

Basic Botany: Key Concepts and Resources

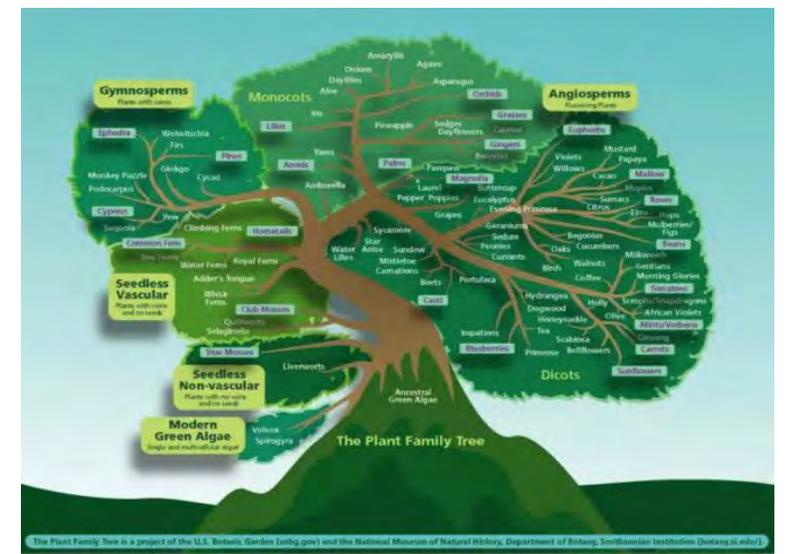
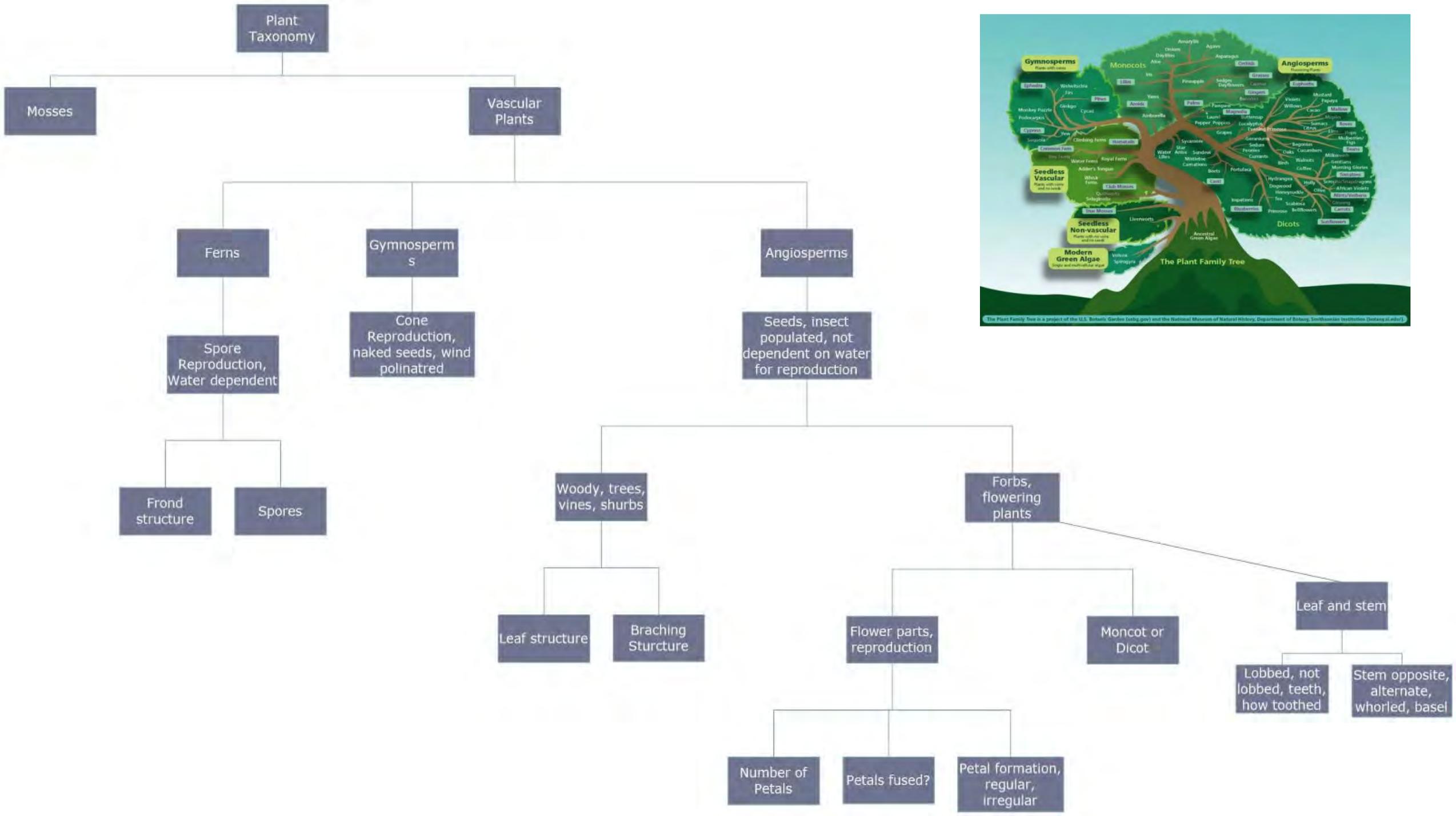
An introduction to Basic Botany for
Identification



Agenda

Plant Taxonomy

- Classification of Plant Types
- Understanding Plant Structure
- Learning Resources and Further Study



