

**Today's Study Tip**

For the audio learners, bring a tape recorder to class and review it another time while stuck in traffic.

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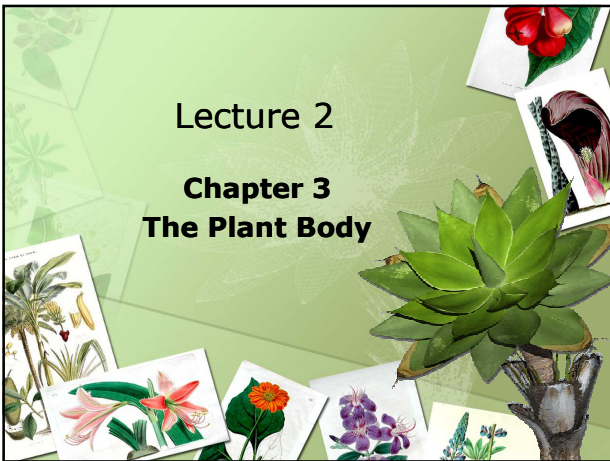
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**Lecture 2**

**Chapter 3**

**The Plant Body**

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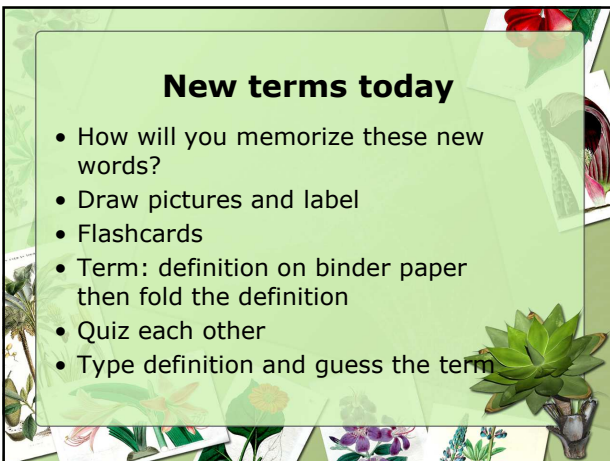
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**New terms today**

- How will you memorize these new words?
- Draw pictures and label
- Flashcards
- Term: definition on binder paper then fold the definition
- Quiz each other
- Type definition and guess the term

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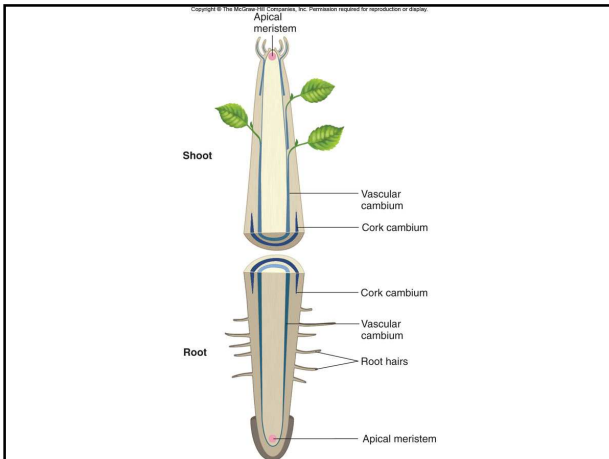
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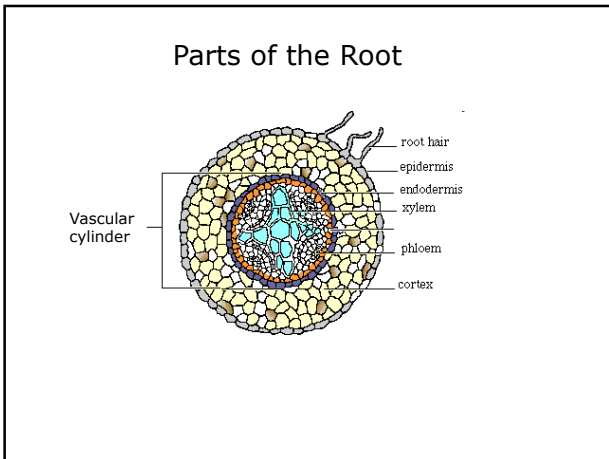
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### Roots

