Overview of Plants

Honors Biology

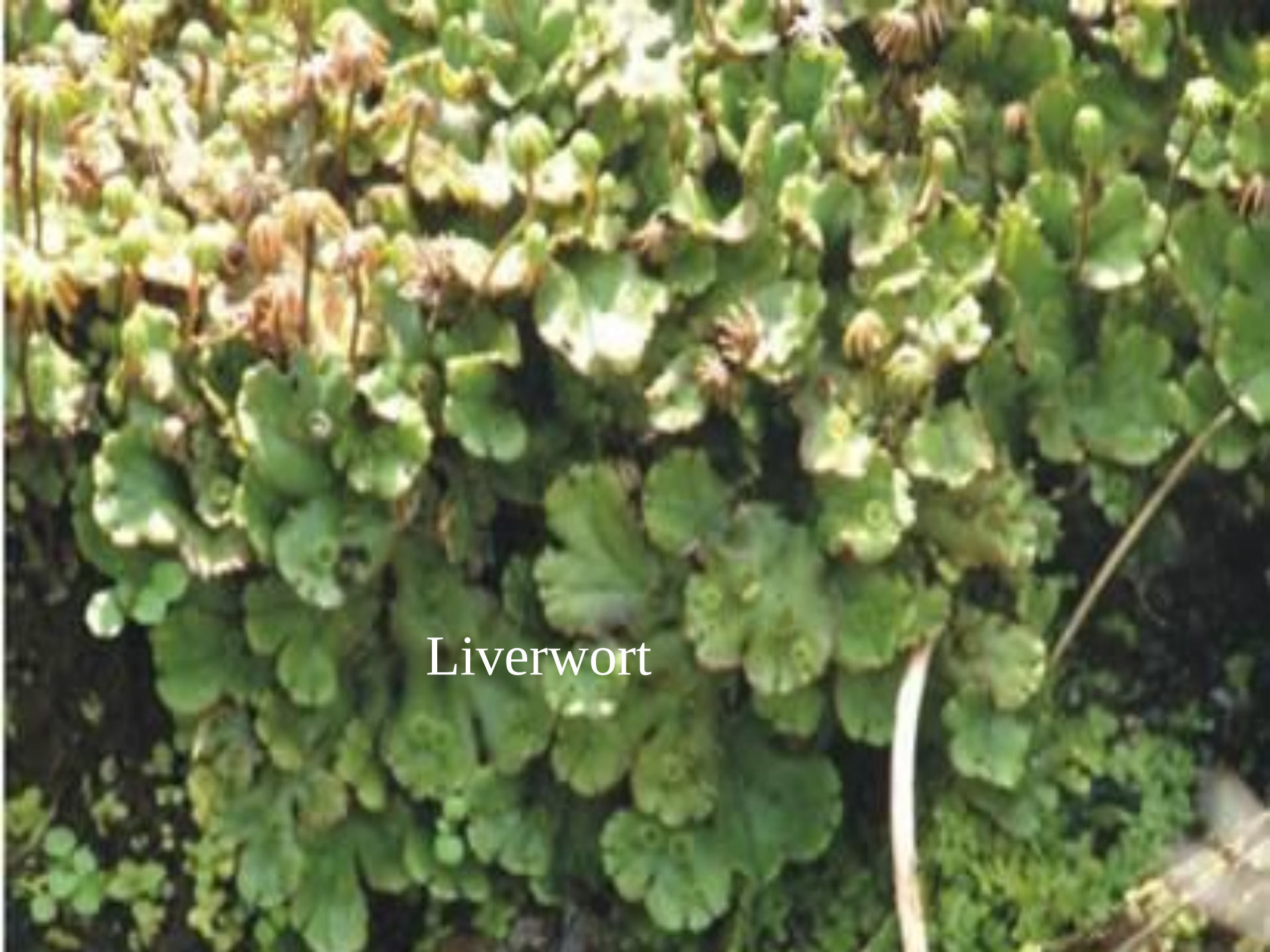
Adaptations

- Cuticle to prevent water loss
- Spore and seeds to protect reproductive cells
- Xylem carries absorbed water and inorganic nutrients in one direction from roots to stems and leaves Play flow of nutrients
- Play water uptake
- Phloem carries organic and inorganic compounds depending on plant's needs
- Play phloem

Nonvascular Plants

- Do not have true roots, stems or leaves
- Small and are usually found in moist areas
- Mosses are attached to the soil by structures called rhizoids: Play lifecycle of a moss
- Liverworts lie close to the ground to absorb water easily
- Hornworts have long thin sporophytes (produce spores) that grow out of the plant


Mosses


Liverwort


Hornwort

Vascular Plants

- Specialized conducting tissues
- Grow large and live in many environments
- Strong stems that allow them to grow tall and receive more sunlight

Seedless vascular plants

- Ferns are the dominant phylum of seedless plants
- Most ferns have a rhizome, an underground stem.
- Club mosses look like miniature pine trees and were once used for Christmas decorations
- Horsetails were used to scrub pots and pans