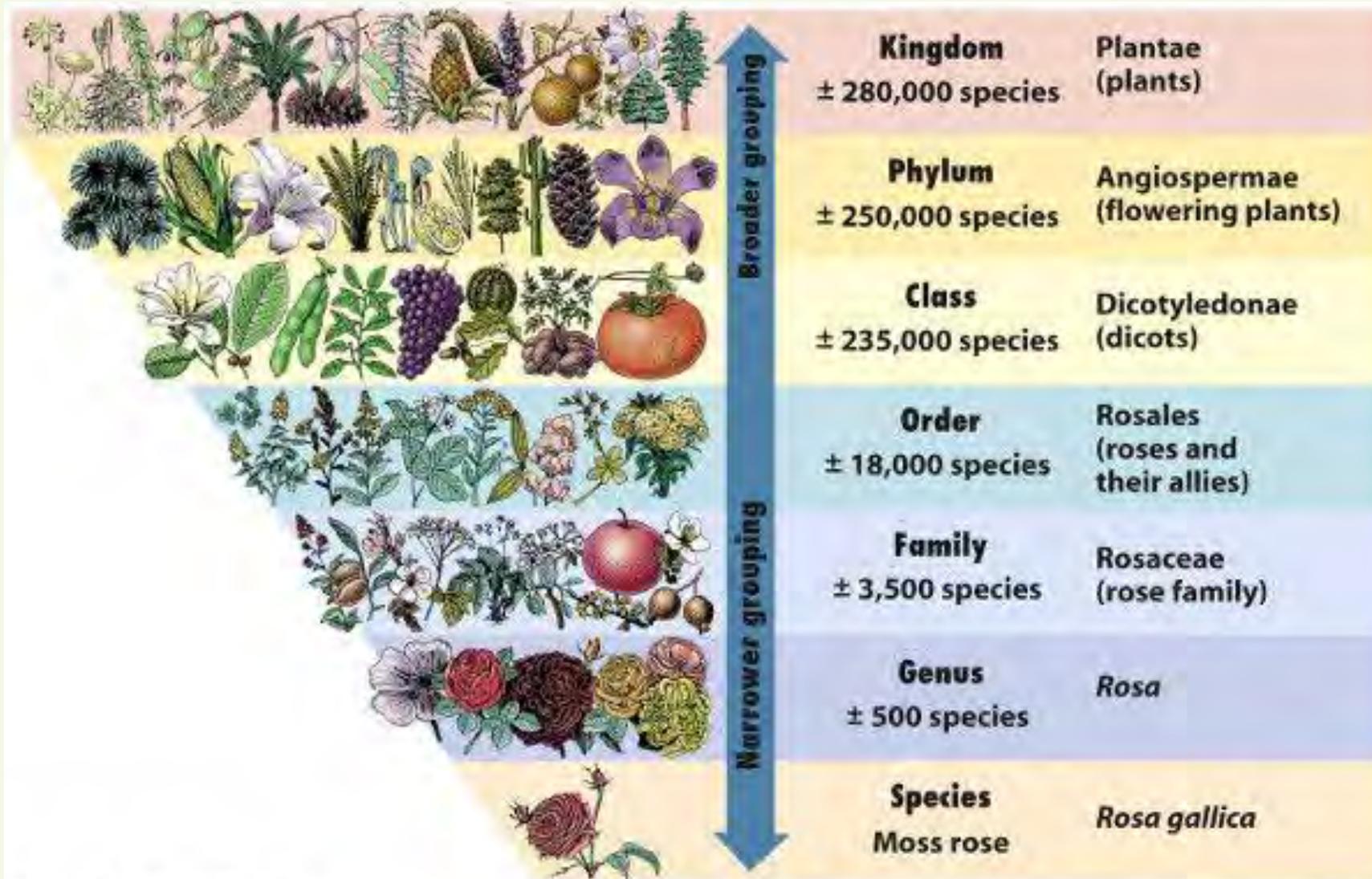


Figure 2-6 Discover Biology 3/e
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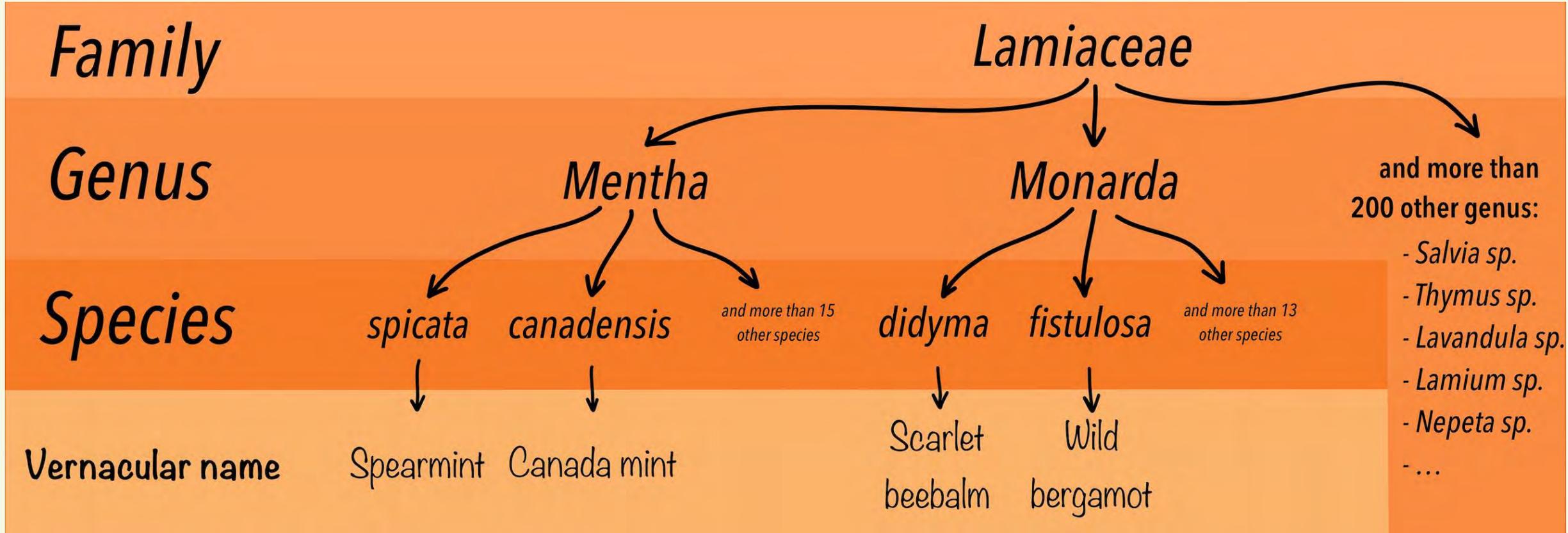
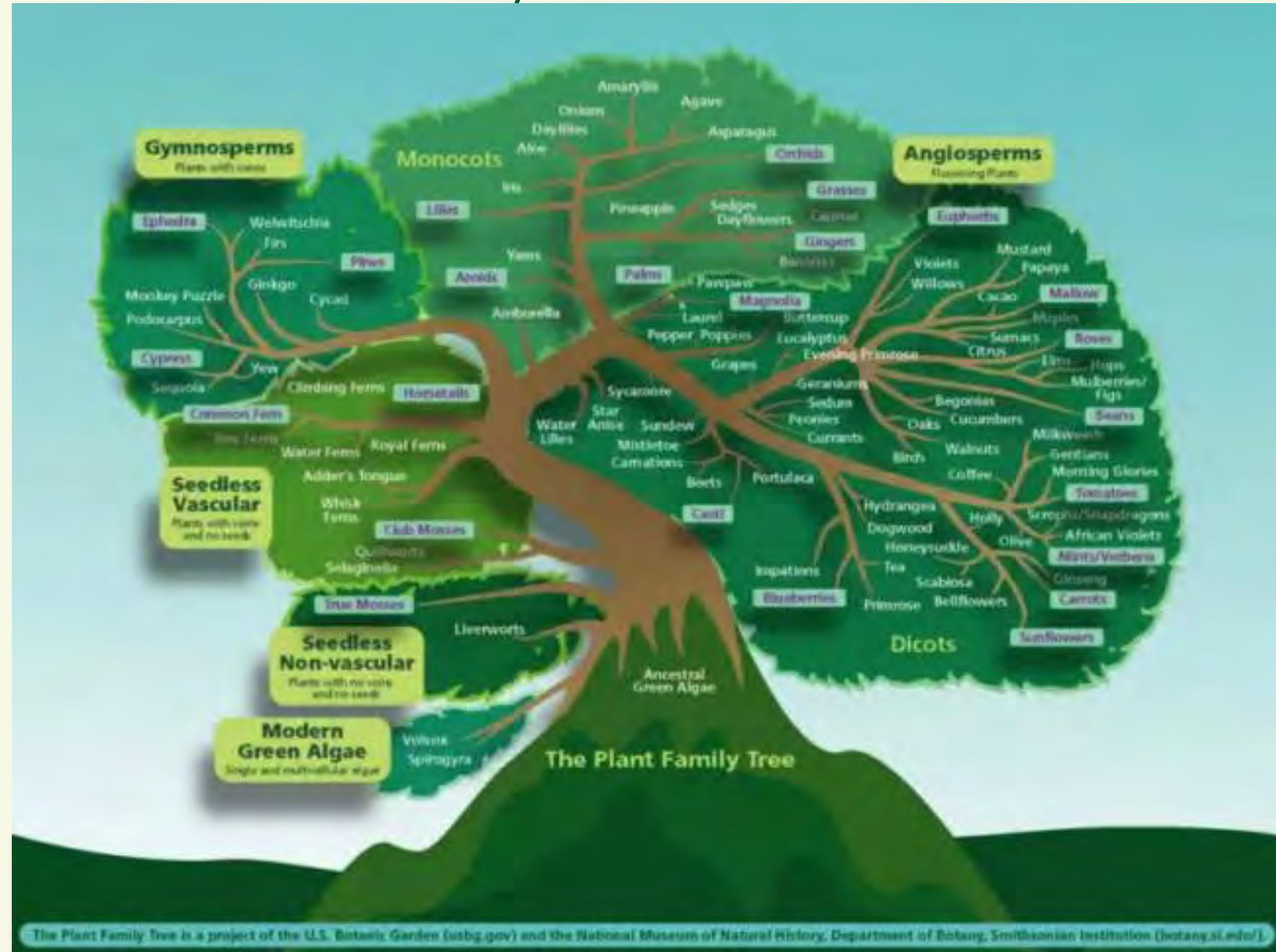
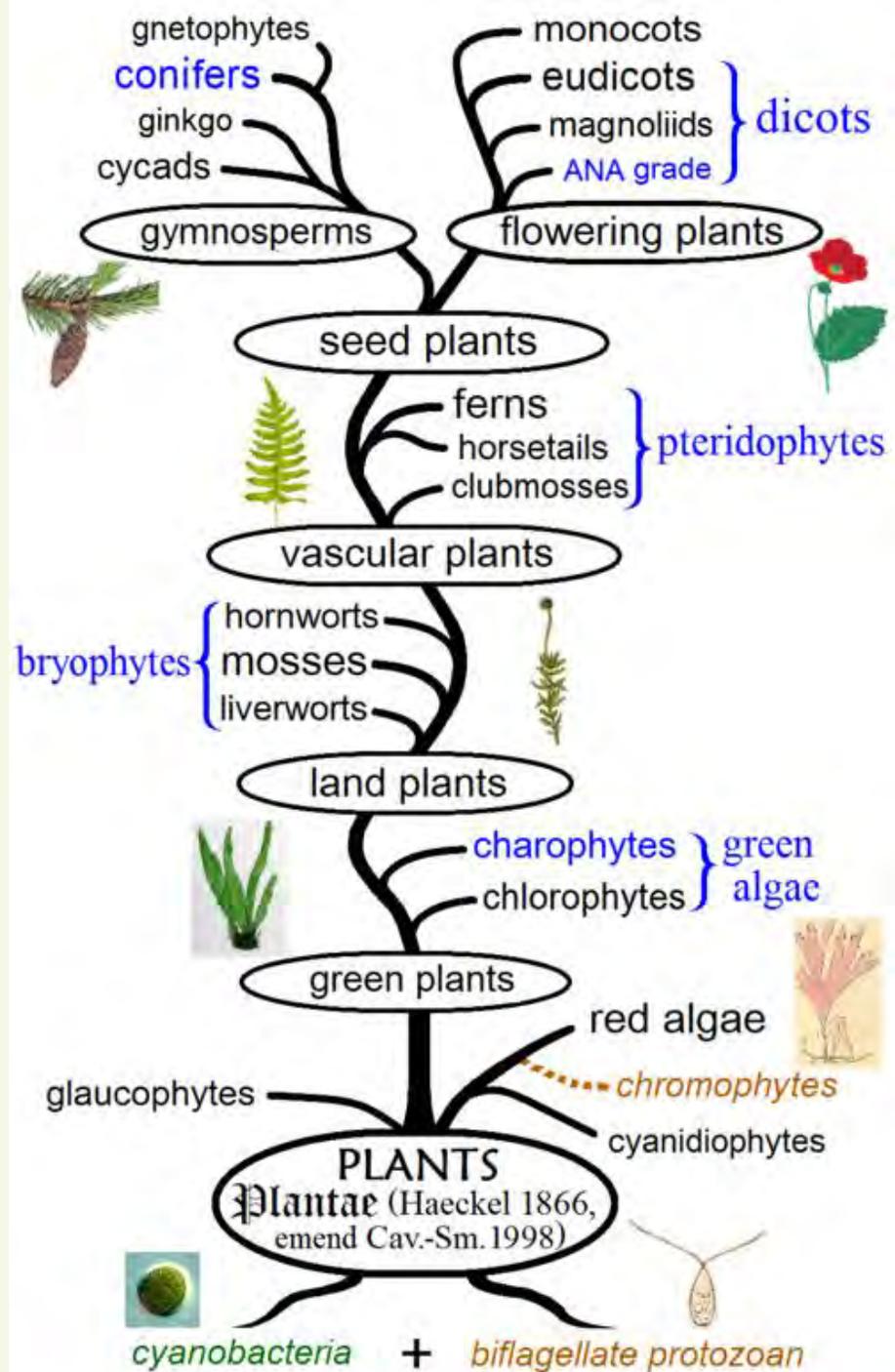


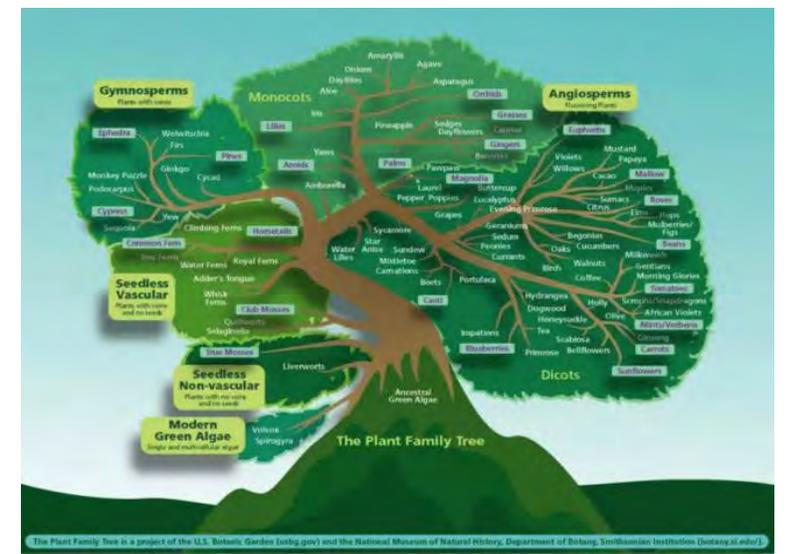
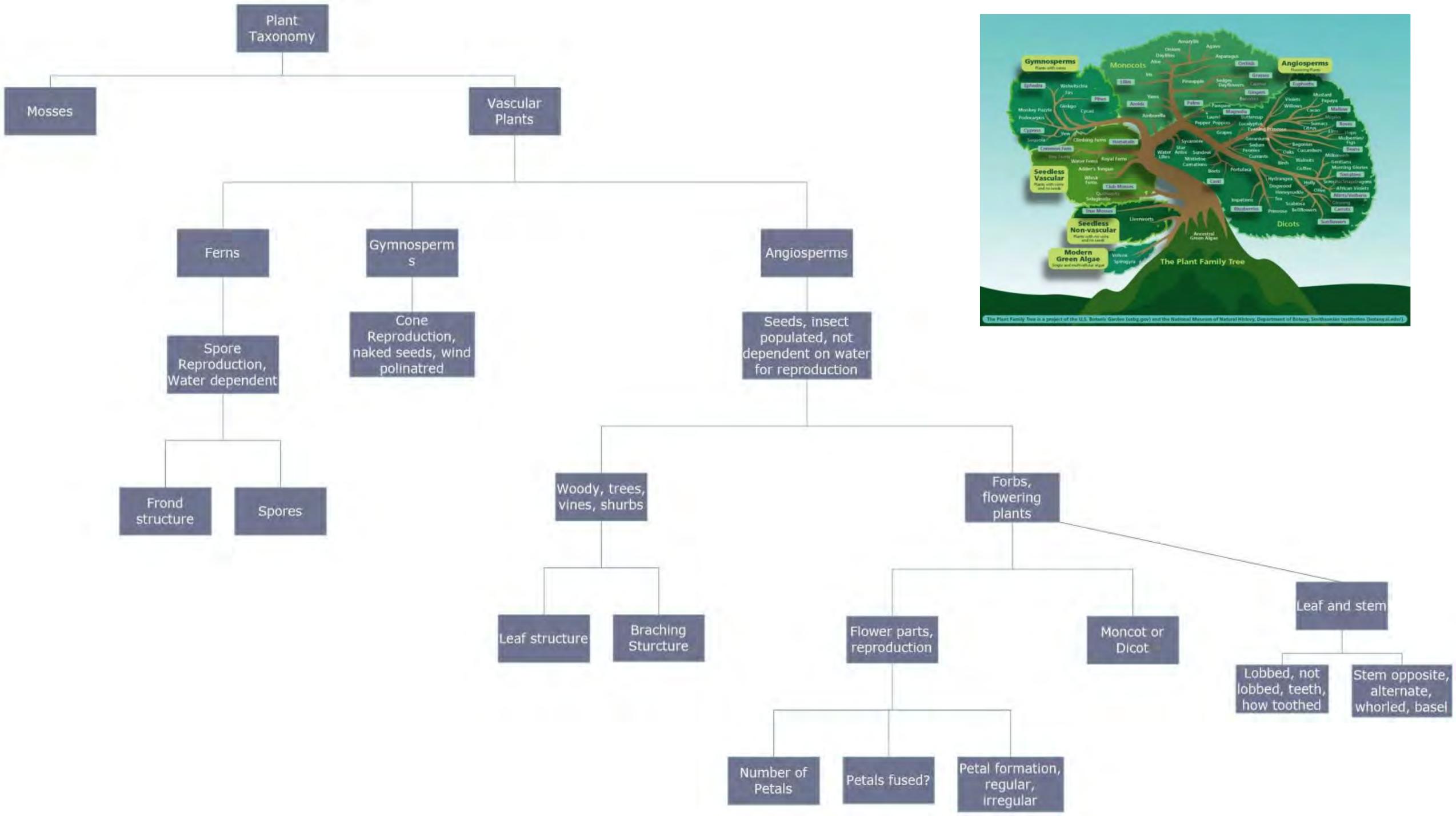
Illustration: Mathieu Gaudreault

Overview of Plant Taxonomy

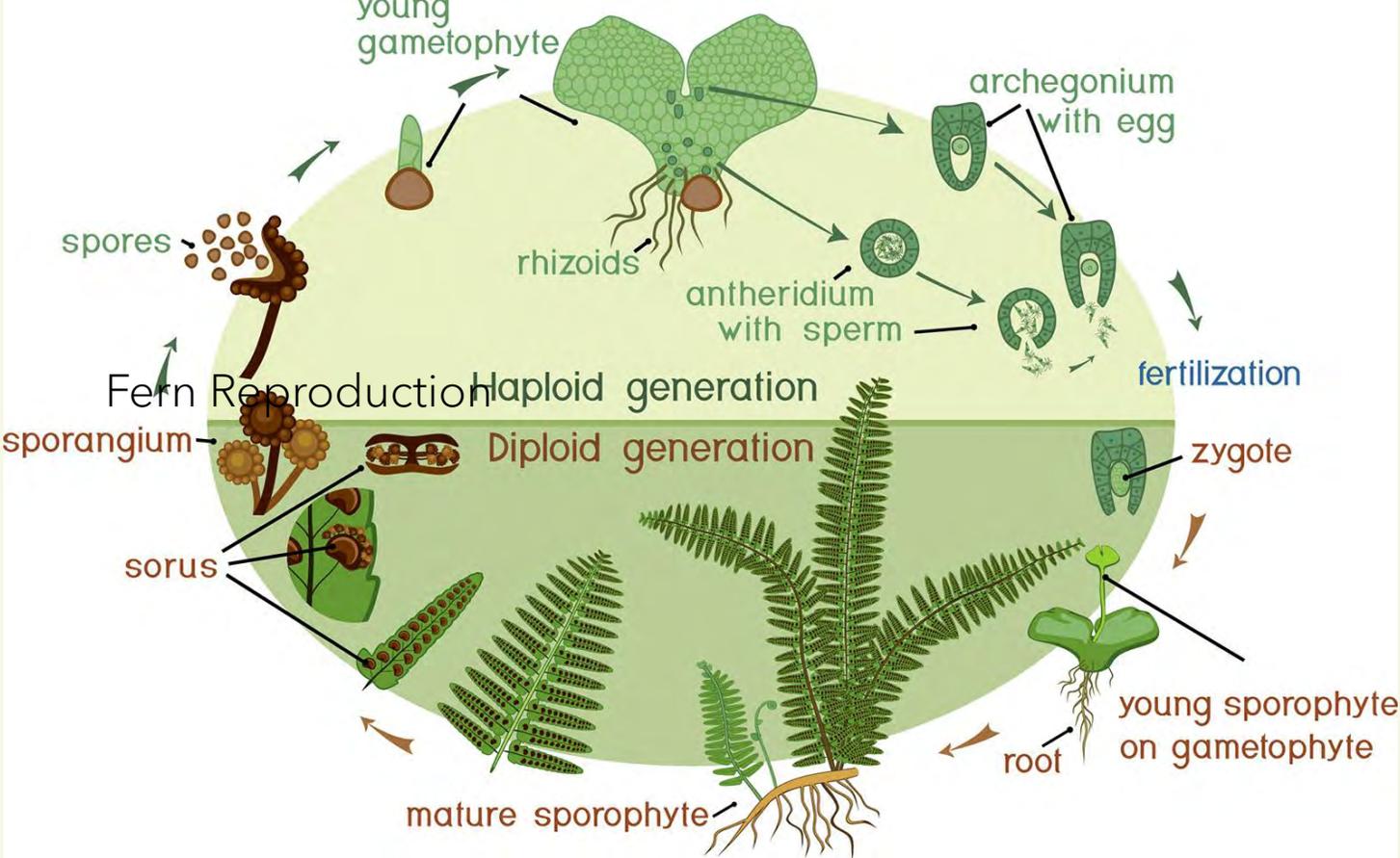
- Angiosperms - flowering plants-vascular tissue to transport water and nutrients from the ground. Advanced seed dispersal
- Gymnosperms -plants with cones-vascular tissue to transport water and nutrients from the ground and have seeds
- Seedless Vascular plants -ferns and club mosses - still need water for one cycle of reproduction
- Seedless Non-vascular - liverworts, mosses -Need Water to reproduce - no vascular tissue



