

Kingdom Plantae



A Brief Survey of Plants

The study of plants is called *botany*. Plants are believed to have evolved from green algae. The main plant (land) characteristics are as follows:

- 1. Common cellular structures:
 - all are eukaryotes
 - multicellular
 - cell wall composed of cellulose
 - chlorophyll contained in chloroplasts
 - produce starch as carbohydrate food reserve
 - central vacuole
- 2. Photosynthetic organisms: autotrophs / producers



3. Most are stationary.

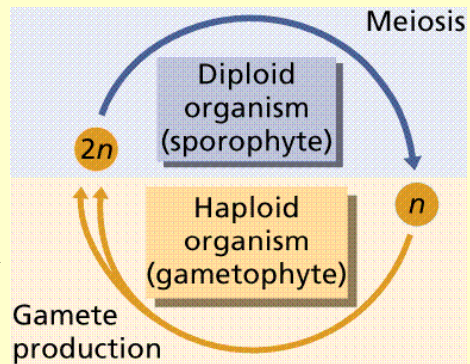
4. Reproduction occurs through a life cycle called *alternation of generations*. The cycle consists of two generations:

(a) Sporophyte generation

- reproduces asexually

(b) Gametophyte generation

- reproduces sexually



- The advantage of alternation of generations is the combined advantage of sexual and asexual reproduction.