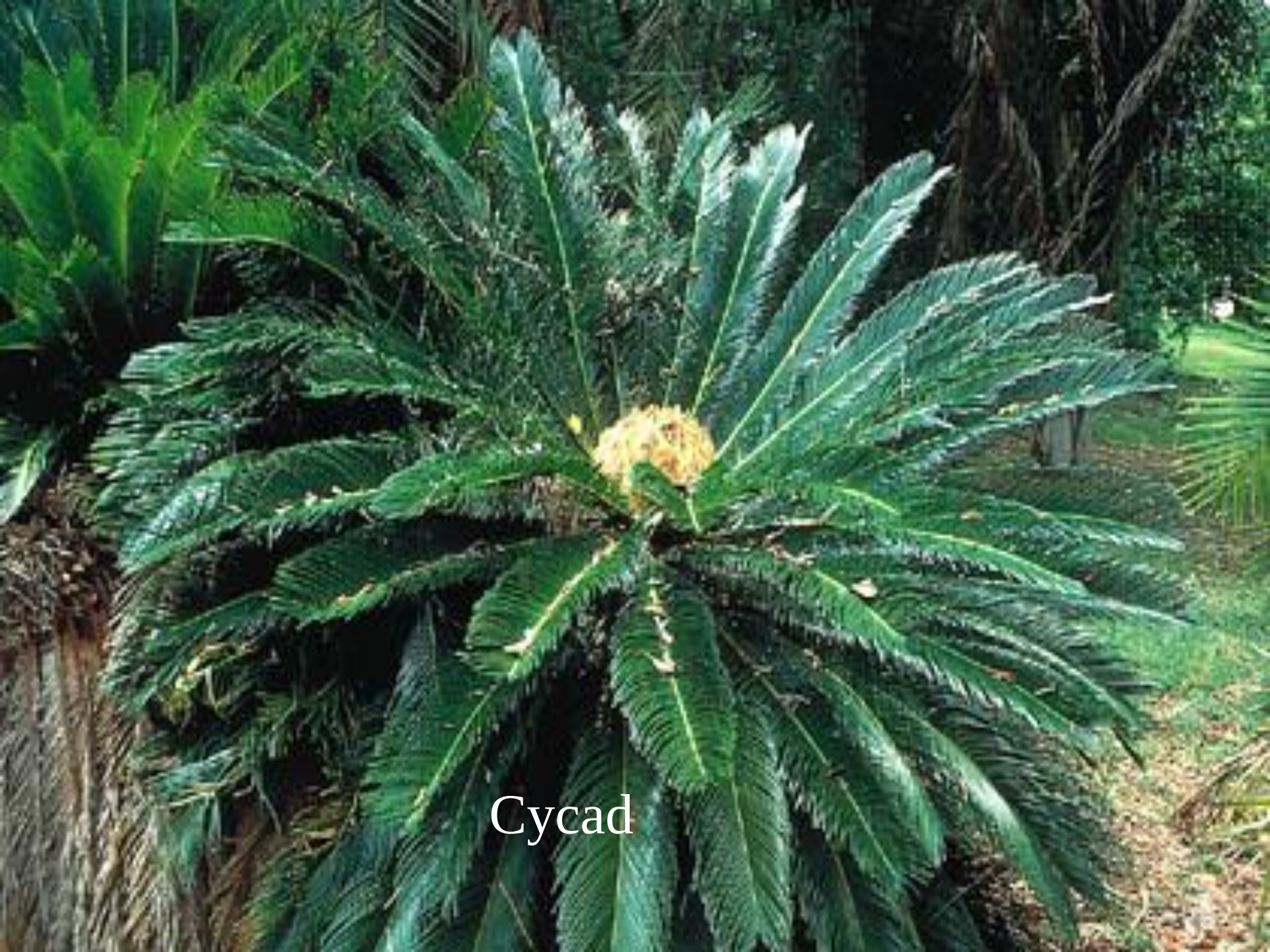

Ferns

Club moss


Horsetails

Vascular seed plants
Gymnosperms

- Naked seeds and no flowers.
- Most are evergreens and bear seeds in cones.
- Cycads are native to tropics and grow slowly. They can live to be thousands of years old.
- Gingkoes are tolerant of air pollution and deciduous.
- Conifers include pine, cedar, redwood, juniper, and are important sources of wood, paper, turpentine and Christmas trees.


Cycad


Gingko


Conifer

Gymnosperms cont…

- Conifers are woody plants with needle or scale-like leaves. Have both male and female cones. Male cones grow in clusters and release pollen. Pollen blows into female cone (larger) and closes tightly. Seeds will mature in one or two years when the female cone opens.

Angiosperms

- Production of fruit that protects seeds
- Quick germination
- Efficient vascular system
- Use animal pollination also
- More diverse
- Occupy more niches (aquatic, epiphytic and parasitic environments)


Rafflesia Arnoldii

Angiosperms cont…

- Monocots-have one cotyledon (seed leaves), several main veins or bundles of vascular tissue running parallel to each other called parallel venation. (ex: lilies, irises, bananas, grasses, wheat…)
- Dicots-two cotyledons, one or more nonparallel veins that branch repeatedly, froming a network called net venation. (ex: beans, oaks, maples, cactuses, carnations, roses, most broad-leaved forest trees…)

Plants and the Environment

- Play a major role in recycling the Earth's water, oxygen, carbon dioxide and inorganic nutrients.
- Most nitrogen in living organisms must first be fixed by bacteria, which may live in association with plant roots, (esp. legumes)
- Provide food to animals that protect them or carry their pollen (beneficial)

Plants and environment…

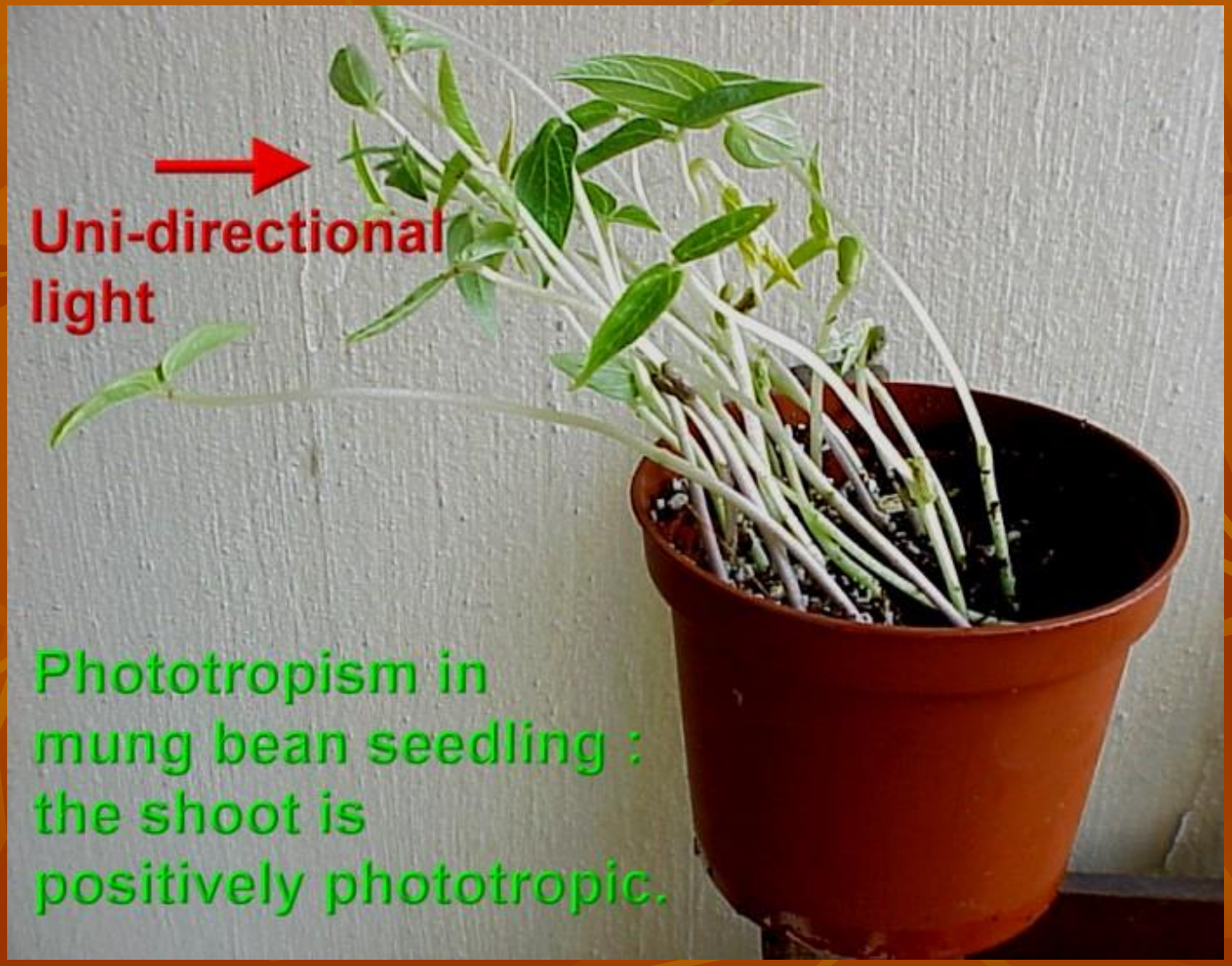
- People have affected wild plant populations negatively by introducing foreign species of plants, animals, and disease organisms.
- Many deaths are caused by addictive plant products (tobacco, cocaine, opium, alcohol…)
- Some are poisonous when eaten or touched
- Millions of people suffer from allergies to pollen.

