*chyma* meaning "in filling"

1. Plant Cells and Tissues
   1. Types of Plant Cells
      1. Parenchyma Cells
         1. Most common
         2. Flexible cell wall
         3. Wide range of functions
            1. Storage
            2. Gas exchange
            3. Photosynthesis
            4. Protection
         4. Can undergo cell division even when mature
            1. Used to replace tissues
         5. Often are leaf cells
            1. Have many chloroplasts when leaf cells
         6. Roots and Fruits
            1. When the cells are in roots and fruits they have large vacuoles
      2. Collenchyma
         1. Elongated cells
         2. Occur in long strands
         3. Function
            1. Support for other cells
            2. Thinner parts of cell wall can expand, causing cells to stretch

Provides flexibility for plant

* + - 1. Undergo cell division when mature
    1. Sclerenchyma
       1. Structure
          1. No cytoplasm or other living components when mature
          2. Thick cell wall

Provide support

* + - * 1. Two types

Sclerids

Randomly distributed

Irregular shape

Provide toughness for seed coats

Also used in transport

Fibers

Needle shaped cell

Form tough, elastic tissue when forming tissues

Thick cell wall, very little interior space

* + - 1. Function
         1. Support
         2. transport
      2. No cell division when mature
  1. Plant Tissues
     + 1. Meristematic Tissues
          1. Regions of rapidly dividing cells
          2. Cells in meristems

Large nuclei

Small or non-existent vacuoles

* + - * 1. 3 Main Types

Apical Meristems

Meristems at root and stem tips

Produce cells that result in growth in length

This is called primary growth

Intercalary Meristems

Grass has these

Cause growth in center of stem

Allow grass to grow after being cut

Lateral meristem

Increases diameter of root and stems

Two types

Vascular Cambium

Produces new transport cells

Cork Cambium

Produces cells that develop tough cell walls

Makes bark on trees

* + - 1. Dermal Tissues
         1. Layer of cells that make outer covering of a plant
         2. Look like jigsaw pieces
         3. Secrete lipids that form the cuticle of the plant

Cuticle: a waxy substance that prevents H2O loss from evaporation and also protects the plant

* + - * 1. 3 Types

Stomata

Small openings on leaves that H2O, CO2, O2 and other gasses pass through

Covered by two guard cells which change shape and open or close the stomata

Trichomes

Protrusions

Make leaves look fuzzy

Protection

Root Hairs

Extensions of root epidermal cells

Increase surface area to let roots take in more materials

* + - 1. Vascular Tissues
         1. Transport Tissues

Xylem

Carries water up and away from roots

Made of tracheids

Tracheids are just cell walls when mature, they have wall ends

Made of vessel elements

Just a tubular cell wall stuck end to end, no wall ends at all

Very efficient for transport

Free movement of water, no osmosis required

Phloem

Carry food

Sieve tube member

No nucleus or ribosomes

Companion cell

Attached to sieve tube, has nucleus

* + - 1. Ground Tissues
         1. Everything else is ground tissue
         2. Most common type

1. Roots Stems and Leaves
   1. Root Structure
      1. Root Cap
         1. Parenchyma Cells that help protect the root as it grows
      2. Cortex
         1. Root tissue beneath the dermal tissues
      3. Endodermis
         1. Under the cortex
         2. Casparian Strip
            1. Forces water into the endodermal cells rather than around them
      4. Pericycle
         1. Produces lateral roots
         2. Toward center
   2. Root Types
      1. Taproots
         1. Thick root with small lateral roots
            1. Ex. Carrots and turnips ARE taproots
      2. Fibrous Roots
         1. Same size roots grow away from a central location
            1. Anchors plant
            2. Gets H2O quickly
      3. Modified and Adventitious roots
         1. See page 641
2. Stem Structure
   1. Bundles of vascular tissues
   2. Surrounded by parenchyma cells
3. Stem Growth
   1. Apical meristem
      1. Increase length of stem
   2. Vascular cambium
      1. Grows stem outward
      2. In trees, this causes growth rings
4. Stem Types
   1. See page 643
5. Leaves
   1. Leaf Structure
      1. Petiole
         1. Attaches leaf to the stem
      2. Palisade Mesophyll
         1. Made of tightly packed cells just below the upper leaf epidermis
         2. Optimal place for photosynthesis
      3. Spongy mesophyll
         1. Irregularly shaped, loosely packed cells
         2. Gasses move through this part
   2. Gas exchange
      1. Stomata
         1. Holes in the leaves
         2. When more h2o diffuses into the plant than out, guard cells, which block the stoma, open
         3. When more h2o diffuses out than in, guard cells change shape to close
         4. Gasses essential to photosynthesis enter and exit here
            1. Transpiration

H2O evaporates through the stomata

This draw water up to the leaves

* 1. Leaf Characteristics: see p.645