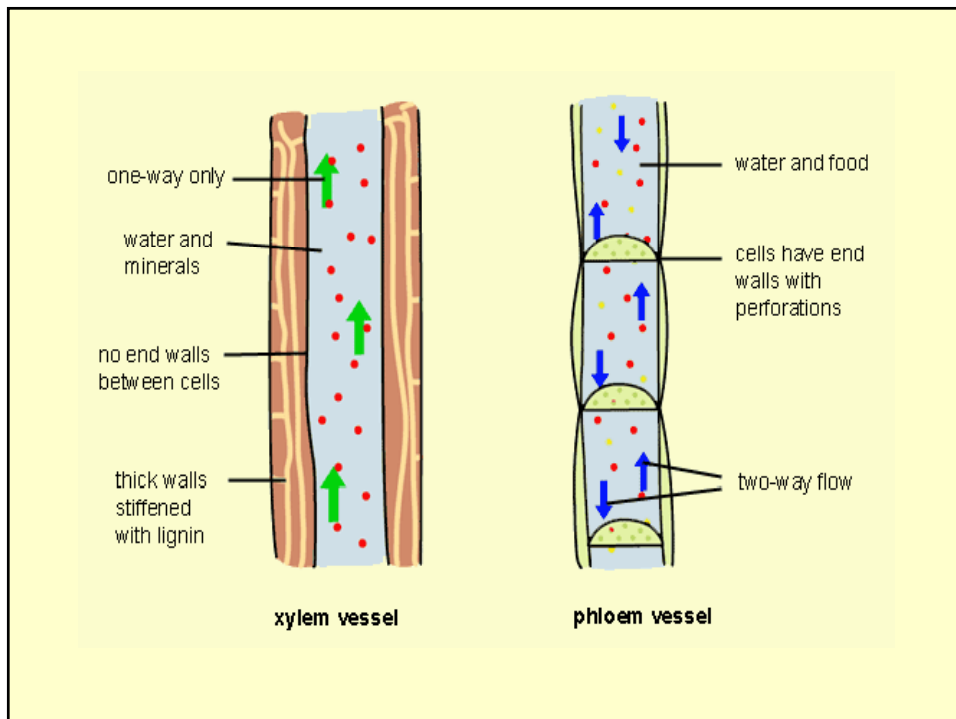
Asexual - only one parent needed

Sexual - produces much genetic variety



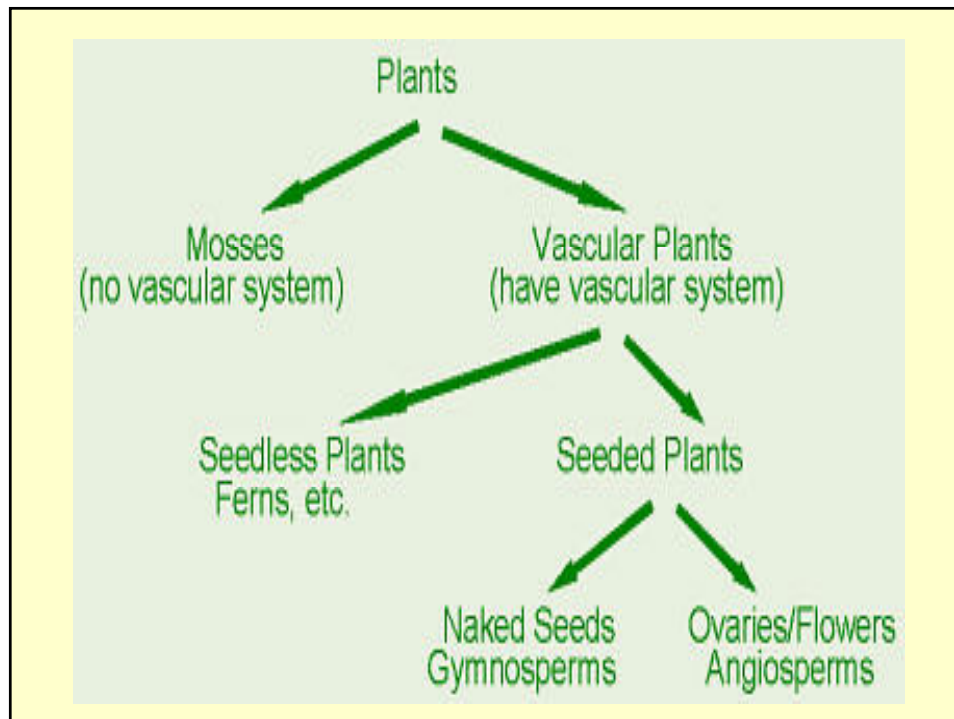
Classification of Plants

- There are two major groups of plants. They are classified according to the presence or absence of vascular tissue. Vascular tissue is a special tissue for support and for the transport of materials within the plant. There are two forms of vascular tissue:
- Xylem: This transports water and minerals up the stem of the plant into the leaves.
- Phloem: This transports glucose produced by the leaves, during photosynthesis, down the stem and into the roots.



The two groups that plants are divided into:

- 1. Bryophytes: These include mosses, liverworts, and hornworts. These plants do not possess vascular tissue. They are short plants that usually grow in areas that have a good supply of water. The gametophyte generation is dominant.
- 2. Tracheophytes: These include horsetails, ferns, gymnosperms, and flowering plants. They have well-developed vascular tissue. The sporophyte generation is dominant.

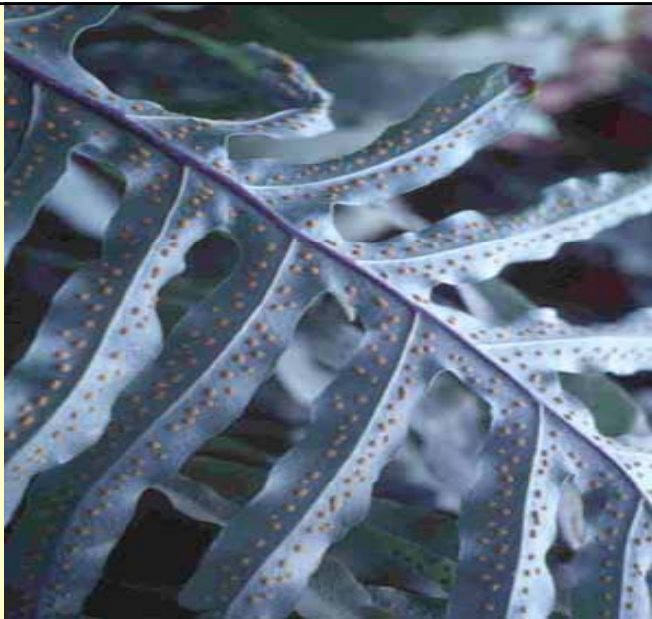




Bryophyte (moss)



Tracheophyte (fern)



Tracheophyte (fern)



Tracheophyte - Gymnosperm (fir tree)



