Plants

What is a plant?
- Multicellular
- Eukaryotic
- Cell wall present
- Central Vacuole
- Photosynthetic
Early plants

- First plants appeared 500 million years ago and were simple, moss-like
- Evolved from green algae in ancient oceans
Mosses and algae both:
- Have cell walls made of cellulose
- Have chlorophyll used in photosynthesis
- Store food in form of starch
Life in water: Algae

- No need for water conservation—nutrients are also in the water
- Reproduce by releasing unprotected gametes into water
Plant adaptations for life on land

- Water and nutrients must be absorbed through roots/rhizoids
- Roots—absorb water and minerals from the soil, transport these to the stem, and anchor plant to ground
- Rhizoids—found in mosses, usually only 1 cell thick
Water loss prevention in plants

- Cuticle—waxy, protective covering on leaves
Stomata—openings in the cuticle that allow gas exchange

- Open during day to release oxygen and take in carbon dioxide for photosynthesis
- Partially closed at night to prevent water loss
- Plant still loses up to 90% of water through stomata
Land adaptations cont.

• Leaves—carry out photosynthesis by trapping light energy
• Reproduction—gametes are protected to withstand wind and weather
• Must grow upright against force of gravity—cellulose
Land adaptations cont.

• Stems—provide structural support for upright growth and contain tissues for transporting food and water to all plant parts
  – Vascular tissues—tubes of elongated cells through which water and food move (most plants are vascular)
Vascular tissues

- Phloem—living tissues that transport sugars from leaves to rest of plant

- Xylem—dead cells that transport water and minerals by capillary action
Xylem vessel:
- One-way only
- Water and minerals
- No end walls between cells
- Thick walls stiffened with lignin

Phloem vessel:
- Water and food
- Cells have end walls with perforations
- Two-way flow
Nonvascular tissues

- Plants with no vascular tissue must transport materials from cell to cell by diffusion and osmosis
Reproductive Strategies

- Seeds and spores protect the zygote/embryo and keeps it from drying out
  - Seeds contain an embryo, food supply, and protective coating—All conifers and flowering plants
  - Spores—contain a single cell with a hard covering—mosses and ferns
• Plants have a life cycle in which a **haploid** plant that makes **gametes** (a **gametophyte**) alternates with a **diploid** plant that makes **spores** (a **sporophyte**). This is known as alternation of generations. In nonvascular plants, the gametophyte is dominant and in vascular plants, the sporophyte is larger.
Meristem

• The **meristem** is the growing region in plants.

  The **apical** meristem is the growing region at the tips of stems and roots in plants.

  The **intercalary** meristem is the region of plant tissue that allows leaves to quickly regrow.

  The **lateral** meristem is the growing region that increases the diameter of roots and stems.