X. Chapter 40—Plant Reproduction

I. Key Concepts
  A. Alternation of generations
    1. Diploid sporophyte produces haploid spores by meiosis
    2. Haploid gametophyte produces haploid gametes by mitosis
  B. Angiosperm reproduction
    1. Gametophytes
      a. Male gametophytes are contained within dispersible pollen grains
      b. Female gametophytes are contained within the ovaries of flowers
    2. Seeds
      a. Contain embryo & food within a tough coat
      b. Ovary develops into the fruit that encloses the seeds

II. Sexual Reproduction (40.1)
  A. Size of both flowers and seeds varies greatly **Fig 40.1**
  B. Sexual Reproduction
    1. Terms
      a. FERTILIZATION: Fusion of haploid GAMETES
      b. POLLINATION: Transfer of sperm-producing pollen grains to egg
      c. SELF FERTILIZE
        (1) Gametes from same individual fertilize
        (2) Produce more offspring but genetic diversity low
        (3) Increased susceptibility to pathogens
      d. OUTCROSS
        (1) Fertilization occurs between different individuals
        (2) Fewer offspring, but increased genetic variability
      e. PERFECT FLOWER: Male & female structures on the same flower
      f. IMPERFECT FLOWER: Either male or female only.
      g. MONOECIOUS: Male and female organs on same individual plant
      h. DIOECIOUS: Individual plants are either male or female **Fig 40.7**
  C. The Land Plant Life Cycle: Alternation of Generations
    1. Multi-celled plants can be either haploid or diploid
      a. Diploid SPOROPHYTE produces haploid spores by meiosis
      b. Haploid GAMETOPHYTE produces haploid gametes by mitosis
      c. SPORE
        (1) One cell that grows directly into an individual plant
        (2) Haploid spore becomes the haploid gametophyte by mitosis
      d. GAMETE
        (1) Two gametes fuse to form diploid zygote
        (2) Zygote grows into multi-celled diploid sporophyte by mitosis. **Fig 40.2**
    2. In flowering plants, the gametophyte generation is small, short-lived, and dependent on the sporophyte for nutrients.

D. Asexual Reproduction:
1. Mechanisms are diverse **Fig 40.3**
a. Stems
(1) RHIZOMES: Below ground
(2) STOLONS: Horizontal above ground
b. Leaves can form PLANTLETS
2. Implications of genetically identical offspring
a. Positive: Rapid reproduction allows clones to occupy habitat before competitors arrive
b. Negative: Genetic similarity makes entire population at risk to disease.

III. Reproductive Structures (40.2)
A. The General Structure of a Flower **Fig 40.4a**
1. PETALS Brightly colored, modified leaves that attract pollinators
2. STAMEN Male portion of flower
3. ANTHER
a. Enlarged structure at tip of stamen
b. Produces *pollen*, containing male gametophytes
4. CARPEL Female region of flower
5. STIGMA
a. Tip of carpel
b. Receives pollen
6. OVARY
a. Bottom of carpel
b. Contains the *ovules* which contain female gametophytes
c. Becomes the fruit after fertilization
B. The two components of sexual reproduction, meiosis and fertilization, occur within two specific flower parts.
1. Meiosis, female gametophyte formation, and fertilization occur in the ovules of the carpel. **Fig 40.8**
2. Meiosis and male gametophyte formation occur in the anthers of the stamens. **Fig 40.9**

IV. Pollination and Fertilization (40.3)
A. Pollination occurs primarily by insects and wind.
B. Pollination was an important innovation in plant evolution.
1. Plants were able to colonize and survive in dry environments.
2. Sexual reproduction became more precise and efficient with animal pollinators. **Fig 40.11**
3. Mutualism evolved between the pollinators and plants.
4. Self-incompatibility between pollen and stigma on same flower eliminates self-fertilization in some plant species.
5. Insect pollination leads to evolution of new flower and insect species. **Fig 40.12**
C. Once the pollen tube reaches the ovule in the ovary…
1. One sperm fuses with the egg to form the diploid zygote
2. The other sperm fuses with the polar nuclei to form the triploid *endosperm*. **Fig 40.14**
3. Phenomenon is known as DOUBLE FERTILIZATION

V. The Seed (40.4)
   A. The ovule develops into the seed, and the ovary develops into the fruit
   B Embryo with nutritive tissue and surrounding seed coat form and are enclosed by the PERICARP, the ovary wall, which develops into the fruit. **Figs 40.15, 40.16 & 40.17**
   C. Fruit functions to protect the seeds, provides nutrients to developing seedlings, and aids in dispersal from the parent plant. **Fig 40.18**