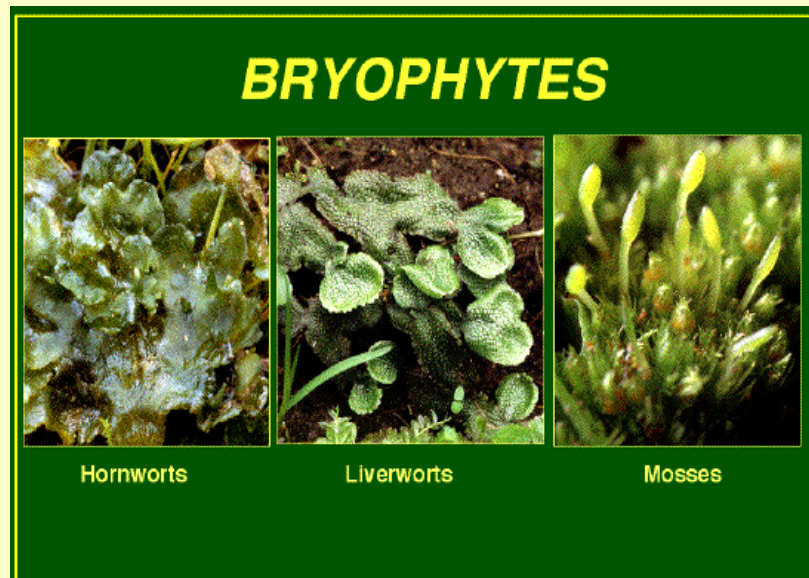
Tracheophyte - Angiosperm (fruit-bearing)



Tracheophyte - Angiosperm (flowering)

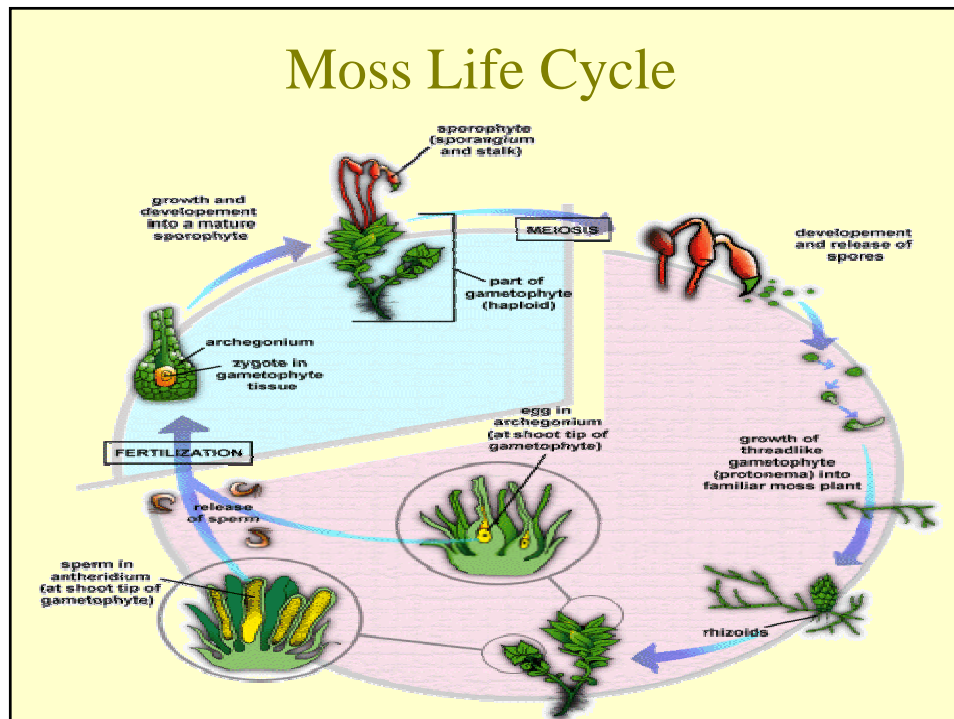
Bryophytes (Moss plants)

- (i) Lack vascular tissue. This accounts for the remaining characteristics.
- (ii) Lack true roots, stems, or leaves.
- (iii) Small in size, growing close to the ground (1-5 cm)
- (iv) Restricted to moist environments.
- (v) Transitional group between aquatic and terrestrial plants.
- (vi) Major forms include moss, liverwort, and hornwort.