- At the roots, water and minerals are taken up from the soil into the plant
- The tip of the root is the apical meristem = "apex" & "divided"
- Root hairs help absorb more nutrients
- The center of the root is called the vascular cylinder
- It contains xylem – tubes that contain water and minerals
- And it contains phloem – tubes that contain materials made by the plant

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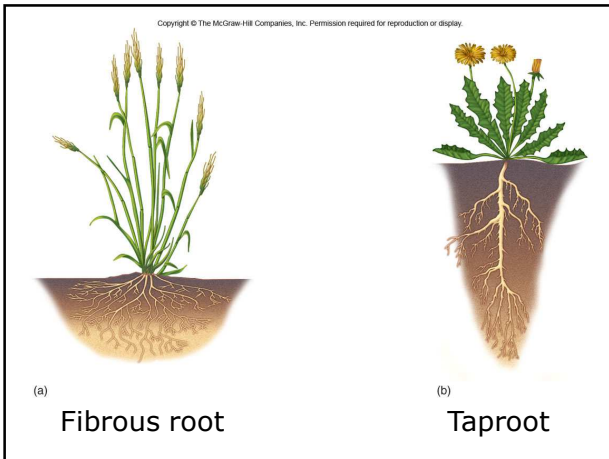
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### Two root types

- Fibrous roots: mostly thin roots, branching. Like grass.
- Taproots: one large main root with several branches
- Some become enlarged and we eat them: examples?

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## Carrots

- The first year a carrot grows, the root becomes large
- The second year it uses the energy from the root to grow petite, white flowers called Queen Anne's Lace
- A biennial plant: "two" "years" needed to complete its life cycle

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Originally, carrots were purple



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## Orange carrots

- The orange color is beta-carotene
- The pigment is converted into vitamin A
- This vitamin is important in helping our night vision
- Also needed to fight cancer as an antioxidant = "against" "oxidation"
- Contains sugar which is why they are a popular vegetable

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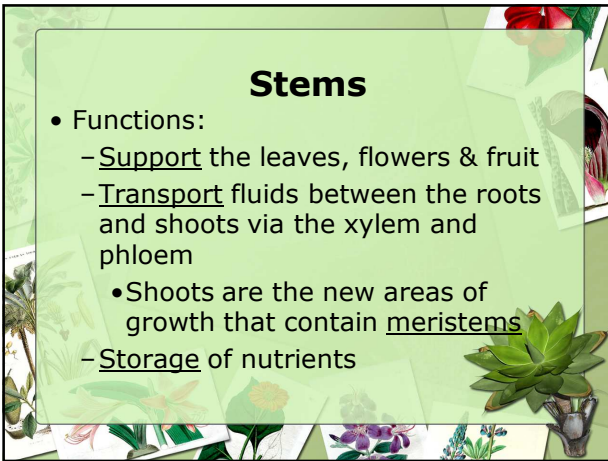
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## Stems

- Functions:
  - Support the leaves, flowers & fruit
  - Transport fluids between the roots and shoots via the xylem and phloem
    - Shoots are the new areas of growth that contain meristems
  - Storage of nutrients




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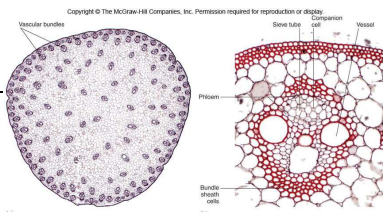
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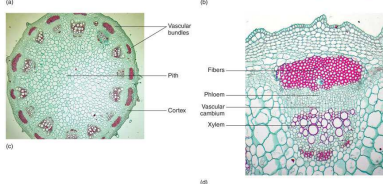
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### Monocot stem cross section



### Dicot stem cross section

The center is called the pith




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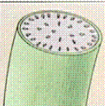
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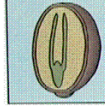

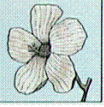
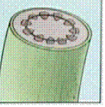
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### MONOCOTS

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

### DICOTS

 Two cotyledons	 Usually netlike	 Usually in fours or fives	 In a ring
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## Asparagus

- A vegetable that is a stem
- Unlike the carrot, it can be harvested year after year
- If not picked, it will flower and "fern out"
- A diuretic
- Sulfur compounds are quickly digested and released in the urine
  - Some people can smell the compounds and others can not

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Green asparagus – why is it green?  
How could we grow it to become white?



