrose” in the index.
2. It sends you to the genus “*Primula*”
3. You find “*Primula*” as it is in alphabetical order in the book.
4. Look at the picture for “Primrose.”
5. It doesn't look like that!
6. Now what?



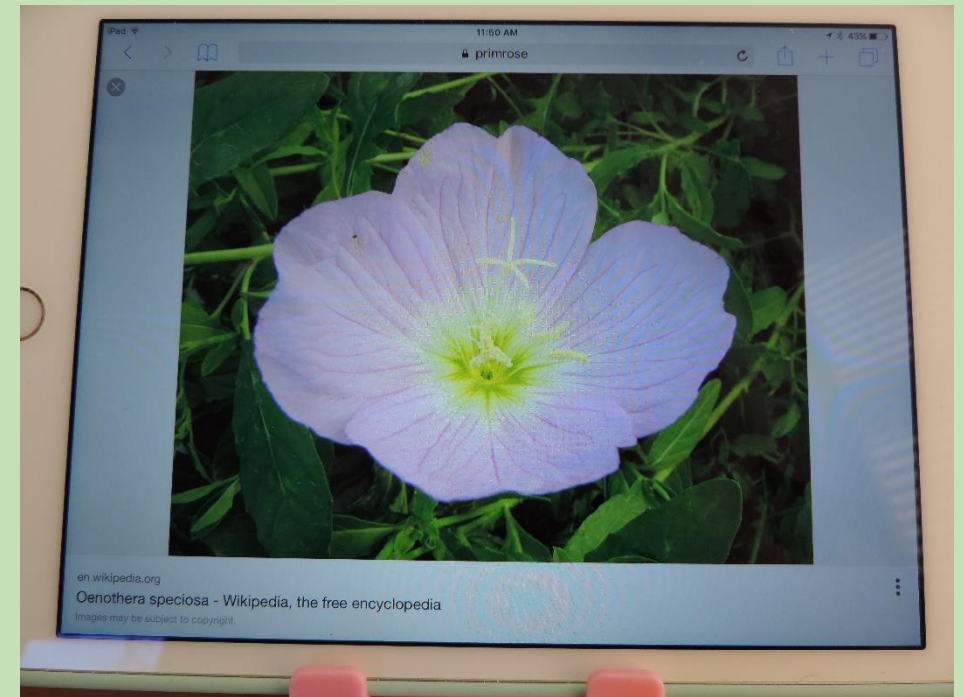
Mexican hat (*Ratibida colum-  
nifera*), 85, 89, **553**  
Mexican heather (*Cuphea hyssopi-  
folia*), **273**  
Mexican honeysuckle (*Justicia  
spicigera*), **390**  
Mexican lily. See *Beschorneria  
yuccoides*  
Mexican orange. See *Choisya  
ternata*  
Mexican oregano (*Poliomintha  
maderensis*), **522–523**  
Mexican poppy (*Argemone mexi-  
cana*), **167**  
Mexican shell flower. See *Tigridia  
pavonia*  
Mexican sunflower. See *Tithonia  
rotundifolia*  
Mexican tarragon (*Tagetes lucida*),  
**622, 683**  
Mexican tea (*Chenopodium  
ambrosioides*). **237**

1. You can ask someone else who might tell you “Mexican Primrose.”
2. Look that up- Not there in the index!
3. If not- go thru the book page by page until you find it.
4. No use being lazy, gang- sometimes that is what you have to do!

**Or you can ask around until you get a name that works.**

**Or you can put in “Primrose images” in an internet search engine and see what comes up**

**Click on the image that looks like your plant and look at its name and use that name in your Western Garden Book.**



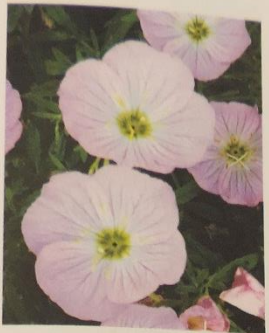
**Oenothera cerasiformis**  
(Osoberry, Indian Plum)  
OSO BERRY, INDIAN PLUM  
ANNUAL  
PERENNIALS OR BIENNIALS  
ZONES 4-9, 14-24  
FULL SUN IN COOLER CLIMATES ONLY  
AMPLE WATER  
FRUIT ATTRACTS BIRDS



*Oenothera cerasiformis*

In damp woodlands and meadows in the Northwest and in parts of California, oso berry's tiny, almond-scented white flowers are among the first signs of spring. This is a fine-textured, suckering shrub that grows to 2-15 ft. tall, eventually spreading into thickets that become 22 ft. wide or more. Lance-shaped leaves are dark green on top, gray-green and slightly fuzzy beneath. Crushed leaves have a fresh scent like that of cucumbers. Bell-shaped, fragrant blooms in drooping clusters up to 4 in. long appear with the foliage, which emerges very early in the year. Male and female plants are separate; if a male is nearby, females will bear small (less than 1/2 in. long) blue-black fruits that are relished by birds and other wildlife. Nice addition to a shrub border or woodland planting. To keep the plant looking its best, remove some of the oldest stems after bloom. Or revive

**Oenothera**  
EVENING PRIMROSE, SUNDROPS  
Onagraceae  
PERENNIALS OR BIENNIALS  
ZONES VARY BY SPECIES  
FULL SUN OR PARTIAL SHADE  
LITTLE TO MODERATE WATER, EXCEPT AS NOTED



*Oenothera speciosa*

Valued for showy, four-petaled, silky flowers in bright yellow, pink, or white. Some types display their blossoms during the day; others open in late afternoon and close the following morning. Flowers of some are fragrant. Plants succeed in tough, rough places.

**O. berlandieri.** See *O. speciosa* 'Rosea'.

**O. caespitosa.** TUFTED, FRAGRANT, or WHITE EVENING PRIMROSE. Perennial or biennial. Zones 1-3, 7-14, 18-21. Native to western U.S. Clump to 8-12 in. high, 2 ft. wide, with many rosettes of narrow, fuzzy gray-green leaves. Fragrant, 3-4-in. flowers fade from white to pink; they open in the evening. Blooms heavily in late spring, early summer.

**O. drummondii.** See *O. stubbei*.

**O. fruticosa.** SUNDROPS. Perennial or biennial. Zones 1-21. Native to eastern U.S. Erect growth to 2 ft. high and wide. Branching reddish stems are set with medium green leaves that turn dull red with frost.

Its leaves are broader than those of species and red tinted when young. Foliage of 'Solstice' ('Sonnenwende') turns bright red in summer, darkens to burgundy in fall.

**O. macrocarpa (O. missouriensis).** OZARK SUNDROPS. Perennial, Zones 1-24. Native to south-central U.S. To 6 in. high and 2 ft. wide. Late spring to early fall, bears pure yellow, 4-in. flowers that remain open all day. Large winged seed-pods follow the flowers. Good in rock gardens. Give partial shade in hottest climates. *O. m. fremontii* 'Silver Blade' has silvery blue leaves.

**O. speciosa.** MEXICAN EVENING PRIMROSE. Perennial. Zones 2b-24; H1, H2. Native to southwestern U.S. and Mexico. To 1 ft. high and 3 ft. or more wide, spreading by rhizomes. Fragrant, 2-in. flowers are white to pinkish, aging to pink; despite the plant's common name, they open during the day. Blooms spring or early summer into fall, then stems die back. Good groundcover for dry slopes or parking strips, but can be aggressive and is potentially invasive. Varieties include pure white 'Alba', light pink 'Rosea' (*O. berlandieri*, *O. speciosa chilensis*), pink 'Siskiyou', and 'Woodside White' (white blossoms with a chartreuse eye).

**O. stubbei.** SALTILLO EVENING PRIMROSE. Perennial. Zones 10-14, 18-24. Native to Mexico. Evening-blooming plant that forms a dark green mat 5 in. high and 4 ft. wide; prostrate stems root along the ground, forming offset plants. Yellow, 2 1/2-in. flowers rise on stems 6-8 in. above foliage. Blooms heavily in spring, sporadically the rest of the year. Endures heat and drought but does better with occasional water. Often sold as *O. drummondii*.

