

Welcome!

# Basic Botany & Plant ID

Wild Ginger Community Herbalism Program

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# Basic Botany and Plant Identification

- Botany in context
- The big picture
- Flower parts and variations
- Observing leaves, inflorescences, fruits, etc.
- Using a key
- A few major plant families



# What is botany?

- Botany is the study of plants, including many disciplines:
  - Taxonomy / classification
  - Anatomy and physiology
  - Pathology
  - Biochemistry
  - Ecology and community relationships

# Botany in context: Why botany is BS

- It's a narrow view of the world of plants
- Reduces plants to chemicals, structures, behaviors, and commodity potential
- Invalidates indigenous knowledge about plants
- It's tied to histories of white supremacy and colonialism





# Our Knowledge Is Not Primitive

Decolonizing Botanical Anishinaabe Teachings

Wendy Makoons Geniusz

# Botany in context: Why bother?

- Its language is incorporated into almost every written resource on plants
- In a globalized herbal community, it helps us to communicate about plants
- Identifying medicinal herbs is really important for herbalists, and botanical tools are readily available
- As with any messed up discipline, we can take what works and discard what doesn't



# How do we know plants?

- Observations of plants in their environments
  - How does the plant look, smell, taste, and feel?
  - How does the plant interact with other organisms?
  - How does the plant change through the year?
  - How can you relate to patterns you see through the year?
  - How does the plant vary from year to year? How is it responding to a changing climate?
  - What can plants tell us about our surroundings?

# How do we know plants?

- Stories and histories
  - Cultural histories and perceptions
  - Family experiences and stories
  - Socio-political histories and impacts of plants
- Relationships
  - Our own and others'
  - Intentional and accidental
  - Individual and cultural



# How do we know plants?

- Meditation and open listening
- Communicating with plants
- Intuitive learning

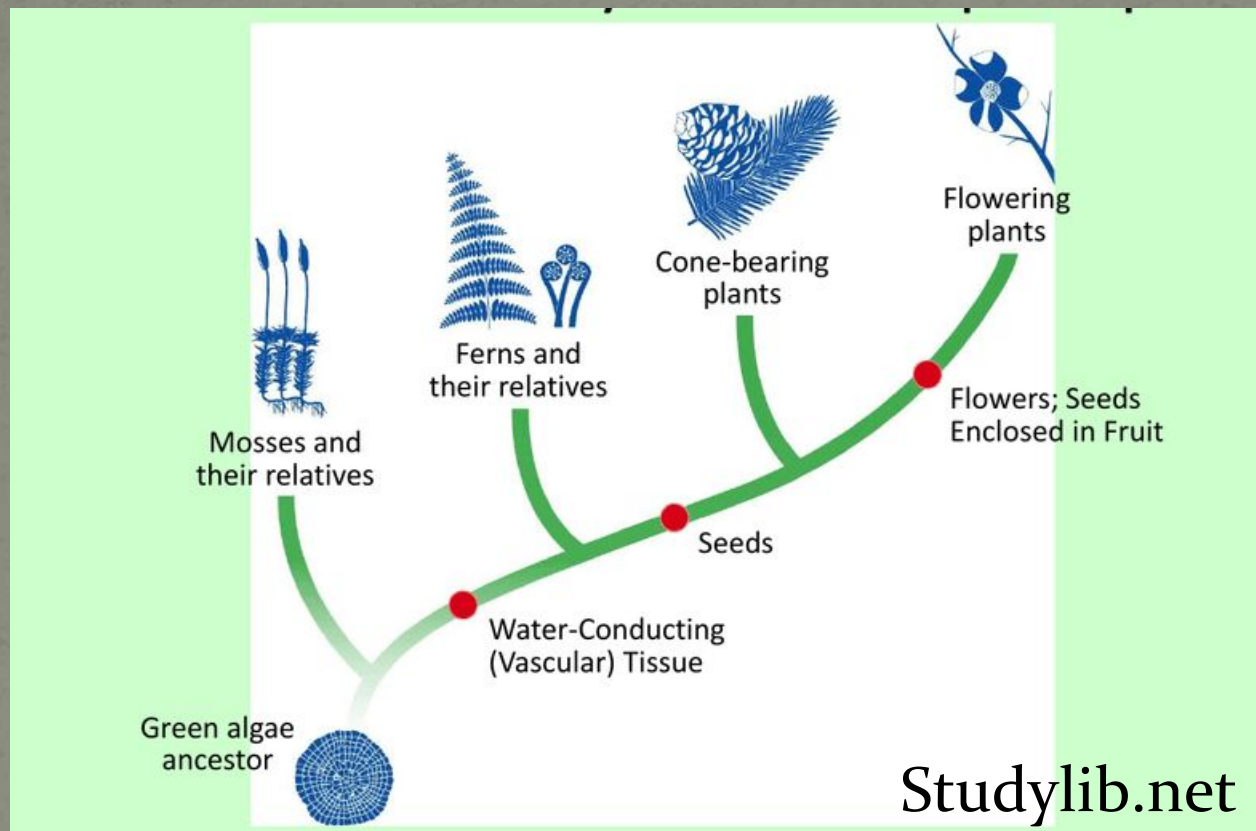
# Everything else

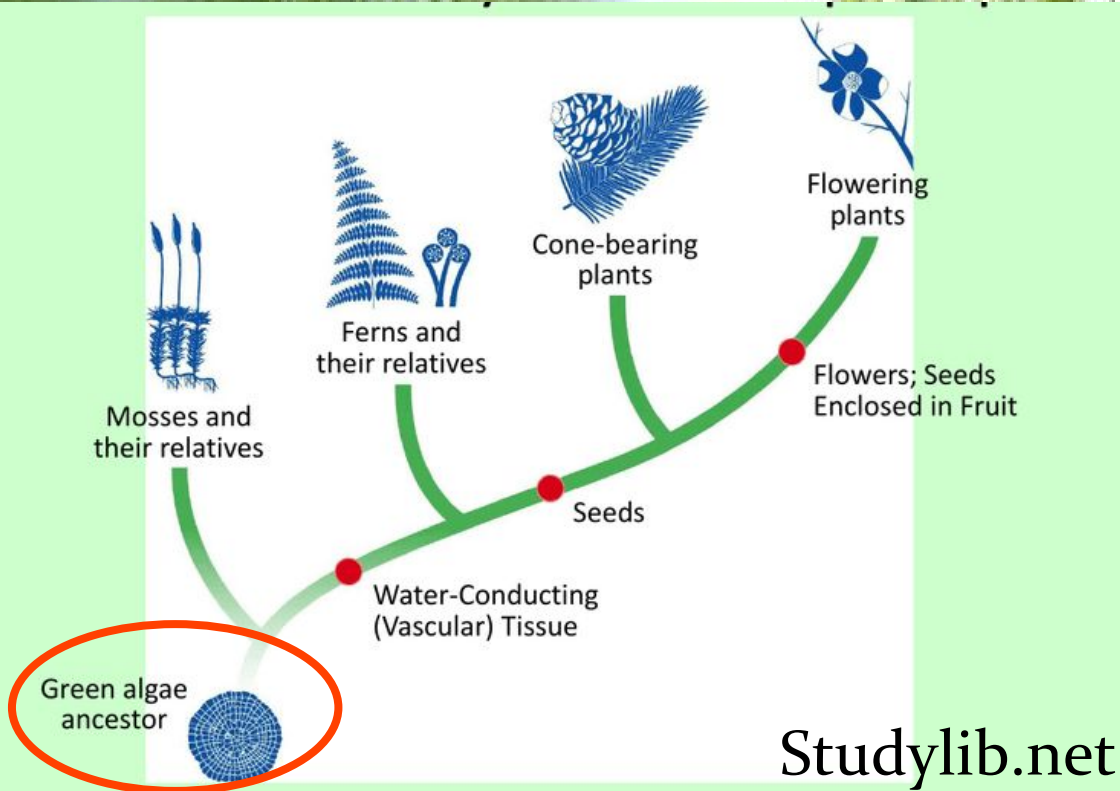
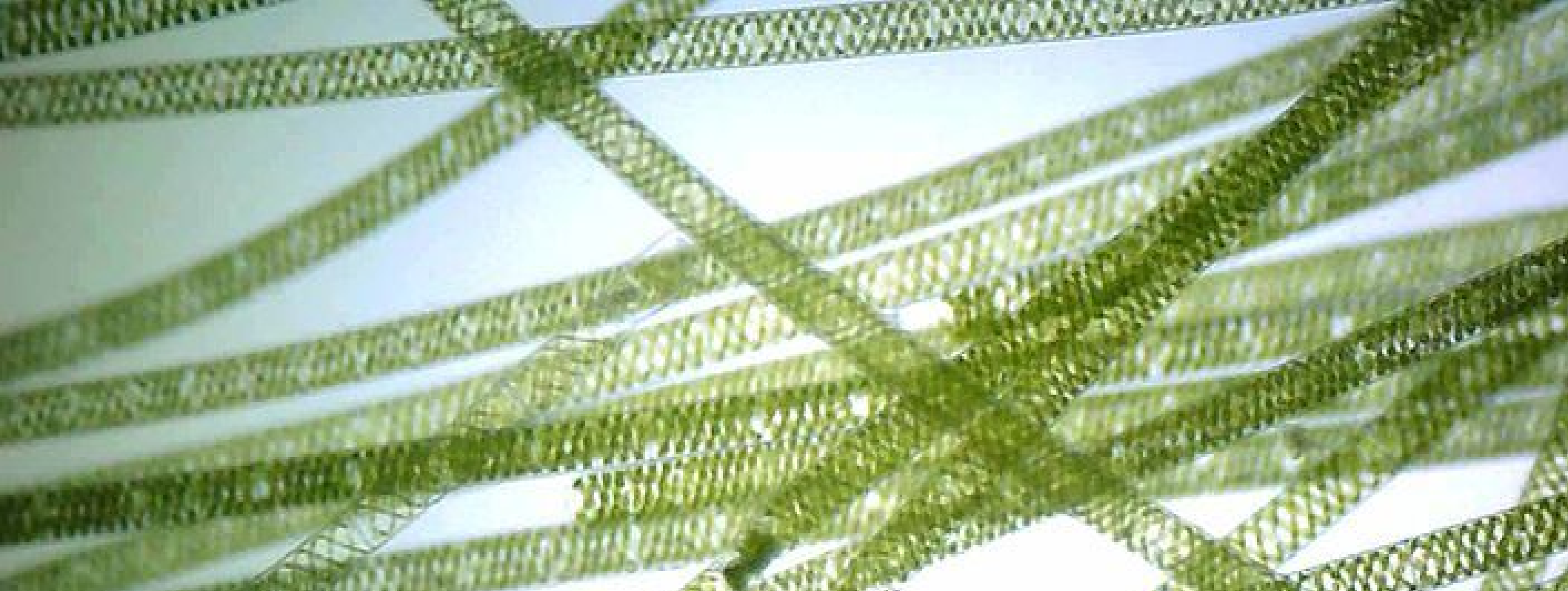
## Botany