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## Supermarket Botany

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## Wood

- All gymnosperms are woody plants
  - Ex: fir trees, cedar trees, pine trees and redwood trees
  - These have cones and needles
- Some dicot angiosperms are woody plants
  - Ex: oak trees, maple trees, fruit trees, birch trees, willow
  - These have flowers

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Resin dripping from a pine tree:

Can be used as glue, varnish for wood, perfumes or incense.



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## Tree rings

- Cut a tree in half and see rings
- The light colored area of the rings are formed by xylem during the period of growth during the Spring
- The dark lines are formed during low growth times such as at the end of summer
- Old rings are secondary xylem

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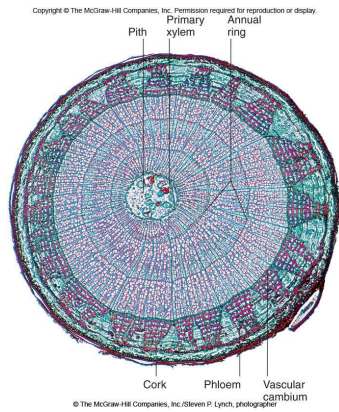
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Slice of a woody, dicot angiosperm




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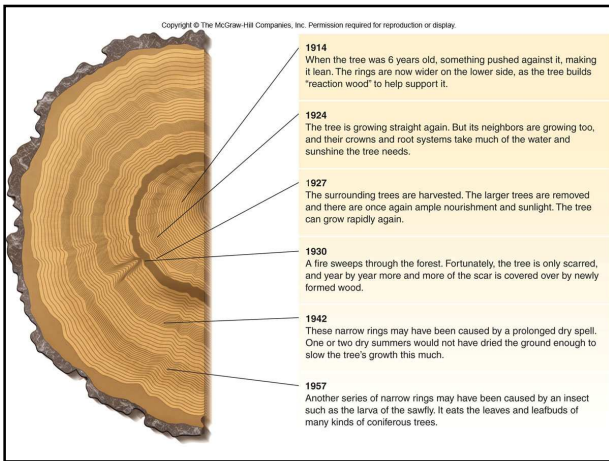
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Redwood tree at visitor's center of Big Basin State Park




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## Study of tree rings

- Dendrochronology can tell a scientist the age of the tree based on the number of rings
- Dendroclimatology can tell about the climate of the years past
  - Big spaces between rings = lots of water and growth
  - Skinny spaces between rings = drought and little growth

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## Leaves

- They are green because of chlorophyll - a pigment that captures photons of light
- They are the photosynthesis factories

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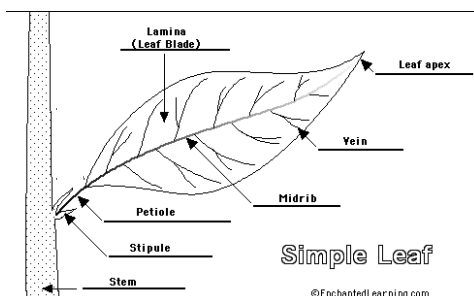
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## Composition of leaves