**O. tetragona.** See *O. fruticosa glauca*.

For a pretty wild-flower effect in a

**Okra**  
Malvaceae  
ANNUAL  
ZONES 18-30, 6-16, 18-23  
FULL SUN  
REGULAR WATER



Okra

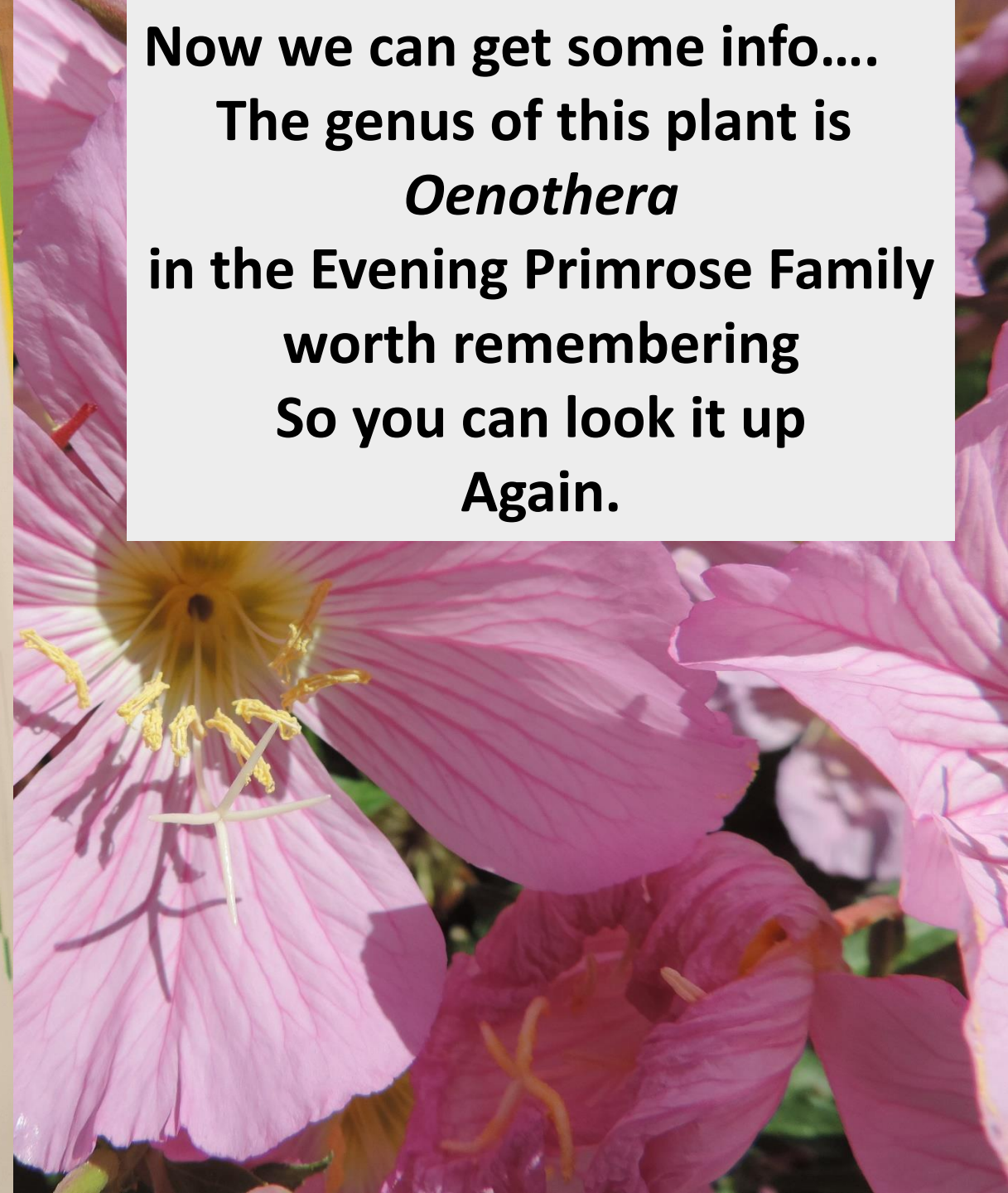
This heat-loving vegetable hails from tropical Asia. It is a large, erect, bushy plant to 6 ft. tall, with big, bold, deeply lobed leaves; the edible pods are produced in leaf joints.

'Clemson Spineless' and 'Cajun Delight' are early varieties that mature in areas with a short growing season. 'Burgundy' has red leaves and pods, looks attractive in containers. Grown in a large tub in a warm spot, a single okra plant can yield a crop large enough to make it worth growing. Okra is used to flavor and thicken soups and gumbos; it can also be sautéed, steamed, or battered-fried.

**CARE**

Grows well under same conditions as sweet corn. Plant when danger of frost is past and ground has warmed to 70°F (21°C). To speed germination, soak seeds for 24 hours before planting; use only seeds that are swollen. Leave 2 1/2-4 ft. between rows; thin plants to 1-1 1/2 ft. apart. Apply a complete fertilizer when the first pods set, again when plants are shoulder high. Begin picking when pods are 2-4 in. long

Now we can get some info....  
The genus of this plant is *Oenothera*  
in the Evening Primrose Family  
worth remembering  
So you can look it up  
Again.



# Most floras use keys (& some illustrations) to ID plants.

## What is a key??

separating from pulp. **SEED**: round structure opposite attachment scar gen raised.  $2n=38$ . Streamsides, springs, canyons; < 1000 m. NW, CaRF, SNF, GV, CW, SNE; OR. 4,5,6; IRR:7-9,10-12,14-24; CVS.

*V. girdiana* Munson (p. 1103) DESERT WILD GRAPE **ST** ± densely tomentose; nodal partitions gen 2-3 mm thick. **LF**: stipules gen > 3.5 mm; blade lobes 0 or 3-5 and shallow, margin gen serrate, lower surface tomentose to densely so. **FL** unisexual. **FR** gen < 8 mm

*V. vinifera* L. young, gen becoming glabrous; nodal partitions gen 3-5 mm thick. **LF**: stipules gen < 3.5 mm; blade lobes 0 to 3-5 and deep, margin gen serrate, lower surface glabrous or hairy. **FL** bisexual. **FR** gen > 8 mm wide, ± ovoid, purple to bluish black, densely to not glaucous; skin adhering to pulp. **SEED**: round structure opposite attachment scar sunken or raised.  $2n=38,57,76$ . Abandoned fields, roadsides; < 1000 m. GV, CW; native to Eur. Hybridizes with native spp.

### ZYGOPHYLLACEAE CALTROP FAMILY

Duncan M. Porter

Herb, shrub, often armed; caudex present or not. **ST** branched; nodes often angled, swollen. **LVS** 1-compound, opposite; stipules persistent or deciduous; lflets entire. **INFL**: fls 1-2 in axils. **FL** bisexual; sepals 5, free, persistent or deciduous; petals 5, free, gen spreading, sometimes twisted and appearing propeller-like; stamens 10, sometimes appendaged on inside base; ovary superior, chambers 5-10, ovules 1-several per chamber, placentas axile. **FR**: capsule or splitting into 5-10 nutlets. 26 genera, ± 250 spp.; widespread esp in warm, dry regions; some cult (*Guaiacum*, lignum vitae; *Peganum*, hormal (NOXIOUS and illegal); *Tribulus*, caltrop (pernicious)). [Porter 1972 J Arnold Arbor 53:531-552]

- 1. Lflets 2
  - 2. Lflets fused at base ..... LARREA
  - 2' Lflets free at base ..... ZYGOPHYLLUM
- 1' Lflets 3 or more
  - 3. Lflets 3, palmate, spine-tipped; stipules spine-tipped ..... FAGONIA
  - 3' Lflets 6-18, pinnate, not spine-tipped; stipules not spine-tipped
    - 4. Fr tubercled, nutlets 10 ..... KALLSTROEMIA
    - 4' Fr spiny, nutlets 5 ..... TRIBULUS

### FAGONIA

Per, shrub. **ST** < 1 m, spreading, angled or ridged. **LF** palmately compound; stipules stiff, spine-tipped; lflets 3, spine-tipped, terminal largest. **INFL**: fls solitary in axils. **FL**: sepals deciduous; petals clawed, twisted, propeller-like, purple to pink, deciduous. **FR**: capsule, deeply 5-lobed, obovoid, ± septicial; style persistent; peduncle reflexed. **SEED** 1 per chamber. ± 18 spp.; sw N.Am, Chile, Medit, sw Afr. (G.C. Fagon, French physician to Louis XIV, 1638-1718)

- 1. St ascending to erect, scabrous; glands only on youngest herbage, << 0.1 mm wide; stipules curved; lflets lanceolate ..... *F. laevis*
- 1' St prostrate, not scabrous; glands also on older herbage, ± 0.15 mm wide; stipules straight; lflets elliptic to ovate ..... *F. pachyacantha*

*F. laevis* Standley (p. 1103) Shrub < 1 m, intricately branched. **LF**: lflets 3-9 mm, gen < petiole, 1-4 mm wide. **FL** ± 1 cm wide.