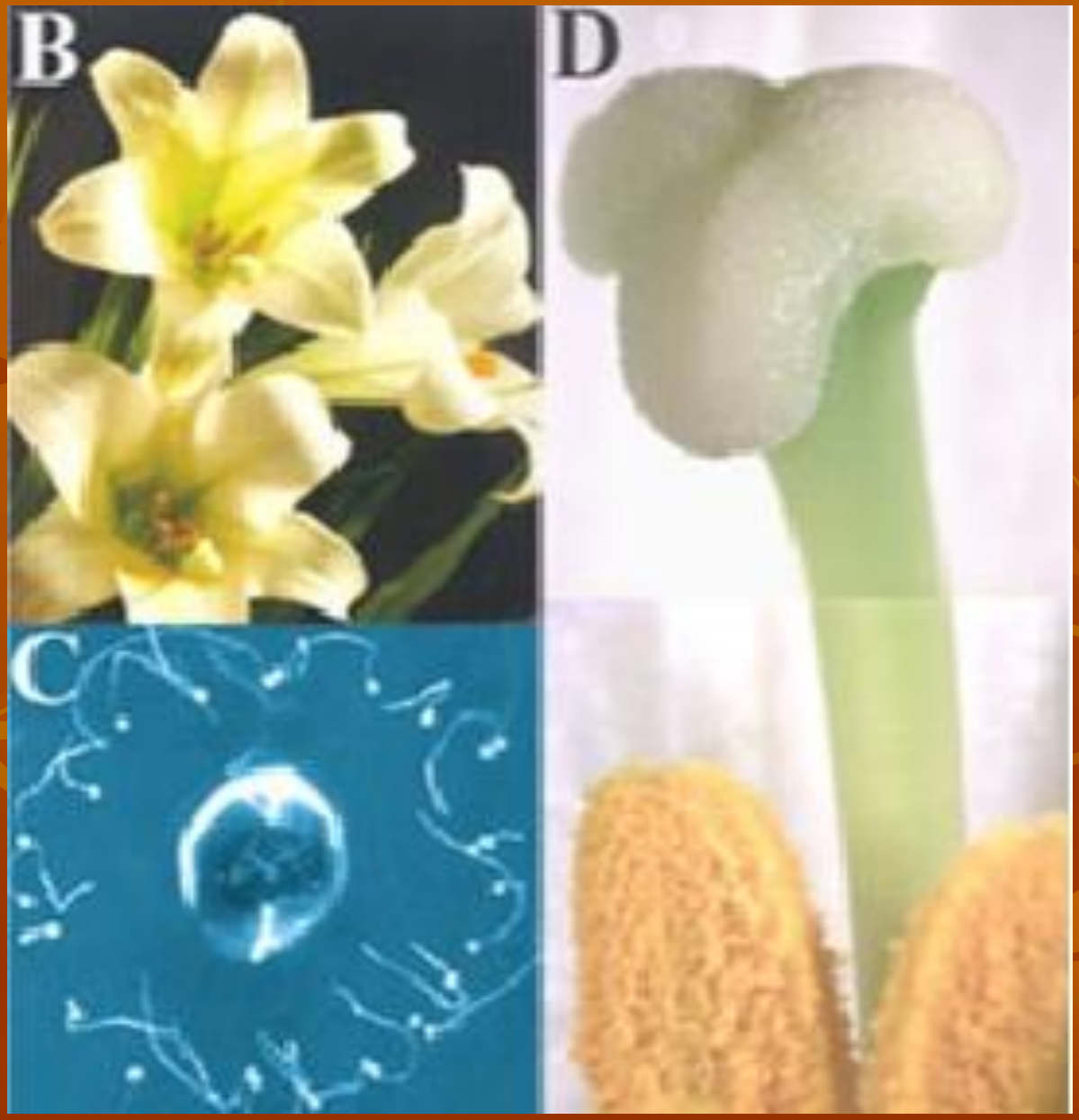
Plant Behavior

- Tropism-movement of all or part of an organism in response to an external stimulus, movement is either toward or away from the stimulus (tropos=turning)
- Phototropism-plant growth in response to light coming from one direction
- Thigmotropism-contact with object (vine twines around a tree)

Plant behavior cont…

- Gravitropism-growth toward gravity (roots grow downward)
- Chemotropism- growth toward chemicals (pollen tube grows toward ovule)
- Play sunflower phototropism
- How plants signal


Uni-directional light
Phototropism in mung bean seedling : the shoot is positively phototropic.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Ornamental plants

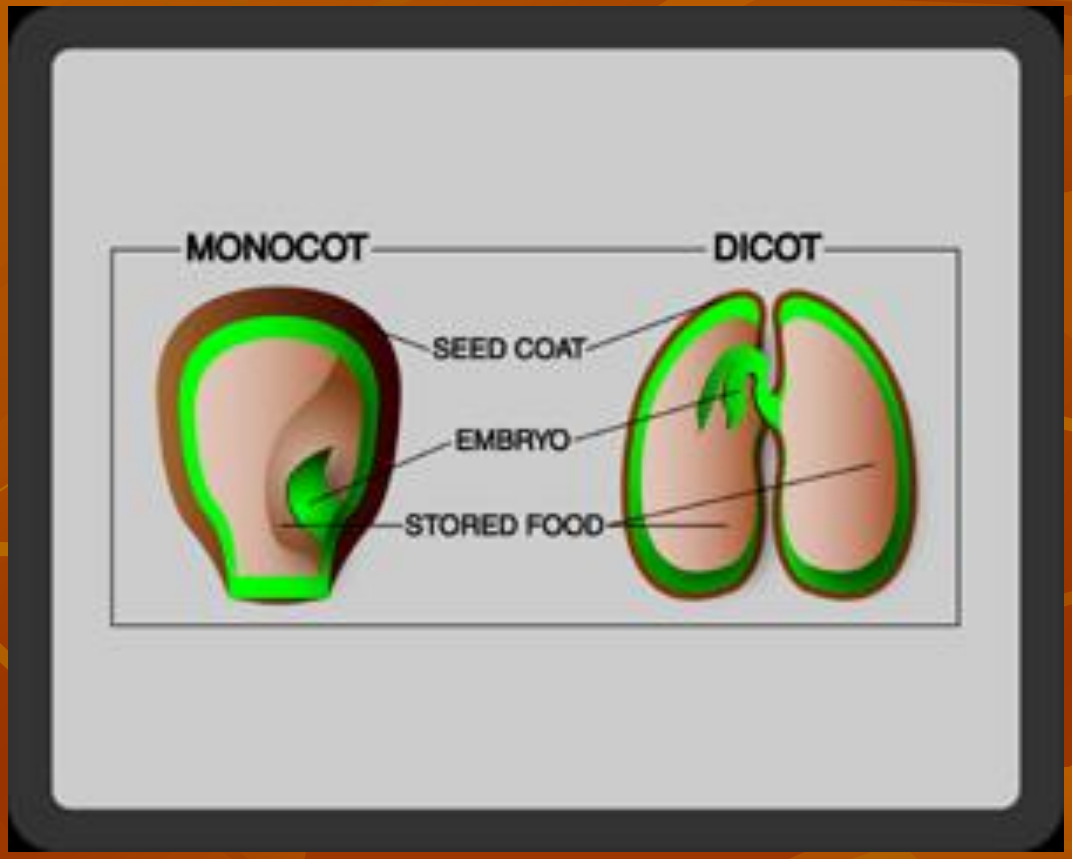
- Improve the human environment in many important ways: provide shade, minimize soil erosion, reduce noise and lower home energy costs…
- Provide thousands of nonfood products, including clothing, fabric dye, lumber, paper, cosmetics, fuel, cork, rubber, turpentine and pesticides.

