

## **FEATURES OF THE PLANT KINGDOM (Viridiplantae)**

1. Bodies include unicellular, colonial, filamentous, coenocytic, and parenchymous types.
2. Cell wall is composed of cellulose, and other carbohydrates. Some have lignin
3. Almost all are photosynthetic. Pigments include chlorophylls, carotene, and lutein.
4. Food is stored as starch (amylose).

### **General Types of Plants**

- A. Green algae and stoneworts
- B. Bryophytes (mosses and liverworts)
- C. Tracheophytes (vascular plants)
  1. Seedless vascular plants (club mosses, horsetails, ferns)
  2. Seed plants (gymnosperms and angiosperms)

## Features of the Land Plants

1. All are multicellular, having bodies that are often differentiated into leaves, stems and roots.
2. Have a well developed alternation of generations, consisting of a diploid sporophyte (that produces spores) and a haploid gametophyte (that produces gametes (eggs and sperm)).
3. Typically live on land, and have several traits that prevent desiccation:
  - A. A cuticle made of cutin (except mosses).
  - B. Sperm that are produced within antheridia.
  - C. Eggs and the young sporophyte (the embryo) that are produced within archegonia.
  - D. Spores that are produced within sporangia.

### PLANTS ARE CLASSIFIED INTO TWO GROUPS:

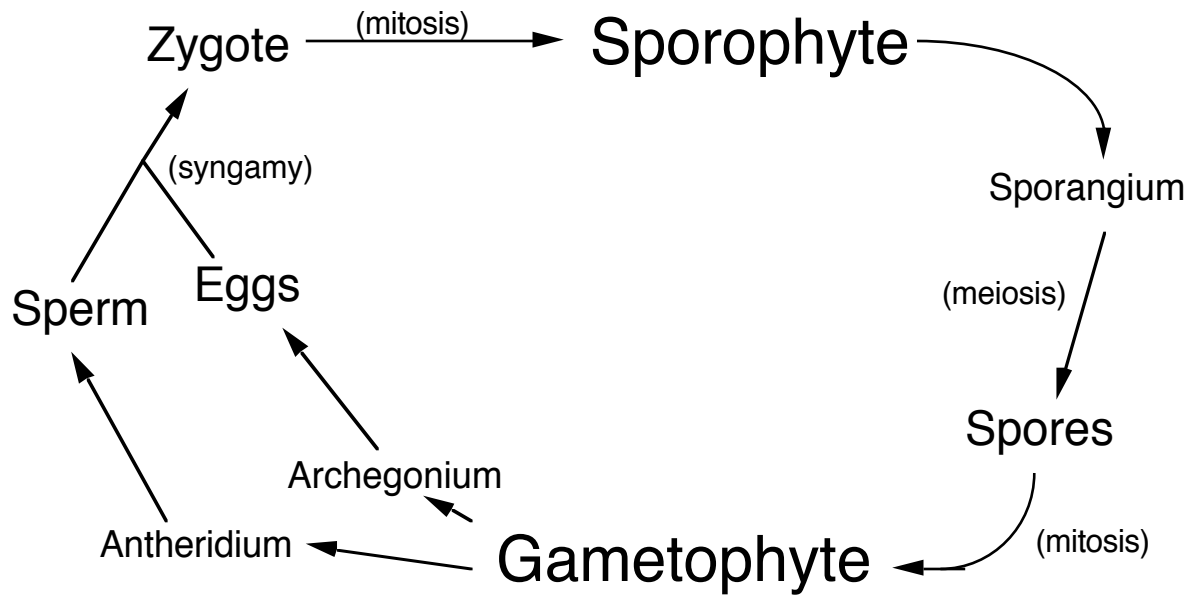
#### Bryophytes

1. Lack vascular tissue
2. Gametophyte is dominant
3. Include mosses and liverworts

#### Tracheophytes

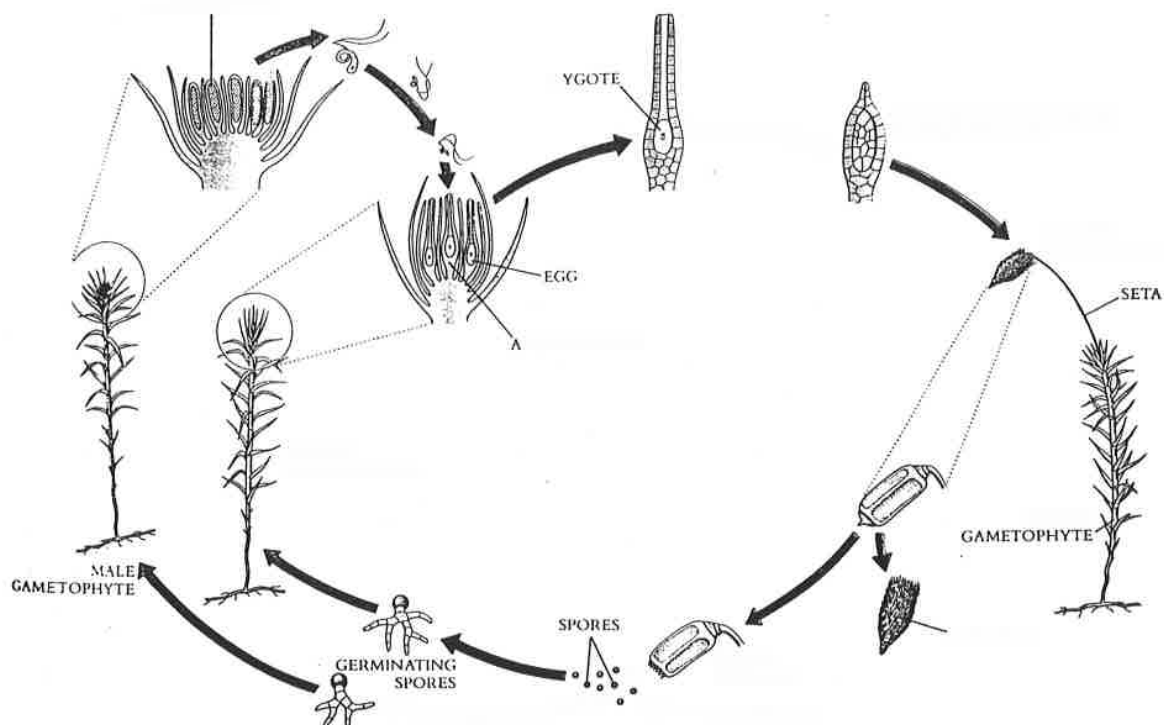
1. Have vascular tissue
2. Sporophyte is dominant
3. Include club mosses, ferns, horsetails, gymnosperms, and angiosperms.

# A GENERALIZED PLANT LIFE CYCLE



## CHARACTERISTICS OF THE MUSCI (MOSSES)

1. Gametophyte typically consists of a slender erect or prostrate stem to which small leaves are attached.