*F. pachyacantha* Rydb. (p. 1103) Per; caudex woody. **LF**: lflets < 25 mm, ± = or > petiole, < 9 mm wide. **FL** ± 1.5 cm wide. **FR** 5

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# A key is a way of identifying a plant by using a series of two choices-

A. The plant is a tree, a perennial.

B. The tree has acorns- Oak Tree

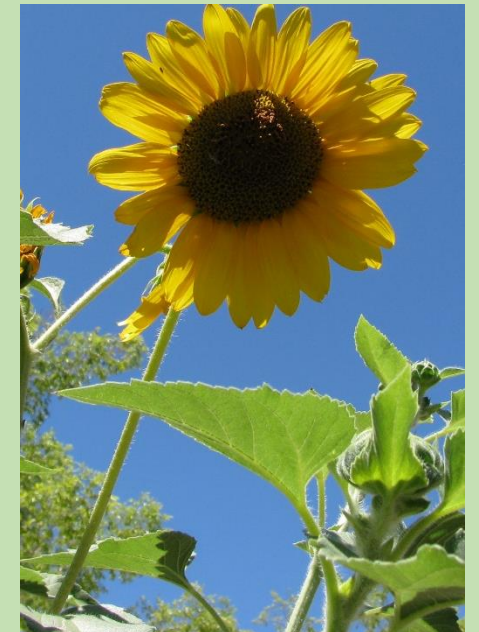
BB. The tree has pine cones- Pine Tree



AA. The plant is an annual, not a tree

C. The plant has yellow daisy-like flowers and is very tall - Sunflower

CC. The plant has white daisy-like flowers and is very small- Desert star



# ARECACEAE [Palmae] PALM FAMILY

Elizabeth McClintock

Shrub, tree, evergreen, monoecious, dioecious, or fls bisexual. **ST**: trunk gen  $\pm$  erect, unbranched. **LVS** splitting to be palmately or pinnately dissected or compound, alternate, forming a terminal crown, large; base sheathing; petiole often long. **INFL**: gen large panicle, axillary; peduncle sheathed by 1 or more large bracts; fls many, gen  $\pm$  sessile. **FL** gen small,  $\pm$  radial; sepals and petals gen 3, sometimes similar, fused at base or free; stamens gen 6; pistils 1 or 3, ovaries superior, gen 3, (if 1, chambers gen 3), styles free or fused. **FR**: often a drupe. **SEED** 1.  $\pm$  200 genera, 3,000 spp.: trop, subtrop; many cult, esp for orn. [Uhl & Dransfield 1987 Genera Palmarum] Used for food (fats, oils, frs, seeds) and building materials.

- 1. Lf blade pinnately compound,  $\pm$  elongate; fl unisexual ..... PHOENIX
- 1' Lf blade palmately divided,  $\pm$  round; fl bisexual ..... WASHINGTONIA

## PHOENIX DATE PALM

Tree, dioecious. **LVS** pinnately compound; bases persistent on trunk; lflets folded longitudinally with margins upward, lower sometimes smaller, spine-like. **INFL** within crown,  $<$  lvs. **FL**: perianth yellowish; calyx 3-lobed; petals gen free; ovaries 3, free, simple.  $\pm$  12 spp.: Afr, Asia. (Greek: name for date palm, of uncertain meaning)

- 1. Trunk thick,  $<$  20 m; lvs  $\pm$  50–100, in dense crown, all  $\pm$  arching; basal sprouts 0 (trunk 1) ..... *P. canariensis*
- 1' Trunk slender, gen  $<$  30 m; lvs 20–40, in  $\pm$  open crown, uppermost erect, others  $\pm$  stiffly drooping; basal sprouts present when young (trunks several if pl unpruned) ..... *P. dactylifera*

*P. canariensis* Chabaud CANARY ISLAND DATE PALM LF gen 5–7 m. FR  $\pm$  2 cm, rounded to ovate, brown, pulp thin. Uncommon. Near habitations, other disturbed areas;  $<$  1000 m. SnFrB, SCo; native to Canary Islands. Abundantly cult; fr pulp sweet, edible.

*P. dactylifera* L. DATE, DATE PALM LF gen  $<$  7 m. FR 2.5–5 cm, oblong-ovate, brown, pulp thick. Uncommon. Near habitations, adjacent moist areas;  $<$  200 m. SCo, DSo; native to n Afr. Abundantly cult; fr (commercial date) pulp sweet, edible.

## WASHINGTONIA FAN PALM

Keys generally require a lot of technical terminology- and/or require some sort of magnification of certain characters, and use abbreviations. They can be very easy or very tough.



