

# Kingdom Plantae

## III. THE PLANT KINGDOM - The Diversity of Plants

- plants are living organisms that grow almost everywhere on the planet
- organisms in the plant kingdom are all multicellular, eukaryotic, and autotrophic
- without plants, life on earth would not exist
- there are over 250, 000 different types of plants on earth

Plants are different from other living organisms because:

1. Do not move around
2. Made up of a substance called **cellulose** (a complex carbohydrate of the cell walls of plants). This allows plants to be very rigid (*think of eating a piece of celery*).
3. Plants are able to make their own food (autotrophs) using sunlight, water, and air (photosynthesis). Plants can do photosynthesis since their tissues contain chlorophyll.

The terrestrial (land) members of the plant kingdom are generally organized or divided into two broad groups, the vascular plants and the non-vascular plants. The vascular plants have vascular, or conducting, tissue and are grouped together as the *tracheophytes*. As their name implies, the non-vascular plants, or the *bryophytes*, do not contain specialized conducting (vascular) tissue.

## A. TAXONOMY

The plant kingdom is split into two divisions - the bryophytes and the tracheophytes.

### THE BRYOPHYTES (AKA NON-VASCULAR PLANTS):

- **Example** - mosses
- these plants do not have **vascular tissue** (tubes that carry food and water throughout the entire plant - like veins)
- they do not grow to a very large size (less than one meter) because they cannot transport materials inside their bodies
- instead of roots, they have structures called **rhizoids** connecting their stalks to the ground
- they reproduce by using structures called **spores**

## A. Non-vascular Plants:

i) Do not have true roots, stems and leaves.

These plants have organs that appear similar to true roots, stems and leaves but they are not true organs. Because of the lack of roots and stems these plants cannot reach water under the soil and actively take it up. They absorb water directly through their cell walls and the water moves from cell to cell via osmosis.

ii) No vascular tissue.

Vascular tissue consists of special cells for the transport of water and nutrients. The root-like, stem-like and leaf-like organs that appear on these plants are not considered true because they do not contain vascular tissue. Lack of vascular tissue limits the size of the plant because it cannot transport water and food very far against gravity.

iii) Small size.

The characteristics described above limit the size of the plant.

iv) Depend on water for reproduction.

This is a limitation because they cannot survive in dry areas. External water is needed for the sperm to swim to the egg

Examples: Mosses, Liverworts, Hornworts



[http://en.wikipedia.org/wiki/Non-vascular\\_plant](http://en.wikipedia.org/wiki/Non-vascular_plant)



<http://www.cartage.org.lb/en/themes/sciences/botanicalsciences/classificationplants/cryptogamia/bryophyta/nonvascular/nonvascular.htm>





## B. The Vascular Plants:

i) Have structures called true roots, stems and leaves.

ii) Vascular tissue is present.

These special transport cells run continuously through the roots, stems and the leaves.

iii) Larger in size.

iv) Cuticle is present to reduce water evaporation from leaves.

Examples: Ferns, conifers, flowering plants

### THE TRACHEOPHYTES (AKA VASCULAR PLANTS):

- **Examples** - flowers, trees, grasses, ferns
- these are plants with **vascular tissues** that run through their roots, stems, and leaves. The vascular system transports nutrients, water, and minerals.
- the vascular system lends support to the plant  $\therefore$  they can grow very tall
- most plants belong to the tracheophytes

The tracheophytes are split into three subdivisions - the angiosperms, the gymnosperms, and the spore bearing plants.

1. **ANGIOSPERMS** (**Example** - flowers, grasses, some trees)

- these are the plants that use flowers to reproduce
- the colorful **petals** of flowers are an adaptation to attract insects
- the petals are backed by **sepals** which protect the flower when it is in its bud stage
- the center of the flower contains the male and female parts of the plant: the **stamens (male)** & the **pistil (female)**
- the stamens contain **pollen grains** which, once they are in the pistil, will form a seed
- the **seed** contains the embryo of the new plant
- pollination of the pistil may occur in a variety of ways (wind, insects, animals)
- plants are adapted for pollination:

- **Example** - insect pollinated plants have bright flowers
- - wind pollinated plants have long strings of pollen

- once the plant has been pollinated, the seeds must be dispersed (scattered). Plants have many adaptations to do this:

**Example** - fruit - animals eat the fruit and do not digest the seeds. The seeds are excreted away from the parent plant.

burrs - catch on passing animals and drop off later

wind - blows lighter seeds away from the plant (dandelions)

- the angiosperms are further split into two groups:
  - a) **monocots** - have veins in their leaves that are parallel to each other. They also contain a one-leafed embryo in the seed. Examples - grasses and grains
  - b) **dicots** - have veins in their leaves that are netted. They contain a two-leafed embryo in the seed. Examples - deciduous trees

## 2. GYMNOSPERMS (Example - pine, spruce)

- these are plants that produce seeds but do not have flowers (coniferous trees). The seeds are “naked”.
- in the spring, male cones on the top of the tree produce pollen which is carried by the wind to the female cones
- the seeds form under the scales of the cones
- gymnosperms are also adapted to disperse their seeds:

**Example** - jackpine cones are sealed shut with a glue that only opens at high temperatures. This means that the seeds are released immediately after a forest fire.

## 3. SPORE BEARING PLANTS (Example - ferns)

- these plants use **spores** instead of seeds when they reproduce
- spores are similar to seeds, except that spores do not contain as much food for the embryo as seeds do ( $\therefore$  they take less energy to produce than seeds, so a plant can make many more spores)
- seed bearing plants won't produce as many seeds, but the seeds have a better chance of survival because they have more stored food

*“What kind of plant has the best vision?”    A potato b/c it has so many eyes.*