2. Sexual reproduction is by sperm produced within antheridia and eggs produced within archegonia. Antheridia and archegonia are borne at the tips of the shoots.
3. The sporophyte consists of the foot, an erect stalklike seta, and a capsule. It is partially dependent on the gametophyte.
4. Spores are produced through meiosis within the capsule and are dispersed after the lid-like operculum opens.
5. Spores germinate to produce a threadlike protonema.
6. Asexual reproduction is by fragmentation.
7. Found worldwide in moist and semi-moist locations on the ground, on rocks, and on tree trunks.
8. One genus *Sphagnum* is found in bogs and is used as a potting medium in horticulture.



# Understanding the Seed Plants

## Events leading to fertilization

1. Eggs and sperm are produced within separate structures:
  - a. Eggs are produced within ovules (immature seeds)
  - b. Sperm are produced by pollen grains
2. Ovules:
  - a. Consist (at maturity) of a female gametophyte containing one or more eggs
  - b. Surrounded by a seed coat
  - c. Often attached to the rest of the plant by a funiculus
  - d. Seed coat is interrupted by a pinhole-sized opening called a micropyle
3. Pollen
  - a. Consists of numerous microscopic pollen grains.
  - b. Forms within a hollow pollen sac
  - c. Develops from a male spore
  - d. Covered by a wall that prevents desiccation
4. Pollination
  - a. Transfer of pollen from pollen sac to a region close to the ovule
  - b. Can be accomplished by wind or animal vector.
5. Fertilization
  - a. Begins when a threadlike pollen tube grows from pollen grain through micropyle
  - b. Contains two sperm nuclei
  - c. One egg fertilizes egg producing a diploid zygote