## Herbarium

**A collection of plant specimens  
used for research and identification**



Native and naturalized plants only

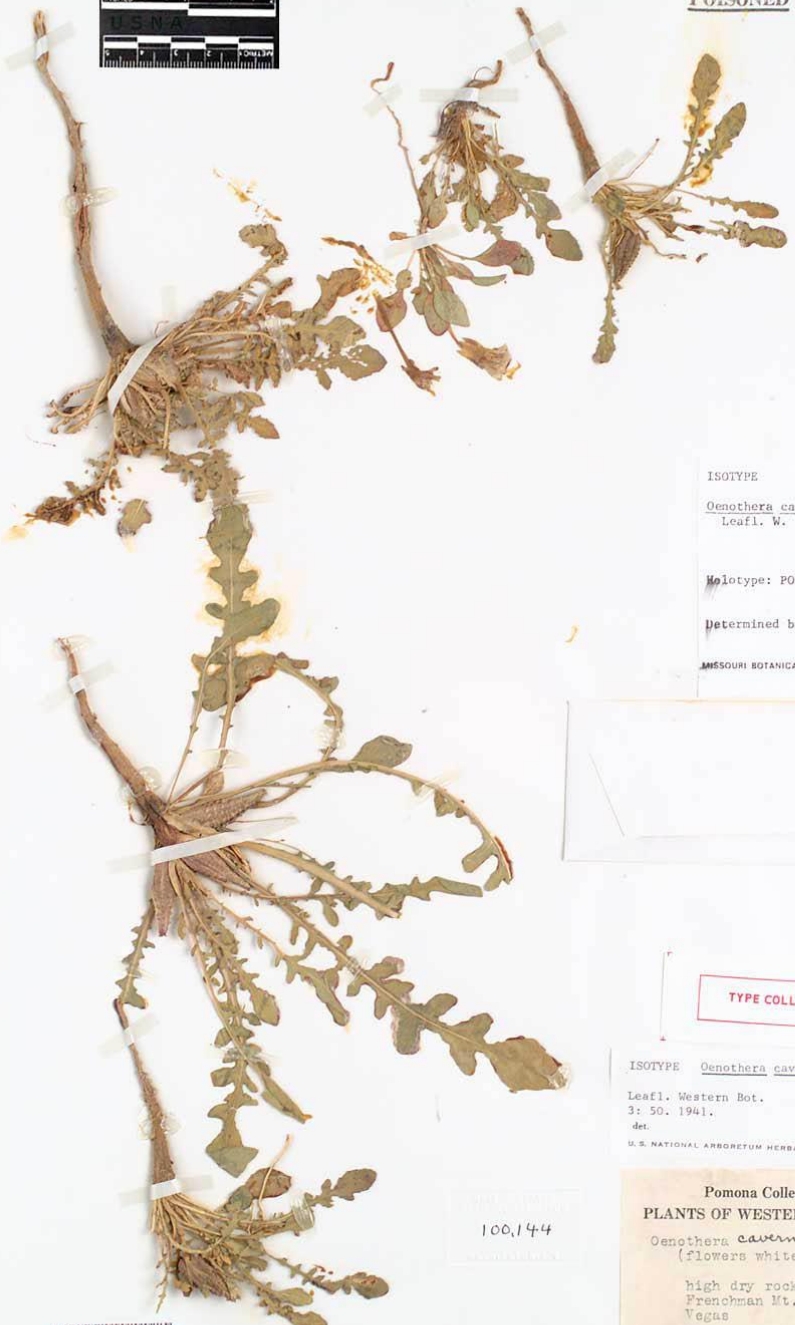




## **Collecting specimens for herbaria**

**Botanists will collect wild plants,  
flatten and dry them in a plant press,  
Take notes about where, when, who  
and what- also information about  
The plant like color of flowers, etc.  
and give pressed  
specimens to their local herbaria.**

POISONED



ISOTYPE

*Oenothera cavernae* Munz  
Leafl. W. Bot. 3:50. 1941

Holotype: POM-255352.

Determined by Warren L. Wagner 1980

MISSOURI BOTANICAL GARDEN HERBARIUM (MO)



TYPE COLLECTION

ISOTYPE *Oenothera cavernae* Munz

Leafl. Western Bot.  
3: 50. 1941.  
det.

U.S. NATIONAL ARBORETUM HERBARIUM, WASHINGTON, D. C.

100,144

Pomona College Herbarium *isotype*  
 PLANTS OF WESTERN UNITED STATES  
*Oenothera cavernae* Munz, n. sp.  
 (flowers white, nocturnal)  
 high dry rocky slope, Gypsum Cave  
 Frenchman Mt. northeast of Las  
 Vegas Clark County,  
 Nevada  
 Date: IV-8-1940 Alt. 1500 ft.  
 Coll. P. A. Munz No. 16376

The plant specimen is pulled up by the roots, pressed, dried, labeled, and glued to a sheet of paper

If carefully handled and protected -It can last this way for over 200 years

The Herbarium acts like an illustrated library of plants- mostly of native or naturalized plants of a particular region.

# Wesley E. Niles Herbarium

A photograph of a man in a white short-sleeved button-down shirt standing in a herbarium. He is positioned in the center-left of the frame, looking towards the camera. The room is filled with tall, dark metal shelving units on both sides, each containing numerous shelves of dried, pressed plant specimens. The specimens are organized into neat rows. The background shows a doorway and a whiteboard on the wall.

[www.unlv.edu/lifesciences/herbarium](http://www.unlv.edu/lifesciences/herbarium)

702-895-3098 or 702-895-3251

Juanita Geer White Building, Room 305

Monday- Thursday 9 am to ~2 pm

# A key to genera

## CACTACEAE CACTUS FAMILY

Edward F. Anderson (except *Opuntia*)

Per, shrub, tree, gen fleshy. **ST** cylindric, spheric, or flat; surface smooth, tubercled, or ribbed (fluted); nodal areoles bear fls, gen bear spines from center (“central spines”) and margin (“radial spines”) (*Opuntia* areoles bear small, barbed, deciduous bristles sometimes called glochids, gen also bear spines). **LF** gen 0. **FL** gen solitary, bisexual, sessile, ± radial; perianth parts gen many, grading from scale-like to petal-like; stamens many; ovary appearing inferior, ± submerged in st, so gen with areoles on surface, style 1, stigma lobes gen many. **FR** gen fleshy, gen indehiscent, spiny, scaly, or smooth. **SEEDS** many. 93 genera, ± 2000 spp.: esp Am deserts; many cult. (Greek: thorny pl) [Benson 1982 Cacti of US & Can; Hunt & Taylor eds 1990 Bradleya 8:85–107]

- 1. St clearly jointed; small barbed bristles present in areoles; seed white, bone-like ..... **OPUNTIA**
- 1' St not clearly jointed; barbed bristles 0; seed black or brown
- 2. St ribs 0 or inconspicuous, tubercles prominent
- 3. Tubercle longitudinally grooved on top (indented in X-section); central spine not hooked ..... **ESCOBARIA**
- 3' Tubercle round in X-section (not grooved); some central spine of areole hooked ..... **MAMMILLARIA**
- 2' St ribs prominent, tubercles 0 to prominent
- 4. Pl > 3 m; st > 30 cm diam, gen branching above 1.5 m; fl creamy white ..... **CARNEGIEA**
- 4' Pl < 3 m; st < 30 cm diam, branching near ground or unbranched; fl yellow to red or magenta
- 5. Sts length gen > 8 × width; empty fr long-persistent ..... **BERGEROCACTUS**
- 5' Sts length gen < 8 × width; fr not long-persistent
- 6. Ovary and young fr spiny, glabrous; st soft-fleshy; branches gen few–many ..... **ECHINOCEREUS**
- 6' Ovary and young fr either spineless or woolly; st firm-fleshy; branches gen 0 (if present, then larger spines with ring-like ridges)
- 7. Fr and st tip densely woolly; bracts sharp-tapered ..... **ECHINOCACTUS**
- 7' Fr and st tip not woolly; bracts wide, obtuse to acute
- 8. St > 15 cm diam; seed pitted ..... **FEROCACTUS**
- 8' St < 15 cm diam; seed smooth or weakly tubercled ..... **SCLEROCACTUS**

# Other methods- using computers/apps

Use a computer to search internet for any name you have for a plant  
And/or look at images.

[Plants.usda.gov](http://plants.usda.gov)    <http://apps.kew.org/wcsp/qsearch.do>

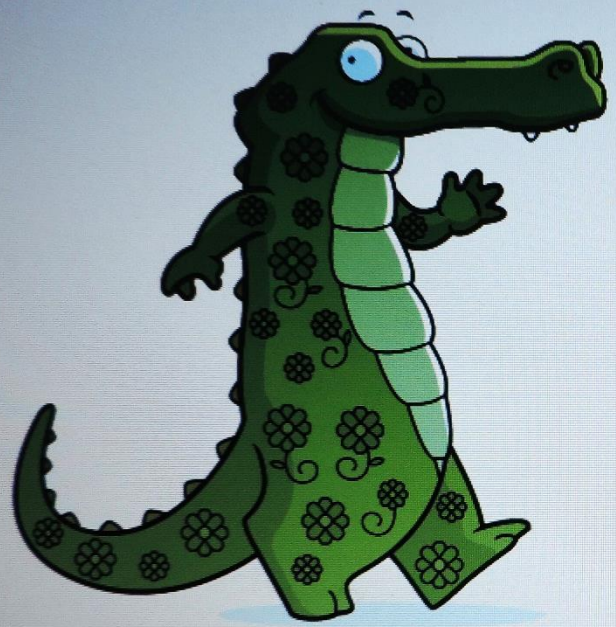
FloraGator program: <http://hort.ifas.ufl.edu/floragator/key.html>

**Apps:**                    ( You need to know A LOT of terminology)

- GardenAnswers Plant Identification
- What's That Flower?
- PlantNet Identification
- Plants
- Garden Flower Identification
- Plant Finder
- Plant Identification Terminology

None of these apps are foolproof-  
And may cover only some regions-  
Or not be very helpful.