MONOCOTS

Monocots

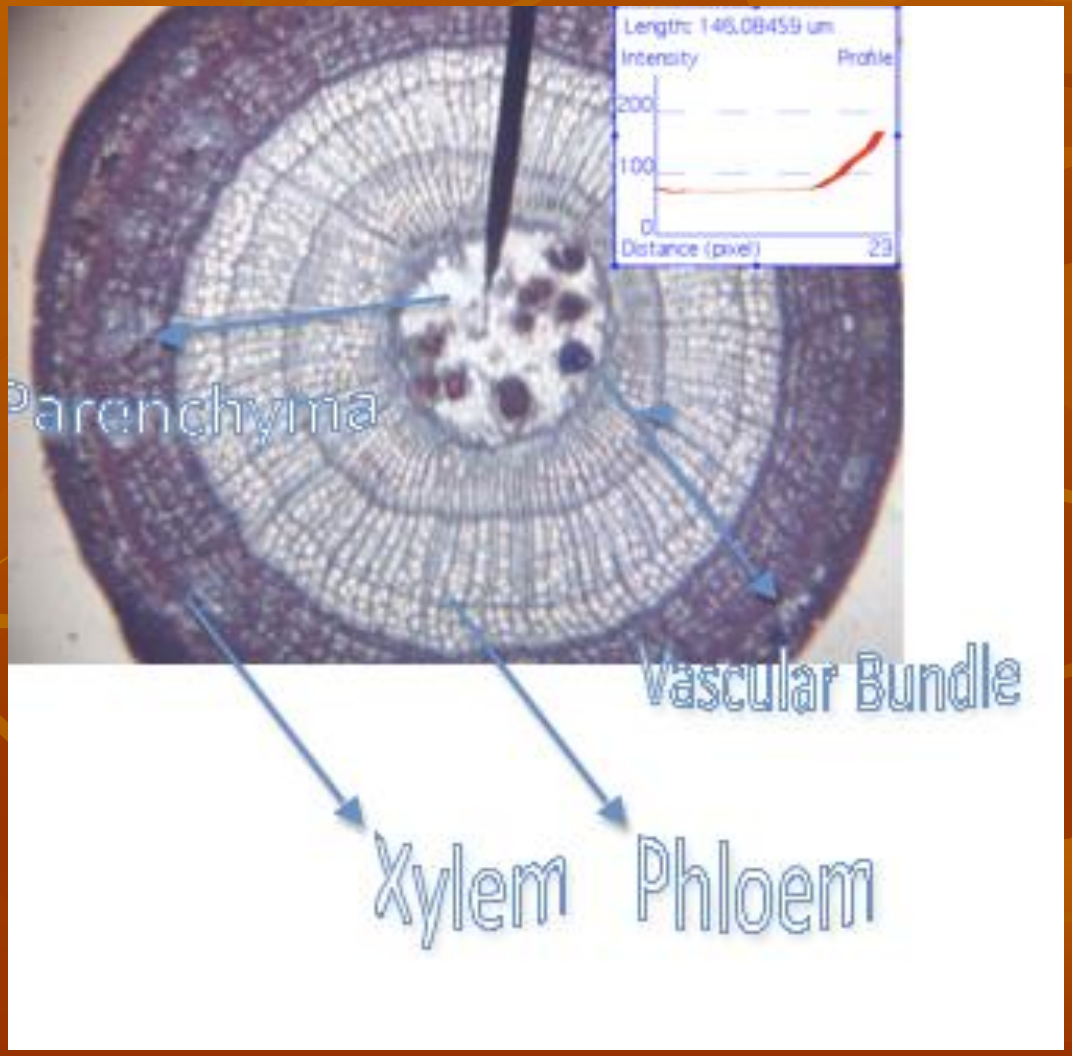
- Embryos- One cotyledon
- Leaves-Parallel venation
- Stems-Scattered vascular bundles
- Flower parts-Usually occur in threes
- Examples-Lilies, irises, orchids, palms, tulips, bananas, pineapples, onions, bamboo, coconut, grasses (including: wheat, corn, rice, and oats)