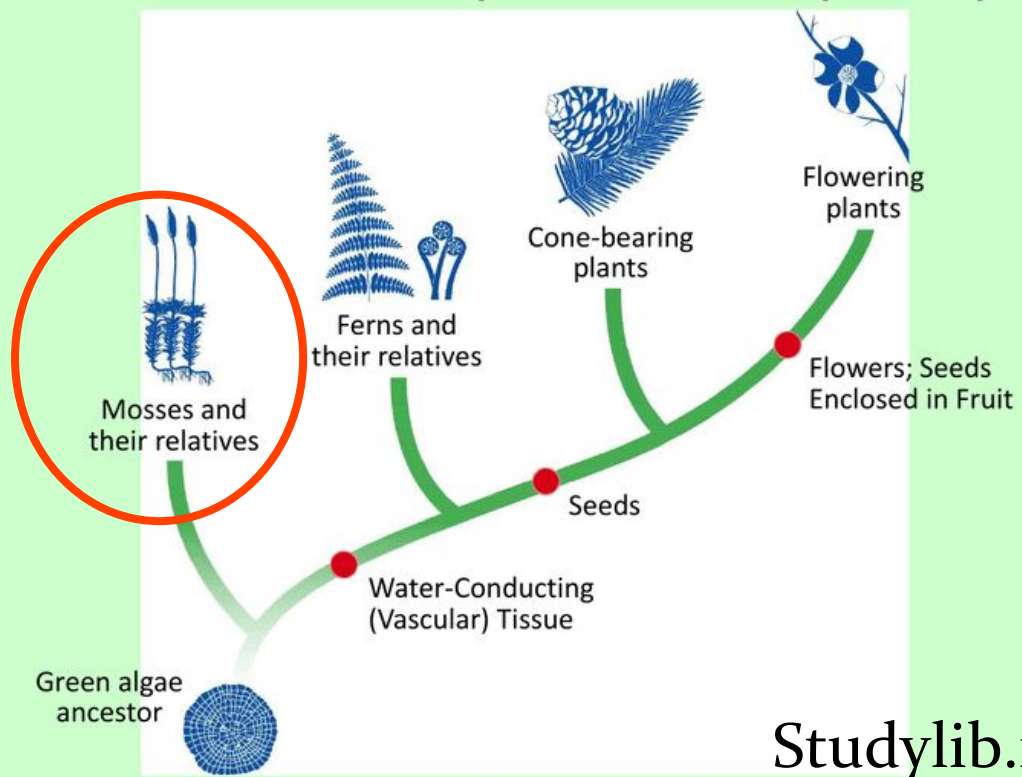


# Botanical classification system

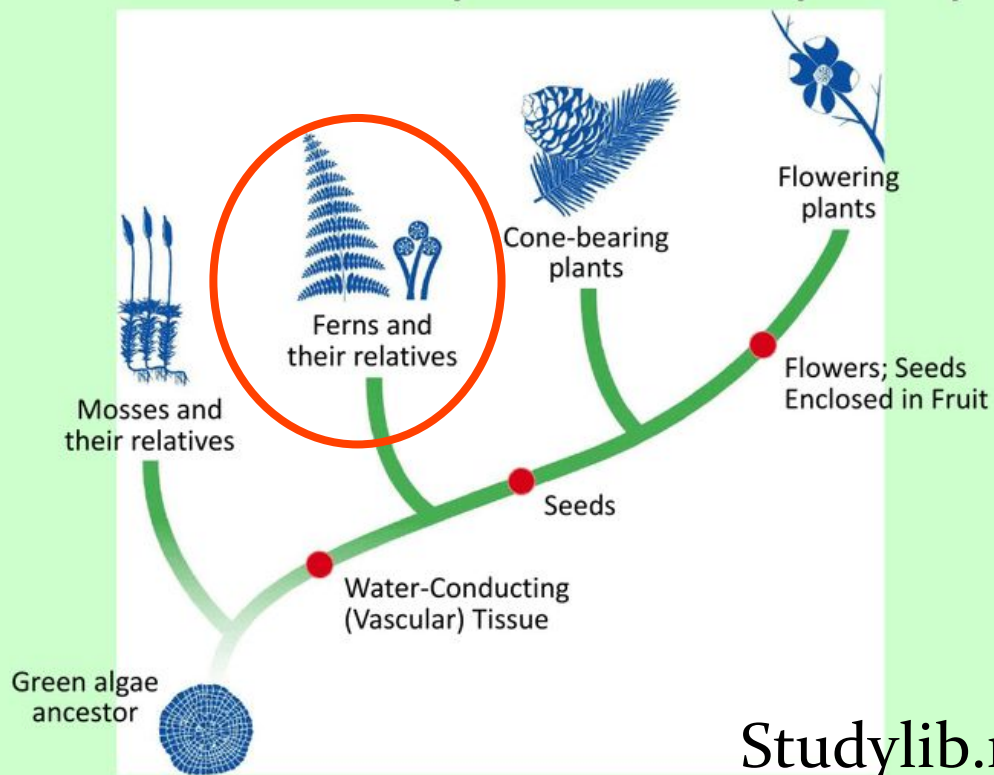




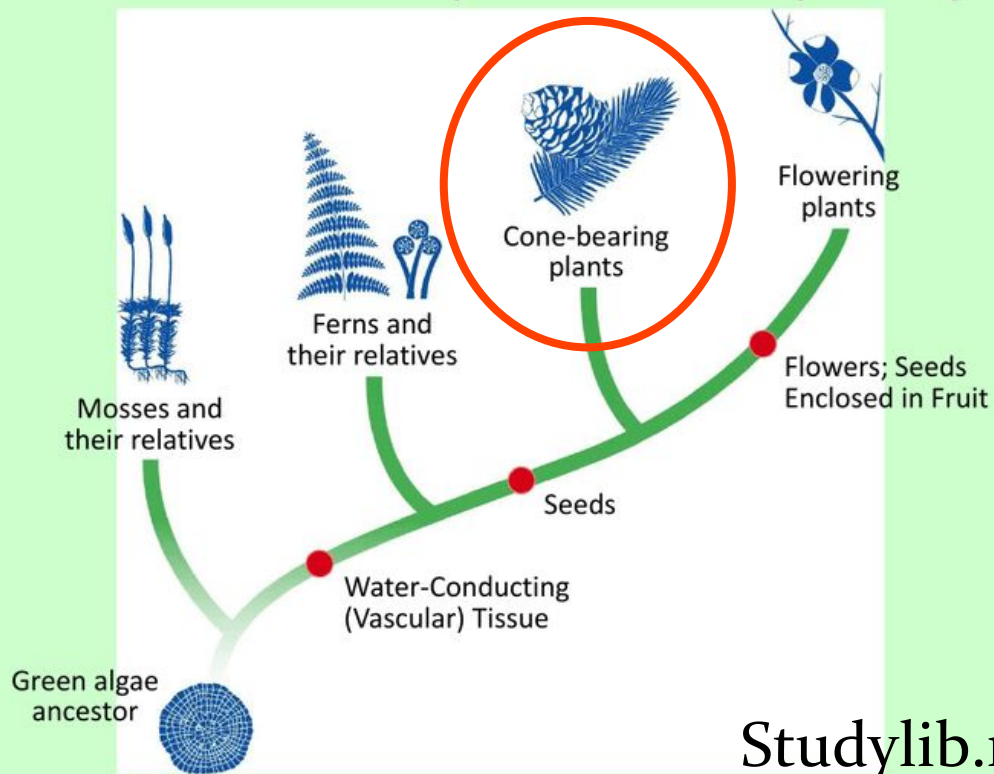




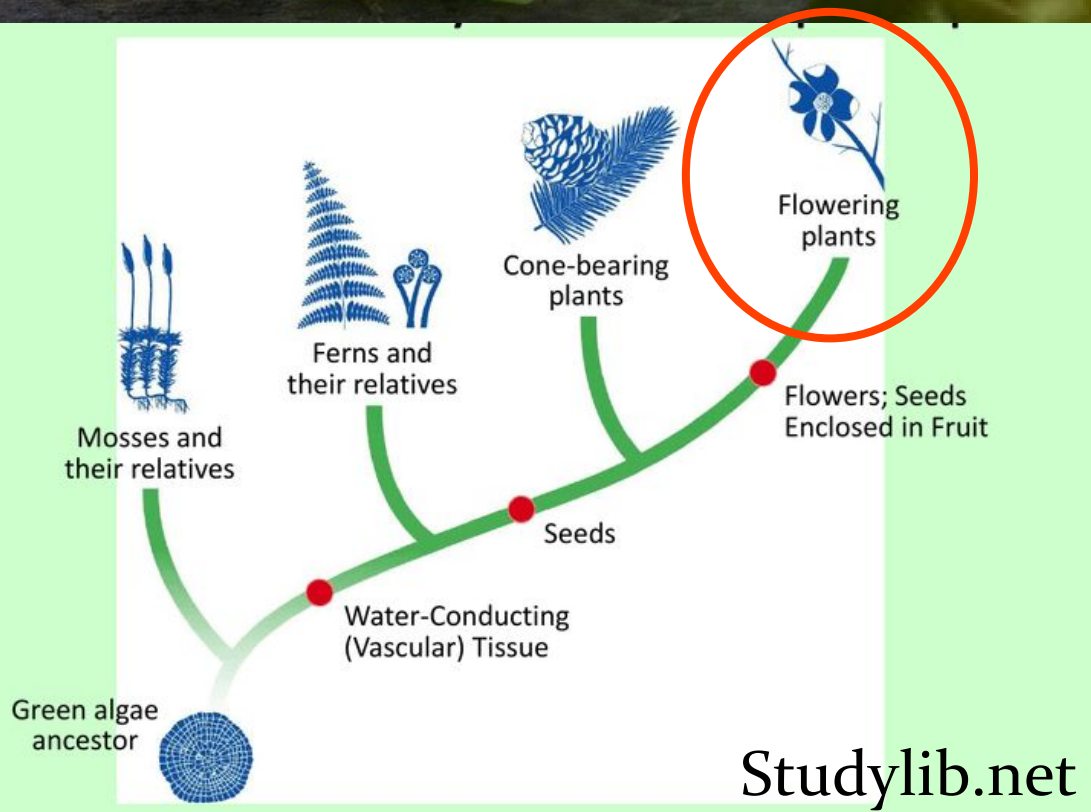




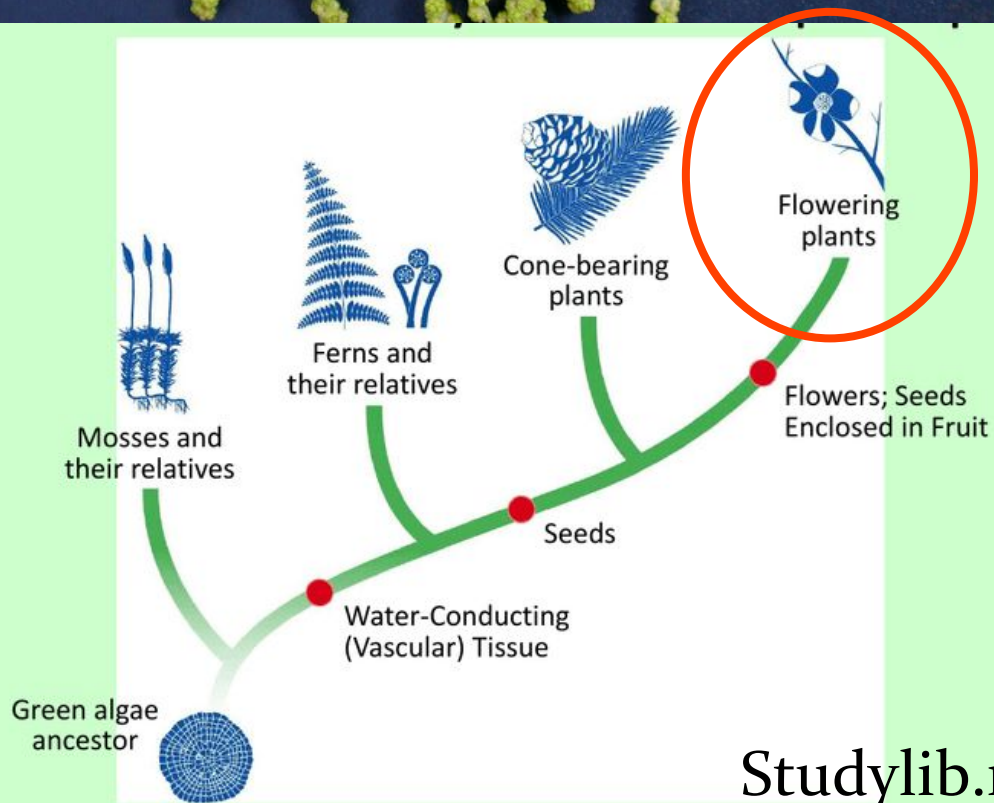








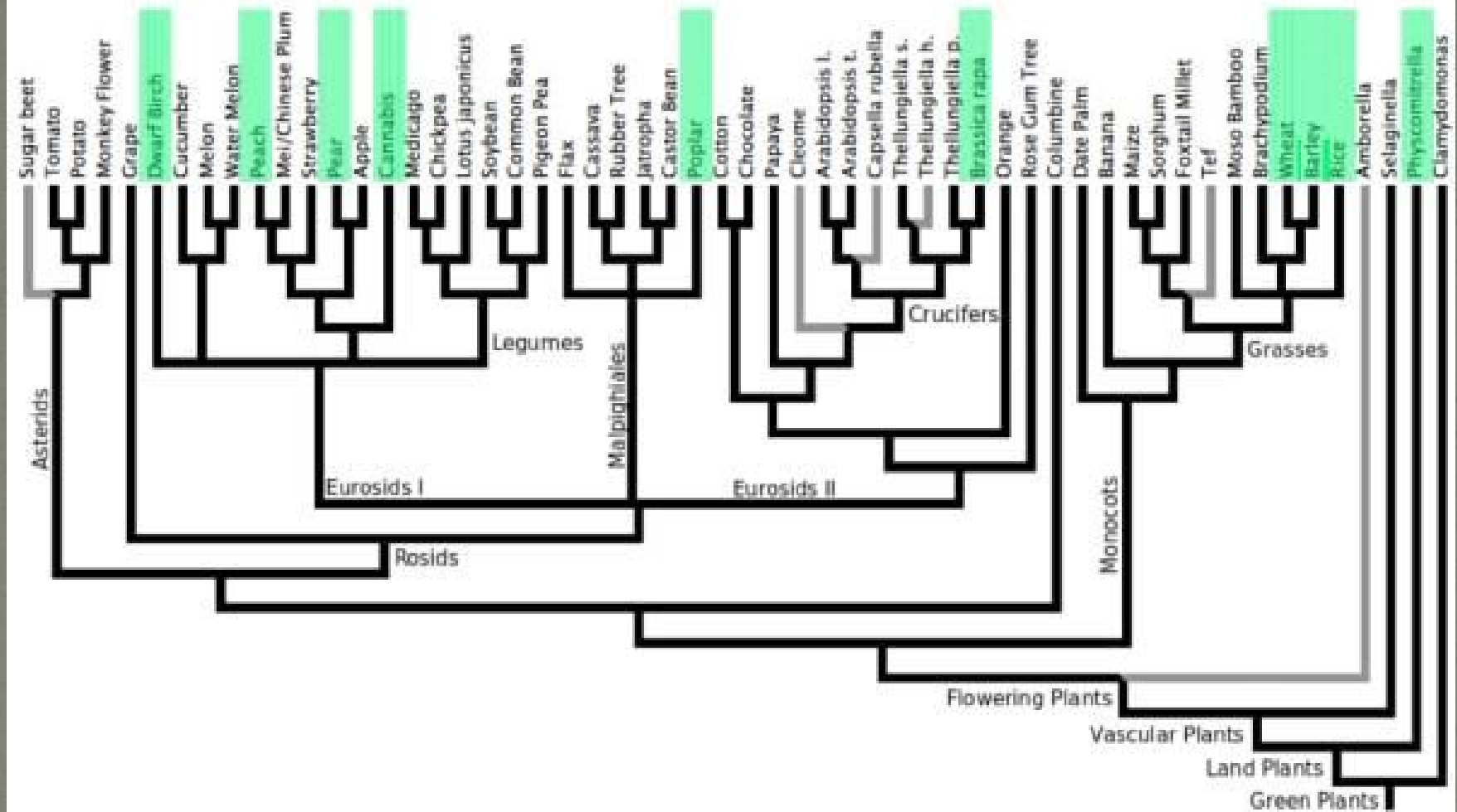