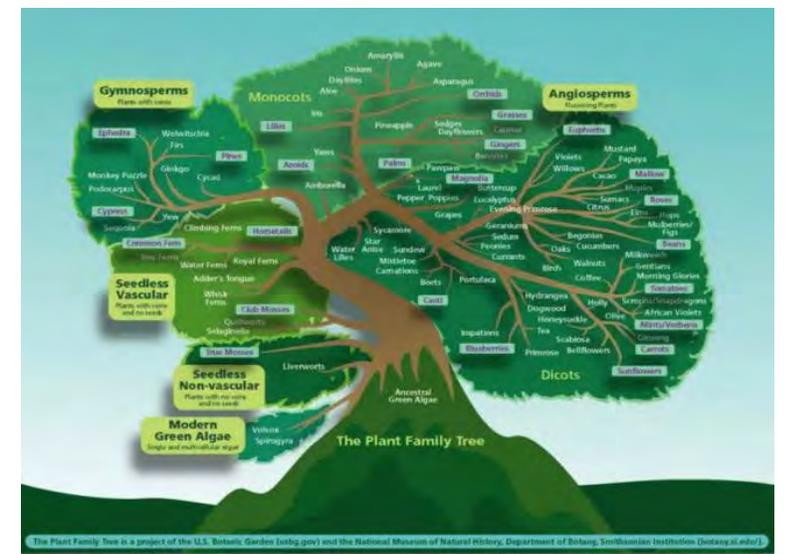
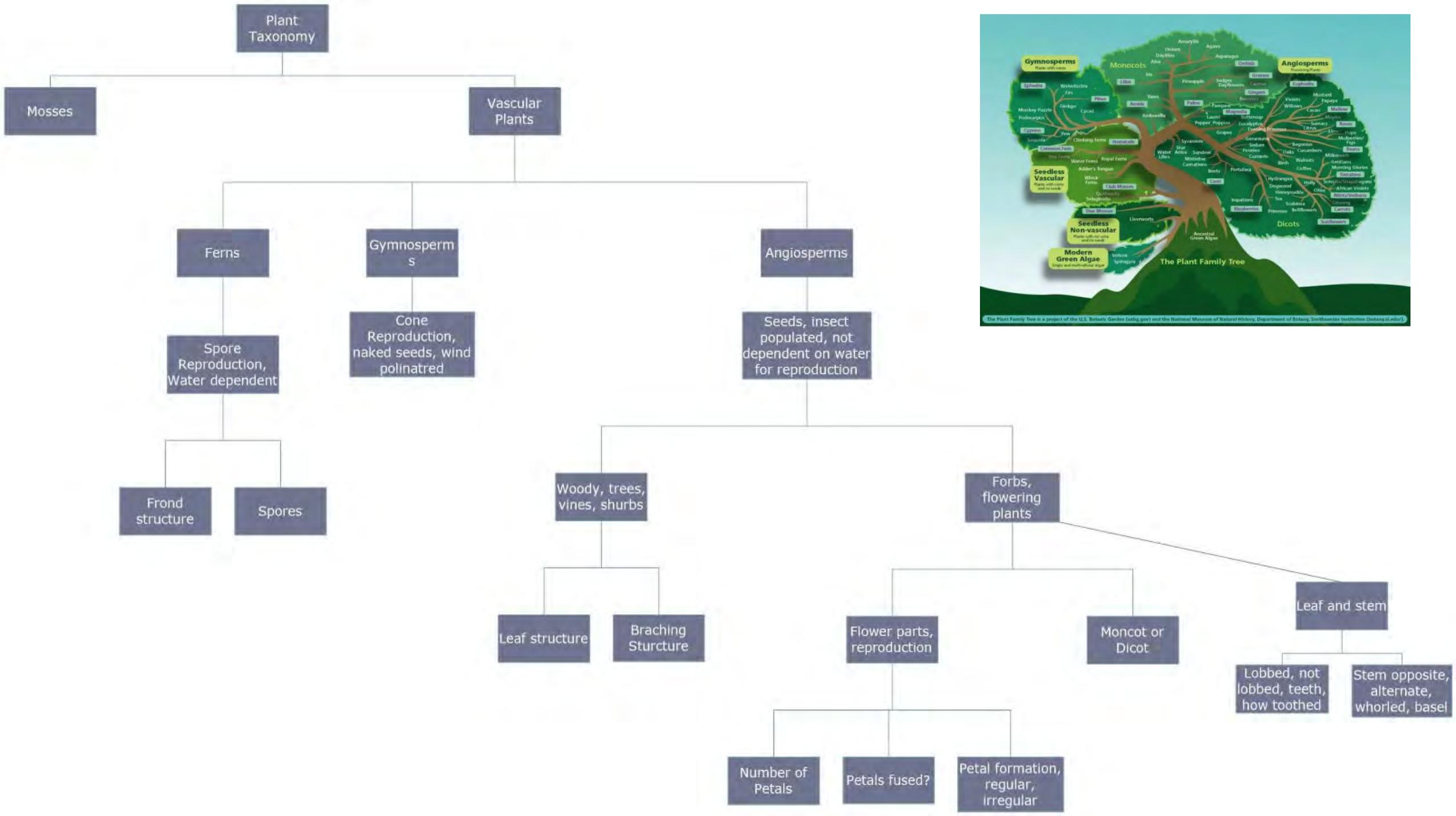




Fern Reproduction



Ferns alternate generations as part of their life cycle.
mariaflaya/Getty Images



Gymnosperms Reproduction via Cones

Male vs. Female Cones

Male cones release pollen; female cones bear seeds on exposed scales.

Wind Pollination

Cone architecture maximizes pollen capture and protects developing seeds.

Ecological Success

This strategy helped pines and firs thrive across forests for millennia.



Pines, Firs, Spruces, Cedars, Larches, Redwoods, Hemlocks, Yews, Cypressess

Angiosperms -Seed-Based Reproduction

Strategies, structures, and ecological significance

Seed reproduction—hallmark of angiosperms—unites gametes within a **protective seed coat, enabling dispersal and survival**. Seeds differ in size, dormancy, **and dispersal methods (wind, animals, water)**. **Flowers and fruits elevated success by attracting pollinators** and aiding spread. **Seed plants represent over 80% of terrestrial biomass and underpin agriculture, forestry, and biodiversity.**

Seed Structure

Seeds protect the embryo and store nutrients, ensuring survival through dormancy and harsh conditions.

Dispersal Methods

Seeds spread via wind (dandelion), animals (berries), and water (coconut), increasing range and survival.

Dormancy in temperate zones

Dormancy delays germination until favorable conditions arise, enhancing persistence across environments.

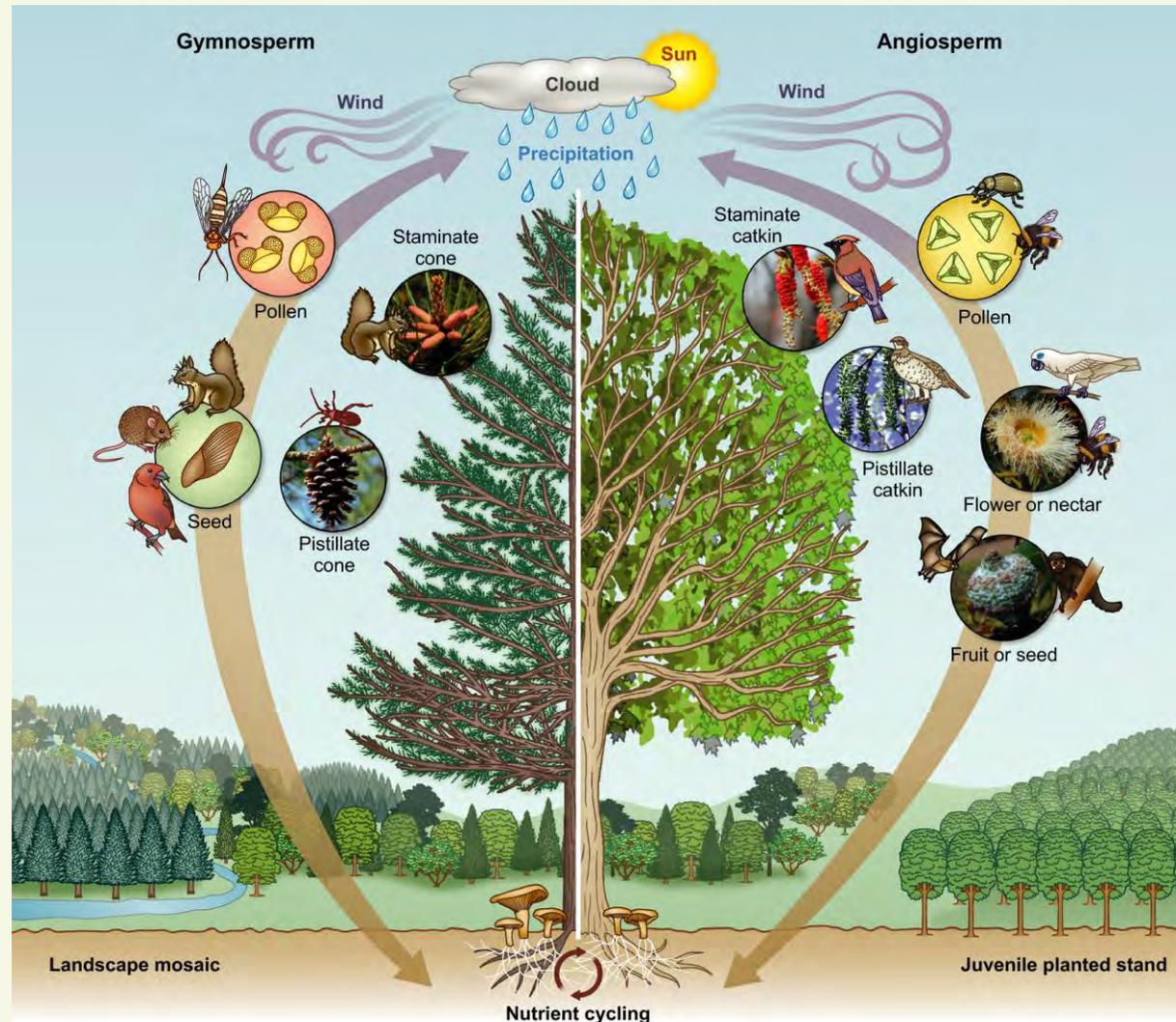
Flower Evolution

Flowers attract **pollinators**, boosting genetic diversity and reproductive efficiency.

Fruit Function

Fruits encase seeds, aiding **dispersal** by enticing animals or enabling wind/water transport.

Woody Plants, trees, vines, shrubs - Seed Dispersal



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Monocots versus Dicots



Seed Leaves

Monocots have **one** cotyledon; dicots have **two** cotyledons.



Leaf Veins

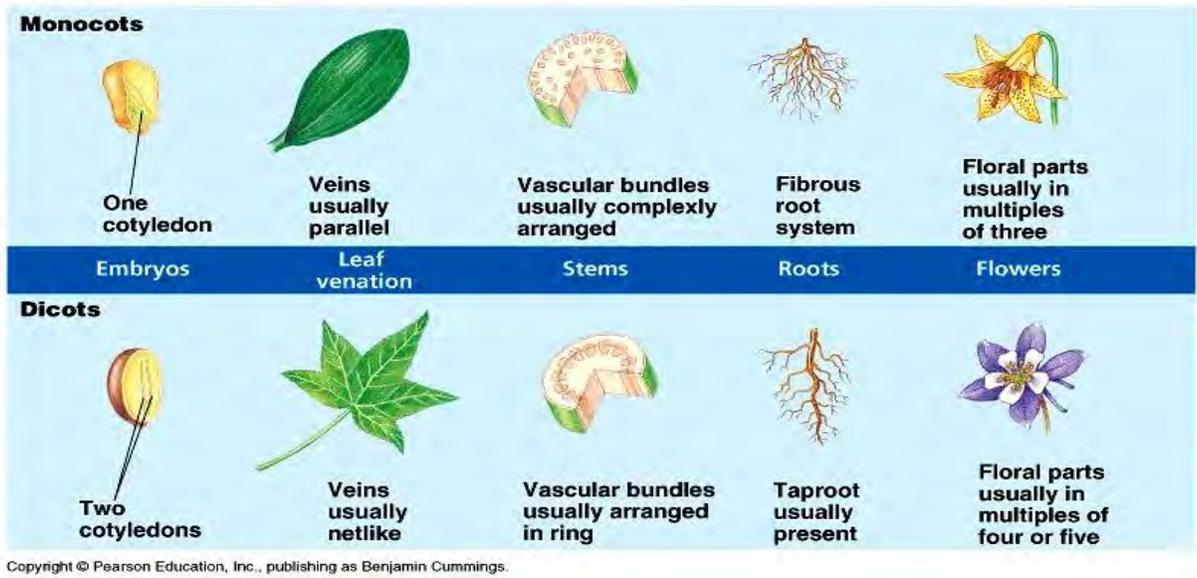
Monocots feature **parallel** veins; dicots display **net-veined** patterns.