One cotyledon

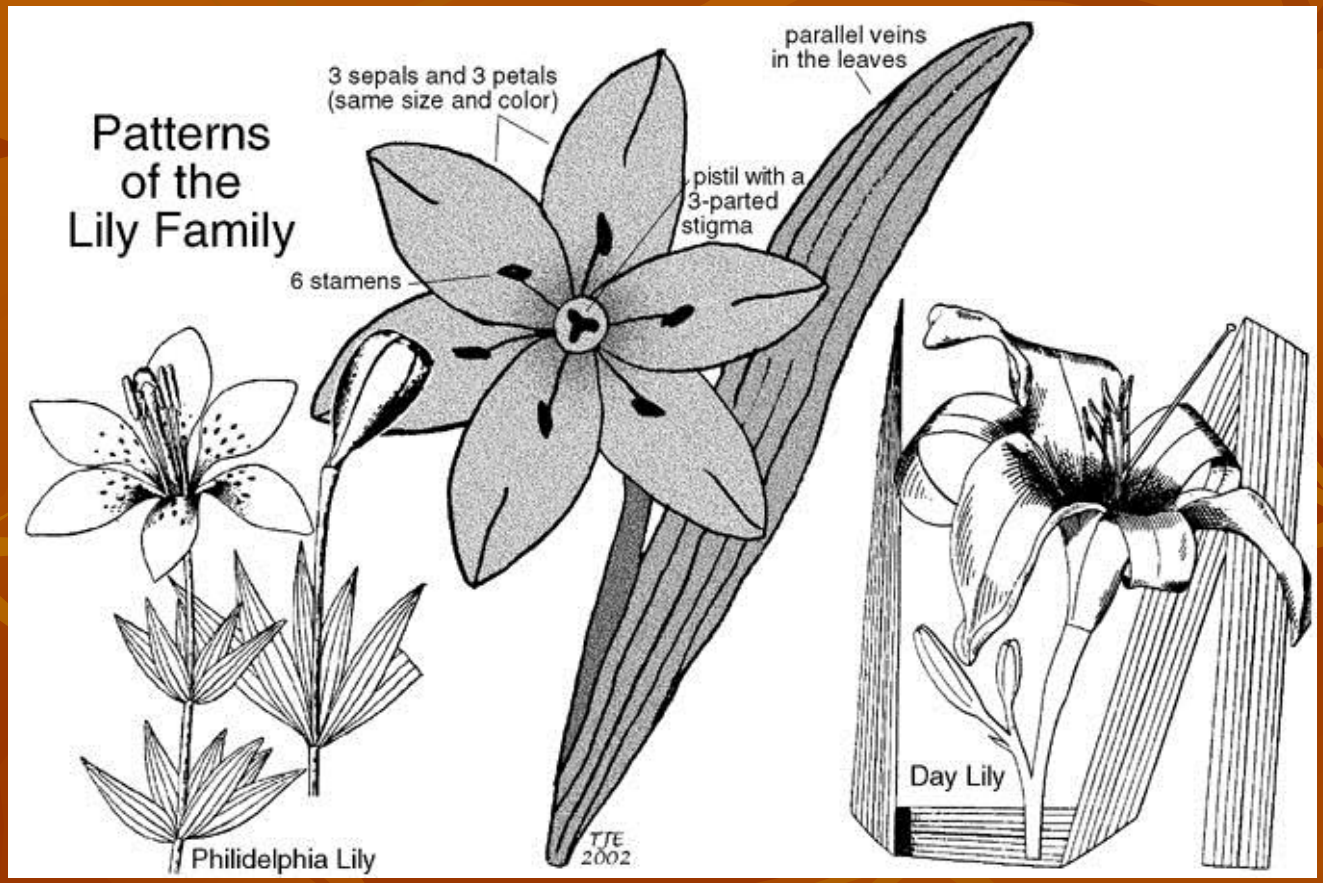


Parallel venation

Scattered vascular bundles



Usually occur in threes



MONOCOTS

Cotyledons	Veins in leaves	Flower parts	Arrangement of primary vascular bundles in stem
			
One cotyledon	Usually Parallel	Usually in multiples of three	Scattered


Lilies


Irises


Bananas

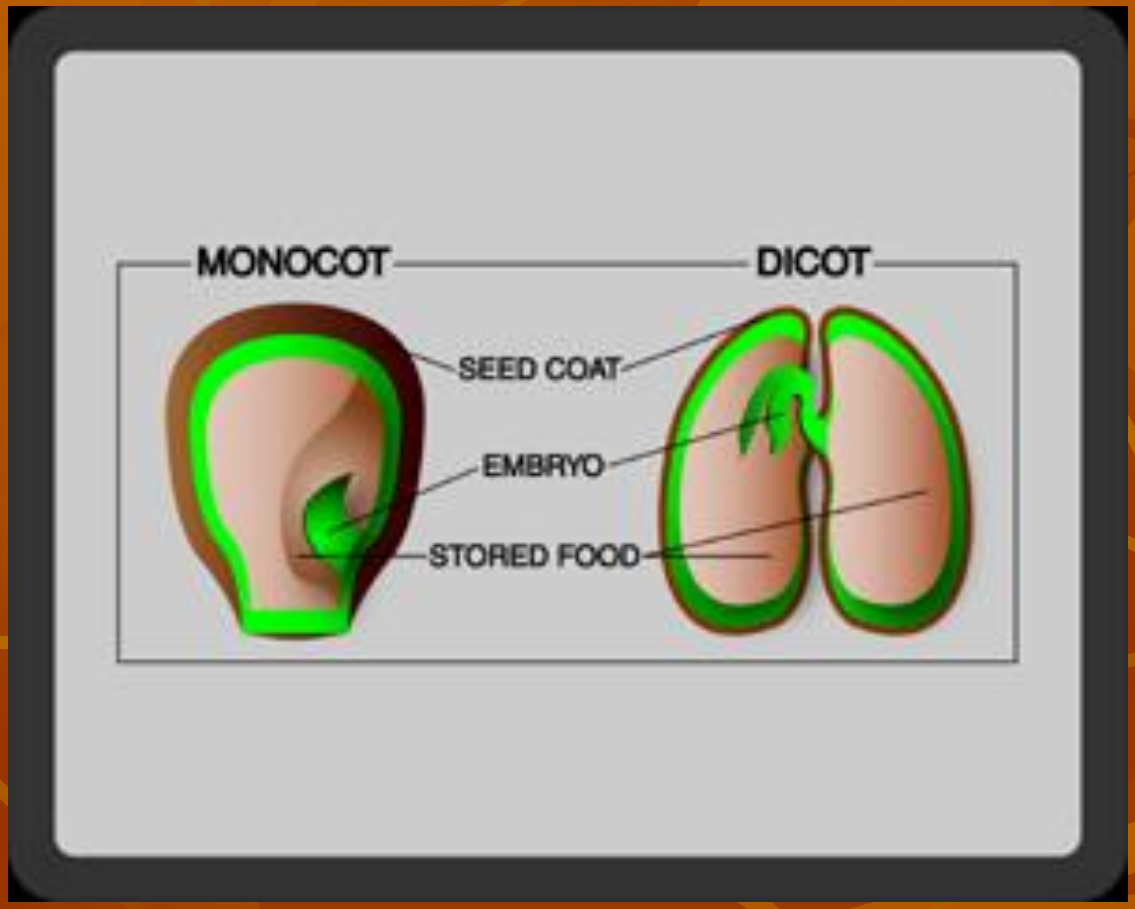

Wheat

DICOTS

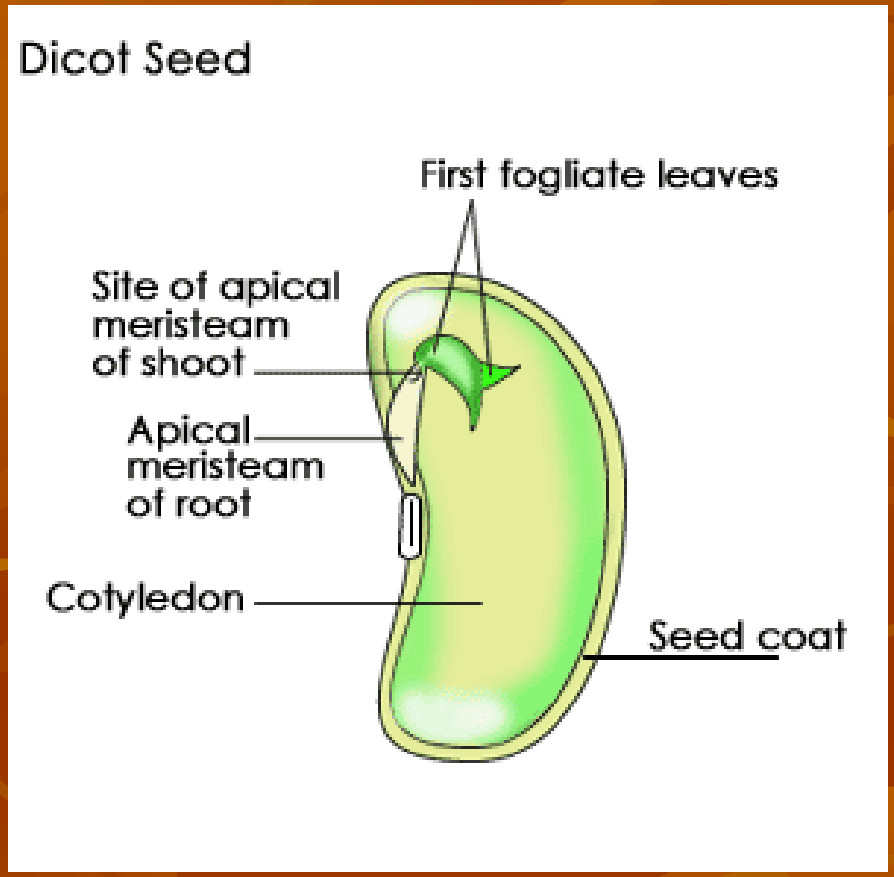
Dicots

- Embryos-two cotyledons
- Leaves-Net venation
- Stems-radially arranged vascular bundles
- Flower parts-usually occur in fours or fives
- Examples-beans, lettuce, oaks, maples, elms, roses, carnations, cactuses, most broad-leaved forest trees