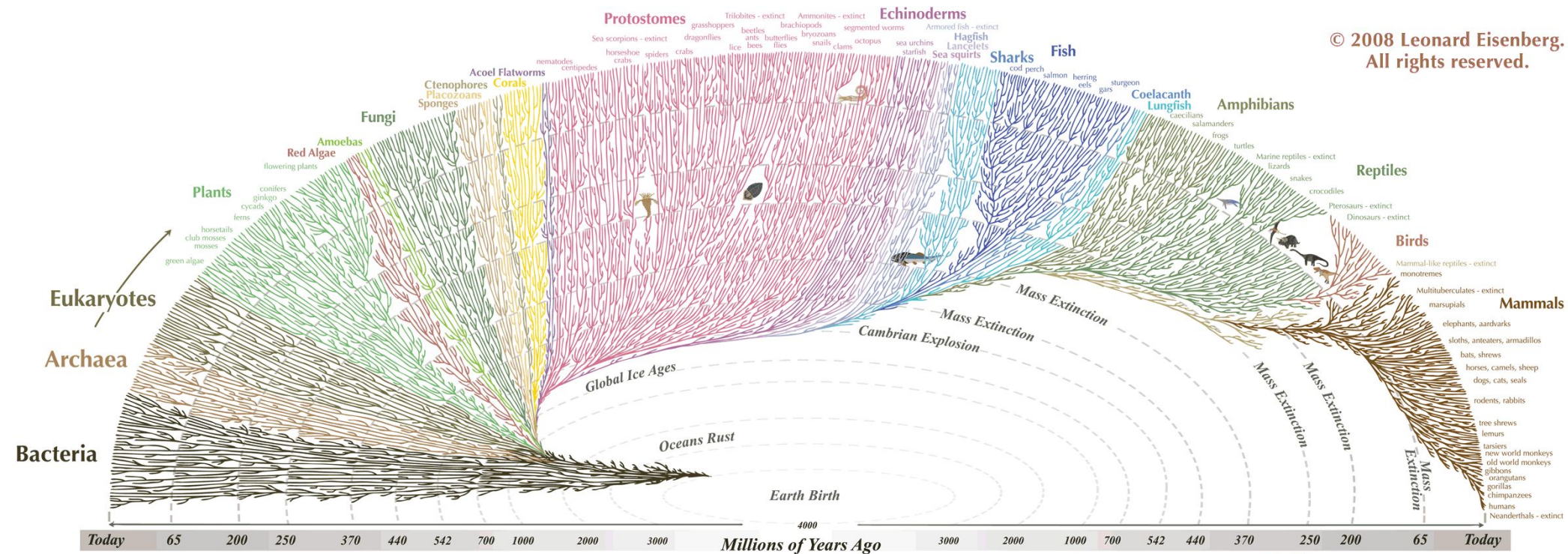








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All the major and many of the minor living branches of life are shown on this diagram, but only a few of those that have gone extinct are shown. Example: Dinosaurs - extinct