**There are many others to try- free to a few dollars, both apple and android**



# FloraGator

a multiple-entry key for  
flowering plant family identification

the key

the families

FAQs (frequently asked  
questions)

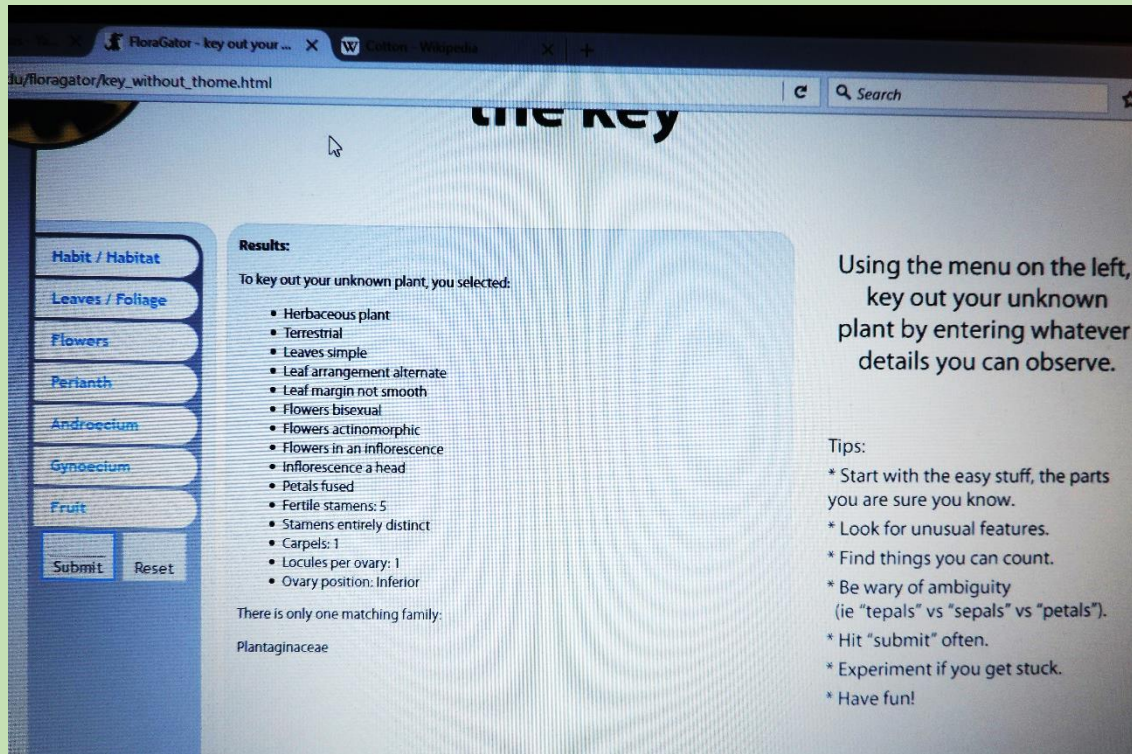
sources / credits

FloraGator is a multiple-entry key to the families of flowering plants as defined by the Angiosperm Phylogeny Group in 2009. Users can identify an unknown plant to the correct family by reporting the visible details of the leaves, flowers, fruits, and other parts. The choice of information to report is entirely up to the user. The order in which information is entered does not affect the identification. Some families can be identified by a single feature. Other families may require up to 20 pieces of information. We welcome your comments, feedback, and suggestions about this site.

**Visitors**

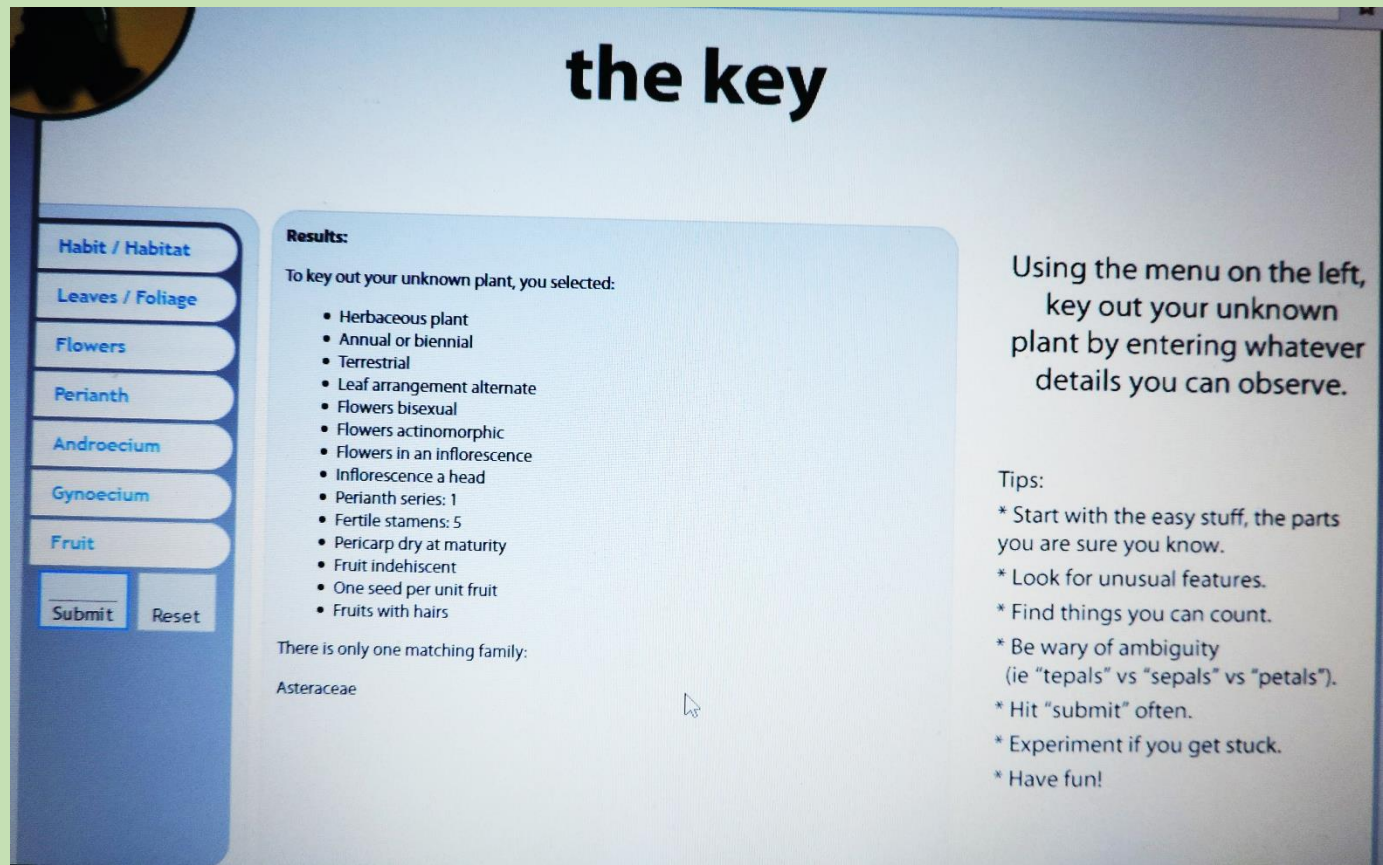
US 14,109	IN 520	NZ 168	PK 108	ES 77	RU 70	NL 57	JP 49
GB 1,495	IT 488	IE 147	FR 104	TR 76	MY 59	PT 55	CO 44
AU 854	MT 366	DE 141	ZA 96	CN 73	GR 58	PR 53	PE 42
CA 815	PH 267	TH 109	MX 85	BR 72	IR 57	ID 50	SE 41

See more ▶



Second time – cheating by adding Pappus which sunflowers don't have- I got Asteraceae

First time trying to get to Asteraceae- by describing a sunflower- I got Plantaginaceae



Reset

Show 35 Plants

Time & Place: Nevada

Plant Type: Wildflowers and other forbs.

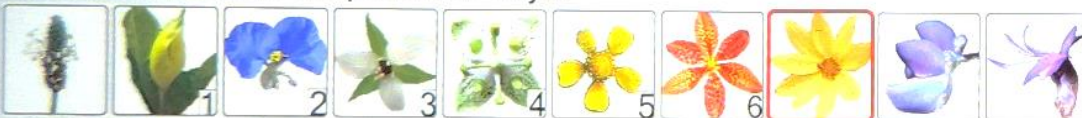


Wildflower Shrub Conifer Other Trees Vine Cactus Aquatic Grass Fern Moss Lichen

Flower Color: Yellow.



