Lab 6 Plant Anatomy

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Tissues: A tissue is a group of cells with a common structure of function.

Organ: Several types of tissues that work together to carry out particular functions.

Shoot system

• Node: location in the where leaves or branches attach to the stem
• Internode: part of the stem between two nodes
• Apical bud: also called terminal bud. This structure that contains growth tissue for a pair of leaves and elongation of the stem.
• Axillary bud: structure from which leaves and lateral branches.
• Vegetative shoot: shoot not involved in reproduction
• Reproductive shoot: reproductive structures such as flowers or cones.

• leaf: Organ for photosynthesis
  – Blade: broad part of leaf
  – Petiole: stem of leaf
  – Veins: bundles of vascular tissue.
Root system

- Tap root: main root like a carrot
- Lateral root branches: these are connected to the tap root
- Fibrous root system: no main root
- Root hairs: extensions of the root epidermal cells used for absorption.
- Root cap: thimble like structure that protects root apical meristems

Tissue Systems

- Dermal tissue system: outer protective layer
  - epidermis: tightly packed protective cells on the outside of plant
  - cuticle: waxy coating on epidermis of most stems and leaves.
  - periderm: protective tissue in older stems and roots of woody plants
  - trichomes: hair like outgrowths of epidermis of some stems and leaves. They reduce water loss, reflect excess light and can be involved in protection from herbivores.
  - root hairs: extensions of the root epidermal cells used for absorption.

- Vascular tissue system
  - xylem: conducts water and absorbed minerals upwards from the roots
    * tracheids: thin long cells
    * vessel elements: shorter wider cells
  - phloem: transports sugars and other photosynthetic products
    * sieve tube elements: tube like cells through which sap flows
    * sieve plate end walls of sieve tube cells that have pores for materials to pass.
    * companion cell provide metabolism to keep sieve tube elements alive.
– stele: the vascular tissue of a root (both xylem and phloem)

• Ground tissue system
  – pith: ground tissue internal to the vascular tissue
  – cortex: ground tissue external to the vascular tissue
  – includes specialized cells for photosynthesis, storage, and support.

Plant Cell Types:

• Parenchyma Cells: metabolic activity, food storage, water storage
• Collenchyma Cells: flexible structure
• Schlerenchyma Cells: rigid structure

Leaves: Organs for photosynthesis (usually)

• Stomata: openings in the epidermis of leaves
  – guard cells: two cells which surround the stomata pores. the open when filled with water.

• mesophyll: ground tissue of leaf
  – performs photosynthesis
  – palisade mesophyll: pillar like cells at top of leaf
  – spongy mesophyll: has space between like a sponge to increase gas exchange

• veins
  – xylem
  – phloem
  – bundle sheath: layer of protective cells around vascular tissue (xylem and phloem)
Plant growth:

- **Primary Growth**: lengthens the plants
  - apical meristems: undifferentiated dividing tissue at the end of shoots or roots
  - leaf primordia: tissue area in an apical bud that develop into new leaves

- **Secondary growth**
  - vascular cambium: Located between xylem and phloem, the vascular cambium produces all of the new xylem and phloem.
  - cork cambium: The cork cambium is located outside of the phloem. It produces the periderm or cork, which replaces the epidermis on woody stems.
  - bark: Bark consists of everything outside of the vascular cambium. This includes phloem, the cork cambium and cork.
  - vascular rays: Vascular rays are cells that connect secondary xylem to secondary phloem.

- **Root growth**
  - apical meristems protected by root caps
  - vascular cylinder: inner part of the root that contains the vascular tissue
  - endodermis: the innermost layer of the cortex that 1 cell thick that separates the vascular cylinder from the cortex
  - pericycle: outer most layer of the vascular cylinder. Lateral roots arise from this tissue.