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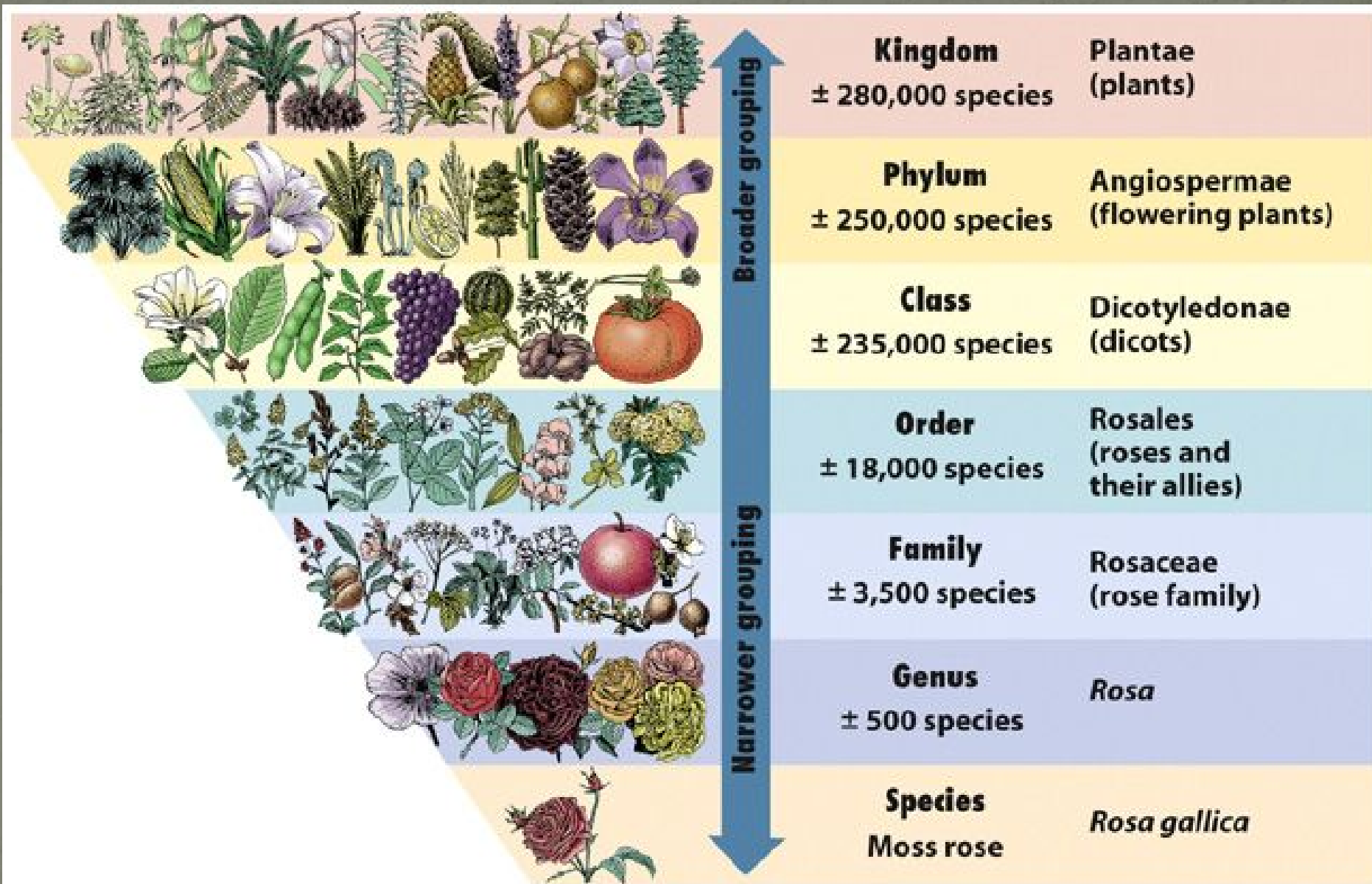
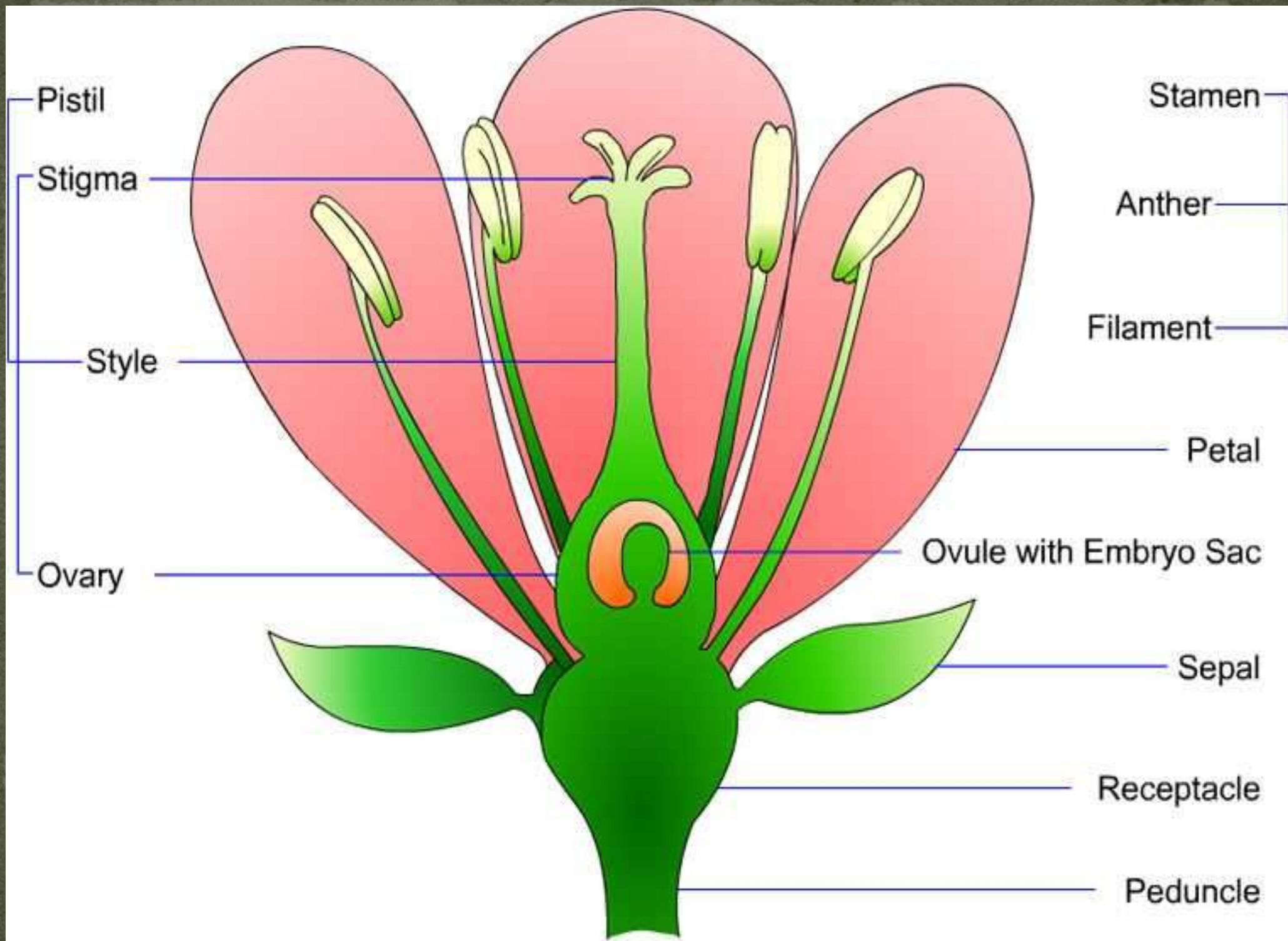


Figure 2-6 Discover Biology 3/e  
© 2006 W. W. Norton & Company, Inc.

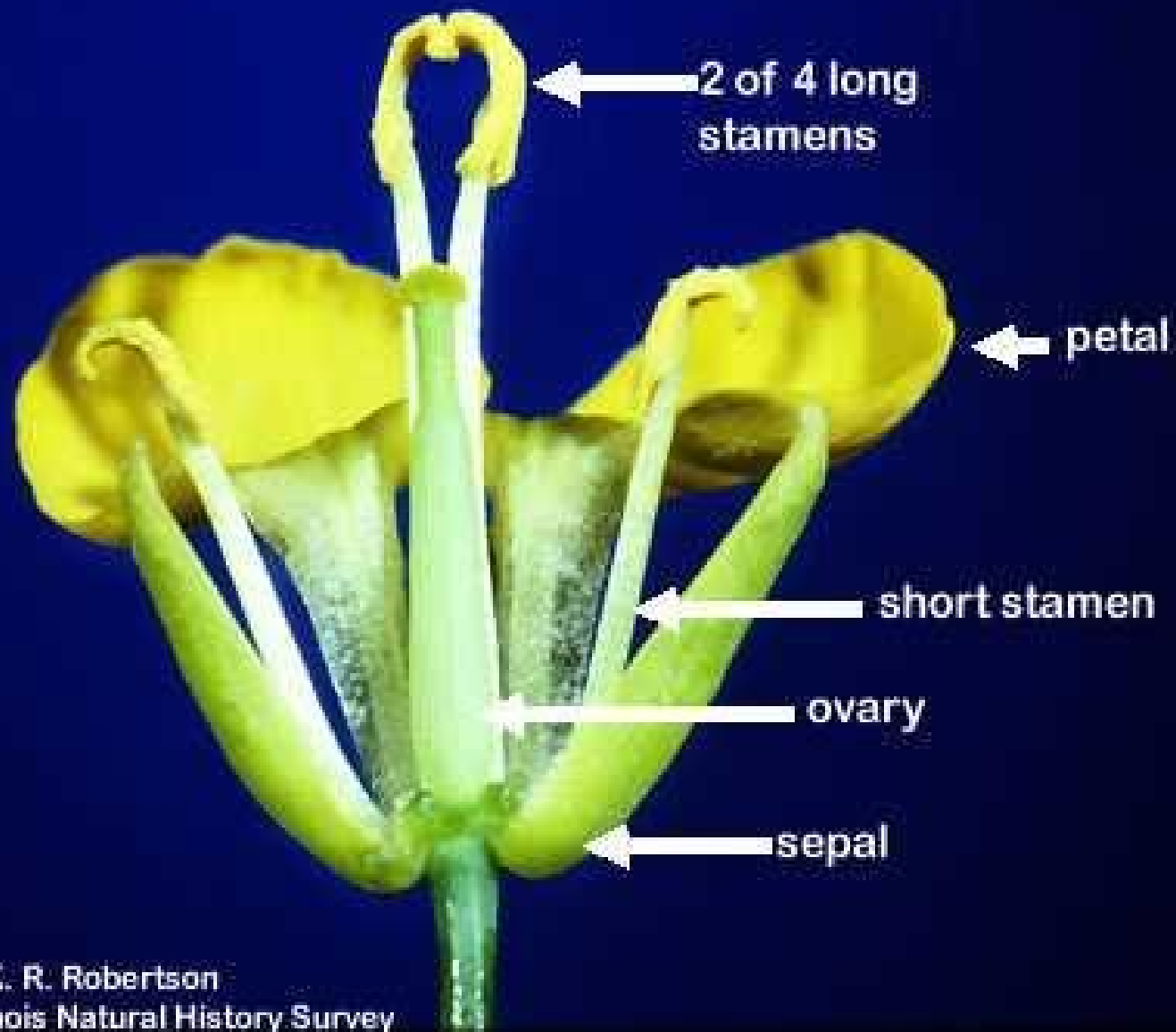


# Flowering plant life cycle (basil)









© K. R. Robertson  
Illinois Natural History Survey

*Capsella bursa-pastoris* (L.) MEDIK.  
©Thomas Schoepke





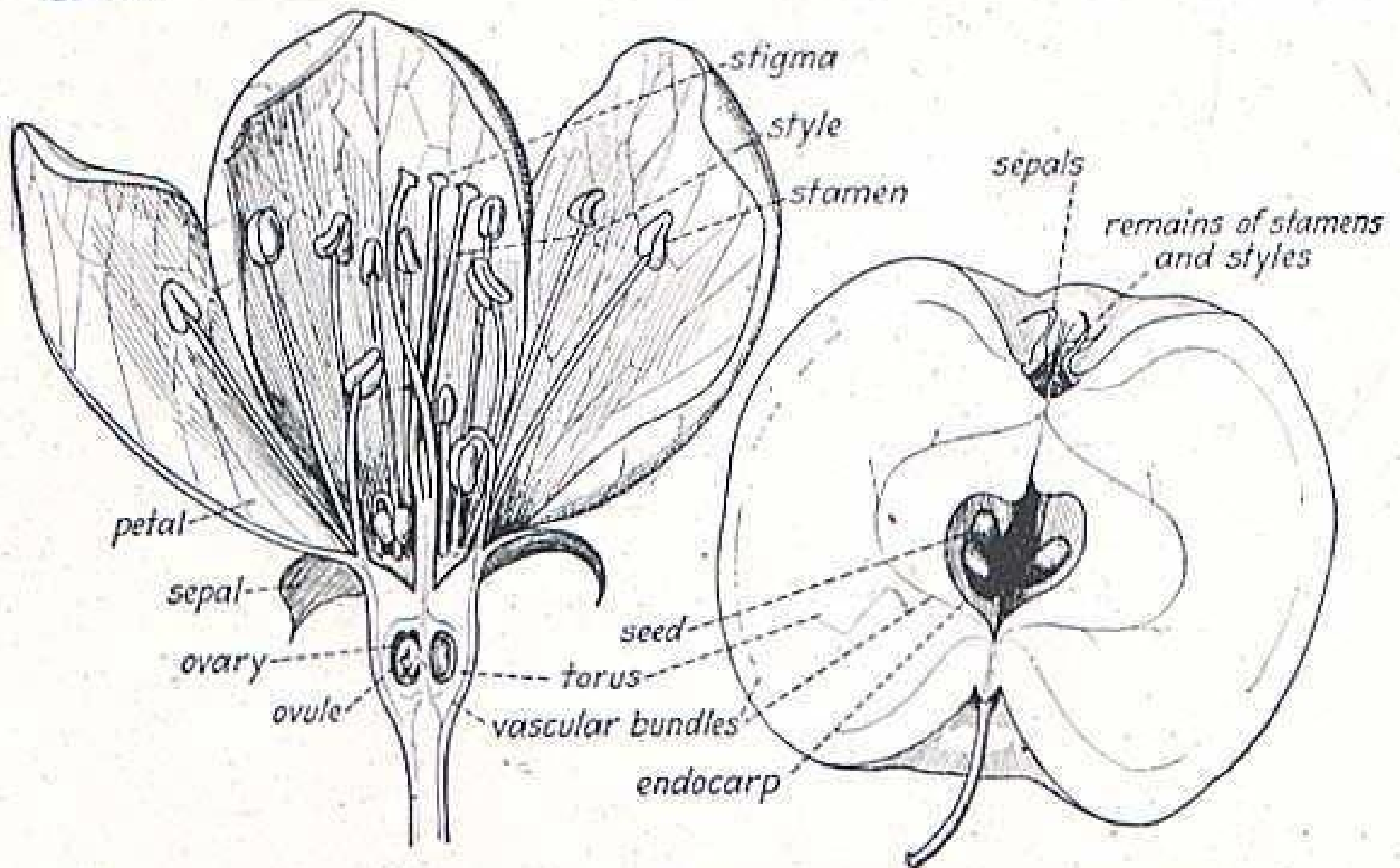


FIG. 381. Flower and fruit of apple (*Malus pumila*), cut lengthwise to show the relation of the parts of the flower to the torus.