Petals: More than six petals or rays.



None One Two Three Four Five Six Many Pea Irregular

Leaf Arrangement: Opposite leaves



Habitat: Disturbed -- Along a road, railroad, burned area, vacant lot, ...



Alpine Cliff Desert Disturbed Forest Grassland



Meadow Riparian Rocky Salt Marsh Sandy Wetland

Nevada Wildflowers  
Free app

Note the characters that are  
Important for identification:  
Life form  
Flower color  
Number of petals/type of flower  
Leaf arrangement  
Habitat



Plant Name



*Helianthus annuus*  
**sunflower**

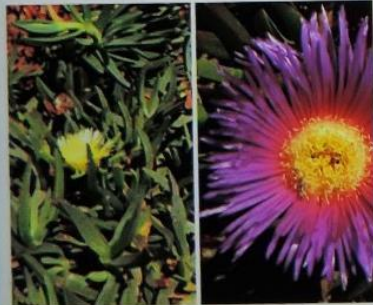
©2008 Matt Lavin

It did give me Sunflower.....



*Helminthotheca echioides*  
**bristly ox-tongue**

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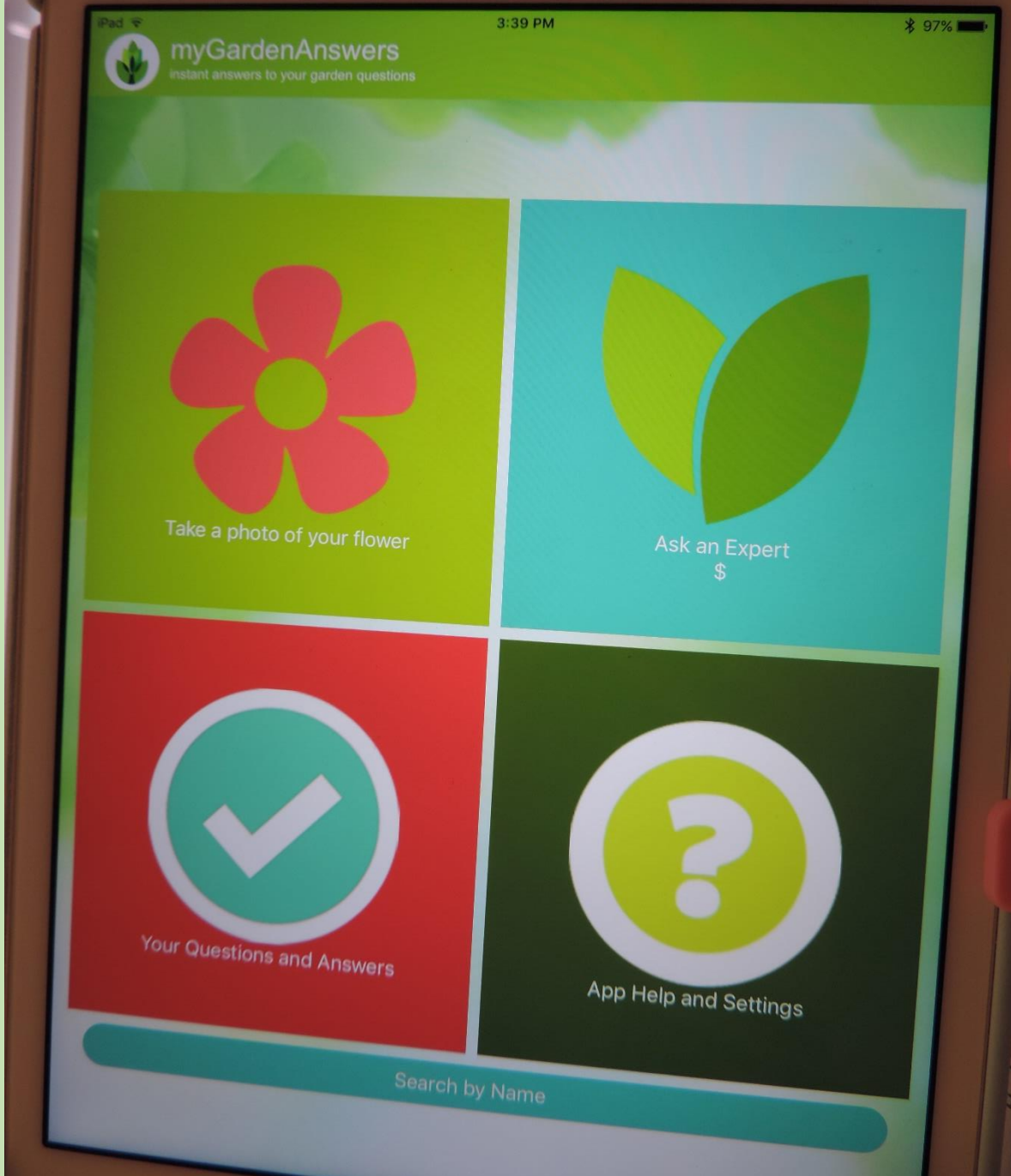


