6 ANGIOSPERMS - THE TULIP FLOWER (1/4x)

The **angiosperms** (AN-jee-oh-spurmz) ("little case seeds"), or flowering plants, represent half of all plant species. The name for this group is due to the presence of the fruit, a nutritive and protective structure surrounding the seeds. Surprisingly, tomatoes, pumpkins and green peppers are really fruit.

Although alternation of generations exists in the angiosperms, the gametophyte stage is hidden inside the flower. Male sex cells, called pollen, are formed within anthers (A) supported on stamens. The female gametes develop as embryo sacs inside the central pistil (P).

7 ANGIOSPERM REPRODUCTION & FERTILIZATION - Left - PISTIL l.s. (5x) / Right - DOUBLE FERTILIZATION (420x)

Reproduction in angiosperms occurs when pollen from the stamen of the male flower lands on the stigma (ST), the sticky top of the pistil. Each pollen grain then forms a tube down the length of the pistil, called the style (SY), reaching toward the ovary (O). The pollen nucleus joins with the egg nucleus and the nuclei of the cells in the sac (E) surrounding the egg. As a result of fertilization, the embryo and the tissue designed to support the embryo both develop at the same time.

8 ANGIOSPERMS - MONOCOTS & DICOTS - Left - MONOCOT SEED (20x) / Right - DICOT SEED (40x)

The flowering plants are divided between the monocots ("one seed leaves") and dicots ("two seed leaves"). **Cotyledons** (KOH-tuh-LEE-duhnz) are the leave first produced by the embryo. Other differences between monocots and dicots include: the arrangement of the veins in the roots, stems and leaves, the number of flower parts, and the nature of stem growth. Approximately 1/4 of all flowering plants are monocots including corn, grasses, and orchids. The remaining flowering plants, such as clover, tomatoes, and oaks are dicots. *What kind of plant, monocot or dicot, is shown in slide number two? Hint: the lower leaves formed from the seed.*

On the left is a cross section of a monocot seed and on the right is a dicot seed. In both cases, the embryo is contained within the protective seed coats (S). The tissue, which will become the root (R), faces down. Notice that the monocot has one seed leaf, or cotyledon (C), and the dicot has two.

THE PLANT KINGDOM
A CELLULAR VIEW

INTRODUCTION

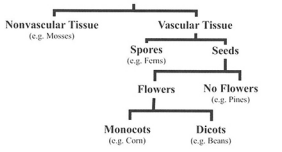
Plants have long been classified in a kingdom of their own. In the past, mold, mildew, mushrooms and even bacteria were classified within the plant kingdom; however, new techniques have allowed biologists to place those organisms into different kingdoms.

The half-million species in the plant kingdom are all multi-cellular and have cells with cell walls. The majority also have chlorophyll contained within oval chloroplasts permitting photosynthesis. In addition, most plants begin their development as embryos formed as a result of sexual reproduction. After fertilization, plants produce either tiny spores or larger seeds consisting of an embryo supplied with stored food (enclosed within a hard coat).

All plants show alternation of generations during which plants shift between a stage in which the cells have the adult chromosome numbers, and a sexual stage producing gametes which have half the adult chromosome numbers. Alternation of generations is most easily seen in primitive plants such as mosses and ferns.

The twelve plant divisions (equivalent to phyla) are based on the presence or absence of vein-like tissues or tubes, the nature of reproductive structures, the presence or absence of flowers and the arrangement of the flower parts. As you examine the images in this set it will be helpful to review the outline of plant classification provided below. Two divisions, the green algae divisions of Chlorophyta and Charophyta, are not included in this lesson.

The magnification given, for example, Slide 1 (110x), means that the microscope was set at that power when the photograph was taken.



1 GENERALIZED PLANT CELLS - Left/ONION (110x) & Right/ELODEA (150x)

This slide shows cells from two kinds of plants. On the left is a section of onion skin and on the right is a view of the aquatic plant Elodea. The brown skin of the onion lacks the green pigment chlorophyll present in the Elodea leaf seen on the right. *Why do you think the onion cells have no chlorophyll?* In both cells, the nucleus (N) containing the genetic code on chromosomes is visible. Surrounding the

By William F. McComas, Ph.D.