# Flower symmetry



Radial symmetry (aka regular, actinomorphic)  
2 or more lines of symmetry  
Like the spokes of a wheel



# Flower symmetry



Bilateral symmetry (aka irregular, zygomorphic)  
Only one line of symmetry  
Like the wings of a butterfly



# Number of flower parts





*Capsella bursa-pastoris* (L.) MEDIK.  
©Thomas Schoepke



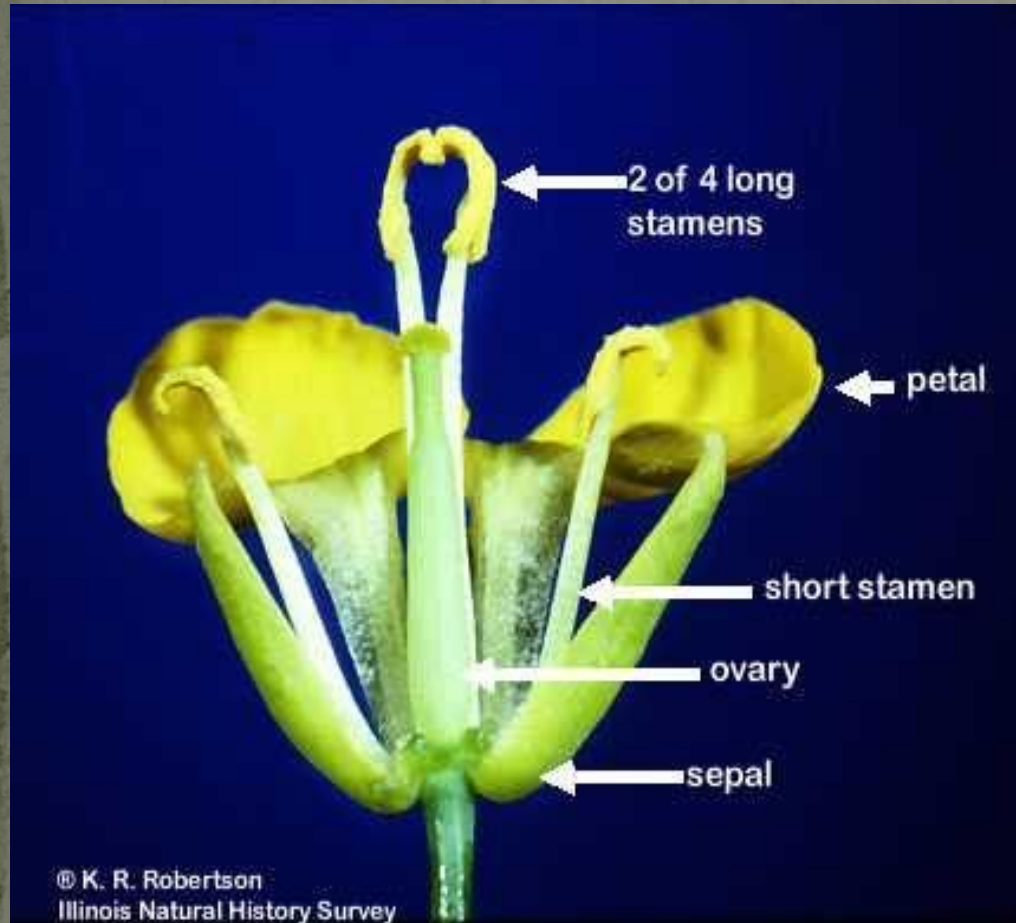




# Numerous parts

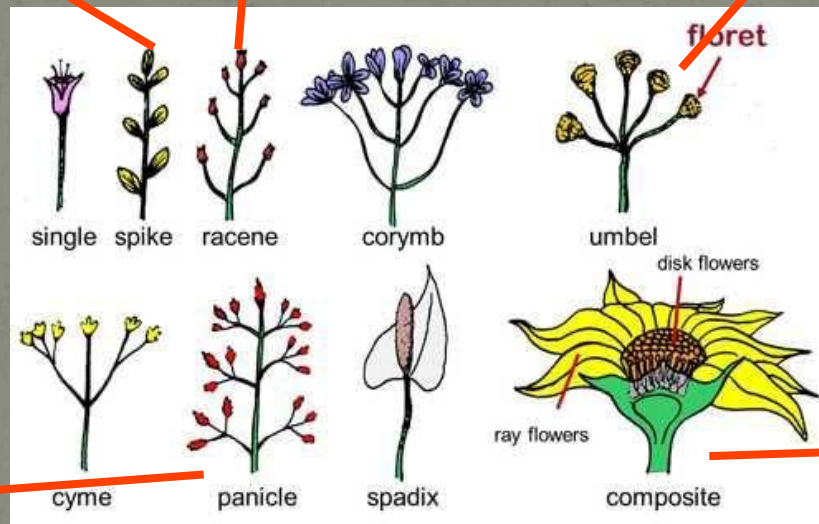
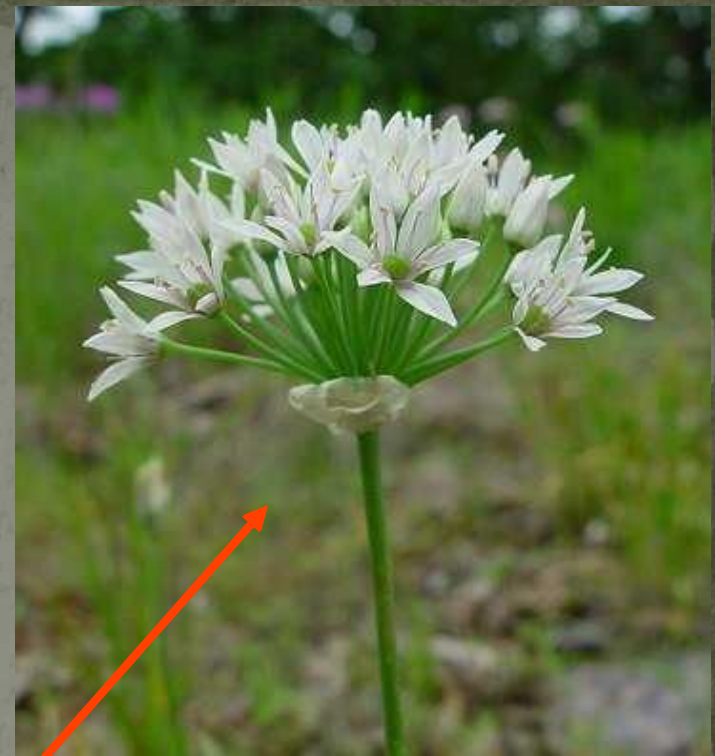