*Carpobrotus edulis*  
**Hottentot fig, freeway ice plant**

©2007 Anthony Valois and the National Park Service

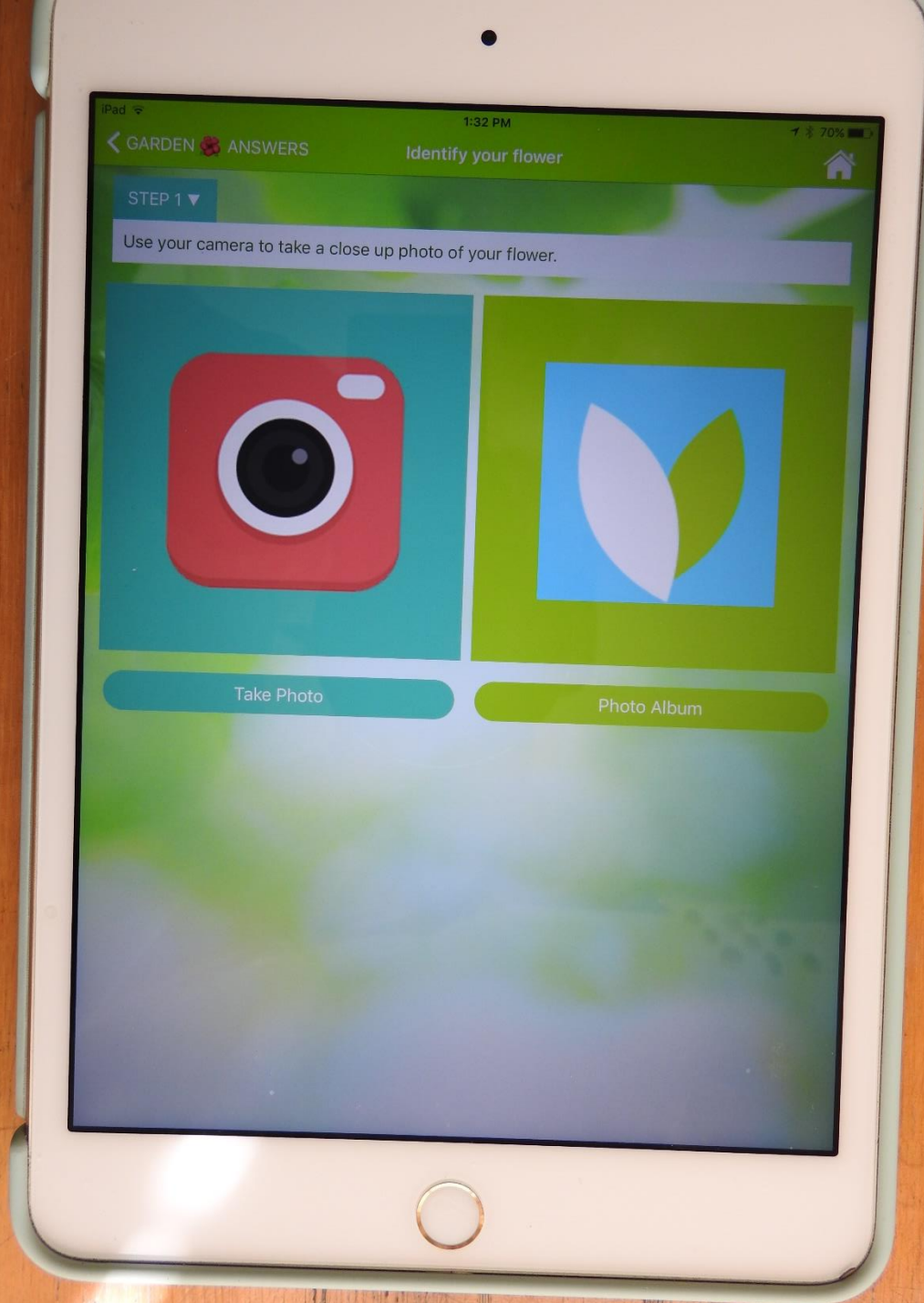


*Coreopsis lanceolata*  
**lance-leaved coreopsis, sand coreopsis**



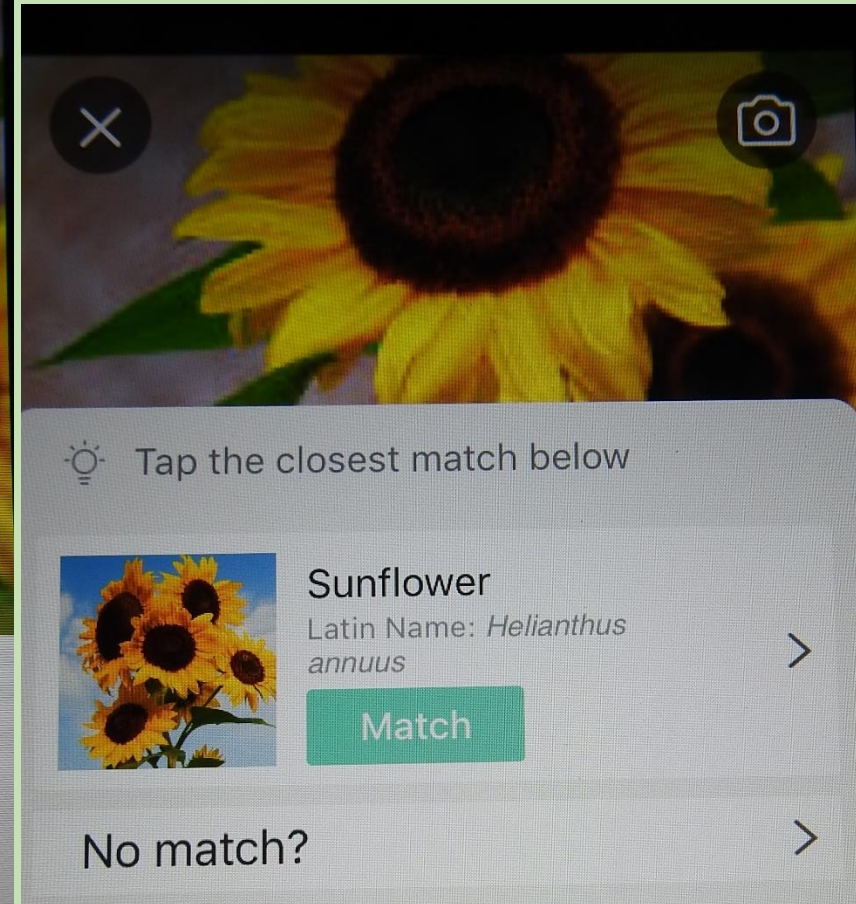
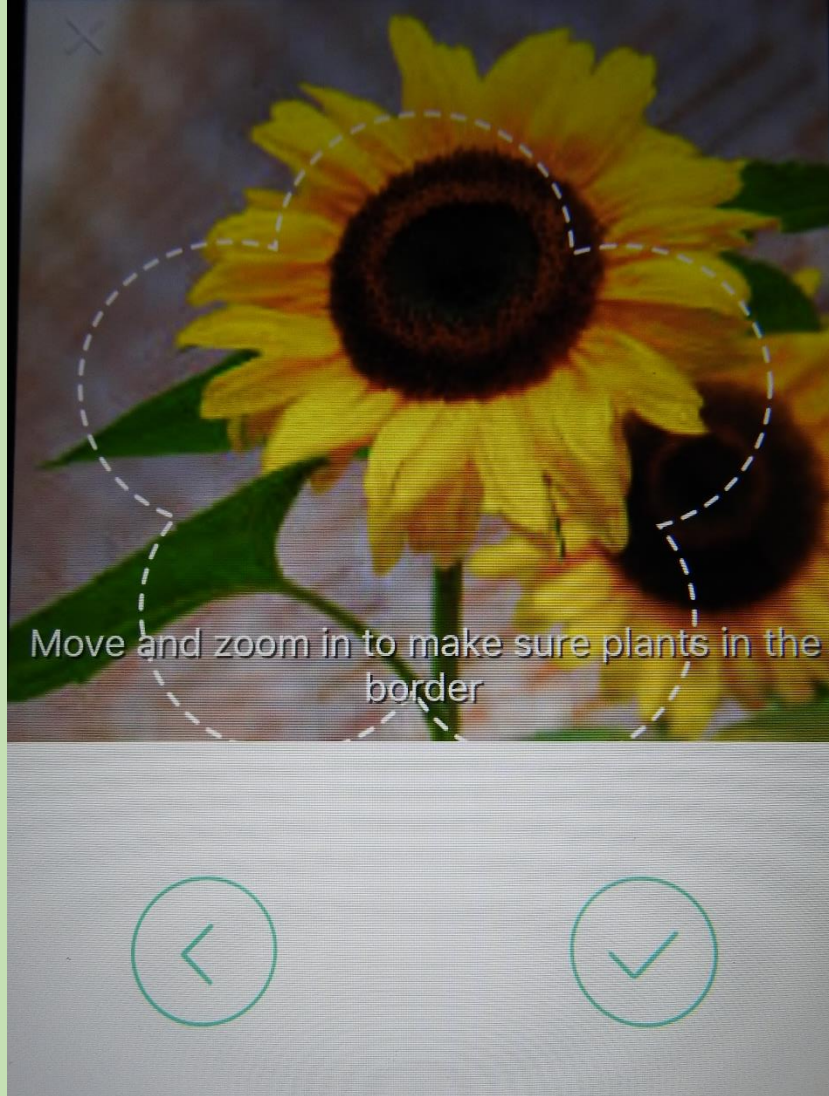
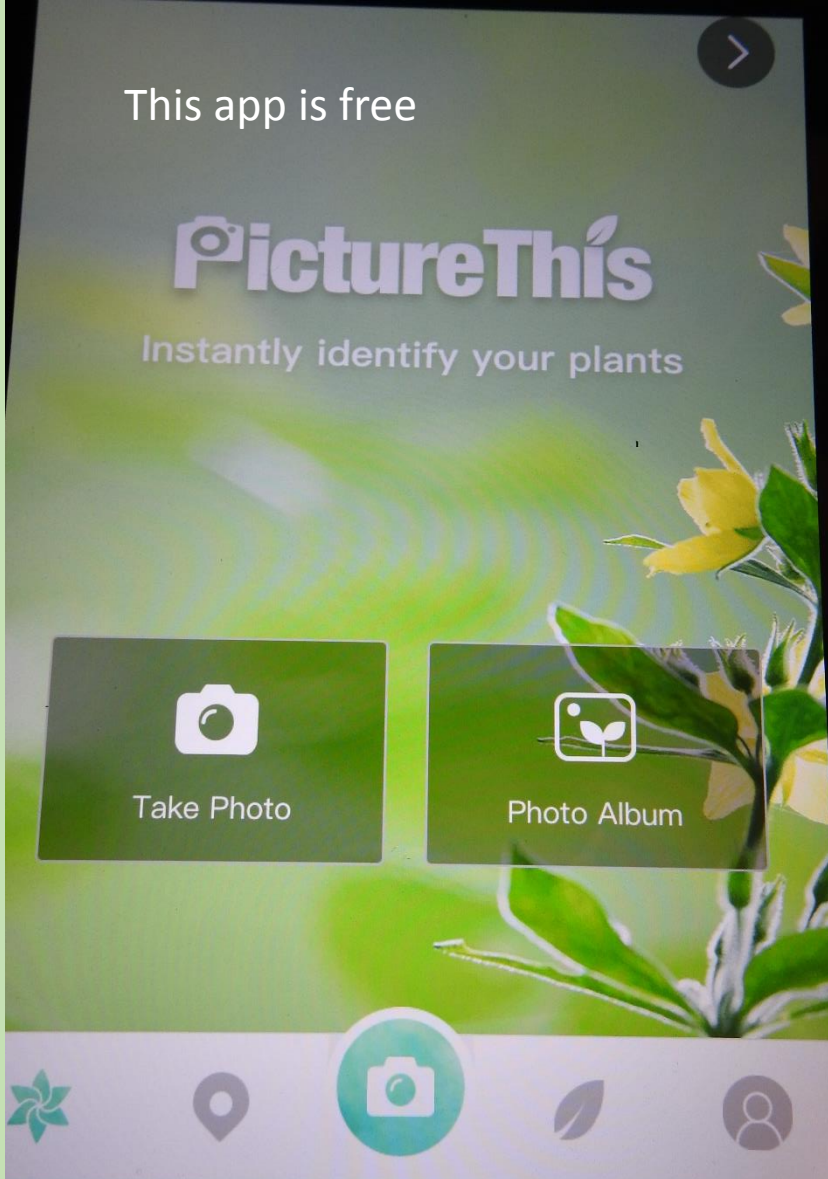
myGardenAnswers-(Garden Answers)  
best to take a picture of your plants-  
can't always ID it correctly-but works  
pretty well