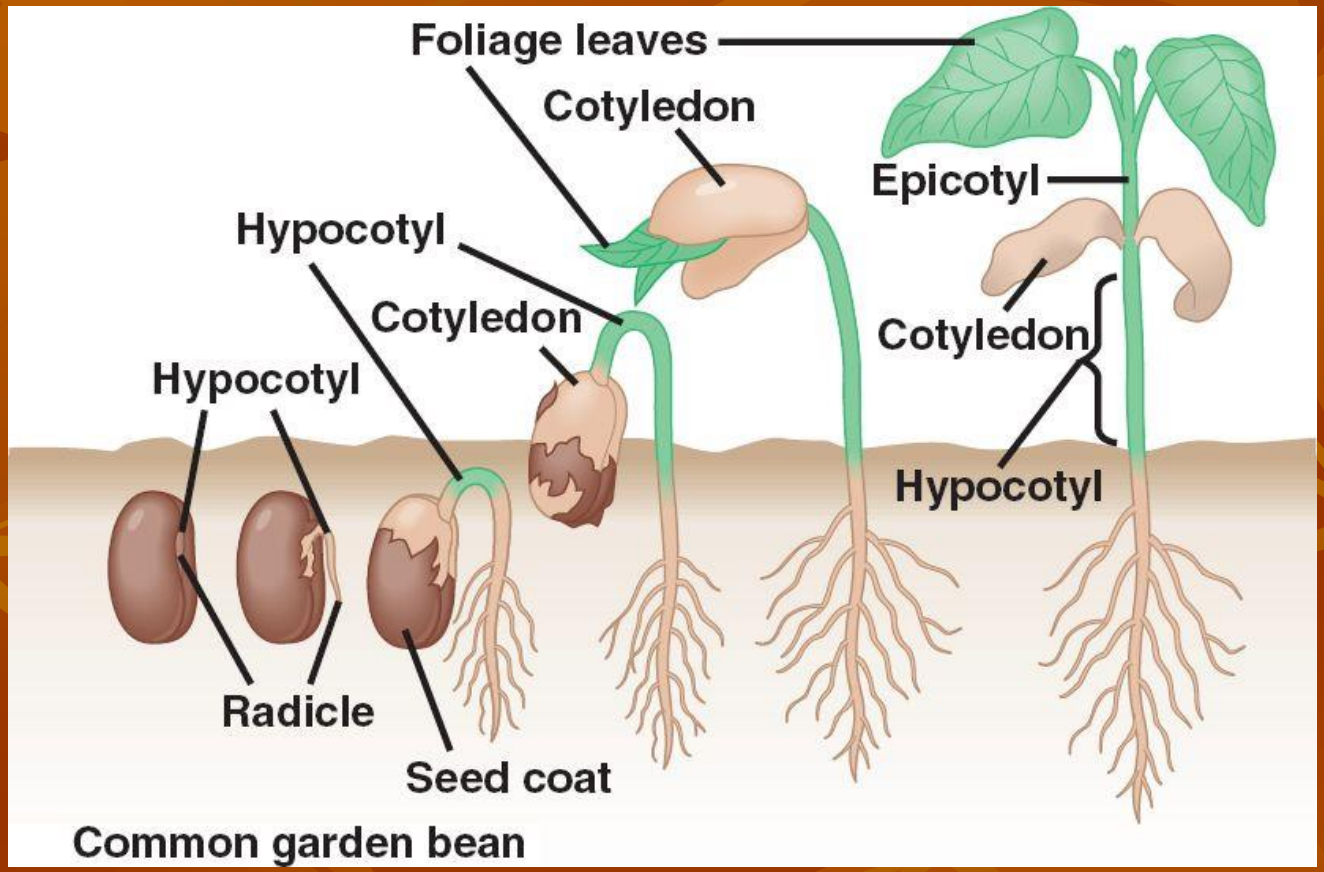
Dicot cotyledon



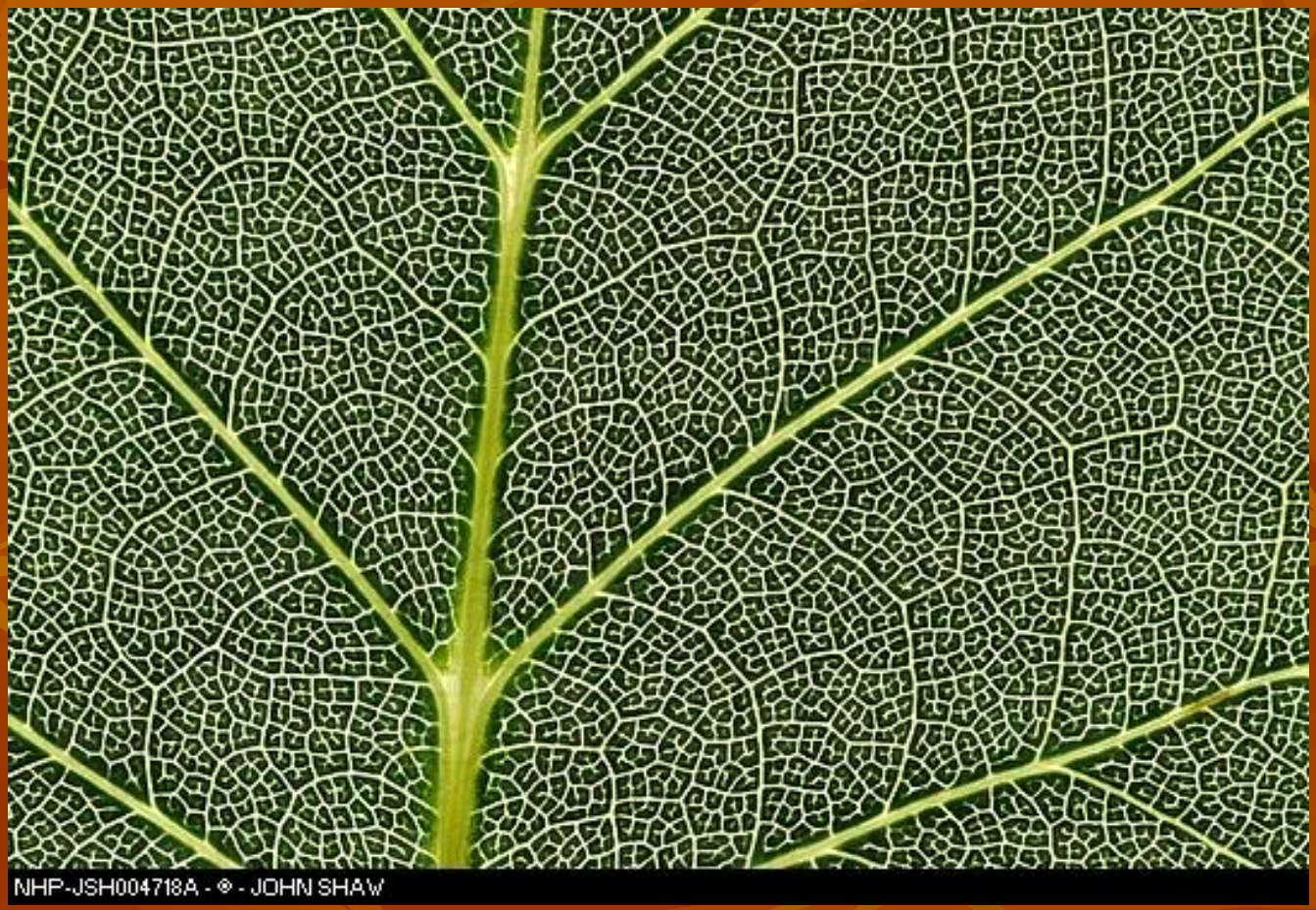
Parts of a dicot seed



How it emerges???