Floral Structures

Monocot flowers are in multiples of **three**; dicot flowers are in multiples of **four or five or more**.





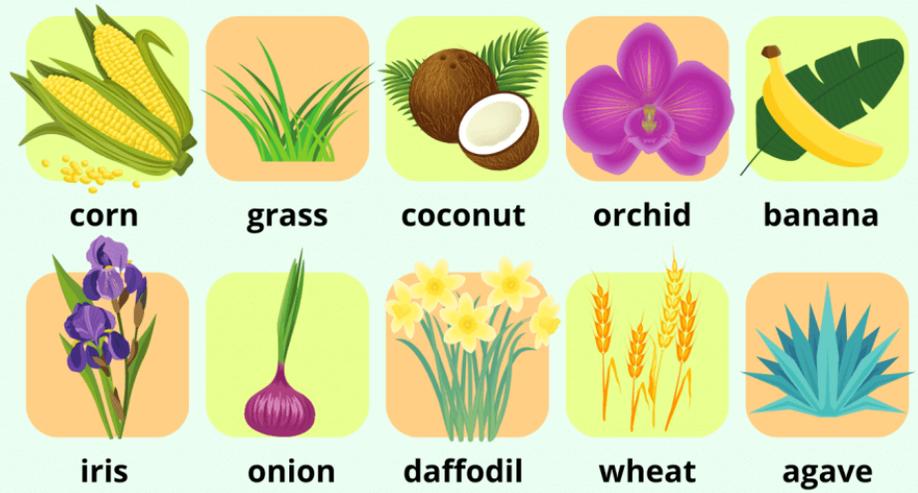
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10 Examples of Dicots



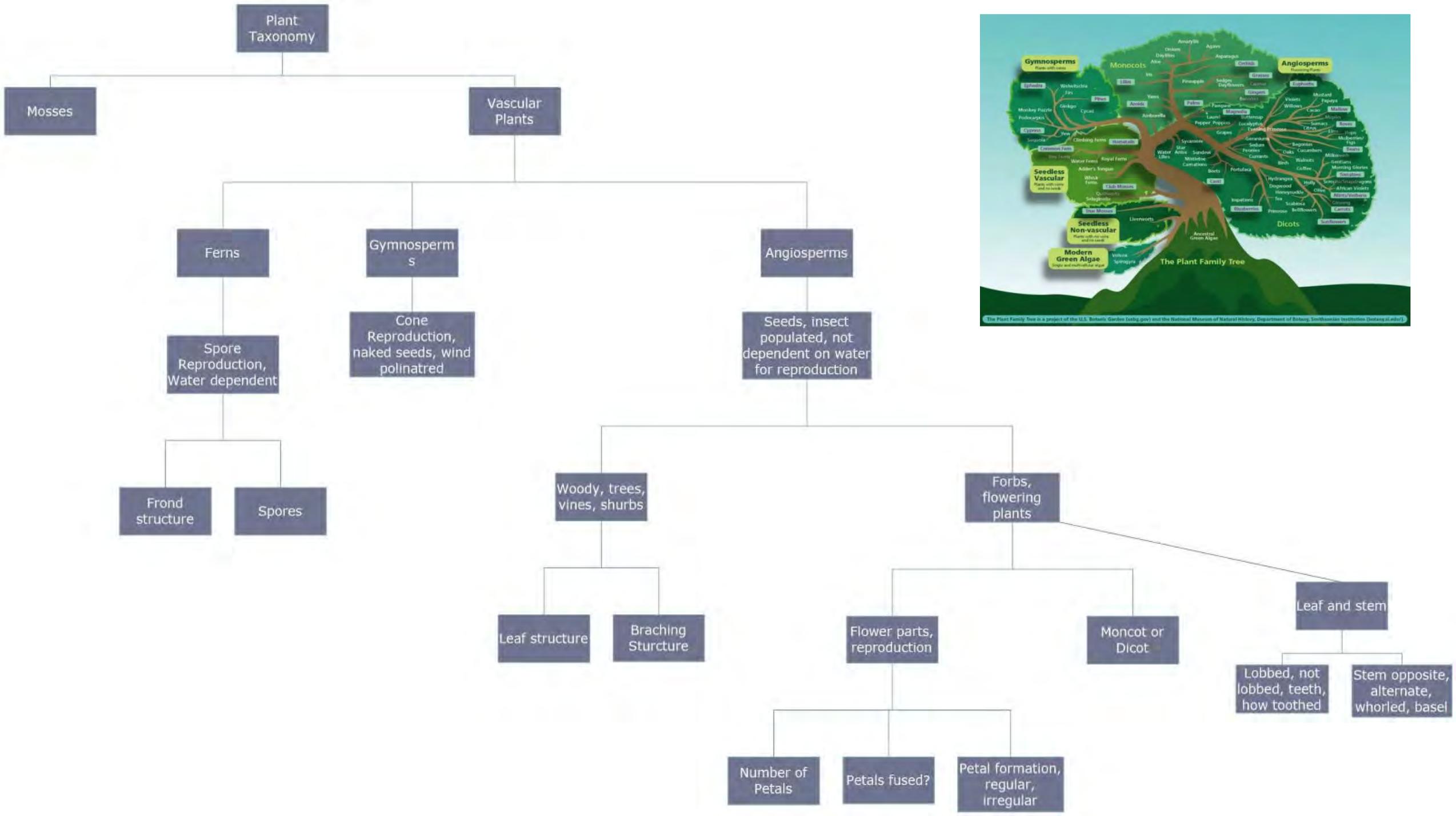
sciencenotes.org

10 Examples of Monocots



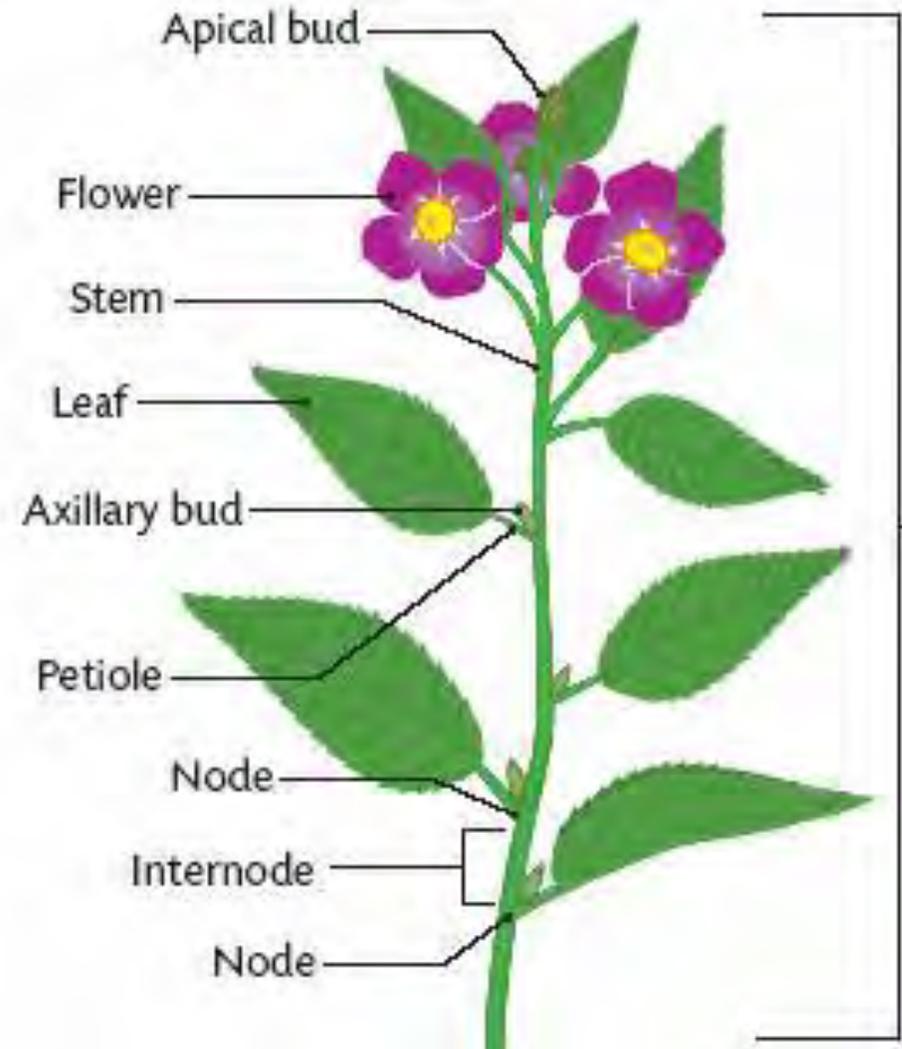
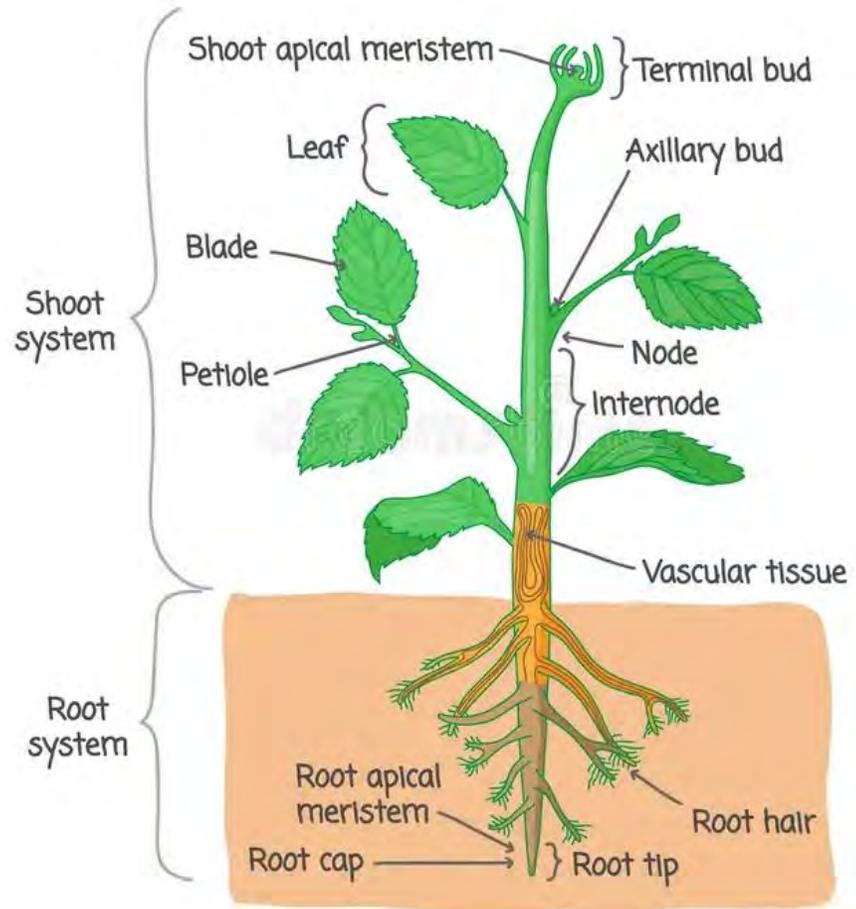
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Stems and Leaves

VASCULAR PLANT

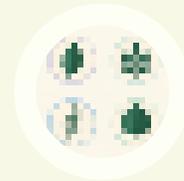


Leaf Basics and Variations



Simple Leaves

Single, undivided blade.



Compound Leaves

Blade divided into leaflets.