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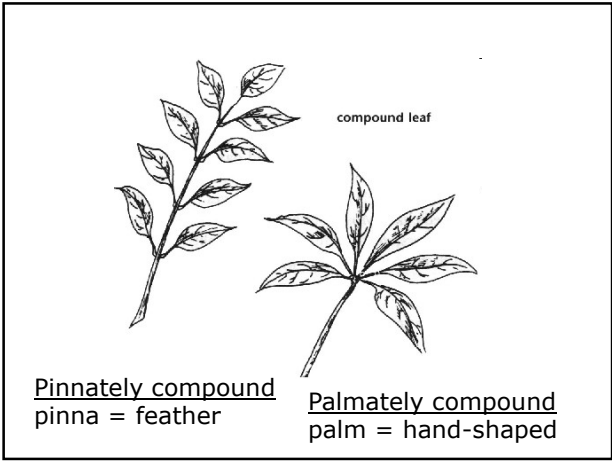
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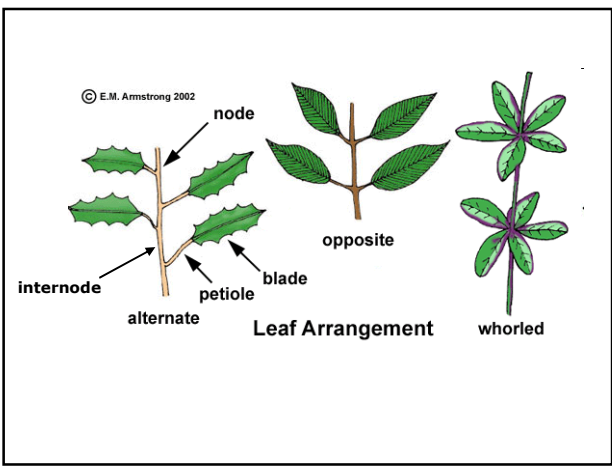
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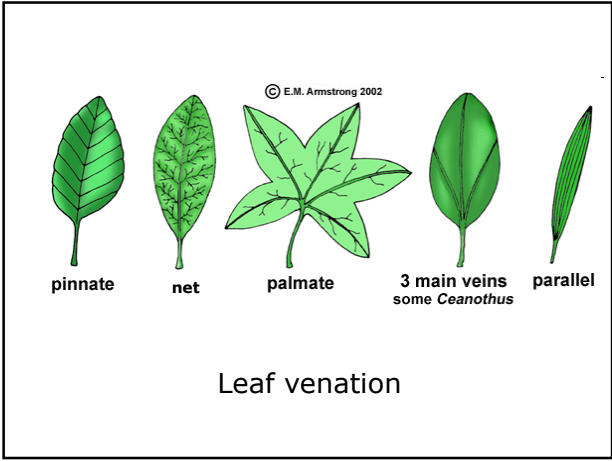
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## Lettuce: leaf vegetable

- Favorite cold veggie of the US
- Ancient Romans ate lettuce salad
- Mostly water, vit A, vit C & calcium
- Head lettuce: iceberg
- Loose-leaf lettuce: green or redleaf
- Cos lettuce: Romaine

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## Dermal tissue

- The outermost layer of leaves and stems is called the epidermis
- These cells make cutin which makes up a waxy layer called the cuticle
- To let carbon dioxide into the leaf, there are little holes that open/close called stomata (plural) or stoma (singular)

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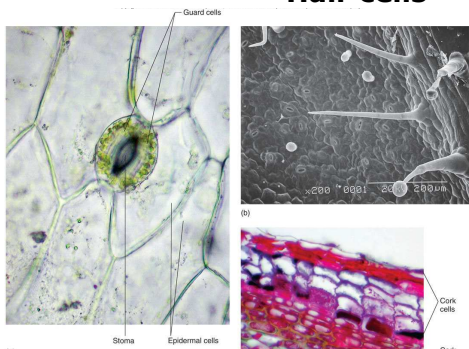
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## Hair cells



Stoma

Cork

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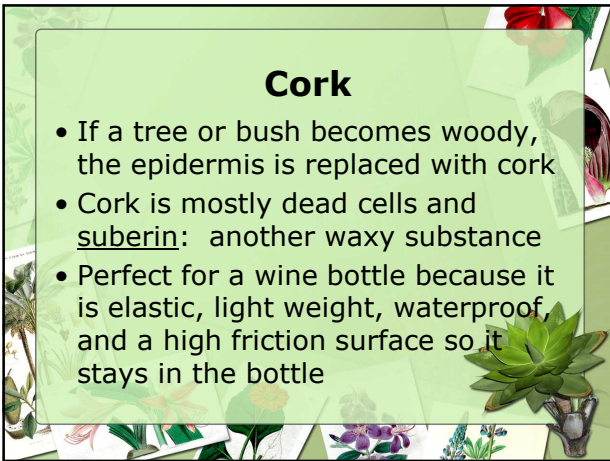
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### Cork

- If a tree or bush becomes woody, the epidermis is replaced with cork
- Cork is mostly dead cells and suberin: another waxy substance
- Perfect for a wine bottle because it is elastic, light weight, waterproof, and a high friction surface so it stays in the bottle

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