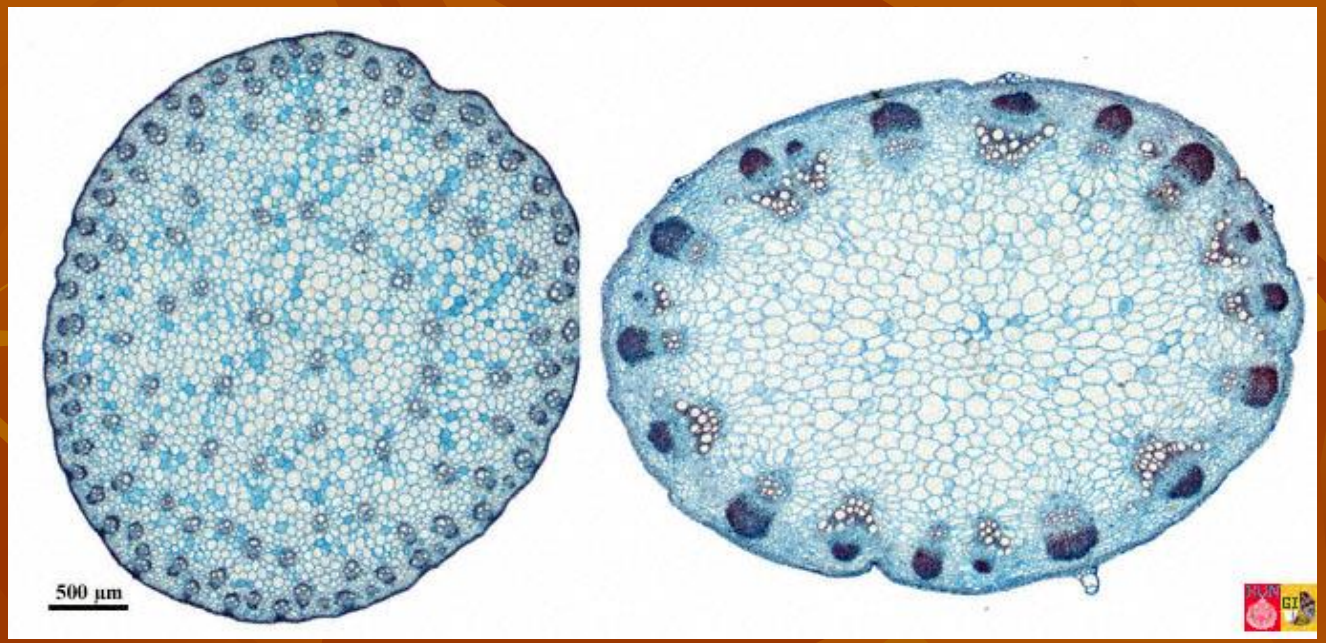


Net Venation

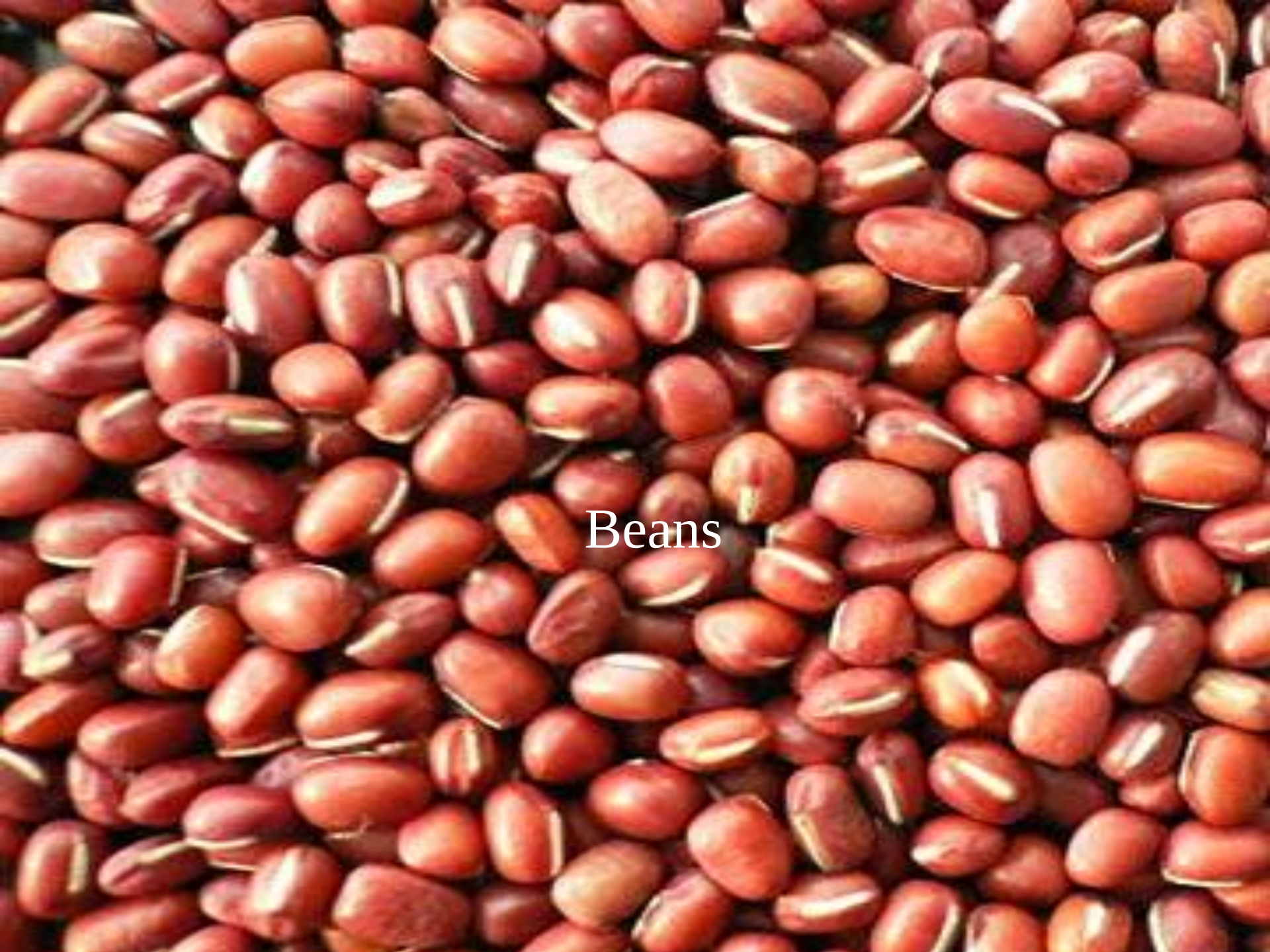


Radially arranged vascular bundles

- Monocot vs Dicot stems



Usually occur in fours or fives