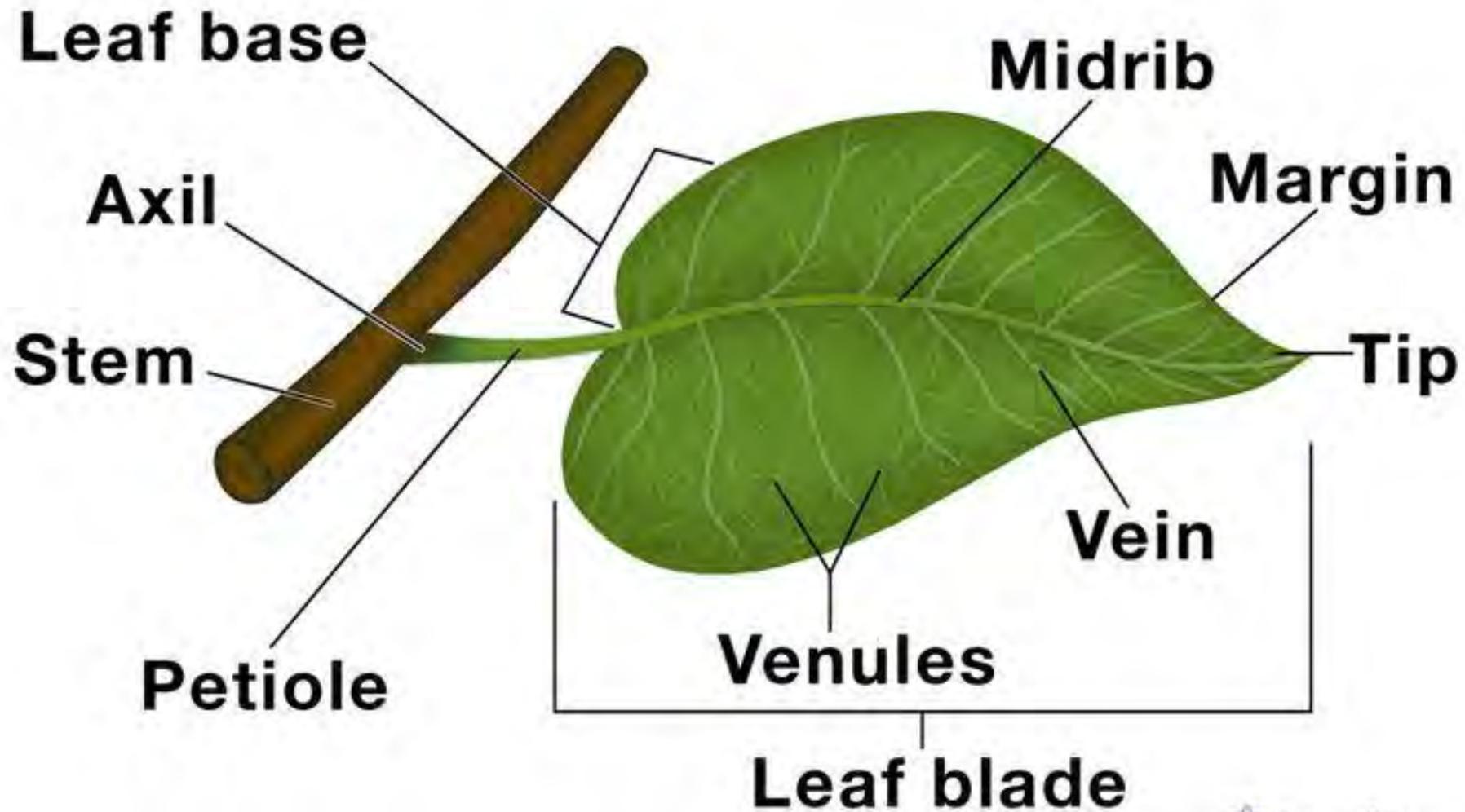


Needle-like Leaves

Thin, narrow shape. Minimizes water loss, common in conifers and dry/cold environments.

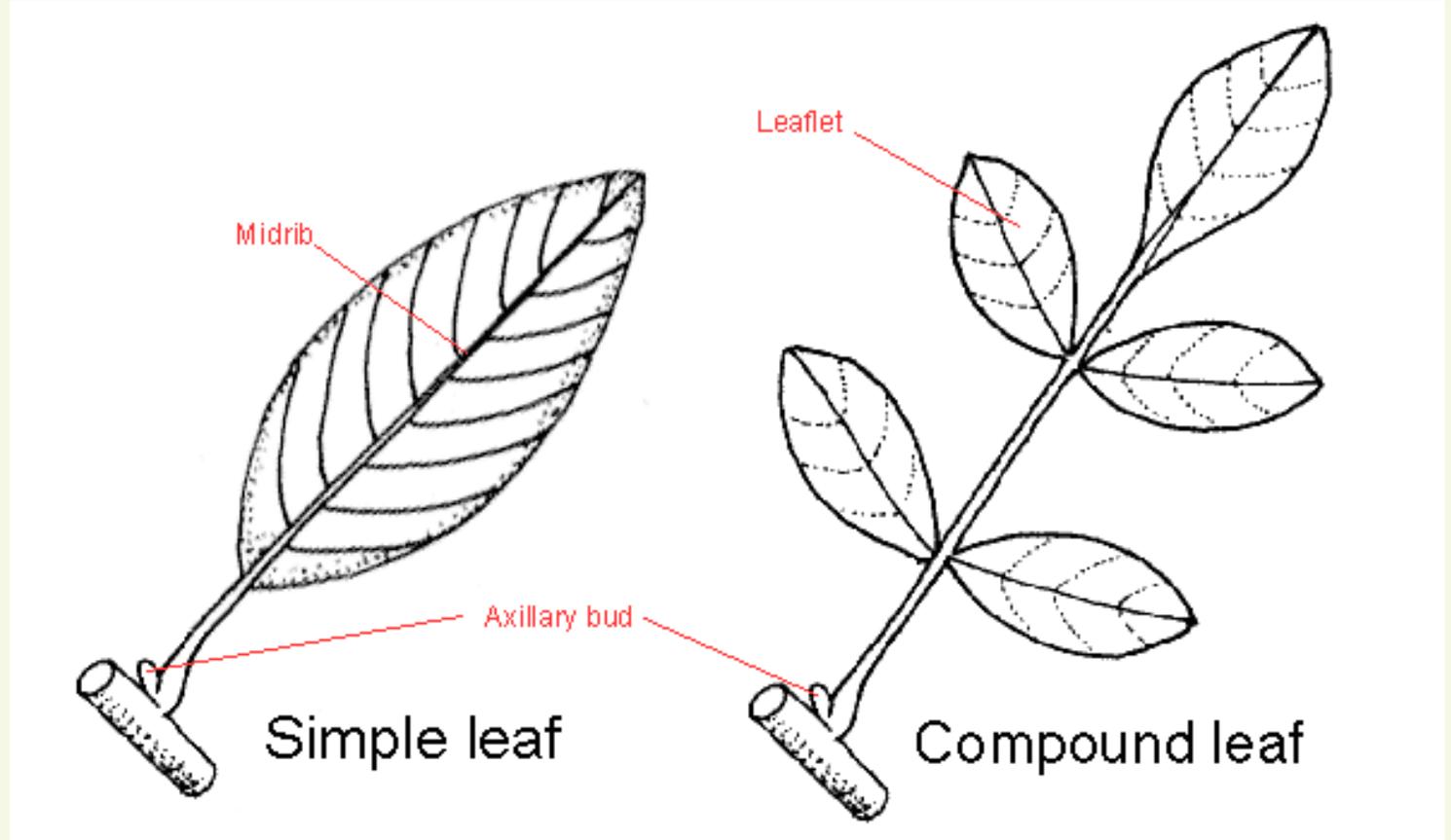
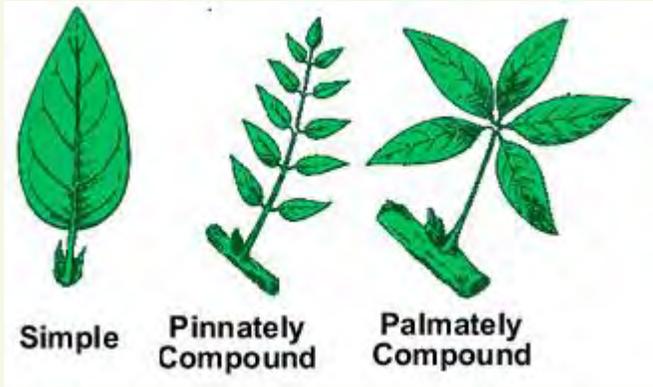


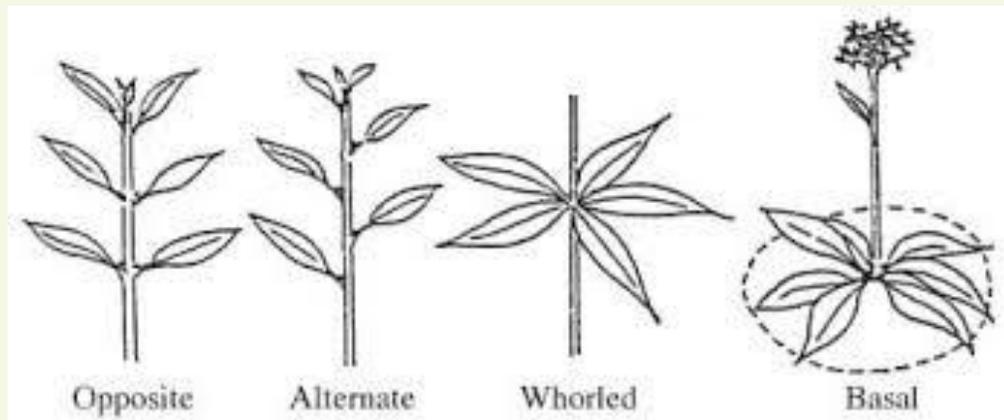
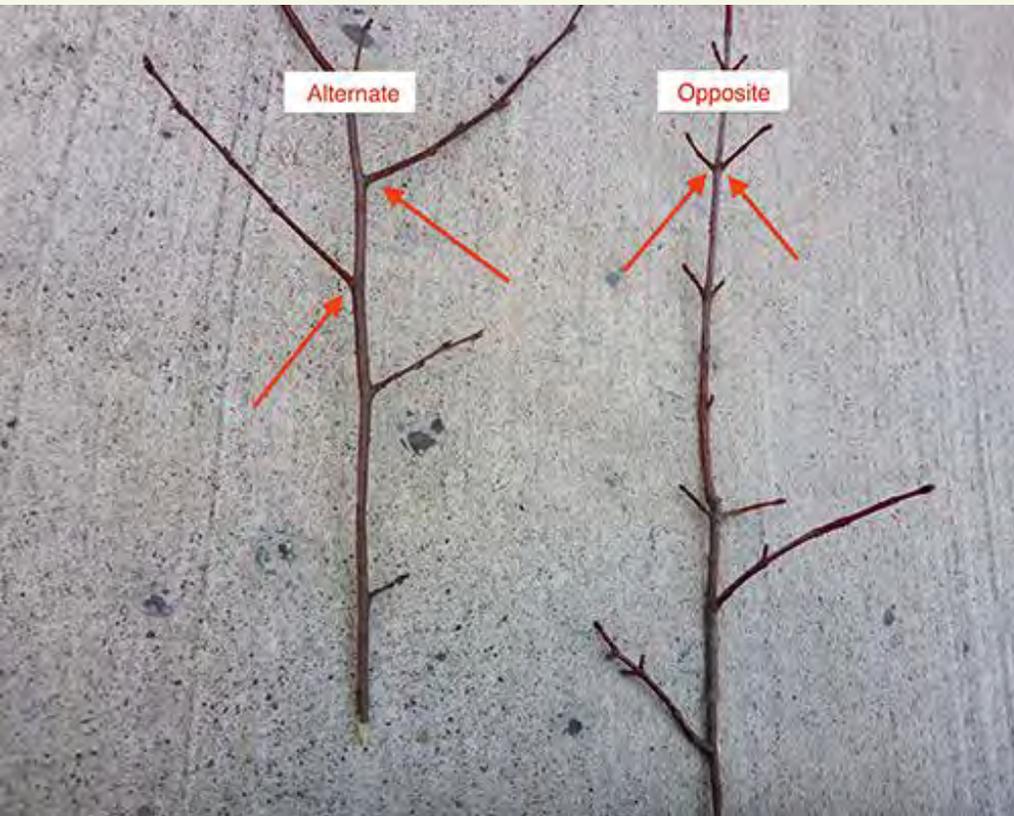
Parts of a Leaf



Leaves







Flower Symmetry



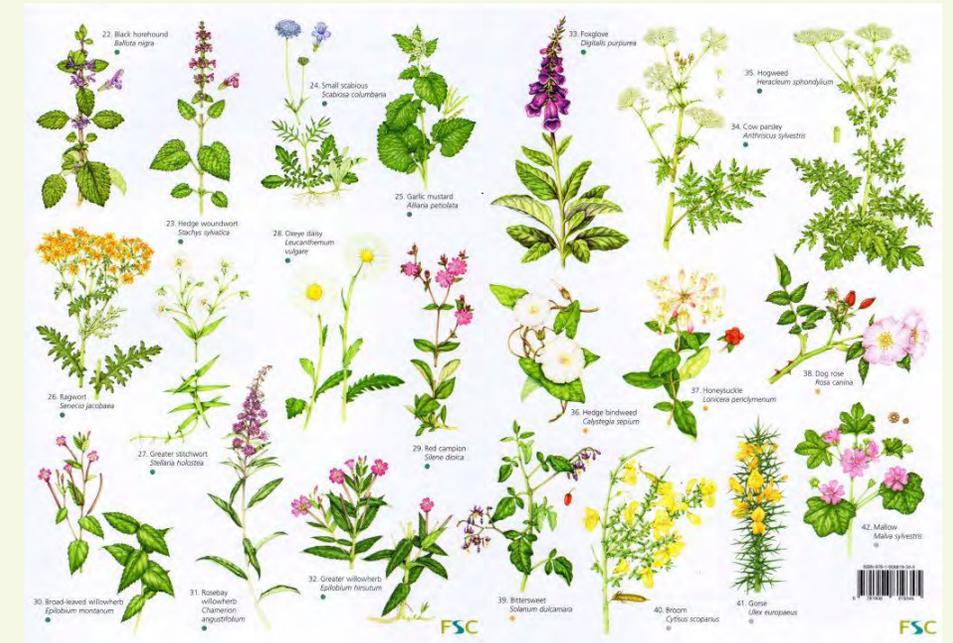
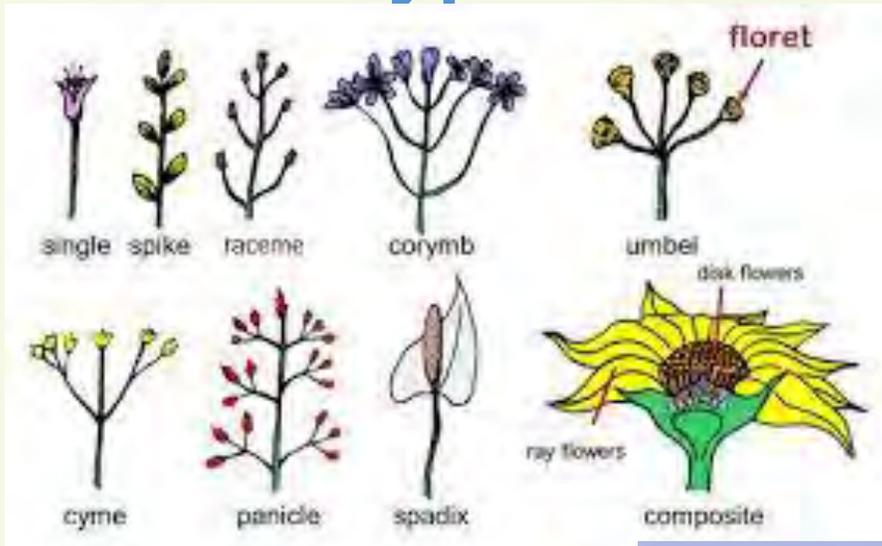
White Avens, *Geum canadense*, has a regular flower. It looks like a wheel or star when viewed face on. It is also called radially symmetrical (with multiple lines of symmetry) or actinomorphic.