Bryophyte Adaptations for Life on Land

- 1. Water Conservation - waxy waterproof covering called a cuticle or *cutin* found on leaflets
- 2. Gas Exchange - pores found on the top of the leaflets
- 3. Internal Transport - occurs by diffusion, no vascular tissue
- 4. Internal Support - none
- 5. Water Absorption - small filaments called *rhizoids*
- 6. Reproduction - dependent upon water to move sperm to the egg



Tracheophytes

- (i) Possess vascular tissue (xylem and phloem). This accounts for the remaining characteristics
- (ii) Possess true roots, stems, and leaves.
- (iii) Large in size, growing well above the ground.
- (iv) Not restricted to moist environments; well distributed over the Earth's surface. Can even exist in areas where water is scarce.
- (v) Most complex group of plants.
- (vi) Major forms include: (a) ferns
(b) gymnosperms - produce seeds in cones, 750 species dominant in cold regions and higher altitudes
(c) angiosperms - produce seeds in flowers, 250 000+ species. Most dominant plant because:

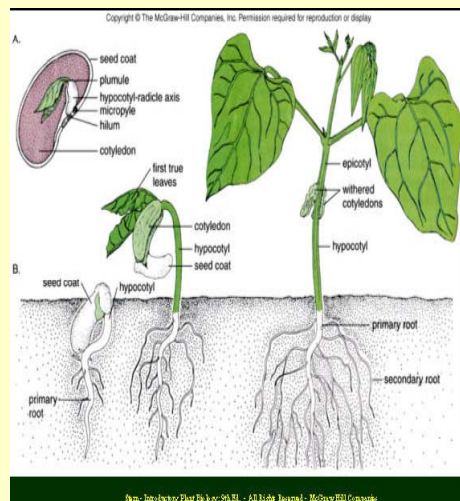
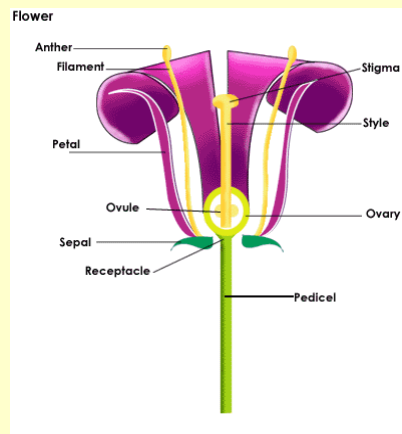
Types of Tracheophytes



Reasons for Angiosperm Success:

- (A) animals and insects help pollinate them:
 - (i) presence of brightly colored flowers attracts insects. That is the purpose of the coloration.
 - (ii) presence of nectar to attract insects that aid in pollination.
- (B) seed coat (fruit) protects and nourishes the embryo
- (C) seed dispersal also aided by wind
- (D) fruit covering the seed aids in dispersal. Animals will eat the fruit and drop the seeds, or the seeds will pass through their digestive systems.

Flower & Seed Structure



There are two forms of angiosperms:

- A. Monocots
- B. Dicots
- A *cotyledon* is a seed leaf and is important in seed germination. It is a modified leaf of a seed plant embryo and can help provide nourishment for the developing embryo. It is one of the first leaves to appear during germination.
- A monocot has one cotyledon and a dicot has two.
- Examples: monocots - grasses, corn, tulips, and palms. Dicots - roses, maples, oaks, peanuts, potatoes, etc.
- Most angiosperms are dicots.

Trachoeophyte Adaptations for Life on Land

- 1. Water Conservation - cuticle or *cutin* present on leaves.
- 2. Gas Exchange - pores called stomata found on the bottom of leaves.
- 3. Internal Transport - contains vascular tissue
- 4. Internal Support - vascular tissue
- 5. Water Absorption - system of roots is present
- 6. Reproduction - water is not required for movement of sperm to egg except in the case of ferns. In gymnosperms and angiosperms, sperm is contained inside a pollen grain that is moved by wind and insects.

Gas Exchange

- Stomata are better for gas exchange for the following reasons:
- (1) No holes in the waterproof covering.
- (2) In the shaded area of the leaf (less water loss).
- (3) They won't become clogged by dust and other materials.