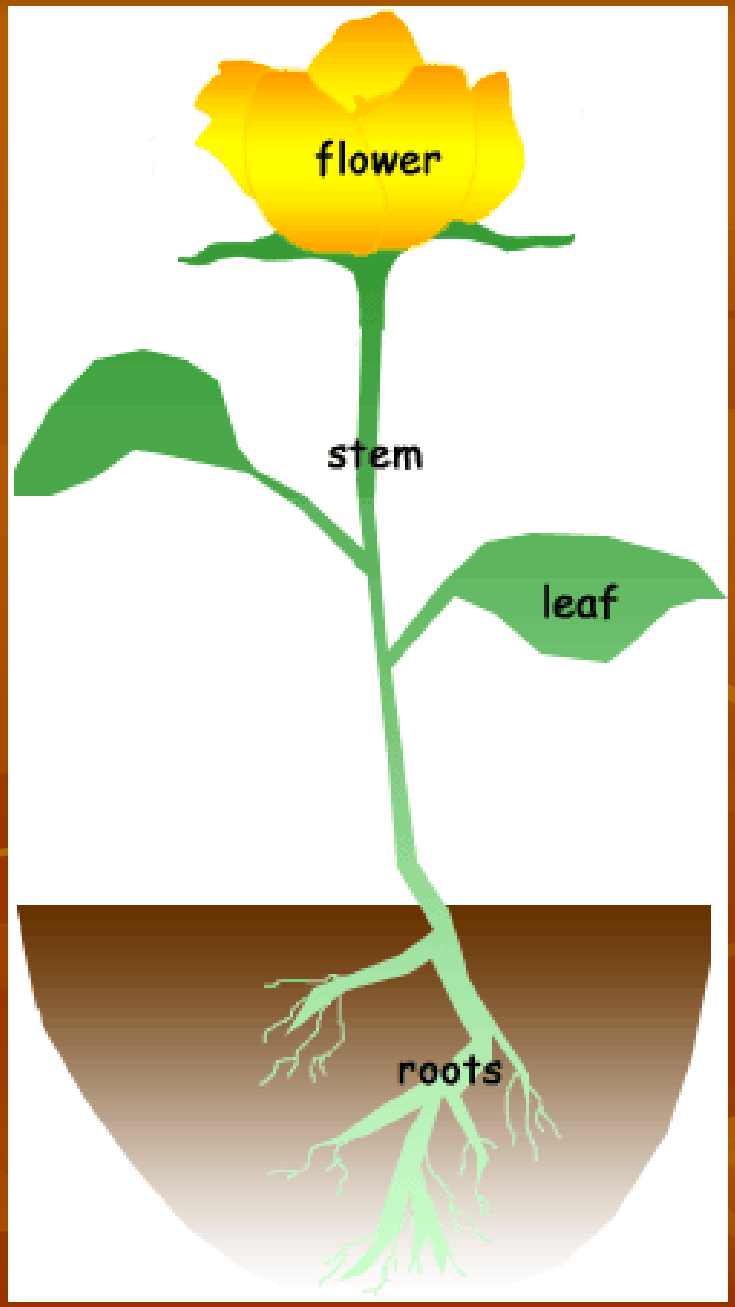

Beans

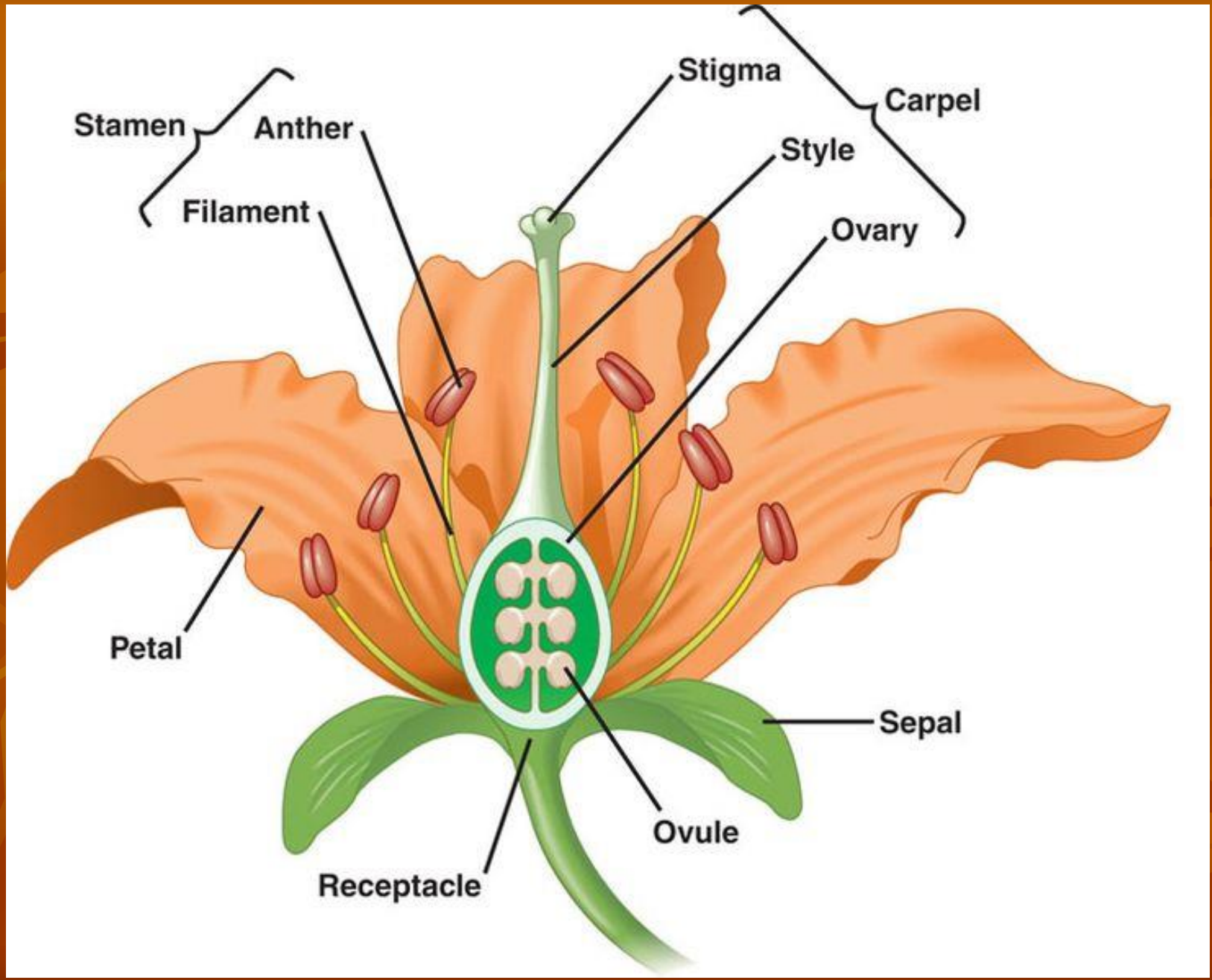

Oaks


Maple Tree


Cacti


Wild Roses


flower
stem
leaf
roots


Stamen
Anther
Filament
Stigma
Style
Ovary
Carpel
Petal
Sepal
Ovule
Receptacle