# Stamens











# Leaf arrangement:

## Opposite, alternate, whorled

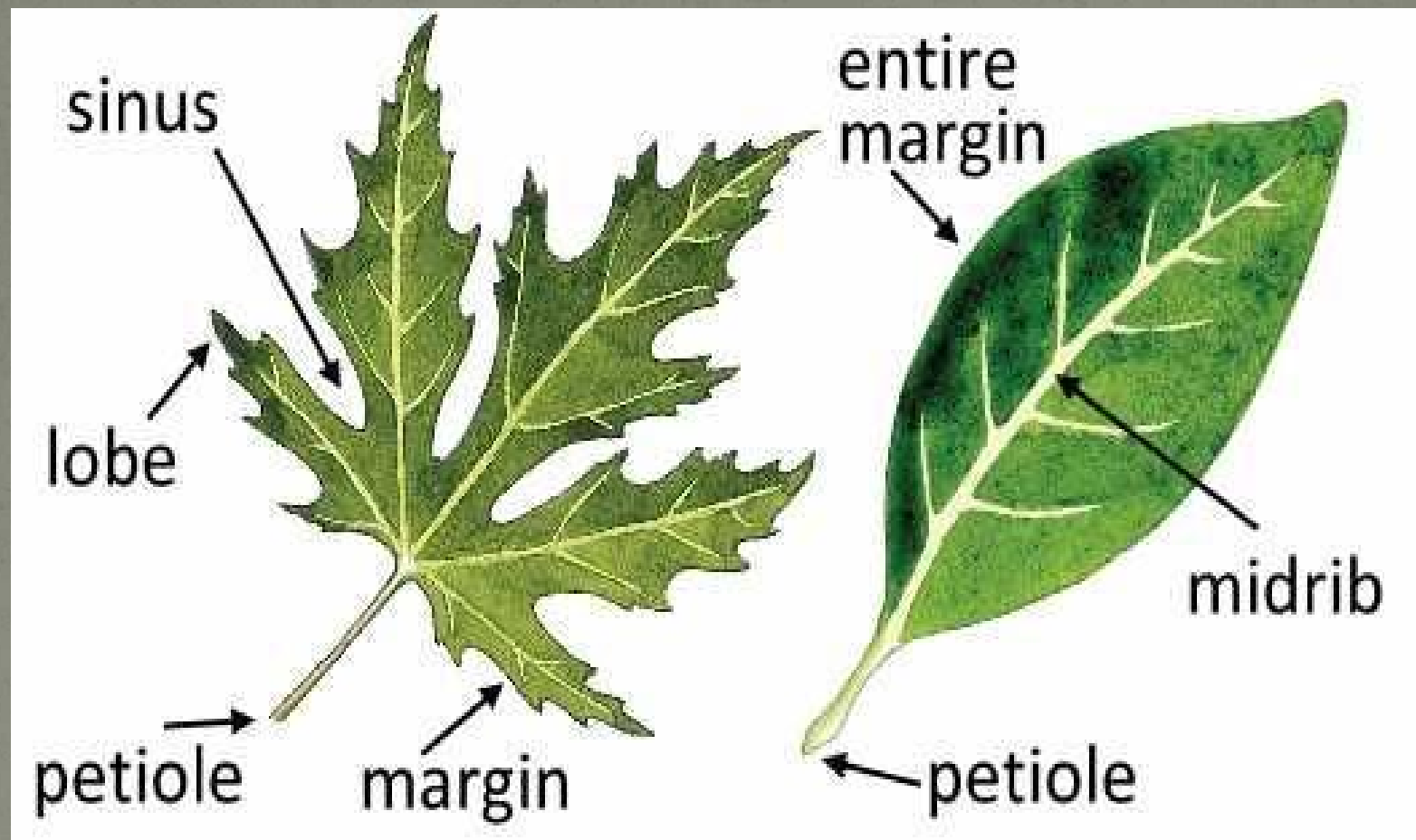




# Basal leaves





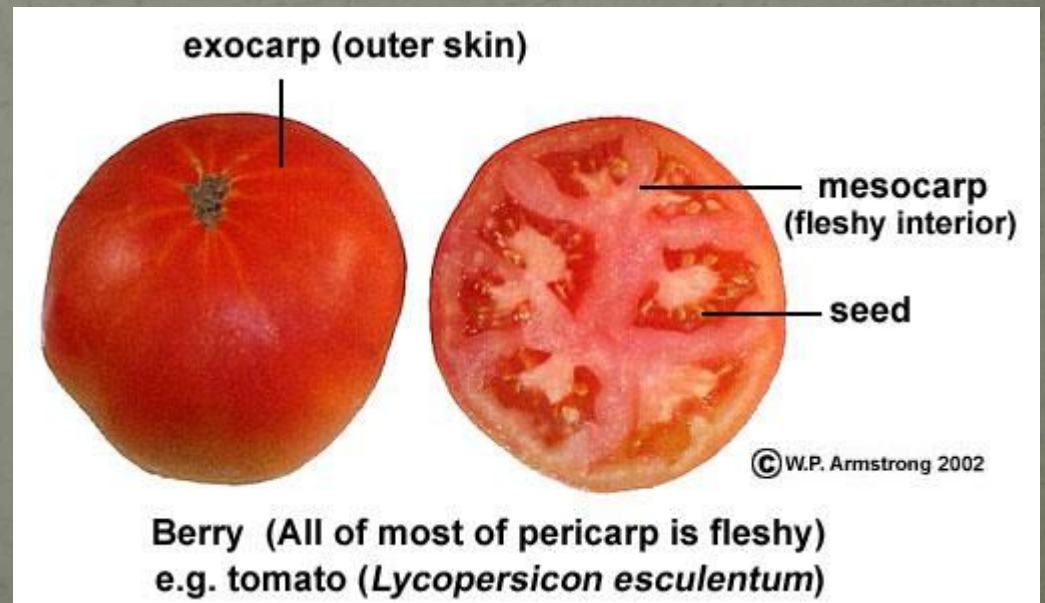








# Fruits (fleshy)





# Fruits (dry)



# Plant habit

- **Annual** plants grow from seeds, complete their life cycle, and die at the end of one growing season (e.g. purple dead nettle, chickweed, tomatoes)
- **Perennial** plants live for an indeterminate number of years, completing reproductive cycles annually when able (e.g. echinacea, goldenrod)
- **Biennial** plants complete their life cycle over two growing seasons and then die
- **Herbaceous** plants are tender and the above-ground parts do not persist year after year even when the roots do (e.g. milkweed, clematis)
- **Woody** plants make stems that survive through multiple growing seasons (e.g. trees, shrubs, grape vine, rosemary, lavender)



# Environment / ecology

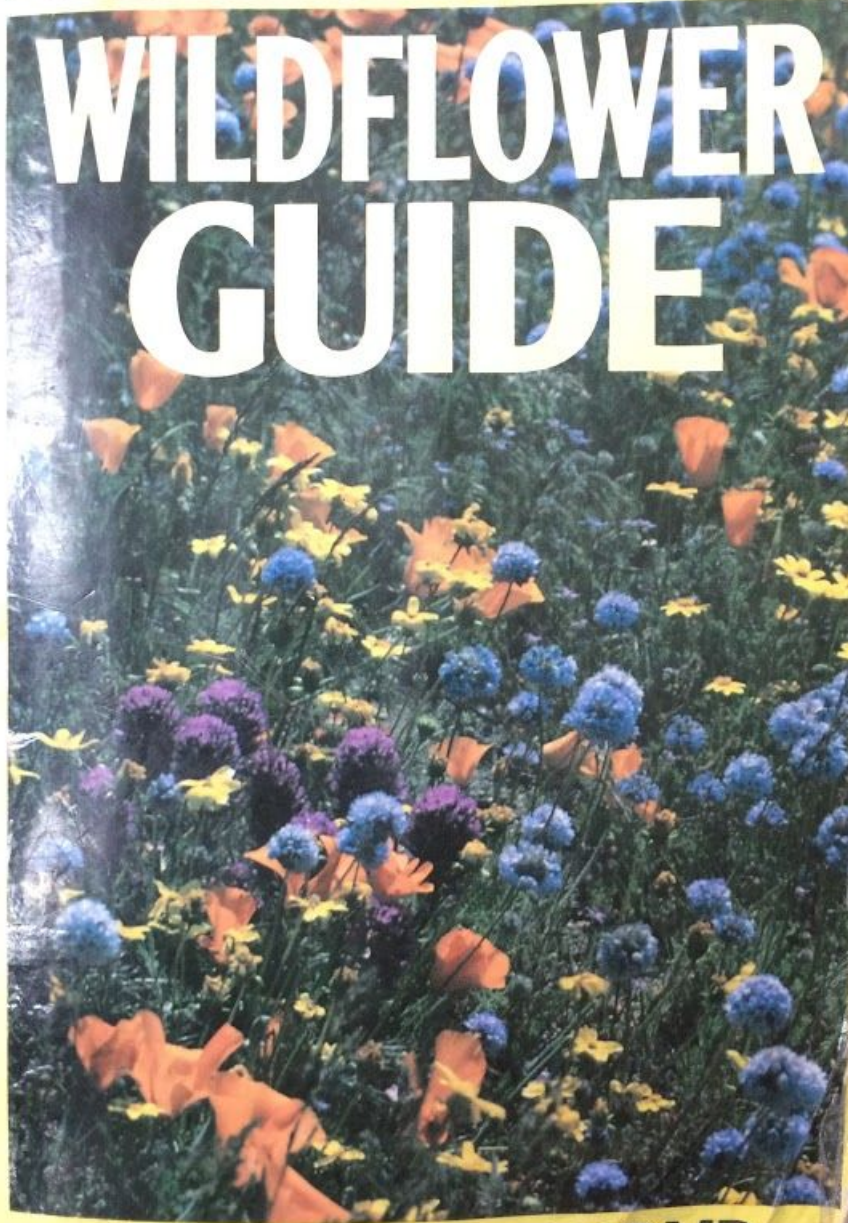
Most plants prefer to grow in a specific type of environment, and this can be an important factor in ID. Some types of environments to consider are:

- Disturbed vs. undisturbed soil (e.g. garden vs. forest)
- Wet vs. dry ecosystem (e.g. riverside vs. upland forest)
- Shade vs. sun
- Specific soil types may be host to unique ecosystems and plant communities
- Ecological range (the area in which a plant has been observed through history-- check references)



NEWCOMB'S

# WILDFLOWER GUIDE



LAWRENCE NEWCOMB

ILLUSTRATED BY GORDON MORRISON







## THE THREE CLASSIFICATIONS

|   |                |                         |                            |   |
|---|----------------|-------------------------|----------------------------|---|
| 1 | FLOWER<br>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<br>TYPE  | Wildflowers             | No Apparent Leaves         | 1 |
|   |                |                         | Basal Leaves Only          | 2 |
|   |                |                         | Alternate Leaves           | 3 |
|   |                |                         | Opposite or Whorled Leaves | 4 |
|   |                | Shrubs                  |                            | 5 |
| 3 |                | Vines                   |                            | 6 |
|   |                |                         |                            |   |
| 4 | LEAF<br>TYPE   | No Apparent Leaves      |                            | 1 |
|   |                | Leaves Entire           |                            | 2 |
|   |                | Leaves Toothed or Lobed |                            | 3 |
|   |                | Leaves Divided          |                            | 4 |





*Wildflowers with Opposite or Whorled Leaves*

- |     |   |    |
|-----|---|----|
| 142 | Leaves entire   |    |
|     | Leaves whorled  | 72 |
|     | Leaves 2, in the middle of the stem   | 74 |
|     | Leaves in pairs   |    |
|     | Flowers short- or long-stalked, growing<br>singly, or in pairs or racemes     |    |
|     | Flowers white or blue, 4-lobed<br>(Speedwells)                                | 74 |
|     | Flowers 2-lipped or 6-petaled   | 76 |
|     | Flowers stalkless, growing in whorls,<br>heads or dense clusters              | 78 |
| 143 | Leaves toothed or lobed   |    |
|     | Yellow, yellowish or straw-colored flowers                                    | 82 |
|     | Flowers not yellow or yellowish   |    |
|     | Individual flowers stalkless, growing in<br>1 or more heads, spikes or whorls |    |
|     | Flowers medium-sized ( $\frac{1}{4}$ – $\frac{3}{4}$ " long)                  |    |
|     | Stamens protruding  | 84 |
|     | Stamens not protruding  | 86 |
|     | Flowers very small (under $\frac{1}{4}$ " long)                               | 90 |
|     | Flowers large (1" or more long)   | 92 |

*Group continued*





**Flowers Medium-sized ( $\frac{1}{4}$ – $\frac{3}{4}$ " Long), in Heads, Spikes or Whorls;  
Not Yellow; Stamens Protruding (cont.)**

**Basil Balm** (*Monarda clinopodia*) Whitish or pinkish flowers with dark spots,  $\frac{3}{4}$ –1" long, in dense heads. See p. 92.

**Flowers Medium-sized ( $\frac{1}{4}$ – $\frac{3}{4}$ " Long), in Heads, Spikes or Whorls; Not Yellow; Stamens Not Protruding**

**LEAVES ROUNDISH, ABOUT AS WIDE AS LONG**

**Ground Ivy or Gill-over-the-ground** (*Glechoma hederacea*) \* Blue or violet flowers,  $\frac{1}{3}$ – $\frac{1}{2}$ " long; stem creeping at the base. Leaves long-stalked, bluntly toothed. A common weed of moist waste places. Spring and early summer. Mint Family.

**Dead Nettles or Henbits** (*Lamium*) Purplish or reddish flowers,  $\frac{1}{3}$ – $\frac{3}{4}$ " long; stems sprawling, not creeping. Leaves broad and the lower leaves long-stalked. Roadsides and waste places. Spring to fall. Mint Family.