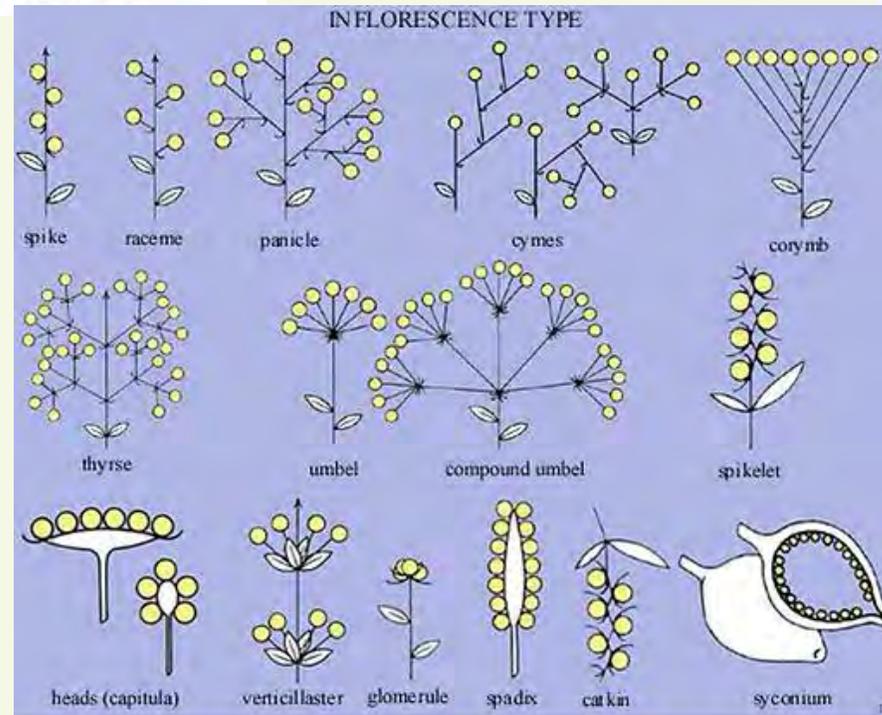
Spotted Jewelweed, *Impatiens capensis*, has an irregular flower. It is bilaterally symmetrical: only one line can be drawn through its face to create similar halves. Irregular flowers are also called zygomorphic.



Flower Types



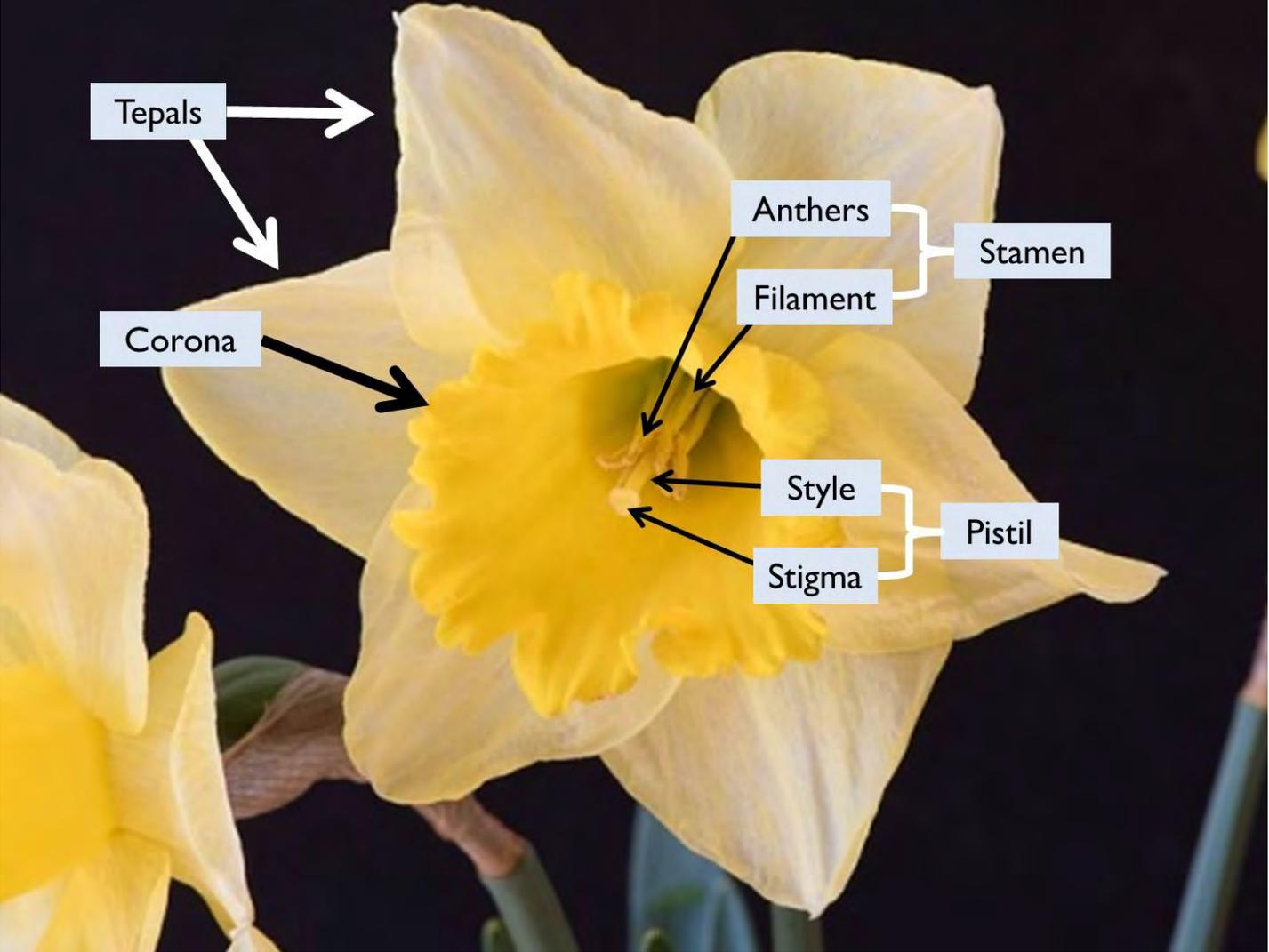
Colorado State University Extension



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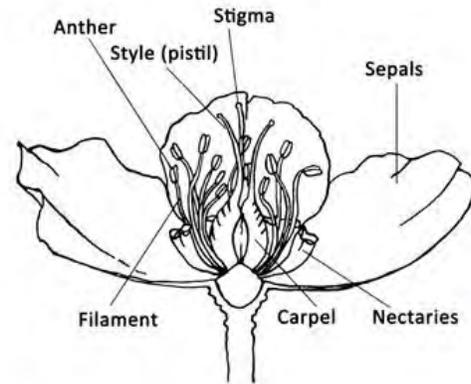
Rich Baer, Master Rosarian and Botanist,
Portland Rose Society
This article was originally published in *The Portland Rose Chatter*, February 2021.

Flower Types



Flower Types

Hellebores: Basic Parts!



A few key features:

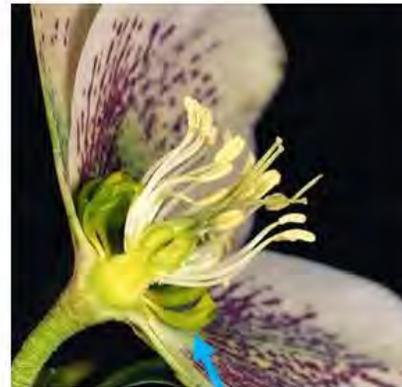
- Sepals are showy (look like petals)
- Petals modified into tubular nectaries
- Many, many stamens
- Pistil is of several separate carpels

Photos from:
<https://helleborus.de/en/plant-facts/botany/>

Illustration from: Rice, G. and E. Strangman. 1993. The Gardener's Guide to Growing Hellebores, Timber Press, Portland.



Petals! (nectaries)



Petals! (nectaries)



These inflated structures (seen later in the spring) are the maturing carpels or fruits. When mature, they are a dry fruit type called a follicle.

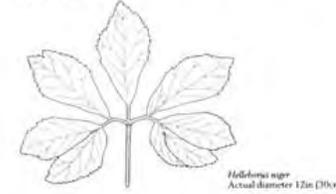
Flower Types

Christmas rose (*Helleborus niger* &/or *Helleborus niger* 'Jacob')



A few key features:

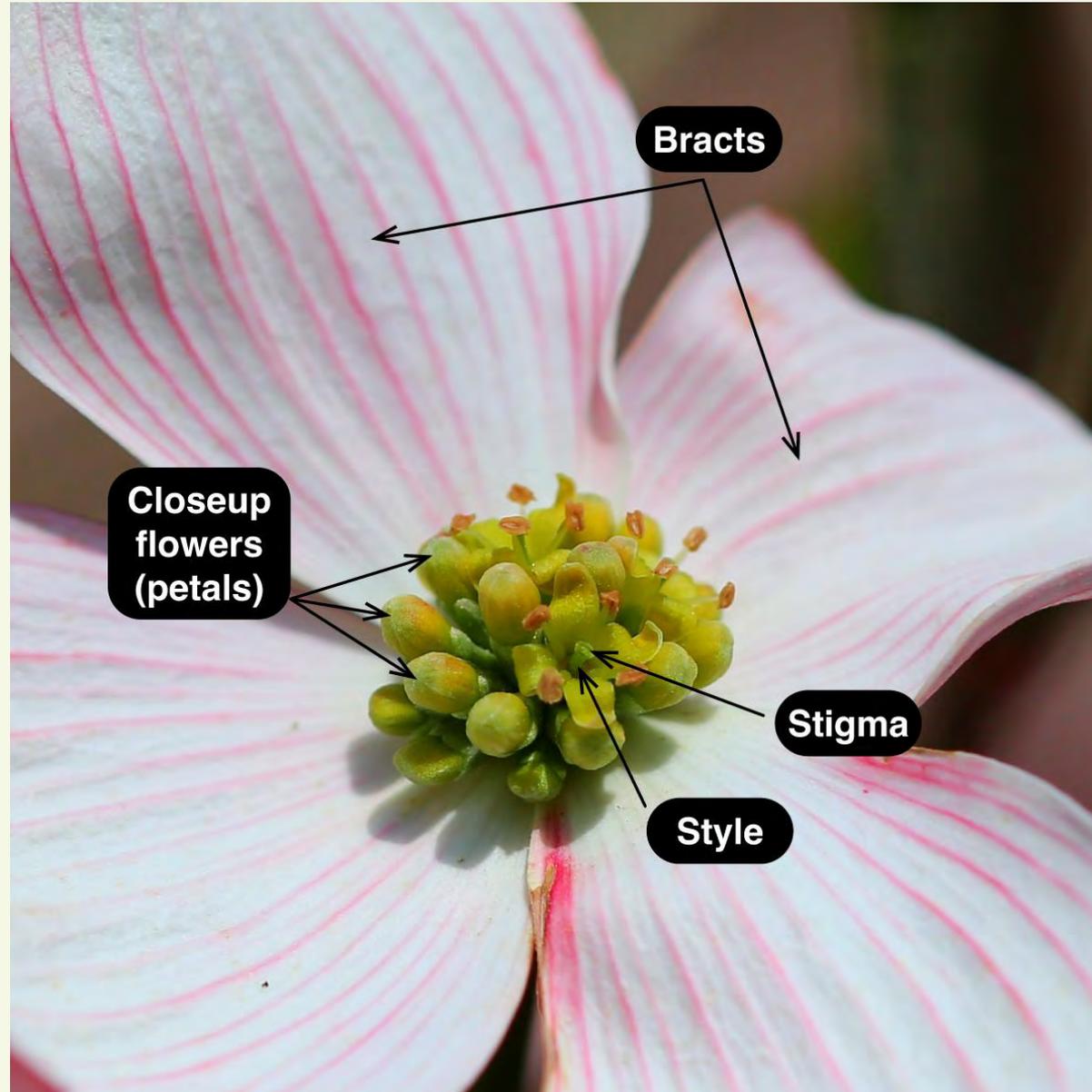
- Leaves deeply divided, appear compound
- Flowering stalks usually unbranched
- Flowers usually solitary
- Sepals bright-white to pale-purple in color



Cultivar *H. niger* 'Jacob'