When you have an internet  
connection. You can also look up  
plants by name.



The app asks you to take a picture of your plant or to pull a picture you have already taken from your photo album on your phone or ipad.

This Free App works fairly well, if you have a good connection. You can also look up plants by name.



The PictureThis app correctly identified my sunflower as a sunflower in a few seconds. It also identified a number of other plants in my garden correctly and you can also put in names of plants and look at pictures it brings up



There are others out there.... Some to try, some to buy.

How serious are you about ID-ing your plants???  
(I'd use a book- but that's just me....)

# Plant Identification Terminology

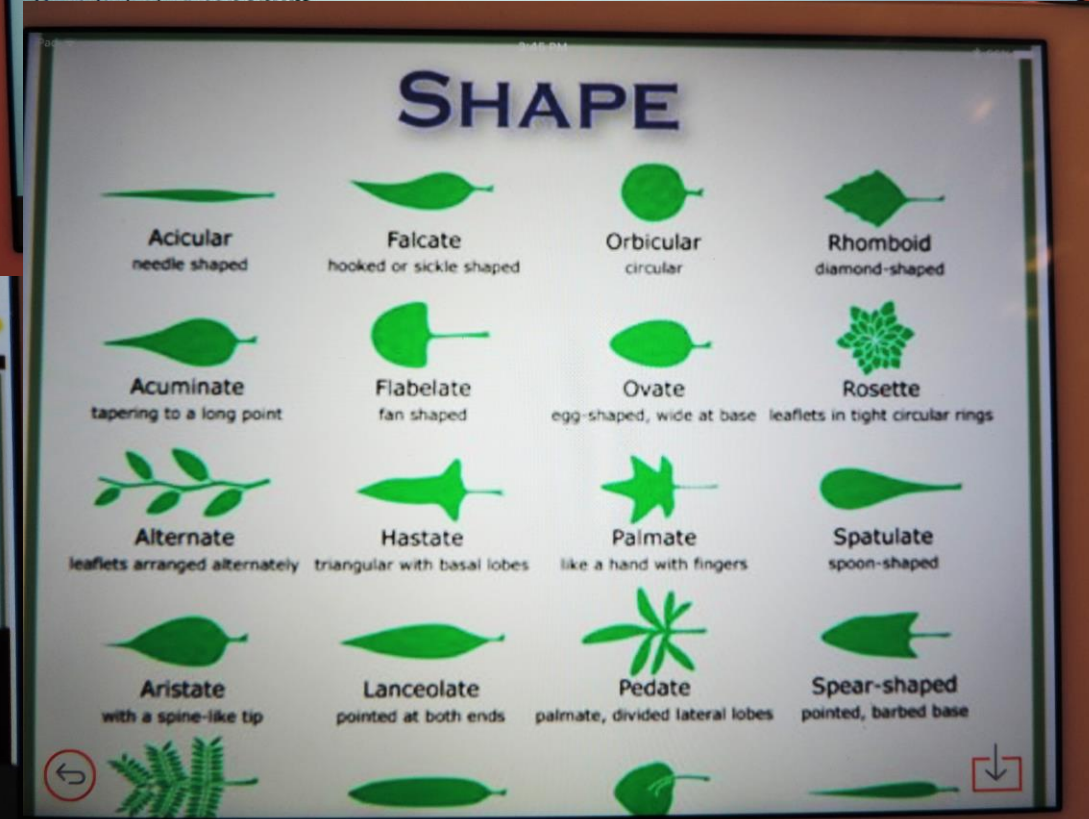
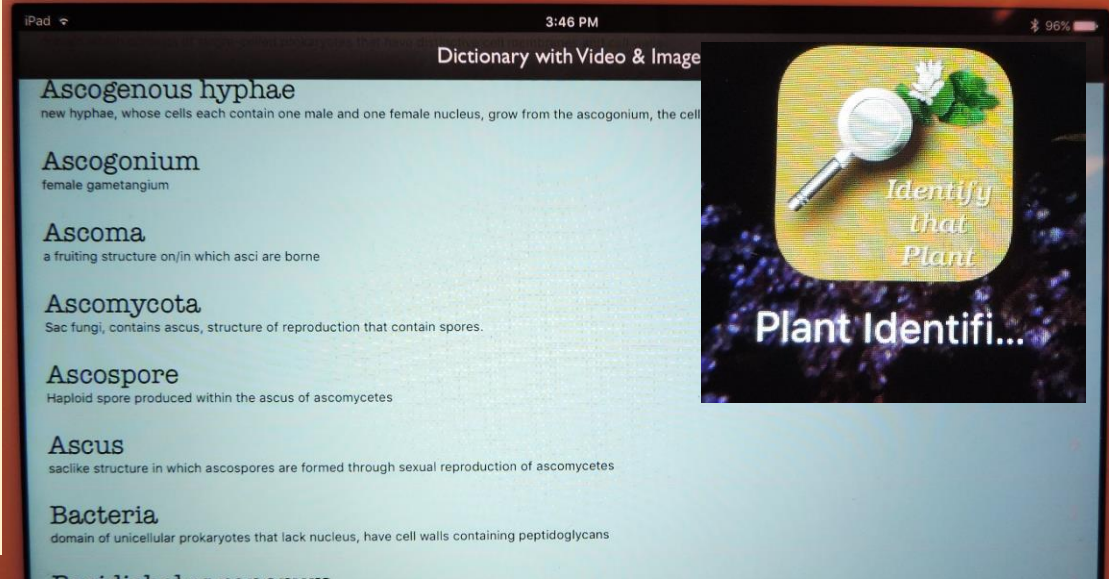
~\$2.99

videos, dictionary, and a lot of info on botany

But limited....

You can't ID your plants....

Without some work





Sometimes you just have to  
Look closely .


And do a little research....

Or ask someone who knows.....

## What have we learned today?

- That every species of plant has a unique scientific name that has two parts – Genus and species- and is written and abbreviated in a special way.
- Cultivated plants have a special way of being written and designated.
- Categorizing plants is a tough and ongoing process.
- Plants are typically recognized by class and family-then genus and species.
- The plants in the palm family are super easy to recognize.
- There are several ways to identify plants- ask someone, use a picture book, use a key, use the herbarium, or use an app.





Enjoy Your Exploration!



**Thanks!  
Questions?**

**Prepared by Elizabeth Powell  
Permission for use required**