III. Kingdom Plantae

All plants are multicellular, eukaryotic, and photosynthetic (i.e., autotrophs). Note also that plant biologists use the term *division* instead of phylum; however, the two terms are essentially synonymous. Plants are grouped into two general categories based on how they transport water, the *nonvascular plants* and the *vascular plants*. Vascular plants are further subdivided into *seedless plants* and *seed plants*. Seed plants are further divided into nonflowering plants (*gymnosperms*) and flowering plants (*angiosperms*).

A) **Division Byrophyta (Nonvascular Plants)**

This group lacks the vascular tissue found in most plants, called *xylem* and *phloem*. (Xylem and phloem will be further discussed in the next chapter.) Therefore they must live in damp areas where water is abundant. Furthermore, they require water for fertilization. These plants do NOT have true stems, leaves, and roots. Examples are mosses, liverworts, and hornworts.

B) **Division Pterophyta (Ferns)**

Ferns are some of the earliest vascular plants, and contain the vascular tissue xylem and phloem, as well as true stems, leaves, and roots. They do NOT, however, have seeds. Instead, ferns have *spores*, which can be scattered by wind.

C) **Division Coniferophyta (Conifers)**

These are true vascular plants. The term *conifer* refers to the cones that carry the seeds of these plants. Most are large, evergreen trees, such as pines, firs, cedars, etc. Because the seeds are not protected in a seed coat, these are "naked-seed" plants, or *gymnosperms*. Gymnosperms do NOT produce flowers.

D) **Division Anthophyta (Flowering Plants)**

This group consists of true vascular plants that produce flowers and pollen. Their seeds are protected by fruits and nuts. Examples are apples, lima beans, tomatoes, melons, etc.

1) **Class Monocots:**
Monocots are named for their single seed leaves (*mono* = one) called a *cotyledon*. Other characteristics of monocots include parallel veins in their leaves, flower parts in multiples of threes, a complex arrangement of vascular tissue in their stems, and a fibrous root system.

2) **Class Dicots:**
Dicots have two seed leaves (two cotyledons), netlike veins in their leaves, flower parts in multiples of four or five, vascular tissue arranged in a ring, and a taproot system.

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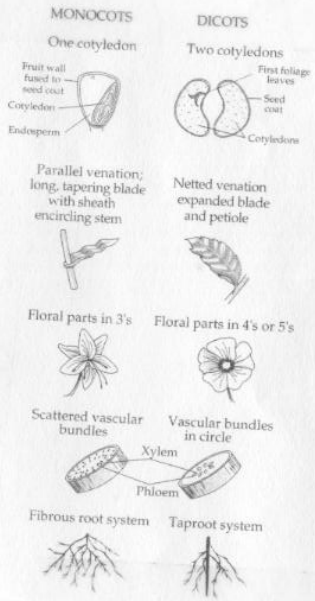
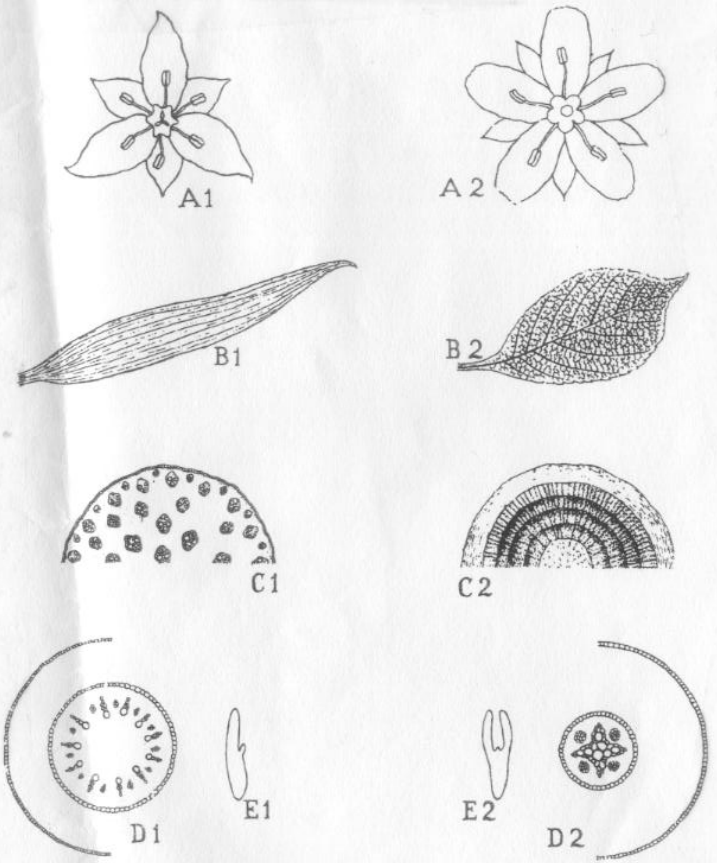


Comparison of Monocots and Dicots
Figure 1



A1. Flower parts usually in threes or sixes
A2. Flower parts usually in fours or fives
B1. Leaves usually parallel veined
B2. Leaves usually net veined
C1. Stems endogenous, bundles separate and irregular in arrangement
C2. Stems exogenous, with central pith and outer cortex separated by bundles which form a hollow tube; annual rings in woody stems
D1. Roots have several to many xylem element
D2. Roots usually have three, four, or five xylem elements
E1. One cotyledon, or seed leaf
E2. Two cotyledons, or seed leaves

Flowers and Reproduction

Flowering plants are called angiospe
about how they reproduce. Here's a

Stamen { Anther
Filament
Sepal
Receptac

The **stamen**: The stame
anther and the *filament*.
pollen. Pollen is made fr
grains contain a cell tha

The **pistil**: The pistil is
stigma, *style*, *ovule*, and
cells called *megaspores*. N
bodies.

Here's how a flowering plant re

1. Some pollen grains fall
ways this can happen; t
by insects, etc. Once on
2. During germination, a t
style to connect to the o
3. The two sperm (from th
ovary and the ovule, wh
fertilizes the egg, and th
4. The fertilized egg become
endosperm. Endosperm is
5. The entire ovule, which
into a *seed*; and the ovar
and helps it disperse by
6. The seed is released (th
finds a suitable environ

Here's a summary:

egg

polar bodi

the entire ovule