**Henbit** (*L. amplexicaule*) \* Uppermost leaves clasping the stem and bluntly toothed. Calyx lobes not spreading.

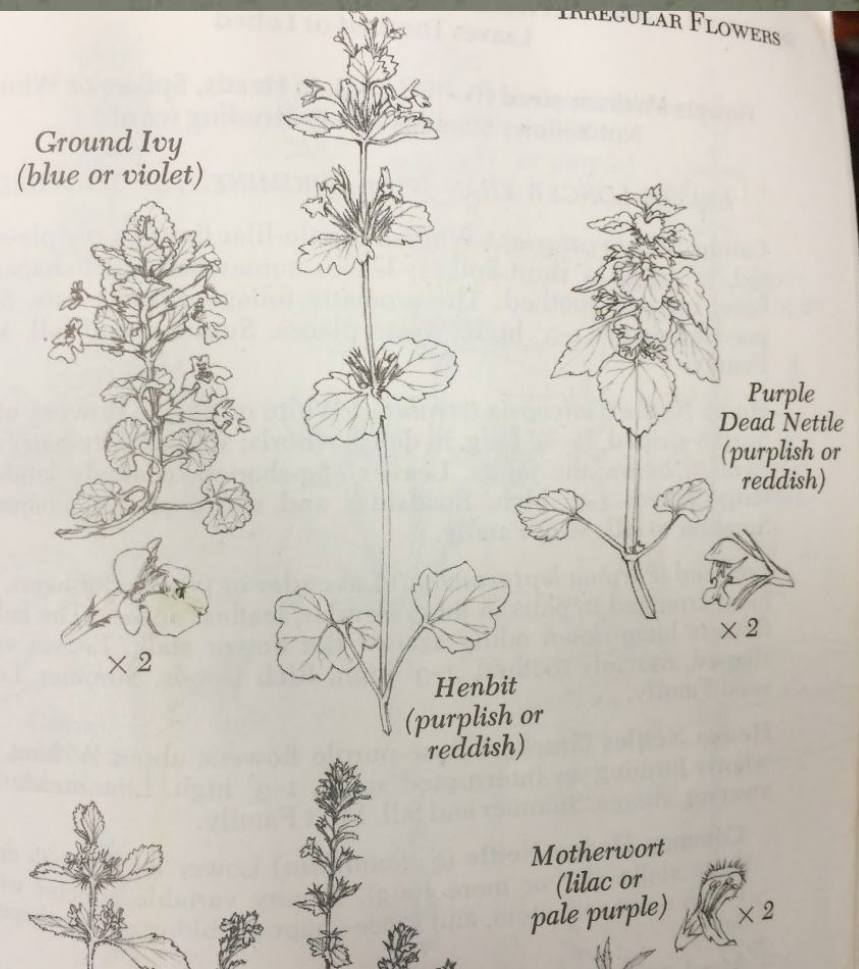
**Purple Dead Nettle** (*L. purpureum*) \* Uppermost leaves short-stalked with blunt teeth and purple-tinged. Calyx lobes spread outward.

**Cut-leaved Henbit** (*L. hybridum*) \*† Similar to Henbit, but the uppermost leaves sharply toothed. Local, N.Eng. south.

**Horehound** (*Marrubium vulgare*) \* White flowers,  $\frac{1}{4}$ " long; leaves 1–2" long. Whole plant white-woolly. Leaves deeply veined, bluntly toothed, the lower leaves long-stalked. 1–2' high. Waste places. Summer. Mint Family.

**Eyebright** (*Euphrasia*)

with purple flowers





Family

Asteraceae

Genus

Echinacea

Artemisia

Species

*E. purpurea*

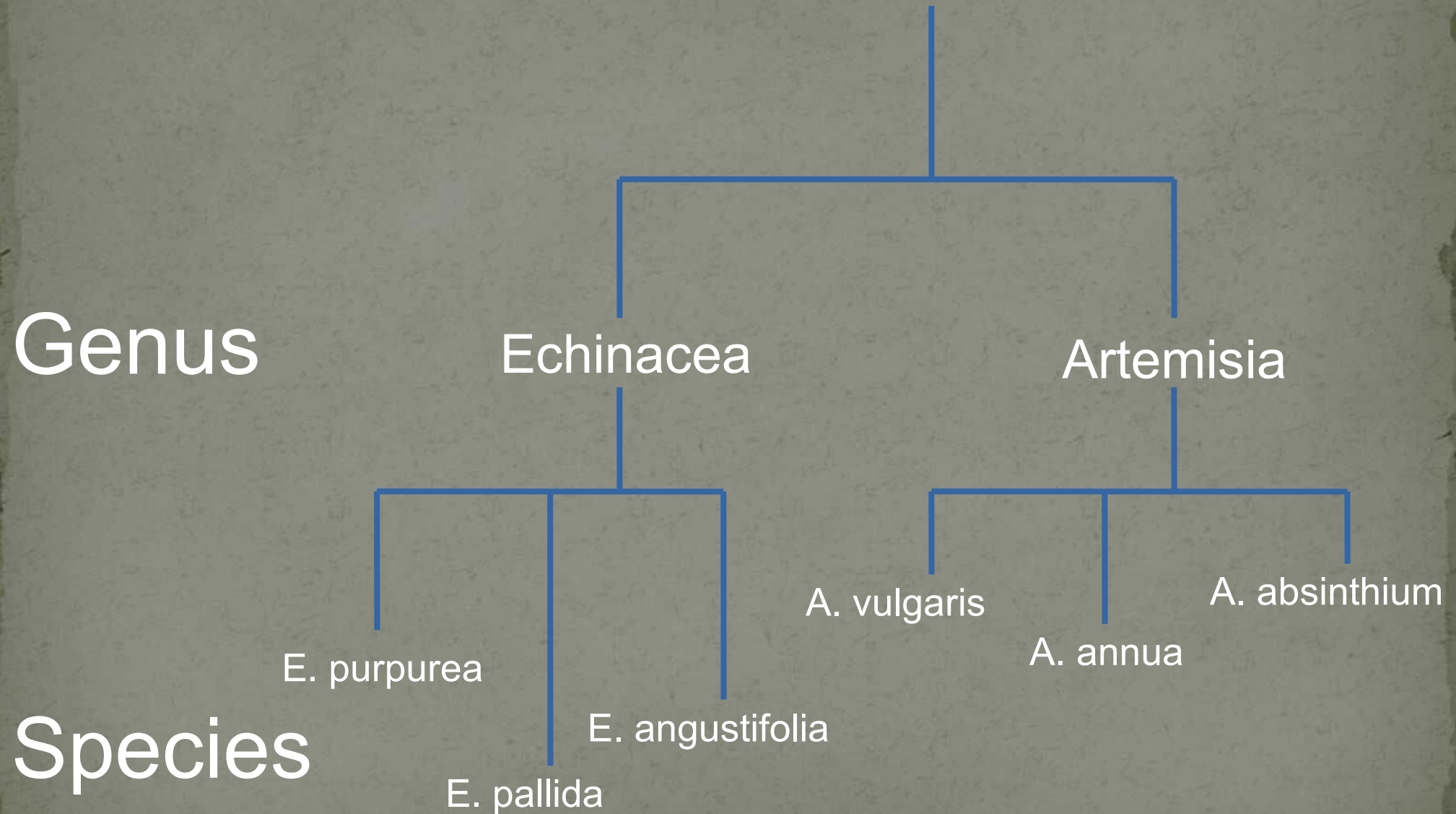
*E. pallida*

*E. angustifolia*

*A. vulgaris*

*A. annua*

*A. absinthium*



# Common plant families

- Mint (Lamiaceae)
- Parsley/Carrot (Apiaceae)
- Rose (Rosaceae)
- Aster (Asteraceae)
- Mustard (Brassicaceae)
- Mallow (Malvaceae)
- Bean (Fabaceae)



# Lamiaceae

## (Mint family, Labiateae)

- Irregular/bilateral/zygomorphic flower shape
  - Two upper and three lower lobes
  - Petals and sepals fused into tubes
- Two or four stamens
- Fruit: four nutlets (from four-parted ovary)
- Opposite leaves, often on square stems
- Plants often aromatic
- Medicinal tendencies: aromatic, digestive support, stimulating and/or relaxing
- Very safe with respect to toxicity





















# Apiaceae

## (Parsley family, Umbelliferae)

- Inflorescence a compound umbel
- Leaves usually dissected or deeply lobed, stems often (but not always) hollow
- Individual flowers small with parts in fives, usually white or yellow
- Fruit a schizocarp: splitting into two dry seeds
- In our area: mostly herbaceous perennials and annuals