# Understanding the Seed Plants

## Events after fertilization

### 1. Seed formation

- a. Zygote divides mitotically to produce an embryo
- b. Mature embryo consists of embryonic axis (plumule and radicle), cotyledons, nutritive material
- c. Surrounded by a seed coat

### 2. Seed dispersal

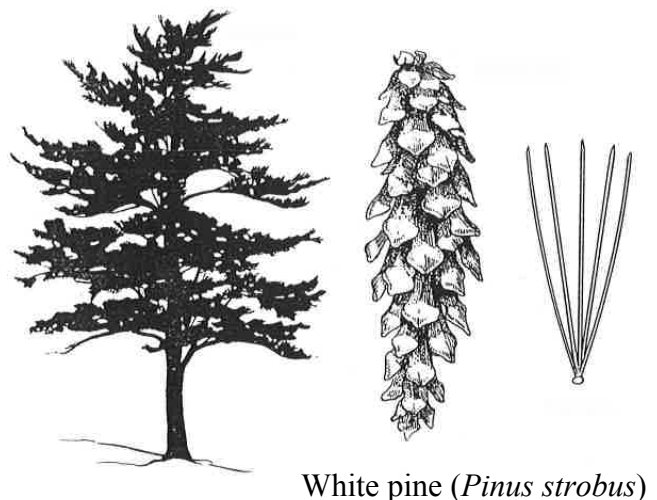
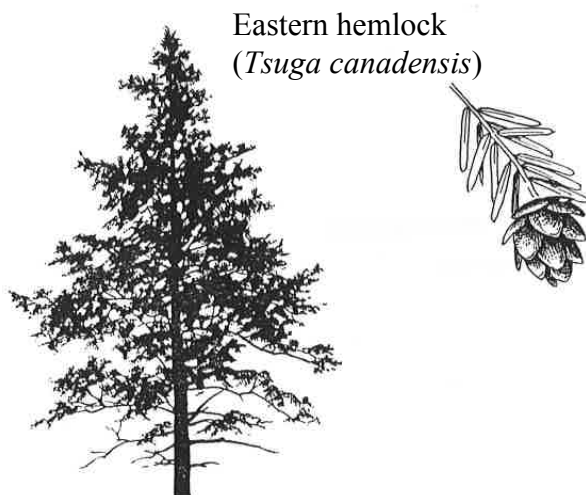
- a. Separate spatial vs temporal dispersal
- b. Spatial dispersal - move offspring to different location
  - \* - performed by animal vector or wind
  - \* - allows plants to colonize new habitats, avoid deteriorating habitats, avoid competition
- c. Temporal dispersal - offspring sit and wait
  - \* - Accomplished through dormancy
  - \* - Plants can persist through unfavorable physical or biological conditions

### 3. Germination

- a. Analogous to an egg hatching
- b. Process involves:
  - \* - seed coat breaking open
  - \* - radicle coming out, penetrating into soil and forming a root system
  - \* - plumule breaking free, forming shoot
  - \* - results in an established seedling
- c. Period of greatest mortality
- d. Microsite conditions are extremely important

## CHARACTERISTICS OF THE CONIFEROPHYTA (CONIFERS)

1. The sporophyte is woody, typically a medium to large tree.
2. Leaves are typically needlelike or scale-like, and persistent.
3. Stems and leaves often contains resin ducts. Resin is a sticky substance that inhibits pathogens (fungi and insects).
4. The life cycle involves several stages.
  - a. Ovules are produced within ovulate cones (strobili). Each ovulate cone consists of many woody, shelflike ovuliferous scales, arranged in a spiral around a central axis. Each ovuliferous scale bears two ovules.
  - b. Pollen is produced within polliniferous cones (strobili). Each polliniferous cone consists of many microsporangia clustered around a central axis.
  - c. Pollination occurs when pollen is transferred via the wind from a polliniferous cone to an ovulate cone.
  - d. Fertilization and seed formation occurs in the ovulate cone.
  - e. Each seed is dispersed by wind, and germinates to form a seedling.
5. Ecologically important as components of our forests. Particularly abundant in Canada, the Rocky Mountains, and the east coast.
6. Economically important as a source of lumber, pulp, and resin.



# 45 Pine Life Cycle

(Fig. 26.12)

