

## Chapter 20.2 & 20.3 - Classification of Plants



### Nonvascular Plants

#### I. What is a nonvascular plant?

- **Nonvascular** plants are not as common as *vascular* plants because they require a close association with *water*.

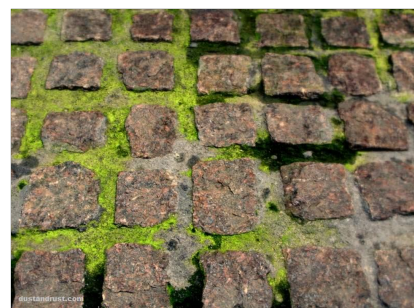
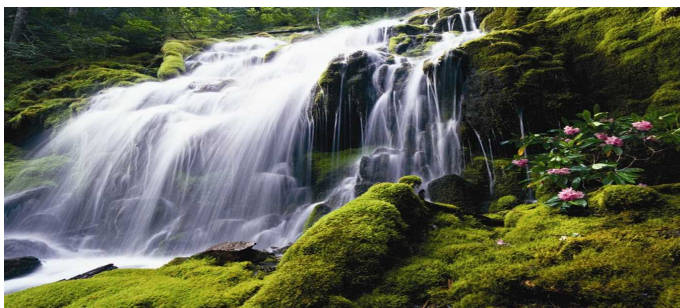
-This *limits* them to moist habitats.

## II. Adaptations in Bryophyta (mosses)

1. *Bryophytes* are the most familiar of the nonvascular plant divisions.
2. Are small plants with *leafy* stems.



3. Have *rhizoids* - colorless multicellular structures, which help *anchor* the stem to the soil.
4. Do not contain true *vascular* tissue they do have water-conducting cells in their *stems*.
5. A well-known moss is *Sphagnum*, also called *peat moss*, used for *fuel*, soil additive and by *florists*.



### III. Origins of Nonvascular Plants

1. Fossils and *genetic* evidence suggests that liverworts were the first *land* plants.
2. Both **nonvascular** and **vascular** plants probably share a common *ancestor* that had alternation of generations, *cellulose* in their cell walls, and *chlorophyll* for photosynthesis.

### Non-Seed Vascular Plants

#### I. What is a non-seed vascular plant?

- The obvious difference between a **vascular** and **nonvascular** plant is the presence of **vascular tissue**.

### II. Adaptations in Pterophyta

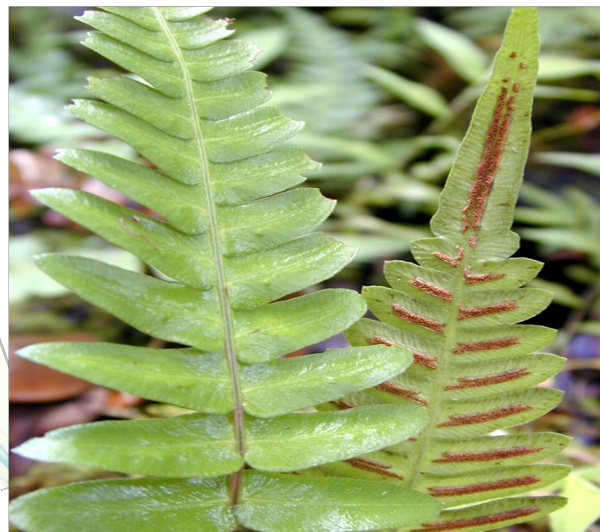
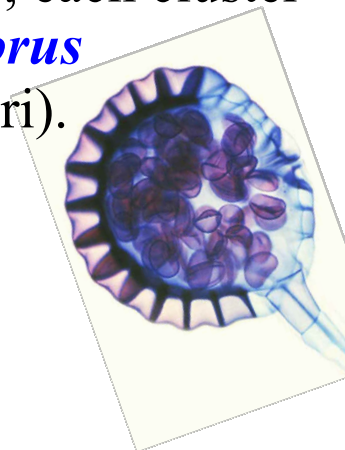
- *Ferns* are pterophytes.
- According to the fossil records, ferns appeared nearly **375** million years ago during a time when *club mosses* and horsetails were the main members of the Earth's *plant* population.
- Ferns range in *size*.
- Today there is about **12,000** species of living ferns.

## Fern Structure

1. As with most vascular plants, the sporophyte generation of ferns has *roots, stems, and leaves*.
2. When you see a plant you know as fern, you are seeing the *sporophyte* generation.
3. The thick underground stem is called a *rhizome*.
4. *Leaves* of the fern are called **fronds**.



5. Fronds grow *upward* from the *rhizome*.
6. Ferns are the first of the *vascular* plants to have evolved leaves with branching *veins*.
7. On the underside of the frond are tiny clusters of spore-producing *sporangia*, each cluster forms a *sorus* (plural, sori).



8. *New fern fronds are called fiddleheads*, because they are shaped like a violin neck.



