**Plant Form and Function**

Dr. Warren Coffeen

Office: 4108 Cordley Hall
Phone: 737-5287, 737-2322
Office Hours: MW 11:30-12:30 and by appointment

---

**The Plant Body**

- Plants exhibit plasticity
  - Environment ....
  - Mobility ....
- Like animal, plants possess organs, tissues, and cells
  - Organs → Body
  - Tissues → Organs
  - Cells → Tissues

---

**Plant Structure**

- Plant body
- Plant organs
  - Roots, shoots, leaves
- Tissues and cells
  - Dermal (epidermis, periderm)
  - Ground (parenchyma, collenchyma, sclerenchyma)
  - Vascular (xylem, phloem)

---

**Plant Organs**

- 

---

**Roots**

- Anchors
- Absorption
  - Root hairs
- Storage of nutrients
- Two types -
  1)
  2)

---

**Taproot Systems**

- Found in ....
- Produces lateral roots
Fibrous Root Systems

- Found in ...
- A mat of thin roots
- No "one-main root"
- Shallow

Modified Roots

- Adventitious roots
  - Develop from ...
  - Tomato plants

Modified Roots

- Prop roots
- Storage roots
- Aerial roots
- Buttress roots
- Pneumatophores

Stems

- Nodes and internodes
- Axillary buds
- Lateral (vegetative) shoot
- Terminal bud
  - Apical dominance

Modified Shoots

- Stolons
- Rhizomes
- Tubers
- Bulbs

Leaves

- Main photosynthetic organ
- Eudicots
  - 
  - 
- Monocots (grasses)
  - 

**Leaf Shape**

- Wide variety of leaf shapes used in taxonomy

**Modified Leaves**

- Tendrils
- Spines
- Storage leaves
- Bracts
- Reproductive leaves

**Plant Tissues**

- Three types
  1) 
  2) 
  3)
- Each is continuous throughout plant body

**Tissues and Cells**

- Dermal
  - epidermis
  - periderm
- Ground
  - parenchyma
  - collenchyma
  - sclerenchyma
- Vascular
  - xylem
  - phloem

**Dermal Tissue**

- Epidermis – protection (skin)
  - Roots contain ...
  - Stems and leaves have a ...
  - Photosynthetic dermal tissue contains ....
- Periderm – bark (cork)
Ground Tissue

- Metabolism, storage, and support
- Forms bulk of plant body between epidermis and vascular tissues
- Two types of tissue, based on location
  1) pith - ....
  2) cortex - ....

Eudicot Stem

Cell Types

- Parenchyma
  - Basic cell, bulk of plant body
  - ______ at maturity
  - Least specialized
  - Most lack ______
  - Functions: metabolism, storage, and support
    (photosynthesis, starch storage)
  - Can give rise to more differentiated cell types
    (totipotent)

Ground Tissue

Three types of cells:

1) ______
2) ______
3) ______

Cell Types

- Collenchyma
  - ______ at maturity
  - ______ only
  - Thickened cell walls (corners)
  - Function: flexible support
    (herbaceous stems and leaves)
  - Occur in bundles and in cylinders

Storage in root

Elodea leaf w/ chloroplast
Cell Types

- **Sclerenchyma**
  - ______ at maturity
  - Thick ______
  - Function: support, protection
  - Two general types
    1) - Long thin cells
    - Often occur in bundles for support
    2) - Small irregularly shaped
    - Protection (seed coats)

Vascular Tissue

- Support and transport

- Two types
  1) ______ - conducts water and minerals (tracheids, vessel elements)
  2) ______ - conducts sugars from photosynthesis (sieve cells, sieve tube members)

Xylem

 "Water-conducting cells"

- ______ at maturity
- Possess ______
- Function: water and mineral transport, support (wood)
- Typically transports from roots to shoots and leaves

- **Tracheids**
  - Long slender, overlapping cells with tapered ends
  - No ______ or ______ at maturity (dead)
  - ______ is hardened with lignin and contains “pits”
  - Pits allow water to move cell to cell through ______
  - Found in conifers and primitive angiosperms
• Vessel elements
  - Short wide cells with thinner walls and less tapered ends
  - Stacked end to end to create ____________
  - End perforations enable ____________ to move freely from cell to cell
  - Evolutionarily more ____________ than tracheids
  - Found in angiosperms

**Phloem**

**“Sugar-conducting cells”**

- ________ at maturity
- ________ only
- Lack _________ (including vacuoles)
- Function: transport of photosynthetic
- Typically the “food” flows from leaves to stems and roots
- Two types of cells
  a) ________ - found in gymnosperms
  b) ________ ________ - found in angiosperms

**Phloem**

- Stack to form sieve tubes
- Sieve plates at cell-to-cell junction, facilitate the flow of sugars
- Associated with ________ ________
  (albuminous cells)
  - many plasmodesmata
  - run metabolic needs of sieve tube members