Biology Chapter 22

Plant = multicellular eukaryote that have a cell wall made of cellulose

Most are autotrophic but some are saprobes or parasites

Plant Life Cycle

Diploid (2N) stage – sporophyte, spore-producing plant
Produces haploid (N) cells through meiosis that grow into gametophyte

Haploid (N) stage – gametophyte, gamete-producing plant
Produces a gamete (N) reproductive cell through mitosis
Two gametes fuse during fertilization to produce a sporophyte

What plants need to survive
Sunlight – for photosynthesis, usually in leaves
Water and minerals – plants absorb from the soil
Gas exchange for photosynthesis
Movement of water and nutrients – often through specialized structures

Four groups
Based on water conducting tissues, seeds, flowers

Cone-bearing plants – Gnetophytes, Cycads, Ginkgoes, Conifers
Flowering plants
Seedless, vascular plants – Ferns, club mosses, horsetails
Bryophytes – mosses, liverworts, and hornworts

Bryophytes
Depend on water for reproduction
NO vascular tissue, can only transport water through osmosis
Small in size and close to the ground

Mosses – Live in swamps, bogs, near streams, rainforests – lots of water
Can tolerate low temperatures where other plants cannot grow
Most abundant plant in polar regions
Leaves are one cell thick – they dry out easily
No true roots
Rhizoids- long thin cells that anchor the moss and absorb water/minerals

Liverworts - found only in soil that is damp year round
look like flat leaves attached to the ground
When plants mature the gametophytes produce “tiny umbrellas” that produce egg and sperm
Gemmae – small multicellular reproductive structures
Hornworts - found only in soil that is damp year round
Sporophyte looks like a tiny green horn, gametophyte looks like liverwort

Bryophytes
Life Cycle
Gametophyte is the dominant, recognizable stage of the life cycle
Gametophyte carries out most photosynthesis
Sporophyte depends on gametophyte for supplies
Fertilization depends on the sperm swimming to the egg in standing water or a coating
Figure 12-11 p. 558 Know
Protonema – filaments produced when a moss spore lands on the ground
Antheridia – gametophyte that produces sperm
Archegonia – gametophyte that produces egg

Human Use of Moss
Natural sponge
Peat can be used for fuel
Used to make soil more acidic in order to help certain plants grow

Vascular tissue = specialized tissue that conducts water and nutrients through a plant

Xylem = transport subsystem that carries water FROM the root to the rest of the plant

Phloem = transport subsystem that carries nutrients and carbohydrates produced by photosynthesis throughout the plant.

Tracheids = key cells in xylem, with hollow centers and thick, strong cell walls. connected end to end to make a structure like a drinking straw

Roots = underground organs that absorb water and minerals

Leaves = photosynthetic organ, contain one or more bundles of vascular tissue

Veins = vascular tissue bundles made of xylem and phloem, on the leaves

Stems = supporting structures that connect roots and leaves, carrying water and nutrients between them.
Seedless Vascular Plants – all have true leaves, roots, stems

**Ferns**
- true vascular tissues
- rhizomes – creeping underground stems
- fronds = large leaves
- wet or seasonally wet environment
- usually thrive in shade
- can grow as large as small trees in rainforest environment

**Club Mosses**
- Small plants that live in moist woodland near streambeds and marshes
- Look like miniature pine trees

**Horsetails**
- Only one genus still living
- Grows about a meter tall
- Nonphotosynthetic scalelike leaves with distinctive whorls or joints along the stem

**Fern Life Cycle** – know illustration figure 22-7 on page 563
- Fern sporophytes develop haploid spores on the underside of fronds inside sporangia
- Sori = clusters of sporangia on the bottom of fern fronds
- Spores germinate → gametophytes (N)
- Gametophyte grows rhizoids, flattens into thin heart-shaped structure
- Gametophyte grows antheridia and archegonia on the underside
- Sperm and egg must travel through water to meet and fertilize
- Fertilization → sporophyte → grows into sporophyte plant (the fern we decorate with)

**Seed Plants**
- Gymnosperms – bear seeds on the surface of cones
  - Conifers, pines, spruces, cycads, ginkoes, gnetophytes
- Angiosperms – flowering plants
  - Grasses, flowering trees, shrubs
  - BIG ADVANTAGE = Do not require water to reproduce

**Flower** = seed bearing structures of angiosperms

**Pollen grain** = structure that contains the entire male gametophyte in angiosperm

**Pollination** = transfer of pollen from male reproductive structure to the female structure

**seed** = embryo of a plant encased in protective covering and surrounded by a food supply

**embryo** = an organism in its early stage of development

**seed coat** = structure that surrounds and protects the embryo, preventing the contents of the seed from drying out
Gymnosperms

Cnetophytes
Cycads = palmlike plants that reproduce with large cones
Ginkgoes = possibly the oldest seed plant structure alive
Conifers = pines, spruce, cedars, firs, sequoias, redwoods, junipers, yewsd

Adapted to dry conditions – needles prevent water loss, thick wax layer on leaves, water openings on the bottom of leaves
Most are “evergreens” = maintain their leaves through the year.

Angiosperms

Develop flowers – advantage because they attract animals that transport pollen, which is more efficient than wind
Flowers contain ovaries, which surround and protect the seeds
Fruit = wall of tissue surrounding a seed
Also helps with success because it uses animals to increase the range of seed dispersal

Diversity of Angiosperms
Monocot vs Dicot

Monocot = has only one seed leaf (one cotyledon)
Dicot = has two seed leaves (two cotyledon)

Cotyledon = first seed leaf in a plant embryo

Characteristics of Monocot
Single cotyledon
Parallel veins
Flower parts in multiples of 3
Vascular bundles scattered throughout stems
Fibrous roots

Characteristics of Dicot
Two cotyledons
Branched veins
Floral parts in multiples of 4 or 5
Vascular bundles arranged in a ring
Taproot

Woody plants = stems are thick to support plant, produce wood trees, shrubs, vines (like grapes or ivy)

Herbaceous plants = stems are smooth and they do not produce wood
Dandelion, azelias, petunias, sunflowers
Three categories of plant life spans:

- **Annual** – complete a life cycle in one growing season
- **Biennial** – complete their life cycle in two years
- **Perennial** – life cycle lasts for more than two years, most have woody stems