### III. Origins of Non-Seed Vascular Plants

1. The earliest evidence of non-seed vascular plants comes from around **375** million years ago.
2. The evolution of vascular **tissue** helped these plants to live on **land** and to have larger body sizes in comparison to the **nonvascular** plants.
3. **Non-seed** vascular plants are closely related to nonvascular plants.

## Seed Plants

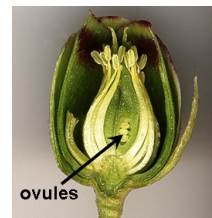
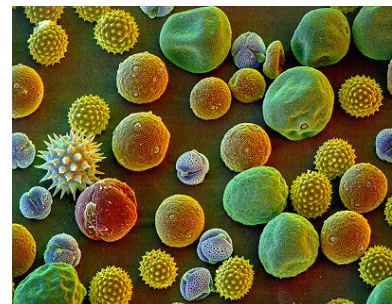
### I. What is a seed plant?

- A **seed** plant is a vascular plant that produces seeds.
- The seed is actually a small **sporophyte plant** inside a protective **coat**.
- The seed may be surrounded by **fruit** or carried on the scales of a **cone**.



### A. Seed plants produce spores

1. In seed plants the **sporophyte** generation is dominant.
2. The **male** gametophyte is inside a structure called a **pollen** grain.
3. The **female** gametophyte, which produces the egg cell, is inside a sporophyte structure called an **ovule**.
4. The ovule forms the **seed** after fertilization.



## B. Fertilization and reproduction

1. The union of the *sperm* and *egg* is called fertilization, which forms the *sporophyte zygote*.
2. The zygote develops into an *embryo*, an early stage of *development* in an organism.
3. An embryo is the young *diploid* sporophyte of a plant.
4. Embryos of seed plants include one or more *cotyledons*, which store or absorb *food*.

## C. Advantages of seeds

1. The seed contains *food* for the young plant until the *leaves* develop enough to carry out photosynthesis.
2. The seed protects the *embryo*.
3. Some seeds have adaptations that help them to move away from the *parent*.

## D. Diversity of seed plants

1. Seed plants are divided into two groups:
  - a. *Gymnosperms* (“*naked seed*”) - seeds are not protected by fruit.
  - b. *Angiosperms* - seeds protected by *fruit*.
2. A fruit includes the ripened *ovary* of a flower, which provides *protection* for the seeds and helps in seed dispersal.

## E. Evergreen conifers

- Most conifers keep their *leaves* for more than one year. They never lose *all* of their leaves at one time. This is why they are sometimes called *evergreens*.





## F. Deciduous trees lose their leaves

1. Deciduous plants **drop** all their leaves each fall or when **water** is scarce.
2. Plants lose most of their water through their **leaves**, and little through the **bark** and **roots**.
3. It is an advantage to drop leaves in times of scarce water, however, without leaves the plant cannot **photosynthesize** and must stay **dormant**.



## II. Adaptations in Anthophyta - flowering plants

- All **flowering** plants are in the division Anthophyta.
- They have **roots, stems,** and **leaves**.
- A **fruit** develops from the **female** reproductive structure in a flower.

### A. Monocots and dicots

1. **Flowering** plants are divided into classes and are named for the number of **cotyledons** (seed leaves) contained in the seeds.
  - a. Monocotyledons (**Monocots**)
  - b. Dicotyledons (**Dicots**)

2. There is a simple way to tell the difference between monocots and dicots (**other than the number of cotyledons**).

The **arrangement** of their *veins* in their leaves; the **arrangement** of their *vascular bundle* (veins) in their stems **& roots**; and their **flower part multiples**.

**See Figure 3.3 on pg. 606**

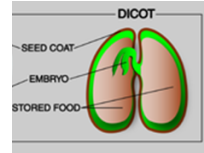
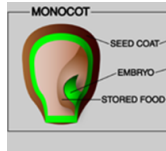
### **B. Life spans of flowering plants**

1. The life span of a plant is *genetically* determined.
2. **Annual** plants live for only *one* year or less; are generally herbaceous; many are food plants.  
Ex: *corn, peas, beans*
3. **Biennial** plants have a *two*-year life span; develop strong root system.  
Ex: *Carrots, beets, turnips*
4. **Perennials** live for *several* years; generally woody or have underground storage organs; have long life spans.  
Ex: *trees, strawberries*

# Monocots

# Dicots

Number of seed leaves (cotyledons):



Flower parts are in multiples of:

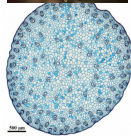


3



4 or 5

Location of vascular bundles (xylem & phloem) in stem:



scattered

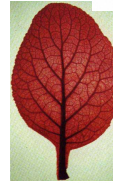


ring at edge

Location of vascular bundles (xylem & phloem) in leaves:

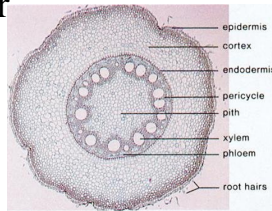


parallel



netted or branched

Location of vascular bundles (xylem & phloem) in roots:



alternating in center



phloem alternating around xylem in "x" formation