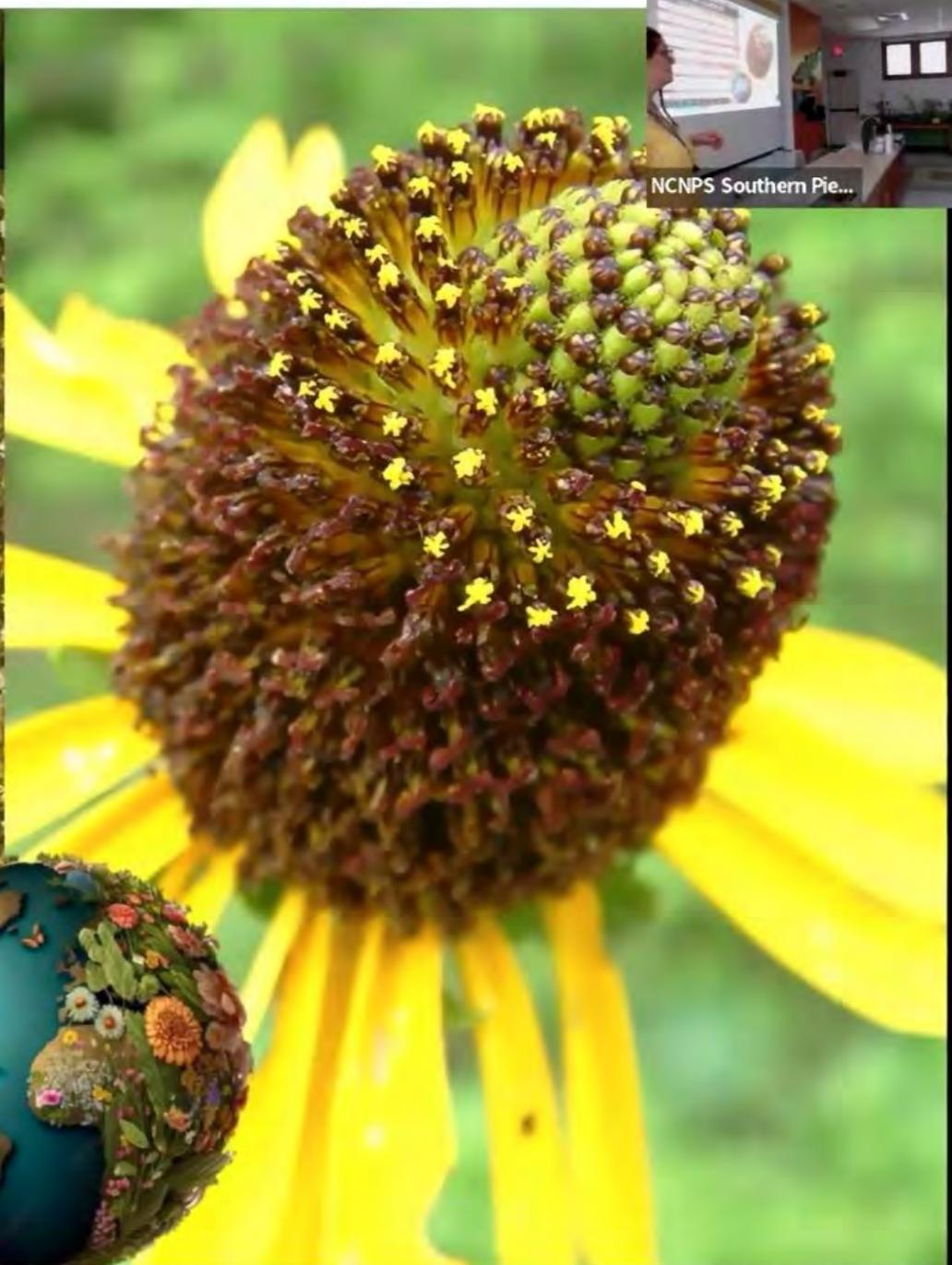
Flower Types

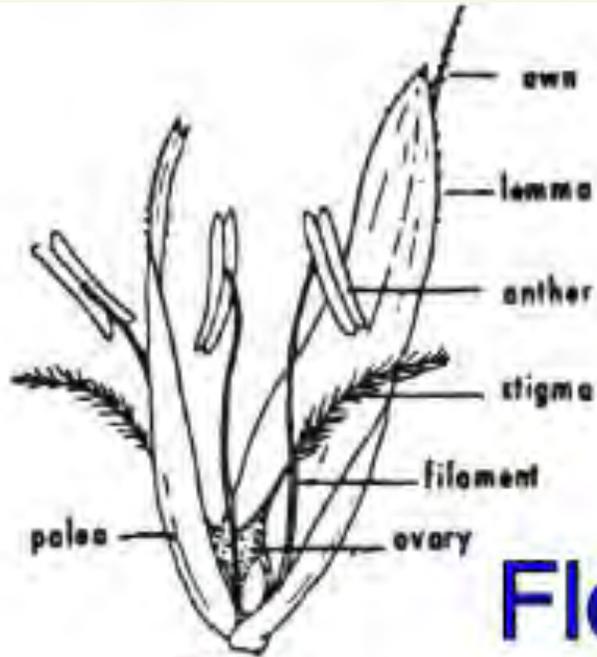


The Flowering Dogwood Flowers. [Dogwood Flower](#) by [SETShots](#), adapted by [Fanshawe College](#), CC BY-NC 2.0. [Click to enlarge]

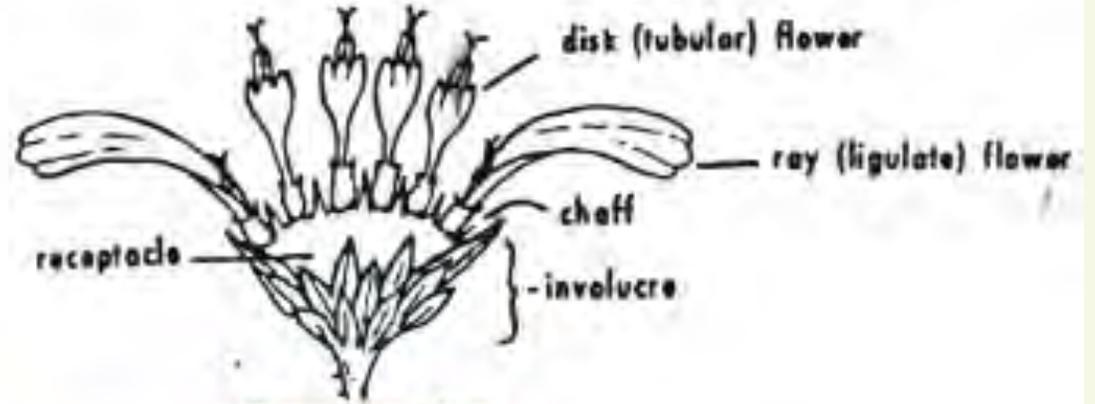
ASTERS BY THE NUMBERS

- Largest Plant family in the world (Orchidaceae may be #1)
- 33,000 +/- species in 1900 genera worldwide
- 10% of the all flowering plant species worldwide
- On every continent, but the inhospitable Antarctica
- Fossil record (pollen) dates to the Cretaceous, 75-89 mya
- In US, 2400 +/- species (Almost all herbaceous)
- In the Carolinas, 575 +/- species (Approx. 15% of all flowering plants in flora)
- 80+ of the 575 above are naturalized non-natives



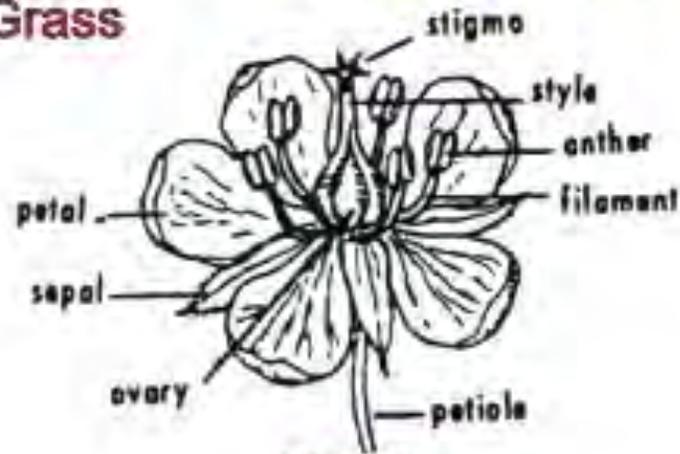


Grass



Composite

Flower Anatomy



Simple

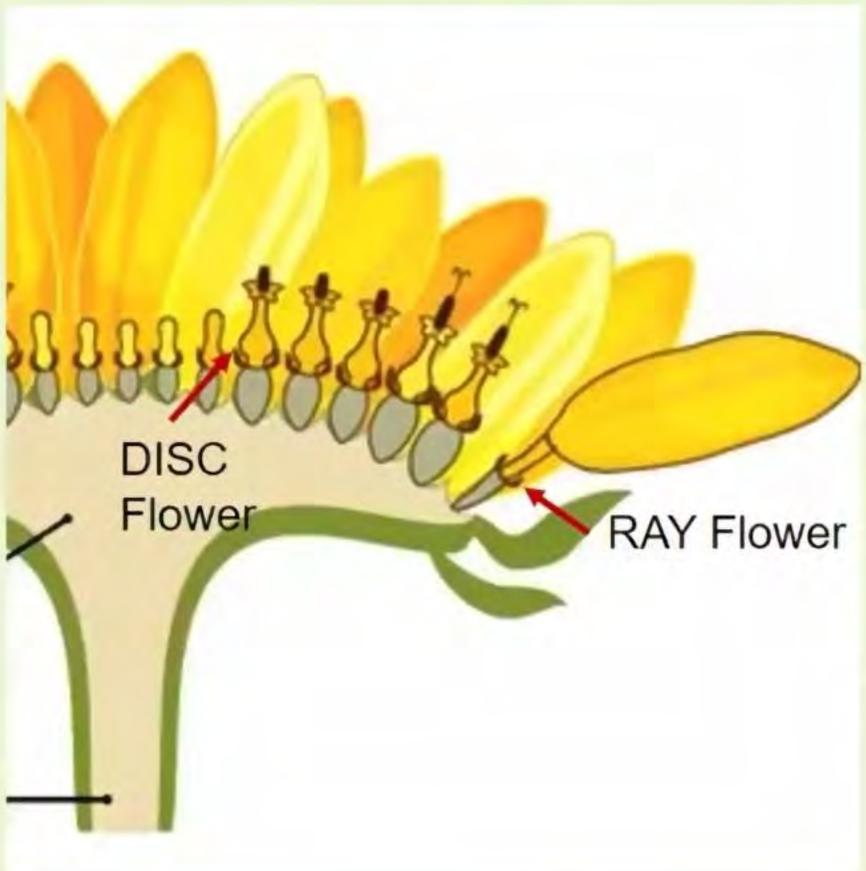


Leguminous

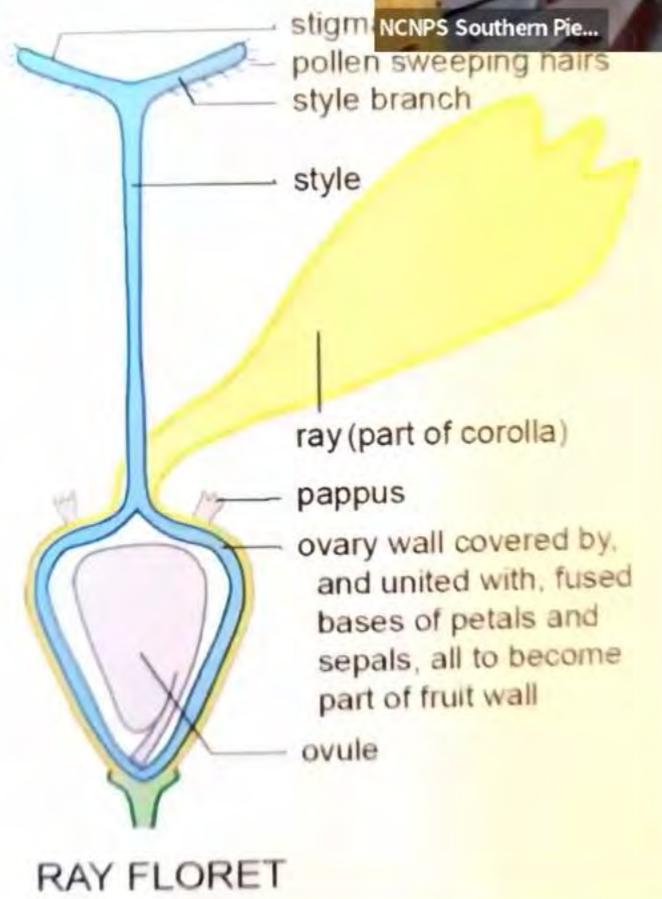
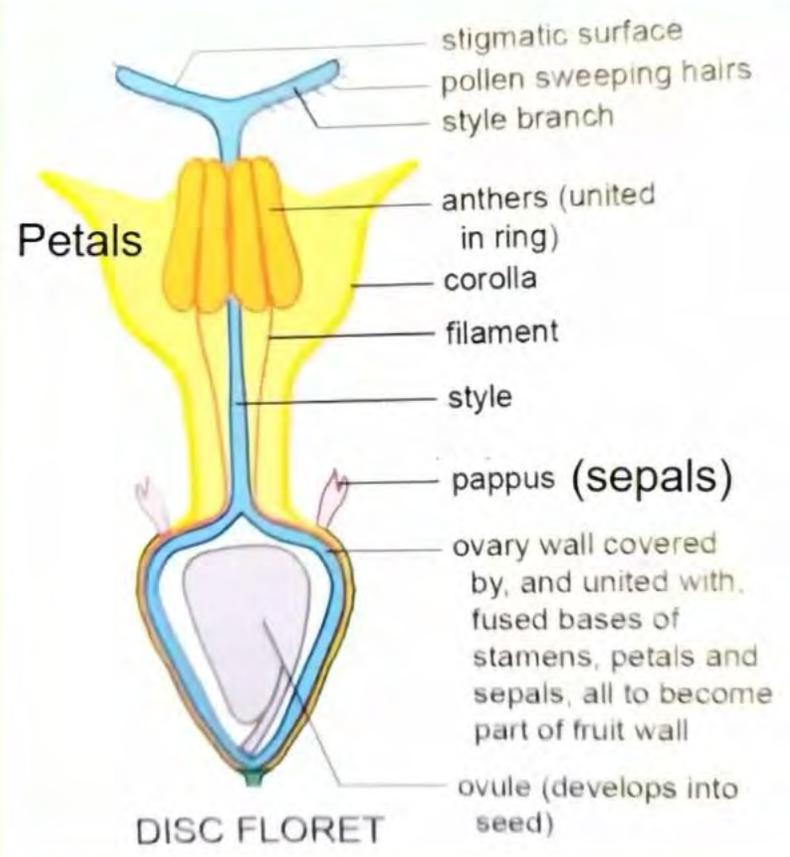


RA

NCNPS Southern Pie...