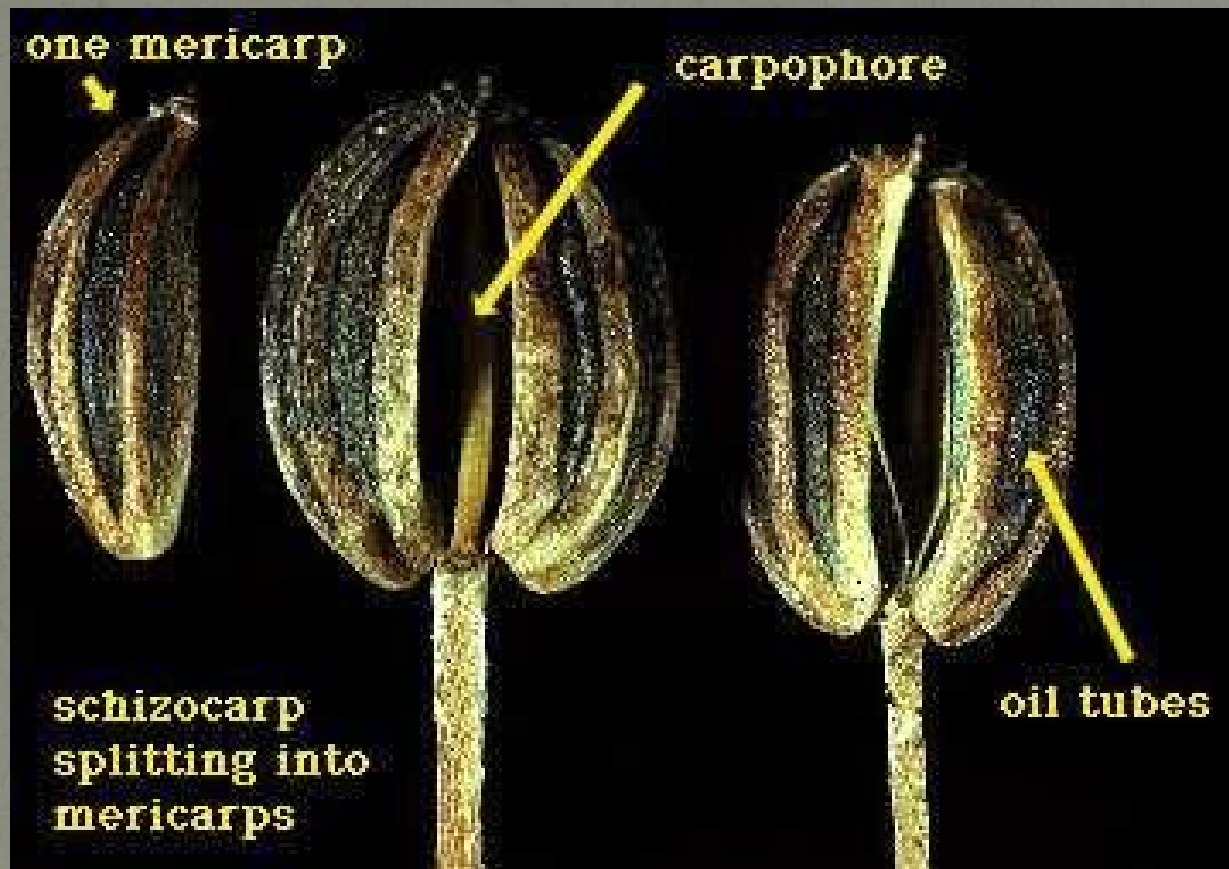
# Apiaceae

## (Parsley family, Umbelliferae)

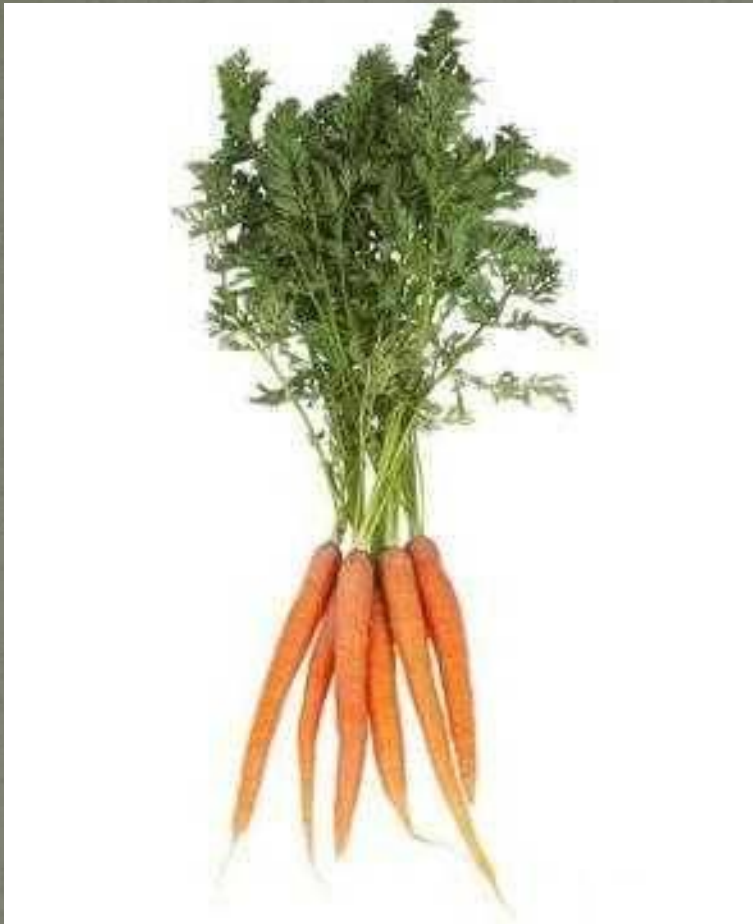
- Many culinary spices and foods: fennel, cumin, cilantro/coriander, anise, dill, carrot, parsnip
- Lots of medicinal plants: angelicas, osha, lomatium, wild carrot, bupleurum
- Medicinal plants tend to be aromatic, carminative, sometimes bitter
- Some genera/species are highly toxic, so treat this family with care! Notable examples are poison hemlock, water hemlock, and giant hogweed



















# Rosaceae

## Rose family



- Flowers with radial symmetry, usually five separate petals (horticultural varieties often have numerous petals)
- Flowers often have numerous stamens and a hypanthium (floral cup)
- Leaves often have stipules and toothed edges
- Fruits are highly variable, ranging from fleshy drupes (stone fruits) to dry-seeds
- Spines, glands, and compound leaves are common



# Rosaceae

## Rose family



- Many edible fruits: peaches, plums, apples, cherries, pears, almonds, raspberries, strawberries, blackberries
- Medicinal plants include hawthorn, agrimony, meadowsweet, rose, wild cherry
- Very safe family; plants tend to have astringent properties and high levels of flavonoids













# Asteraceae

## Aster family, Compositae

- Flowers arranged on a head or capitulum (often looking like one big flower)
- Flowers have 5 fused petals, symmetry radial (disc flowers) or bilateral (ray flowers)
- On close examination, two-parted style makes a “ram's head”
- Fruit is a dry or oily seed surrounded by pericarp tissue, often with accessory tufts for seed dispersal



# Asteraceae

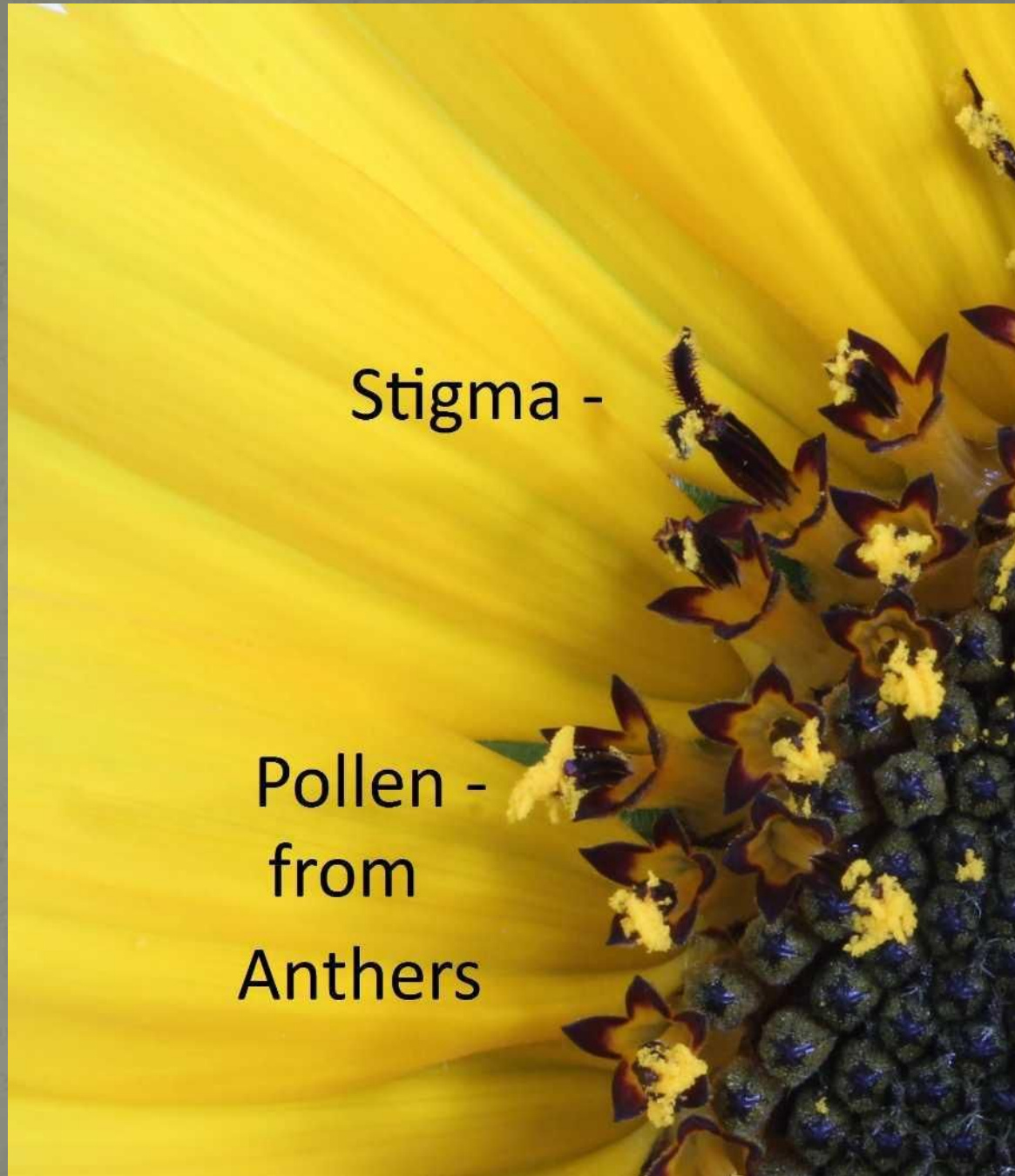
## Aster family, Compositae

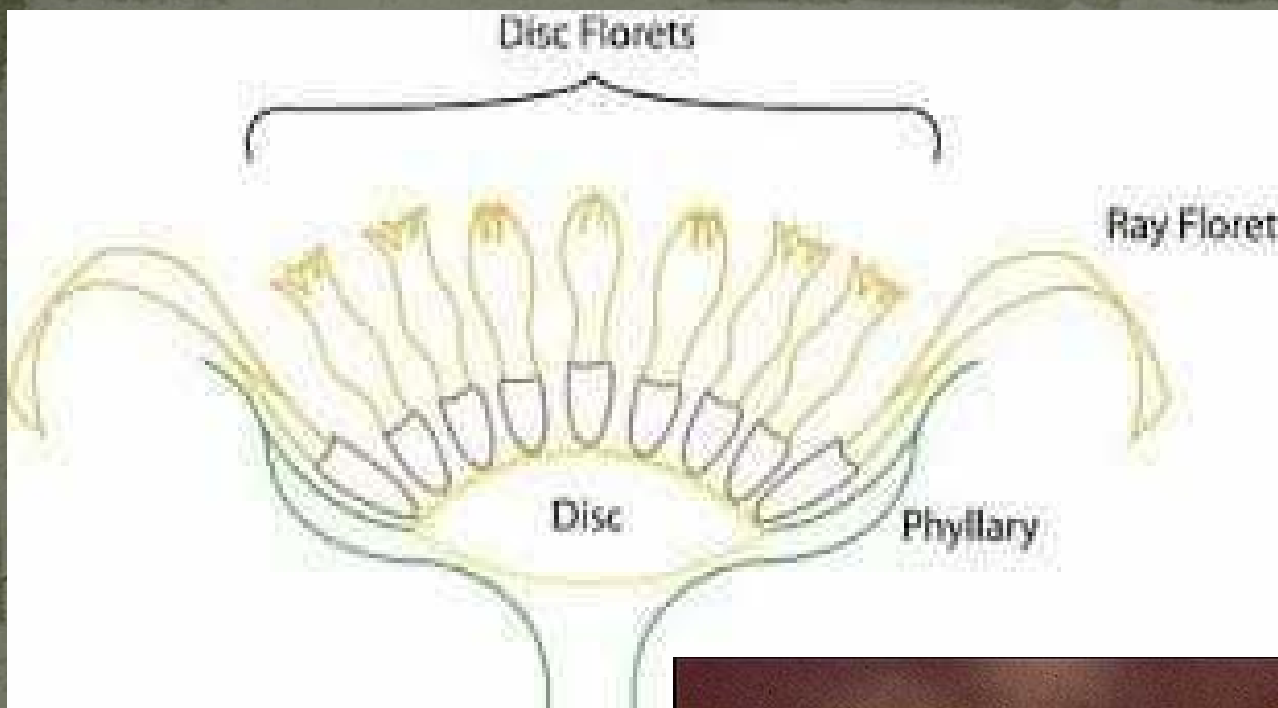
- Food plants include lettuce, artichoke, sunflower
- Medicinal plants include dandelion, burdock, ragweed, calendula, echinacea, grindelia, chamomile, feverfew, goldenrod, yarrow, mugwort, arnica, milk thistle, new england aster, oxeye daisy, golden ragwort
- Difficult family to characterize medicinally-- lots of different activities and compounds: inulins, resins, tannins, and aromatics are common



Stigma -

Pollen -  
from  
Anthers















# Brassicaceae (Mustard family)

- 4 petals in cross- or H-shape
- 4 long and 2 short stamens
- Fruit a silique (2-sided capsule with central membrane)
- Food plants: cabbage, kale, arugula, cauliflower, broccoli, radish, turnip, etc
- Hot and acrid medicinal constituents: mustard, horseradish (glucosinolate metabolites)



## Recommended botany books:

Flora of Virginia

Botany in a Day (Thomas Elpel)

Naming Nature (Carol Kaesuk Yoon)

How to Identify Plants (H.D. Harrington)

Families of Flowering Plants (Wendy Zomleffer)

Our Knowledge is not Primitive: Decolonizing Anishinaabe Botanical Teachings (Wendy Geniusz)

Manual of Vascular Plants of the Northeast (Gleason and Cronquist)

Braiding Sweetgrass: Robin Wall Kimmerer

Also: In Defense of Plants podcast