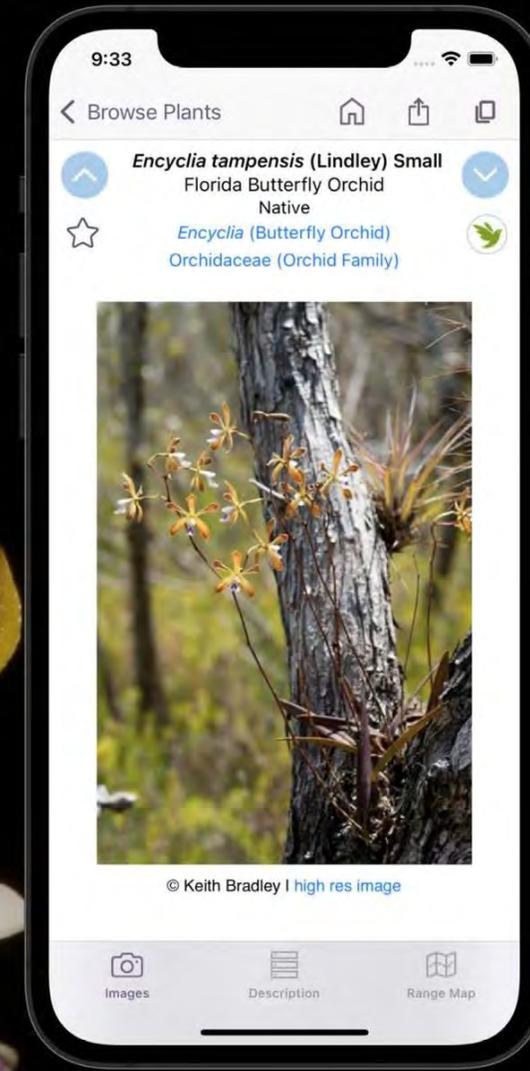
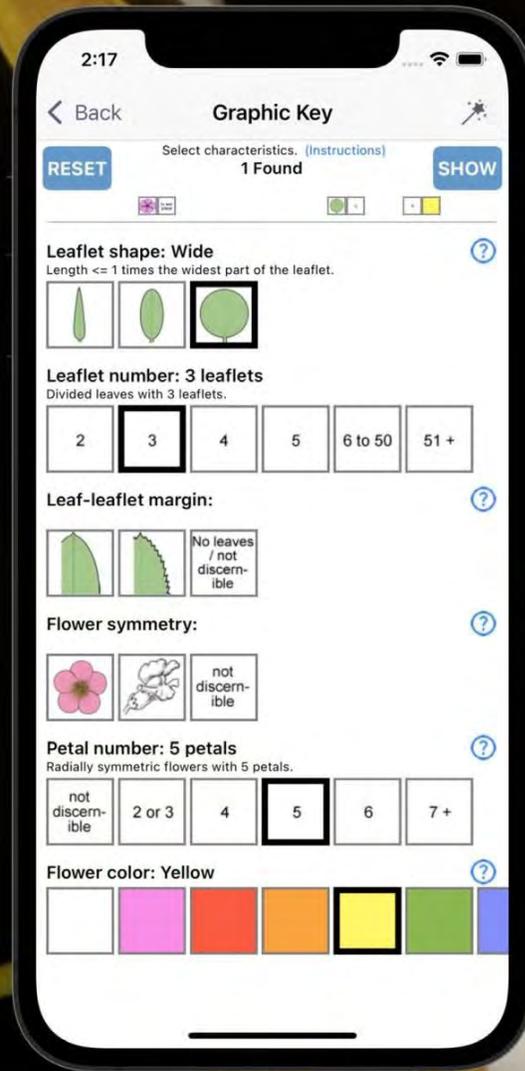
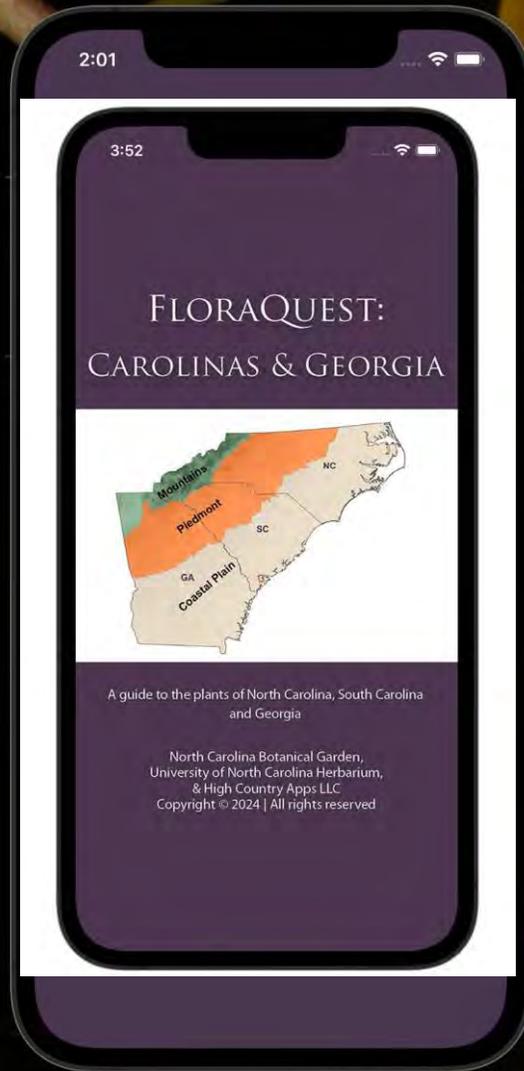


DISC



RAY FLORET

Floret diagrams from ©The Sunflower Family by Spellenburg and Zucker



THE THREE CLASSIFICATIONS

1	FLOWER TYPE	Irregular Flowers	1	
		2 Regular Parts	2	
		3 Regular Parts	3	
		4 Regular Parts	4	
		5 Regular Parts	5	
		6 Regular Parts	6	
		7 or More Regular Parts	7	
		Parts Indistinguishable	8	
2	PLANT TYPE	Wildflowers	No Apparent Leaves	1
			Basal Leaves Only	2
			Alternate Leaves	3
			Opposite or Whorled Leaves	4
3		Shrubs	5	
		Vines	6	
4	LEAF TYPE	No Apparent Leaves	1	
		Leaves Entire	2	
		Leaves Toothed or Lobed	3	
		Leaves Divided	4	



Identifying Plants

Check out these great resources:

Tree Finder and *Fern Finder*
Any favorite wildflower guide
Newcomb's Wildflower Guide
The Plant Gallery at ncwildflower.org

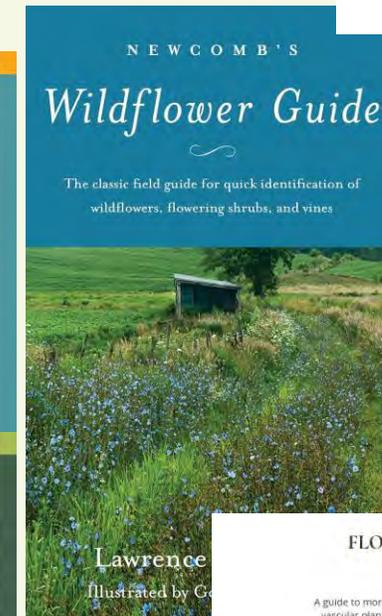
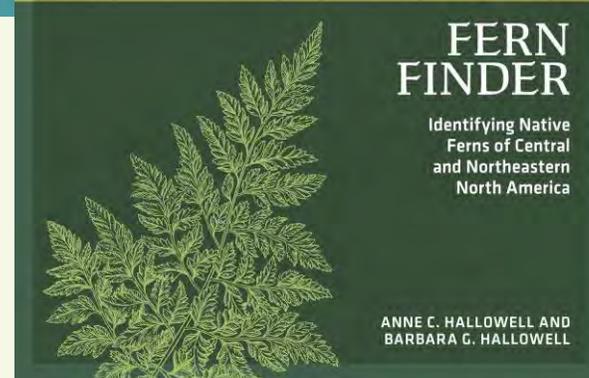
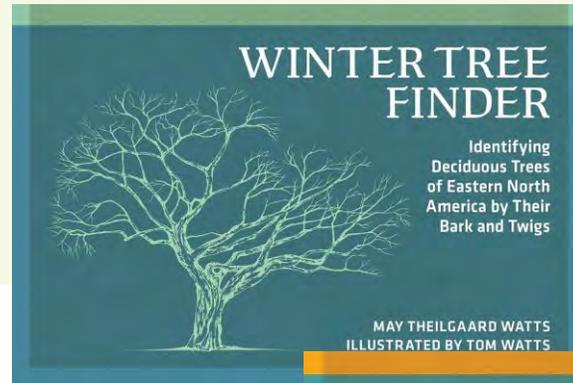
– lists if it's a NC native plant

[Name that Plant](#) web site

iNaturalist app

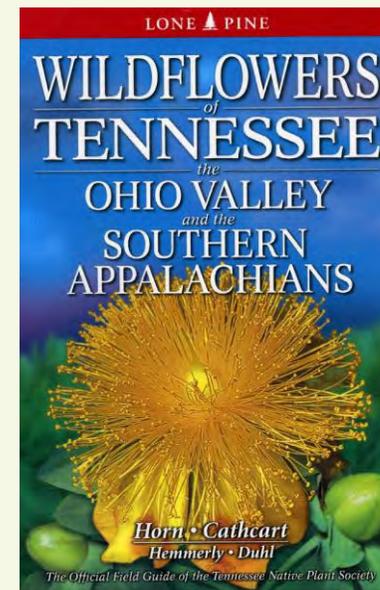
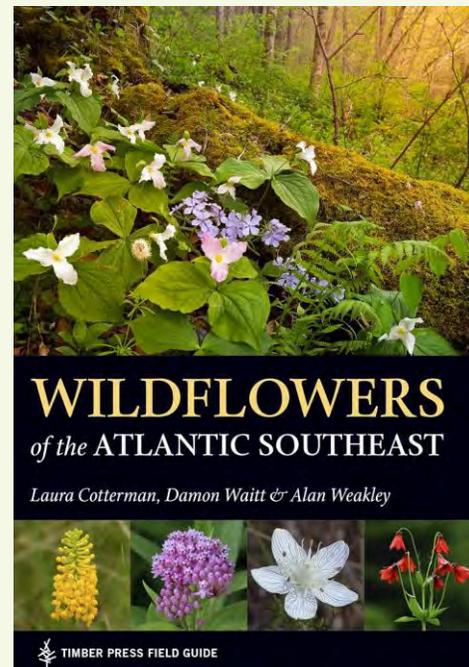
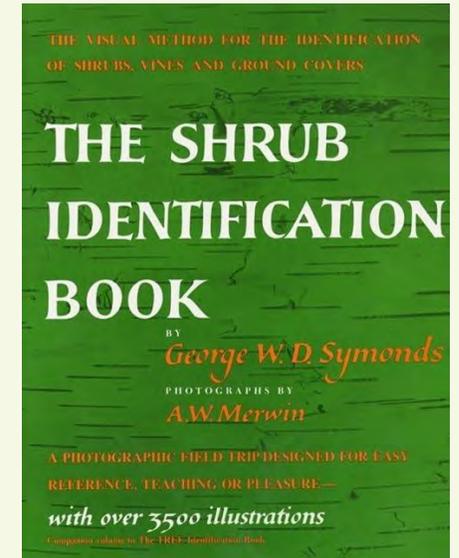
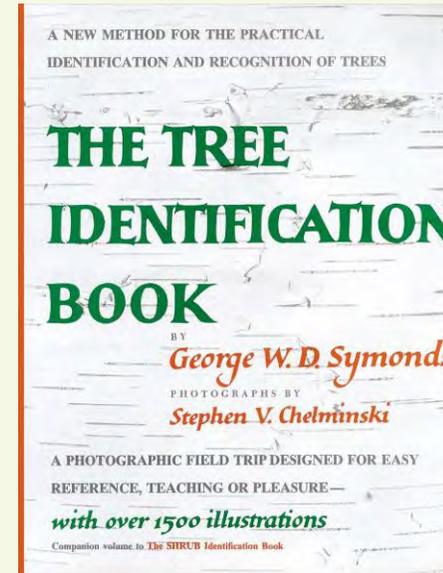
FloraQuest

Land of the Sky Chapter meetings,
classes, and walks



More Books

- The Tree Identification Book by George W. Symonds
- The Shrub Identification Book by George W. Symonds



More Resources

- Botanical Terms <https://www.namethatplant.net/glossary.shtml>
- Asters. Video NCNPS https://www.youtube.com/watch?v=CxiOnoS_MFk&t=3712s
- Botany Basics The explanation starts at 15:57 minutes in and goes to 22.00.
<https://www.youtube.com/watch?v=qK1vcqkGPLU>